

ANNUAL REPORT

ON THE

CULTURAL, DAIRYING AND BREEDING OPERATIONS

CONDUCTED ON

EXPERIMENTAL FARMS AND
GARDENS

IN THE

BOMBAY PRESIDENCY,

During the year ending 31st March 1902.



Bombay:

PRINTED AT THE GOVERNMENT CENTRAL PRESS.

1902.

[Indian Price—7 Annas.]

[English Price—8 Pence.]

OFFICIAL AGENTS FOR THE SALE OF INDIAN
OFFICIAL PUBLICATIONS.

In England.

E. A. Arnold, 37, Bedford Street, Strand, W.C., London.
Constable & Co., 2, Whitehall Gardens, S.W., London.
Sampson, Low, Marston & Co., St. Dunstan's House, Fetter Lane, E.C.,
London.
P. S. King & Son, 9, Bridge Street, Westminster, S.W., London.
Luzac & Co., 46, Great Russell Street, W.C., London.
Kegan Paul, Trench, Trübner & Co., Charing Cross Road,
W.C., London.
B. Quaritch, 15, Piccadilly, W., London.
Williams and Norgate, Oxford.
Deighton Bell & Co., Cambridge.

On the Continent.

Friedlander & Sohn, 11, Carlstrasse, Berlin.
Otto Harrassowitz, Leipzig.
Karl W. Hiersemann, Leipzig.
Ernest Leroux, 28, Rue Bonaparte, Paris.
Martinus Nijhoff, The Hague.

In India.

Higginbotham & Co., and **V. Kalyanarama Iyer & Co.**, Madras.
Thacker, Spink & Co., and **W. Neyman & Co.**, Calcutta.
Thacker & Co. (Ld.), **A. J. Combridge & Co.**, **Mr. Seymour Hale**,
and **Curator, Government Central Book Depot**, Bombay.
D. B. Taraporevala (Ld.), **Sons & Co.**, Bombay.

ANNUAL REPORT

ON THE

CULTURAL, DAIRYING AND BREEDING OPERATIONS

CONDUCTED ON

EXPERIMENTAL FARMS AND
GARDENS

IN THE

BOMBAY PRESIDENCY,

During the year ending 31st March 1902.



Bombay:
PRINTED AT THE GOVERNMENT CENTRAL PRESS.

1902.

CONTENTS.

	PAGES
Poona Farm account ... ..	... 1—19
Surat Farm account ... ..	... 20—22
Northcote Gowshála account ... ..	... 23
Nadiad Farm account ... ..	... 24—32
Empress and Bund Gardens account ... ..	... 33—35

No. 772 OF 1902.

FROM

P. R. MEHTA, Esq., M.R.A.C.,
Acting Deputy Director of Agriculture,
Bombay Presidency ;

TO

H. S. LAWRENCE, Esq., I. C. S.,
Acting Director of Land Records and
Agriculture, Bombay Presidency.

Poona, 14th August 1902.

SIR,

I have the honour to submit the accompanying account on the working of the Government Experimental Farms at Poona and Surat and of the Northcote Gowshála at Chhárodi (Ahmedabad).

I have the honour to be,

Sir,

Your most obedient Servant,

P. R. MEHTA,
Acting Deputy Director of Agriculture.

ANNUAL REPORT ON EXPERIMENTAL FARMS AND GARDENS IN THE BOMBAY PRESIDENCY.

POONA FARM.

Season.

The season was favourable for kharif crops. The ante-monsoon-showers commenced about the end of April which greatly helped the preparation of the fields. The regular monsoon broke on the 8th of June. The sowing of field crops was completed by the middle of the month. There was little rain after the first burst but timely fall of $1\frac{1}{2}$ inches on the 25th of June saved the young crops. In the second week of July there was a heavy downpour which favoured the transplantation of rice in the district. The crops made excellent progress until the middle of August when the want of rain was felt and Bájri growing on shallow soils had to be irrigated from the canal. There was another heavy downpour in the middle of September which laid Jowári and Bájri crops causing considerable damage. The rabi rains were scarce and the crops had to be assisted by irrigation. During the year fodder was plentiful as both Kadbi and grass yielded a good harvest.

2. The following statement compares the rainfall of the year under report with the average of the preceding ten years :—

Month.		1900.		1901.		Average of ten years (1891-1900).
		Number of rainy days.	Rainfall in inches.	Number of rainy days.	Rainfall in inches.	
May	1st fortnight	...	0.00	3	2.46	1.17
Do.	2nd do.	...	0.00	2	0.87	
June	1st do.	3	1.52	5	2.39	5.73
Do.	2nd do.	1	0.25	3	1.63	
July	1st do.	6	7.49	7	4.60	8.44
Do.	2nd do.	7	4.62	7	3.72	
August	1st do.	14	10.96	11	5.36	4.51
Do.	2nd do.	2	0.64	2	0.77	
September	1st do.	...	0.22	1	0.38	4.22
Do.	2nd do.	7	2.28	6	3.35	
October	1st do.	...	0.00	...	0.00	5.22
Do.	2nd do.	2	1.95	4	2.78	
November	1st do.	...	0.00	...	0.00	0.47
Do.	2nd do.	...	0.00	...	0.00	
December	1st do.	...	0.00	...	0.00	0.02
Do.	2nd do.	...	0.00	...	0.00	
Total		42	29.93	51	28.31	29.78

3. The following statement shows the area under cultivation :—

No.	Crop.	Area.		No.	Crop.	Area.	
		A.	g.			A.	g.
1	Bájri (six varieties) and Tur	4	28	10	Various fodders	10	24
2	Cotton	0	30	11	Gram	2	0
3	Varieties of Jowári	2	28	12	Linseed	1	4
4	Tobacco	0	12	13	Wheat	1	18
5	Maize	4	22	14	Soy bean	0	27
6	Rhea	0	13	15	Turmeric and Yams	0	8
7	Guinea grass	9	15	16	Surans	0	5
8	Lucerne	0	12	17	Groundnuts	2	35
9	Water grass	0	4	18	Shálu	0	32
						42	37

N.B.—Out of the above area 4 acres 18 gunthas were twice cropped.

Object Lessons.

4. Besides the above there were the usual series of small plots growing the ordinary crops of the Presidency to serve as an object lesson to the Agricultural students.

Experiments with Fodder Crops.

5. *Australian Salt Bush*.—A small plot was sown with the seeds of this plant obtained from the crop of the previous year. The plants grew to a height of about $1\frac{1}{2}$ feet. The leaf growth was scanty and could not afford grazing even of poor quality. Although it is said to thrive on poor soil in Australia it does not suit our climate.

6. *Paspalum dilatatum*.—This Australian grass was also a failure again this year. The seeds preserved from the previous year's crop as well as a small quantity received through the Director of Land Records and Agriculture were sown side by side. The germination was fair; the plant tillers in an extraordinary degree forming large sized clumps. The leaf growth however remains stunted, hardly growing to a height of six inches. In fact the plant spreads along the ground instead of attaining any height, a characteristic which has been noted before in the case of another imported plant, namely Rye.

7. The plant has the reputation of being drought-resistant in Australia, but it shows nothing of this characteristic in the Deccan. In fact throughout the cold and hot season it had to be kept alive with irrigation. Without irrigation the plants would have died. Many plants died before irrigation was given.

8. The heavy mortality of cattle in Gujarát and elsewhere during the famine of 1900 has led some persons to recommend the extensive cultivation of drought-resisting grasses and herbaceous plants which are known to furnish fair grazing in other countries in years of scanty rainfall. *Paspalum dilatatum* as well as a number of Australian salt and sheep bushes were strongly recommended. I have referred to the failure of some of these plants in the Deccan and I understand that equally unsuccessful trials have been made in various parts of India. It should be noted that in the Deccan we have to deal with poor thin upland grazing tracts which are closely grazed by a large number of cattle, sheep and goats. Whereas in Australia there are I believe ordinarily 8 acres to a sheep, in the Deccan we have often more than 8 cattle to the acre. Even if exotic salt bushes were established at an outlay which would be considerable, they would disappear in the course of a single season by such close grazing. So far as Gujarát is concerned the unoccupied culturable waste already grows a fair crop of good grass in ordinary years.

9. As a matter of fact the main fodder-supply of the Presidency is produced in the arable area and given good soil, manure and irrigation from a well or other source, it is impossible to introduce from any other country crops which yield so well as the numerous sorghums indigenous to the country. The fodder produced is also of rich and excellent quality, even on the thin inferior soil. It is extremely doubtful if we can bring into the country any crop which will produce with moderate rainfall better fodder and in larger quantity than that yielded by the crops ordinarily grown. These fail of course when there is no rain, but our experience is that the exotics suffer the same fate.

10. *Jowári varieties (Sorghum vulgare)*.—Seeds from the selected heads of 56 Jowári varieties were sown in rows of four with two of Tur intervening between each variety. The collection of the Jowáris has been extended this season by obtaining all the varieties grown in the Presidency. In future this experiment will be carried out at Mánjri. Careful notes will be compiled and the varieties useful as fodder and as grain will be noted. They will be also tested as to whether they undergo change in colour, size, &c., of the grain or remain constant to the original type when cultivated in a locality different from the one to which they are accustomed. On account of the heavy rainfall of the 18th of September the crop which was growing luxuriantly was laid and considerably damaged.

The following statement shows the result per acre of the cultivation of six varieties of Jowari grown for fodder during the year under report :—

Name.				Outturn per acre dry weight.	Cost of cultivation.	Value of outturn.	Rate per rupee.
				Lbs.	Rs.	Rs.	Lbs.
Sundhia	...	...	...	4,910	46	38	130
Nilwa...	...	...	...	6,946	46	46	150
Imphee	...	...	...	8,552	46	57	150
Sorghum Amber	...	...	...	6,859	46	46	150
Sorghum Collier	...	...	...	6,918	46	46	150
Utávali	...	...	...	10,623	46	76	140

11. Another field was sown with the same varieties, but with a subordinate crop of Tur. The results per acre are shown below :—

Name.				Outturn per acre dry weight.	Cost of cultivation.	Value of outturn.	Rate per rupee.
				Lbs.	Rs.	Rs.	Lbs.
Sundhia	...	...	..	3,715	29	29	130
Nilwa...	...	...	...	9,720	29	65	150
Imphee	...	...	...	10,059	29	67	150
Sorghum Collier	...	...	...	10,725	29	71	150
Sorghum Amber	...	...	...	6,440	29	43	150
Utávali	...	...	...	8,200	29	59	140

Besides the above the yield of Tur was 482 lbs. from 4 acres under the mixed crop. The Tur yield was much below the average.

12. *Mauritius Water-grass*.—As has been reported in previous years, this grass occupies and thrives in places which remain constantly wet through leakage from irrigation channels and which therefore cannot be brought under cultivation. As will be observed from the statement given below the outturn of the year under report was larger than that of any of the previous years. Other indigenous grasses have crept in the plots and have contributed to the increase in the outturn.

The outturn results of the last six years are as under :—

Year.		Outturn of green fodder per acre.	Year.		Outturn of green fodder per acre.
		Lbs.			Lbs.
1896	...	27,690	1899	...	24,528
1897	...	26,807	1900	...	16,900
1898	...	26,377	1901	...	30,700

13. *Guinea Grass (Panicum jumentorum)*.—There were in all 9 acres 15 gunthas under Guinea grass. It serves the useful purpose of supplying green fodder to the dairy cattle in the hot weather months. This year the hot weather cuttings were poor and consequently the yield per acre was much below the average of the past seasons.

The following statement compares the results of this year's cuttings with the average of the previous eight years:—

Year.	Outturn per acre.	Cost of cultivation per acre.	Value of outturn per acre.
	Lbs.	Rs. a. p.	Rs. a. p.
Average of the last 8 years. ...	17,534	63 0 0	91 0 0
1901... ..	13,662	60 0 0	91 0 0

Experiments with other crops.

14. *Soy-bean (Glycine hispida)*.—A plot of about $\frac{3}{4}$ of an acre was devoted to this crop. The seeds produced were small and shrivelled. It yielded a poor return. It failed also at the Nadiád and Surat farms owing chiefly to the scarcity of rains in Gujarát. Seeds of improved varieties of soy-beans have been obtained from Japan and will receive attention during the current year.

15. *Rhea (Bæhmeria nivea)*.—The plot under this fibre plant was dug up. It was started in 1898. The crop will not survive throughout the year without irrigation. The cost of preparing the ribbons was heavy. It takes two years to establish a plantation of Rhea, and having undergone this expense, our experience proves that in the Deccan the plants rapidly degenerate and there is no hope of introducing it as a commercial crop. Two cuttings in the months of April and October yielded only 45 lbs. of ribbons from a plot measuring nearly a third of an acre.

16. *Cassava or Tapioca (Manihot utilissimum)*.—Stems of several varieties of Cassava were received from Mr. Robert Thomson of Jamaica in the month of October 1901. Of those that survived the journey all germinated and took root. They were planted in a shady place and were irrigated. Tapioca plant has been grown without difficulty on several experimental farms. It produces a large quantity of tubers and has therefore been recommended to be planted out in hedge rows and waste lands as a plant useful in famine years. It must, however, be remarked that like all tuberous plants a large outturn could only be expected under a liberal system of cultivation. If left to take care of itself on waste lands the size and number of the tubers would be materially reduced.

17. *Sweet Potatoes (Ipomœa Batatas)*.—Three varieties of sweet potatoes were received through the Inspector General of Agriculture from America. The crop had to be maintained for a longer period than necessary owing to the demands for haulms from outside, and in consequence the tubers were badly infected with grubs. The haulms were supplied to the Government farms at Nágpur, Cawnpore, Mánjri, Surat, Nadiád, Dumraon, Lyallpur, Sibpur and Hissár. There is no doubt that these imported varieties (all white in colour) are much more prolific than the indigenous ones. They produced the tubers in bunches. Nansemond and New Jersey varieties produced 16 to 18 tubers in a bunch and the Virginia 4 to 5. The tubers of the last variety were mostly small and thin. Those of the other two varieties were good sized, oval and shapely.

18. *Maize (Zea Mays)*.—The seed of American maize received from Government was, as reported last year, sown in the cold weather of 1900 in a small plot. The produce of this plot was resown in the monsoon of 1901, together with other American varieties received from Cawnpore. Mr. Mollison ordered, while in America, seeds of selected varieties of Indian corns (both field corn and sugar corn) which were cultivated in the cold weather of 1901.

19. The term sugar corn is applied in America to varieties of maize grown in gardens and used as vegetables.

20. In all, 4 acres were devoted to the varieties of maize. Their characteristics have been noted, and selected varieties will be again cultivated this

season for distribution of seed. It must be remarked that the results expressed per acre may be a little exaggerated, as the areas occupied by some of the varieties were small. At the same time they give a fair indication of the quantity and quality of the crop to be expected in future trials.

21. The seeds, received direct from America, were sown on the American system. Instead of sowing them in straight lines like the way in which Indian seeds are drilled, they were dibbled in with hand in pits three feet apart. As the plants grew they were earthed up. Thus the crop grows on hillocks. Each hill had 8 plants. These were, however, found too many. In future experiments not more than 4 or 5 seeds will be dibbled in on each hillock.

22. In the following statement the variety noted as American is the one of which the seeds were received from Government. It was found to be a mixed sample, consisting of several varieties.

Statement showing the outturn results of the varieties of American maize.

Name of the variety.	Cobs* lbs. per Acre.	Fodder lbs. per Acre.	Remarks.
Maize (American) ...	1,221	2,465	Sown in June 1901. Originally seeds received from Government and grown on the farm in the cold weather.
Early Mastadon ...	1,846	2,769	
Extra Early Waterloo ...	2,616	5,692	Sown in June 1901. Seeds received from Cawnpore.
Yellow Dent ...	2,677	4,307	
King Phillips ...	1,661	2,923	
Sweet Corn ...	933	7,833	
Cawnpore indigenous ...	3,016	4,154	
Jawnpore do. ...	3,163	3,692	
Hickery King Field Corn ...	1,389	5,826	Sown in November 1901. Fresh seeds received from America.
White Flint ...	1,255	1,703	
Compton's Early ...	2,017	1,793	
Early Mastadon ...	3,451	4,706	
King Phillips ...	2,106	2,061	
Golden Beauty ...	1,389	5,826	Sown in November 1901. Seeds from the Poona Farm Kharif crop of 1901.
Early Mastadon ...	2,106	4,078	
Extra Early Waterloo ...	2,330	7,571	
Yellow Dent ...	2,779	4,706	
King Phillips ...	2,644	2,510	
Jawnpore Maize ...	2,913	2,599	
Cawnpore do. ...	2,510	1,837	
Maize (American) ...	914	6,184	
Poona (Local) ...	2,970	4,473	Sown in November 1901. Seeds obtained locally.

* 100 lbs. of cobs yield 76 lbs. of seed.

23. 655 lbs. of American maize seeds, the produce of our crop, were distributed in May last in the Panch Maháls, the only district in which maize is grown as a staple crop.

24. The outturn results of the varieties of sugar corns tried last year have not been reported. They failed both in respect of the quantity of the crop and the quality of the grain. Sugar corn when grown in India loses its sweet taste. In America it is prized as a vegetable for its tenderness and sweetness. The Superintendent of the Empress Gardens, Poona, informs me that he has also experienced great difficulty in selling and popularizing the sweet corns on account of their insipid taste.

25. *Groundnut (Arachis hypogea)*.—Groundnut is known by various names. In America it is known by the name of Pea-nut. Elsewhere it is also called earth-nut or monkey-nut. The following improved varieties of groundnut seeds were ordered out from America and Japan by Mr. Mollison for trial during the year under report. As is well known the area under groundnut has gone down considerably during recent years both in this Presidency as well as in Madras, the reason being that the crop is attacked with a fungoid disease called "Tika," which destroys the crop altogether or materially reduces the yield. The plants are affected by a blight on the leaves and stems. This is marked by the appearance of brown spots surrounded by a yellow areola. The leaves wither and fall off. New leaves appear, but the growth of the nuts is checked. The crop assumes a patchy appearance and the affected portions of the field are covered with a thick coating of the fallen leaves.

26. Dr. Butler, to whom the specimens were submitted for examination, states "that the disease is caused by a species of *Cercospora*, a member of a large genus of fungi containing nearly six hundred species, most of which are leaf parasites. They are not usually considered dangerous, and in this case I am inclined to look further for an explanation of the apparently rapid spread and fatal character of the disease. Indeed, the *Cercospora* is even in totally withered leaves strictly confined to the centre of the brown spots, while the rest of the leaf is permeated by the mycelium of a different fungus. This is a *Cladosporium*, a fungus responsible, I believe, for an enormous amount of the damage caused by fungus blight in the country. It enters plants already weakened from some cause or other (in this case no doubt from the presence of the *Cercospora*), multiplies with extraordinary rapidity and, until the whole plant is permeated, causes little outward change in the appearance of the plant. Then the whole dies off suddenly just as described. Examination of dead specimens does not permit me to say with absolute certainty that this is an accurate picture of what occurs in the groundnut, but I believe that the *Cladosporium* plays a very large part in the causation of the disease."

27. The object of importing the foreign varieties was to ascertain whether they could resist the disease and thus revive the cultivation of a crop which being an export article is certainly more paying to the cultivator than many other crops ordinarily grown.

28. The seeds were dibbled by hand in the month of June and harvested in November and December. The crop was irrigated from the canal four times. The yield was a fair one; considering that the seeds were freshly imported from America. All the plots were attacked by "Tika."

29. In the month of May 1901, 1,725 lbs. of seed of the Mauritius groundnut were distributed among several cultivators in the talukas of Karád, Pátan, Khed and Junnar, and in Surat and Nadiád. Groundnut is not grown in the last mentioned place, but there is no doubt that if the experimental trials prove successful its cultivation will be eagerly taken up by the Pátidárs. I visited the Karád taluka in the month of October and inspected the crops grown from the indigenous and imported seeds.

30. From the reports received from the villages in which the imported Mauritius seed was distributed and from our own experience the following conclusions have been drawn:—

(1) That the crops grown from the imported groundnut seeds are liable to the attack of Tika, but not to so great an extent as the indigenous variety.

(2) That the imported nuts grow within a depth of three or four inches instead of six inches and more as is the case with the indigenous nuts and consequently they are much more liable to the attacks of rats and birds than the local variety.

(3) That the yield of the American nuts was larger, in many cases considerably larger, than that of the indigenous variety.

During the current year 5,400 lbs. of American groundnut seeds, the produce of our last year's crop, have been distributed in the talukas of Karád, Pátan, Khed, Junnar, Haveli, &c.

Chemical examination by the Agricultural Chemist proves that some of the imported varieties contain as much as 6 per cent. more oil than the indigenous variety.

31. The following statement shows the outturn per acre of the varieties of groundnut grown on the farm :—

Name of the variety.	Outturn per acre.	Cost of cultivation.	Value of outturn.
	Lbs.	Rs.	Rs.
Pondicherry	2,224	66	111
Spanish Pea-nuts (America)	2,550	52	127
Selected Virginia (America)	2,966	65	148
Small Japanese	2,019	47	101
Big Japanese	3,171	66	159

32. The following statement gives the analyses of the varieties of groundnuts made by the Agricultural Chemist to the Government of India :—

Name of the variety.	Oil per cent.	Number of kernels per pod.	Relative weight of kernels and shells.
Pondicherry original seed	45.09	1.9	76 : 24
Do. Farm grown crop	41.77	1.9	78 : 22
Spanish Pea-nuts original seed	47.73	1.6	72 : 28
Do. Farm grown crop	47.33	1.6	73 : 27
Selected Virginia original seed... ..	46.98	2.0	73 : 27
Do. Farm grown crop	44.62	1.7	74 : 26
Small Japanese original seed	45.83	1.6	82 : 18
Do. Farm grown crop	48.32	1.9	79 : 21
Big Japanese original seed	41.66	1.2	64 : 36
Do. Farm grown crop	44.04	1.7	75 : 25
Country groundnut purchased locally	42.80	...	...

33. *Bájrí* (*Pennisetum typhoideum*).—This crop occupied 4 acres 28 gunthas. Six varieties were sown with alternate rows of Tur. As will be seen from the statement given below, only one variety, namely, Bháwnagri produced a high yield. Others produced an average crop, except Málbandro and Poona selected whose yields were poor :—

Name.		Outturn of grain per acre.	Fodder.	Cost of cultivation.	Value of outturn.
		Lbs.	Lbs.	Rs.	Rs.
Nadiád	Bájrí	795	992	29	29
Bháwnagri	do.	1,018	1,872	29	39
Málbandro	do.	504	1,515	29	21
Poona Select	do.	378	1,515	29	16
Bázár Seed	do.	523	1,200	29	20
Bearded	do.	627	1,091	29	24

34. *Gram* and *Linseed* occupied two acres and one acre and four gunthas, respectively. The crops were irrigated after the germination of the seeds. Soon after, however, there was a heavy downpour of rain, which washed away the seedlings from parts of the fields. Both the crops yielded poor returns.

SUGARCANE EXPERIMENTS AT MÁNJRI.

35. The various questions in connection with the cultivation of sugarcane, such as the comparative effect of different manures, the percentages of cane sugar to glucose, and the conditions which affect their ratio, the effect of climate on imported varieties, &c., have been so exhaustively investigated and reported upon by Mr. Mollison and Dr. Leather (*vide* appendix to the report of 1896 and of several publications of the Agricultural Ledger Series) that it is unnecessary to reproduce here the figures of past years. It will suffice to note them where necessary in the remarks made in connection with each of the series of experiments conducted during the year under report.

Manure Experiments.

36. The following statement shows the quantity and cost per acre of manures used for sugarcane calculated according to their manurial value and according to their price in the Poona market :—

No.	Name of Manure.	Quantity of manure equivalent to 400 lbs. of nitrogen.	Cost per acre.
		Tons.	Rs.
1	Cake-fed cattle dung, Rs. 4½ per ton ...	22·07	100
2	Fish manure, 40 lbs. per rupee ...	1·90	108
3	Farm yard manure ...	23·18	108
4	Safflower cake, 40 lbs. per rupee ...	2·53	148
5	Karanj cake, 60 lbs. per rupee ...	4·61	172
6	Poudrette, Rs. 7 per ton ...	24·80	172
7	Niger seed cake, 40 lbs. per rupee ...	3·35	188
8	Castor cake, 50 lbs. per rupee ...	5·10	228
9	Cotton seed manure, 60 lbs. per rupee ...	7·09	264
10	Bone meal, 35 lbs. per rupee ...	4·65	308
11	Saltpetre, 9 lbs. per rupee ...	1·55	384
12	Mowra cake, 60 lbs. per rupee ...	10·63	396

37. For a crop such as sugarcane the value of the manure depends upon the percentage of nitrogen it contains, and its price is therefore regulated accordingly in all the civilized countries. In the above table the price includes cartage to Mánjri (8 miles from Poona) and the cost of preparation such as crushing the oil cakes. The nitrogen is calculated according to the analyses of the Agricultural Chemist.

38. It will be easy for the reader to calculate which manure will be most economical as soon as he ascertains its market price in his own village. Thus for instance castor cake is sold at Poona at 50 lbs. per rupee, whereas in Gujarát, from where Poona receives its supply, its rate is 80 lbs. per rupee. Its application will, therefore, cost Rs. 144 in Gujarát instead of Rs. 228 as in Poona, supposing the cane was wholly manured with it. Again in Northern India where nitre is manufactured, it will cost considerably less than in Poona, where its price is prohibitive.

39. The value of the manure per acre is calculated on 400 lbs. of nitrogen as our experiments tend to the conclusion that this quantity is the most economical to apply to sugarcane grown under heavy canal irrigation.

40. It will be observed that the old friend of the farmer, namely, farm yard manure, tops the list. It must, however, be noted (1) that both the samples were richer than the manure ordinarily available, being the product of cattle highly fed at the Poona Dairy Farm, and (2) that it is not available in required quantity where sugarcane is extensively grown as near Poona. It is generally applied in smaller quantities before planting and supplemented with cakes or fish manure in the beginning of monsoon.

41. Safflower and niger seed cakes are edible cakes, but the former which is obtainable at Poona at a moderate price is, since its value as a sugarcane manure has been demonstrated by our experiments, largely made use of by the sugarcane planters all round Poona.

42. Poudrette is sold at a far too dear rate owing to its demand for sugarcane cultivation. Other Municipalities can only sell it at a price less than half of what it has in Poona. In the following table the estimates of cotton seed and bone-meal on the basis of nitrogen units contained in them are not strictly correct as these are phosphatic manures and should also be valued for their phosphates.

43. Cotton seed is prepared for manure by soaking it in water to start germination and then drying and crushing it. We find it convenient to crush it in the ordinary stone roller mill used for preparing mortar. Cotton seed cake is used as manure in America to supply phosphates. It will be found economical in the heart of cotton districts where its price is low.

44. Bone-meal is dear, being an export article. It is also a phosphatic manure. Our experiments past and present prove it to be of little value as manure for the soils of the Presidency with or without irrigation. It is supposed that the Bombay soils probably contain a sufficient quantity of available phosphoric acid to render the application of bone-meal ineffectual.

45. Mowra (*Bassia latifolia*) seed cake contains very little nitrogen. It has besides a poisonous effect upon the canes. If applied immediately before planting, it kills the young shoot. This deleterious effect wears off if applied a month before planting.

46. The following statement shows the comparative effect of different manures used per acre:—

Variety—Pundia; each plot = $\frac{1}{2}$ acre.

Plot No.	Kind of manure.	Quantity of manure in lbs.	Cost of manure in Rs.	Weight of canes stripped and topped in lbs.	Weight of tops in lbs.	Weight of juice in lbs.	Weight of gull in lbs.	Per-centage of juice to cane.	Per-centage of gull to cane.
2	Safflower cake	5,835	131	100,120	11,780	67,680	13,640	67.5	13.6
3	{ Bassia	3,360	414	78,735	12,120	49,530	9,230	62.9	11.7
	{ Safflower	11,340							
4	Bone crushed	4,430	132	67,235	...	...	...	...	...
5	Bone dissolved	4,478	220	78,740	...	...	...	...	...
6	Cotton seed	15,863	264	101,280	15,230	69,230	13,425	68.4	13.2
7	Fish manure	4,250	106	92,790	8,430	60,270	12,345	64.9	13.3
8	Castor cake	11,427	229	95,700	10,820	63,825	12,300	66.7	12.8
9	Karanj cake	10,340	172	85,960	10,370	58,520	11,760	68.1	13.7
10	{ Bones	4,480	184	44,500	...	...	...	...	...
	{ Nitre	500							
11	{ Dissolved bones	4,480	284	67,625	...	...	...	...	...
	{ Nitre	500							
12	Poudrette... ..	55,555	174	54,740	8,855	35,135	7,280	64.2	13.3
13	Cattle dung	49,379	99	65,405	11,535	43,815	9,135	66.9	13.9
14	Farm yard manure	53,333	107	89,160	11,610	58,915	11,635	66.0	13.0
15	Niger seed cake	7,500	167	97,820	11,665	64,350	12,945	65.7	13.2

N.B.—The produce of plots Nos. 4, 5, 10 and 11 was partly utilized for planting.

It will be observed that as in past years safflower cake has yielded the best results. Bone-meal and bone-meal plus nitre have again failed. Nitre is easily soluble and it is probable that under the heavy irrigation that is given to sugarcane in Poona it is liable to be washed away in the drainage water. Poudrette generally gives better results than in these experiments. Farm yard manure has been proved to be slow in action. It does not show its full effect in the year of application and therefore is not at first so profitable for sugarcane as manures which act quicker, as for instance fish manure, castor, safflower and niger seed cakes.

Plots 31 to 45 were devoted to ascertain what quantity of Poudrette and Poudrette in combination with several cakes was the most economical application. The results were however irregular for reasons not connected with the varying application of manure and have not been published.

47. The following statement shows the results per acre obtained with different varieties of canes :—

Plot No.	Variety of cane.	Kind of manure.	Quantity in lbs.	Cost of manure in Rs.	Weight of canes stripped and topped in lbs.	Weight of tops in lbs.	Weight of juice in lbs.	Weight of gul in lbs.	Percentage of juice to cane.	Percentage of gul to cane.
1	Vánsi...	Poudrette ... Safflower cake.	33,600 3,360	180	108,960	10,025	66,530	11,770	61·0	10·8
16	Green Mauritius.	Do. ...	Do.	Do.	94,465	9,090	60,150	11,295	63·7	11·9
17	Do. ...	Do. ...	Do.	Do.	82,060	10,470	54,040	9,430	65·8	11·5
18	Pundia ...	Do. ...	Do.	Do.	101,620	11,860	66,370	12,820	65·3	12·6
22	Do. ...	Do. ...	Do.	Do.	94,645	9,275	67,375	12,310	70·1	13·0
25	Sanna Bile ...	Poudrette ... Niger seed cake.	33,600 3,360	Do.	100,170	14,965	59,345	10,715	59·2	10·7
26	Do. ...	Do. ...	Do.	Do.	98,415	12,565	56,585	10,445	57·5	10·6
27	Red Mauritius.	Do. ...	Do.	Do.	121,875	11,305	82,540	12,945	67·7	10·6
29	Do. ...	Do. ...	Do.	Do.	113,445	8,170	75,525	12,505	66·6	11·0

The results this year are instructive. All the varieties except the Pundia are importations. They produced in former years about 2,600 lbs. less Gul per acre than the local Pundia. In fact the Mauritius canes were failures in the beginning. When they were imported they were said to contain 18 per cent. of cane sugar. They yielded in Poona before they were acclimatized less than ten per cent. They have, however, improved and have come up to the level of the local Pundia. This was anticipated by Mr. Mollison, who had also remarked that the cost of acclimatizing a costly crop like sugarcane was beyond the means of the ordinary cultivator.

The *Vánsi* or *Bámbu* cane is reputed to be a poor producer of Gul. This is possibly due to its not receiving the same liberal treatment as the good varieties. Our experiments point to the conclusion that its yield can be improved with liberal treatment.

Sanna Bile, a Belgaum variety, is a cane which has many good points. It is thick but hard and is therefore less subject to the attack of jackals and pigs. *Sanna Bile* as well as the Red Mauritius are less subject to the attack of sugarcane borer than Pundia. It is satisfactory to know that *Sanna Bile* which was sent to Behar from Mánjri has become a special favourite with the indigo planters who were supplied the sets about 8 years ago from the Mánjri farm. The cultivation of the Mánjri Red and White Mauritius varieties and also of *Vánsi* and of *Sanna Bile* is gradually extending in Behar and elsewhere in Bengal.

48. In the following table are shown the results per acre of Mauritius and ordinary systems of planting :—

Plot Number.	Variety of cane.	Kind of manure.	Quantity of manure in lbs.	Cost of manure in Rupees.	Weight of canes stripped and topped in lbs.	Weight of tops in lbs.	Weight of juice in lbs.	Weight of gul in lbs.	Percentage of juice to cane.	Percentage of gul to cane.	System of planting.
26	Sanna Bile ...	Poudrette ... Nigerseed cake	33,600 3,360	180	100,170	14,965	59,345	10,715	59·2	10·7	Mauritius.
26	Do. ...	Do. ...	Do.	Do.	98,415	12,565	56,585	10,445	57·5	10·6	Ordinary.
27	Red Mauritius ...	Do. ...	Do.	Do.	121,875	11,305	82,540	12,945	67·7	10·6	Mauritius.
28	Do. ...	Do. ...	Do.	Do.	113,445	8,170	75,525	12,505	66·6	11·0	Ordinary.
29	Pundia ...	Do. ...	Do.	Do.	95,635	11,915	64,455	12,035	67·4	13·2	Mauritius.
30	Do. ...	Do. ...	Do.	Do.	69,335	10,345	60,025	11,940	67·0	13·4	Ordinary.

The difference between the two systems is that in the case of Mauritius system, instead of planting the sets in furrows in straight lines, they are deposited in pits one foot deep and about three feet apart. The outturn is slightly in favour of the Mauritius system, but there are other advantages. The crop when planted according to the Mauritius system stands up well in wind or heavy rain, the roots being firmly held by the soil. This is an advantage

because the percentage of sugar in lodged cane is always less than in upright cane. In the Mauritius system two sets were deposited in each pit, and 13,000 sets were required per acre against 17,500 as in the ordinary system. This means a considerable saving in ordinary years. Last year the saving was more than usual. Sets were dear because the price of gul was high. The Mauritius system has distinct advantages in case of canes which have good tillering capacity like the Sanna Bile and is strongly recommended to sugarcane planters. Plot No. 17 is interesting inasmuch as it proves the effect of shade trees on the sugarcane. Not only the quantity of gul per acre is diminished but also its quality suffers when the crop is grown under the road-side trees.

Water Experiments.

49. These experiments re-affirm the conclusion drawn in previous years, that a much smaller quantity of water is required to grow the crop to perfection if it can be obtained at short and regular intervals in the hot-weather months. It happens, however, that at this period the cultivator is not sure as to when the canal will be next open to him, and he therefore floods his fields as much as they can hold. In the hot weather the intervals between the two waterings often exceed half a month, which must affect the yield of Gul as the soil layer is only $1\frac{1}{2}'$ to $2\frac{1}{2}'$ deep resting on a hard bed of murum. Therefore the water drains off and the soil dries quickly.

Variety of cane Pundia; manure applied poudrrette and safflower = 469 lbs. of nitrogen per acre.

Plot.	Yield of Gul per acre in lbs.	Description of irrigation.
18	12,820	Watered as often as the canal was open to cultivators.
19	13,675	Watered at the interval of ten days in the hot weather and as often as the canal was open to cultivators in other season.
20	13,860	Half the normal supply of water every eighth day in hot weather and tenth day in cold weather.
21	13,865	Three-fourths of the normal supply every eighth day in hot weather and tenth day in cold weather.
22	12,310	Full normal supply every eighth day in hot weather and tenth day in cold weather.

Whole Cane Sets versus Green Top Sets.

50. As in previous years the sets cut from whole canes have produced better results than those made up of only the green tops.

Variety Pundia; manure applied safflower cake at the rate of 500 lbs. nitrogen per acre.

Plot.	Sets.	Yield of gul in lbs. per acre.
43	Whole cane sets ...	10,660
46	Top sets ...	9,125

SEWAGE EXPERIMENTS AT MA'NJRI.

51. This is the second year of these experiments. The cane was ratoon crop. It has for its object the comparison of the effluent or purified sewage with other manures (*vide* paragraph 23 of last year's report). The following statement shows the results per acre:—

Plot Number.	Kind of manure.	Quantity of manure in lbs.	Cost of manure in rupees.	Weight of cane stripped and topped in lbs.	Weight of tops in lbs.	Weight of juice in lbs.	Weight of gul in lbs.	Percentage of juice to cane.	Percentage of gul to cane.
1	Septic Tank Effluent ...	...	...	72,333	12,309	47,623	8,949	65.9	12.4
2	Dib Din's Filter Effluent ...	...	...	60,914	11,108	38,983	7,371	63.9	12.1
3	Macerating Tank Effluent ...	...	...	59,531	11,886	37,714	6,983	63.3	11.7
4	Poudrrette ...	48,411	151	79,166	12,583	52,377	10,640	66.1	13.4
5	Farm yard manure and castor cake.	27,885	56	71,234	8,263	46,000	8,994	64.6	12.6
		4,011	80						
6	Niger seed cake ...	6,549	145	81,680	8,308	53,862	10,274	65.9	12.6
7	Safflower seed cake ...	5,131	114	88,571	10,000	54,617	10,994	61.7	12.4

The outturn of Gul from the effluent plots was smaller than that from other manures. It has been explained in the last year's report that our manufacturing apparatus is small and the flow of the effluent is not sufficient to flood the plots quickly. As a result the ratoon crop was affected by the heat of the sun in the hot weather months. It was at one time thought not good enough to be kept up, but it revived and has produced a crop which no other manures except the quick acting chemical manures, such as Ammonium Sulphate and Sodium Nitrate, would have produced. In order to show that insufficient moisture was really the cause of the inferior yield from the effluent plots, the end rows of canes which received the effluent continuously on its way to the middle of the plots were separately weighed with the following result:—

Plot No.	Name of Filter.	Average weight of Cane, 1st and 6th rows.	Average weight of Cane, middle 4 rows.
		Lbs.	Lbs.
1	Septic Tank	1,525	819
2	Dibdin's Filter	1,126	769
3	Macerating Tank	1,264	670

The Septic Tank effluent has yielded a better result than that prepared under the other two methods. This result coincides with the analyses of Dr. Leather, who found more Nitrogen in the case of the former than that of the latter two. There is no doubt that loss of Nitrogen takes place in Dibdin's Filter and Macerating Tank. In our new experiments the preparation of the effluent is confined to the Septic Tank system and is to be compared for its agricultural value with the effluent which has been further purified in contact beds.

52. During the present year Dr. Leather has determined the amounts of the important plant foods, namely, Nitrogen, Phosphoric Acid and Potash, in heavy sugarcane crops and in the purified sewage and the results are set out in the following statements.

Statement A.—Showing the composition of the Sugarcane crop, being an average of six analyses of crops grown under the effluent and farm-yard manure niger and safflower cakes.

Description.	Nitrogen, per cent.	Phosphoric Acid, per cent.	Potash, per cent.
Dry leaves	·455	·124	·870
Green tops	·201	·107	·618
Sugar-cane	·045	·050	·160

Statement B.—Showing the weight of plant foods per acre in the crop.

Description.	Weight in lbs. p r acre.	Nitrogen.	Phosphoric Acid.	Potash.
	Lbs.	Lbs.	Lbs.	Lbs.
Clean cane	98,300	44·23	49·15	157·30
Green tops	14,840	29·83	15·88	91·71
Dry leaves	12,570	57·19	15·58	103·35
Total	125,710	131·25	80·61	358·36

Statement C.—Showing the amounts of the more important plant foods, in the purified sewage (parts per 100,000), average of nine samples.

Name.	Nitrogen.	Phosphoric Acid.	Potash.
Septic Tank, Mánjri ...	2.68	1.99	1.95
Dibdin's Filter ...	1.11	1.26	1.91
Septic Tank, Poona ...	3.68	1.91	3.05

Statement D.—Showing the approximate weights of plant foods in the effluent supplied at the rate of 4,000 gallons per acre per day for 9 months.

Name.	Nitrogen.	Phosphoric Acid.	Potash.
	Lbs.	Lbs.	Lbs.
Septic Tank, Mánjri ...	308	229	224
Dibdin's Filter ...	128	144	219
Septic Tank, Poona ...	423	219	350

Dr. Leather remarks that there is a very considerable difference between the amounts of Nitrogen in the effluent from these two systems and is no doubt due to the loss of Nitrogen by evaporation from Dibdin's Filter. In our new experiments on a larger scale the Septic Tank system has been adopted, and the analyses of Dibdin's Filter may properly be excluded from calculations as to the manurial value of the sewage.

53. An irrigation estimate of 4,000 gallons of sewage per acre per day has been assumed as suitable for the heavy crops of sugar-cane grown near Poona, where the soil varies in depth between 2 to 3 feet and rests upon a muram (soft rock) bed. This is equivalent to 1,150,000 gallons for nine months. The amount of the several plant foods (in lbs.) is entered in Statement D, and it will be seen on comparing these with the figures of Statement B that such sewage as that prepared at Poona and Mánjri (calculated to represent the strength of a city sewage with a water-supply of 15 to 20 gallons per day per head of population) contains much more Nitrogen and Phosphoric Acid than heavy crops of cane require. The quantity of Potash, perhaps, falls somewhat short, but as regards this point it may be stated that the Poona mixtures contain quite sufficient Potash. It must not be forgotten that in the case of sugar-cane, the greater part of the Phosphoric Acid and Potash may be returned to the soil by the application of the ashes from the fire places of the boiling pans.

54. A new series of experiments has been lately commenced at Mánjri to try the effect of the effluent on larger areas than have hitherto been attempted. A full description of these experiments will be found in Appendix A (page 18).

SEWAGE EXPERIMENTS AT THE POONA FARM.

55. Experiments to compare the value of the effluent with other manures were again tried at the Poona Farm on garden crops. It will be observed from the statement given below that, as in past years, the effluent has produced nearly in all cases superior yields. Fresh night-soil has always yielded poor returns. Suran takes 4 years to mature. The corms planted this year were three years old, and hence the heavy yield of the crop.

Manure.	Crop.	Yield in lbs per acre.	Remarks.
Effluent 12 Waterings	Surans	45,360	} Mixed crop.
Farm-yard manure ... 10 Tons	Do.	38,160	
Poudrette 10 Tons	Do.	41,304	
Effluent 11 Waterings	Turmeric	5,544	
	Yams	23,488	
Farm-yard manure ... 10 Tons	Turmeric	6,384	
	Yams	22,704	} Do.

Manure.	Crop.	Yield in lbs. per acre.	Remarks.
Poudrette ... 10 Tons ...	Turmeric ... Yams ...	5,088 16,584	} Mixed crop.
Fresh night-soil ... 4 Dressings ...	Turmeric ... Yams ...	3,547 11,827	
Effluent ... 10 Waterings...	Groundnut ... Castors ...	1,488 54	} Do.
Farm-yard manure ... 10 Tons ...	Groundnut ... Castors ...	840 162	
Poudrette ... 10 Tons ...	Groundnut ... Castors ...	480 300	} Do.
Fresh night-soil ... 4 Dressings ...	Groundnut ... Castors ...	210 40	
Effluent ... 20 Waterings...	Guinea-Grass ...	49,590	} Do.
Farm-yard manure ... 10 Tons ...	Do. ...	29,070	
Poudrette ... 10 Tons ...	Do. ...	37,070	} Do.
Effluent ... 21 Waterings...	Lucerne ...	55,330	
Farm-yard manure ... 10 Tons ...	Do. ...	44,100	} Do.
Poudrette ... 10 Tons ...	Do. ...	56,530	

56. The cultivation of Surans and yams was unknown in Poona. These vegetables, like potatoes, have this advantage that they can be stored away for a year and consumed gradually. A few Bráhmín gentlemen have introduced their cultivation in their own fields.

CROSS-BREEDING EXPERIMENTS.

57. Mr. Mollison, while in America last year, studied the processes of cross-breeding of cultivated crops with the view of improving the varieties. On his return the experiments were commenced at the Poona and Surat farms on wheats and cottons. The process consists in cross-fertilizing the flowers of two varieties with a definite object. Thus it is well known that our spelt wheat (Khapli) is rust-proof, but is of inferior quality and not fit for export; and on the other hand our irrigated wheats which are generally of fine quality are so much attacked with rust that the cultivators often do not venture to grow them. If by cross-fertilization between khapli and irrigated varieties we obtain a breed which, while possessing the colour and consistency of the latter, acquires the rust-proof character of the former, a great step will have been gained. In the same manner, if we could give to Khándesh an improved long stapled Varádi cotton which would retain its white colour and hardy character and acquire, in addition, the length and silkiness of the Broach cotton, a great advance will have been made in improving the quality of our cotton varieties.

58. Sixteen varieties of wheat and six varieties of cotton were experimented upon. The result of our labours cannot be known for a couple of years and even more in case of wheat. But there is no doubt that if we succeed (and there is no reason why we should not) as in America, the cultivators will be greatly benefited. Side by side with cross-breeding experiments, we are also trying to effect the improvement in seeds by selection. With this end in view the seeds of the staple crops Jowári, Bájri, cotton, Tur, &c., have been obtained from all over the Presidency and through Mr. Mollison from other parts of India.

59. Professor Gammie of the College of Science was very helpful with these experiments last year. He watched the progress of the work and taught

the necessary manipulation for plant breeding, to our fieldmen, and Mális, and has kindly promised to co-operate with the Department in the plant-breeding work. He will determine botanical variations induced by cross-fertilization and take botanical description of the numerous varieties of wheat, cotton and Jowár which will be growing in the current season.

TOBACCO CURING.

60. At the request of the Inspector General of Agriculture experiments in tobacco curing on the lines adopted in America were undertaken. Briefly stated the American system of curing tobacco consists in slowly drying and curing the leaves from the green state until they become an even yellow brown colour. The curing should take three weeks, and is done in large sheds ventilated by means of shutters. During the curing period the leaves are allowed to dry in the day time, the barn being fully open and ventilated for the purpose, and absorb moisture at night when the shutters and ventilators are closed. The leaves thus alternately become dry and limpid during the 24 hours. It was, however, found impracticable to carry out the process in our dry climate. An artificial arrangement to supply moisture by means of placing vessels filled with water on the floor which was wetted in addition did not serve the purpose.

RINDERPEST EXPERIMENTS.

61. During the year under report this Department assisted Dr. Lingard in carrying out experiments to test the strength of the rinderpest serum required for the local breeds of cattle. Mr. Juda Hyam, the Veterinary Assistant, was in charge of the experiments. In all 28 cattle were supplied and were operated upon.

GANESHKHIND GARDENS.

62. During the year the graft mango trees fetched Rs. 350 and the value of the grass consumed by the dairy cattle amounted to Rs. 1,108. There was a balance of Rs. 196 to the Government in the garden accounts.

FARM IMPROVEMENTS.

63. During the year under report extensive improvements have been carried out on the Government farms at a heavy expenditure.

Cow sheds, grass sheds, and labourers' quarters have been erected at the Poona Farm at a cost of Rs. 9,000.

A store-room and labourers' quarters are in course of construction at Mánjri, and will cost a further sum of Rs. 3,000. The area of the Mánjri Farm has also been extended from 13-10 acres to 44-7 acres, and the whole area has been protected by a wire-fence at a total cost of Rs. 3,000. New buildings and a well have been erected at the Surat Farm at a total cost of Rs. 6,500. A small area including a well has also been leased for the better protection of our pedigree seeds during a drought. As the Mánjri and Surat Farms will henceforward be chiefly devoted to the improvement of the seeds of the staple crops of the country by cross breeding and by selection and the improved varieties will be distributed to other places beyond the Presidency whenever the climatic and other conditions are found suitable, the Government of India on the recommendation of the Inspector General of Agriculture have contributed towards the improvements noted above to the amount of Rs. 10,000.

THE DAIRY AND DAIRY HERD.

64. The Dairy worked at a loss of Rs. 697. The deficit was partly due to the higher prices of food-grains and partly to the fact that the Commissariat declined to take, under medical advice, buffalo's milk which it accepted in previous years. In all 138 animals consisting of the aged and buffalo calves were sold and 24 cows and one bull were imported from Karáchi.

Description.	Strength on the 1st April 1901.	INCREASE.			DECREASE.				Strength on the 1st April 1902.	VALUATION.		Increase or Decrease during 1901-1902.
		Purchased or Transferred.	Born.	Total.	Sold.	Died.	Transferred.	Total.		1901.	1902.	
<i>Cows.</i>												
Stud bulls	5	...	1	1	1	...	...	1	5	880	370	-10
Cows	37	26	...	26	4	1	...	5	53	1,950	4,055	+2,105
Heifers	7	5	...	5	1	2	2	5	7	115	160	+45
Cow calves	25	4	14	18	...	2	...	7	36	161	267	+96
Bull calves	36	5	14	19	30	...	...	30	25	263	208	-2
Total ...	110	41	28	69	36	5	7	48	131	2,874	5,108	+2,234
<i>Buffaloes.</i>												
Bull buffaloes	1	1	...	1	...	...	...	...	2	75	180	+75
She-buffaloes	55	...	...	...	14	...	...	14	41	1,825	2,010	-815
Heifers	9	...	...	...	9	...	...	9	...	300	...	-300
She-buffalo calves ...	69	...	18	18	61	7	...	68	19	441	85	-356
Bull-buffalo calves ...	19	...	21	21	18	3	1	22	18	48	98	+50
Total ...	163	1	39	40	102	10	1	113	80	3,687	2,841	-1,846
Dairy Horses,	3	...	...	...	1	...	...	1	2	160	130	-20

65. The following statement shows the yield of milk, &c., from cows and buffaloes :—

A.—Cows.

No.	Name.	Breed.	Number of days in milk.	Maximum yield.	Average yield.	Total yield.	Number of days between two calvings.
				lbs. ozs.	lbs. ozs.	lbs. ozs.	
1	Samsári	Aden ...	420	18 4	10 9	4,457 8	460
2	Narmada	Do. ...	286	12 12	6 10	1,902 8	625
3	Vithi	Do. ...	517	9 4	4 6	2,267 4	695
4	Chameli	Do. ...	295	9 4	5 0	1,486 8	425
5	Nārangi	Do. ...	274	7 8	5 1	1,395 4	399
6	Nāri	Do. ...	341	13 12	9 9	3,271 12	420
			355	11 13	6 14	2,463 7	504
7	Pelari	Sind ...	393	16 12	9 8	3,747 12	426
8	Paree	Do. ...	339	15 0	11 1	3,754 8	413
9	Putali	Do. ...	326	14 12	8 4	2,697 4	430
10	Dhagi	Do. ...	427	13 8	8 12	3,738 8	Sold.
11	Pitāmbari	Do. ...	345	16 0	9 4	3,193 8	350
12	Samarth	Do. ...	300	13 0	8 13	2,648 4	408
13	Milee	Do. ...	304	11 12	7 14	2,411 0	438
14	Bujaki	Do. ...	411	9 8	6 4	2,590 8	493
15	Piree... ..	Do. ...	332	14 8	7 1	2,348 4	338
16	Bhāma	Do. ...	399	12 0	7 1	2,810 8	456
17	Sundri	Do. ...	283	9 12	6 12	1,935 4	502
			351	13 5	8 4	2,900 8	425
18	Yamani	Cross ...	277	12 12	9 2	2,540 0	391
19	Somi... ..	Do. ...	211	9 8	4 12	1,049 0	346
20	Lādki	Do. ...	248	9 12	4 4	1,068 4	400
21	Kalyán	Do. ...	403	15 4	10 1	4,078 12	437
22	Mekini	Do. ...	305	12 8	8 0	2,450 4	356
23	Abdāgiri	Do. ...	259	14 0	6 6	1,659 0	385
24	Sarji	Do. ...	385	13 0	7 5	2,830 4	385
25	Bhasmi	Do. ...	377	11 8	7 9	2,862 8	493
26	Paithan	Do. ...	347	13 4	6 14	1,291 0	383
27	Bigul	Do. ...	435	14 4	7 12	3,393 12	456
28	Lakhi	Do. ...	421	11 8	4 4	1,871 4	542
			333	12 8	7 13	2,281 0	416

B.—Buffaloes.

No.	Name.	Breed.	Number of days in milk.	Maximum yield.	Average yield.	Total yield.	Number of days between two calvings.
				lbs. ozs.	lbs. ozs.	lbs. ozs.	
1	Mahálan	Delhi	371	29 12	17 4	6,405 4	449
2	Champa	Jafarabadi ...	506	19 8	7 8	5,617 12	610
3	Thami	Do.	391	11 12	6 4	3,305 8	311
4	Nenasi	Do.	360	11 12	6 14	2,495 4	478
			419	14 5	6 14	3,816 3	475
5	Mirgi	Deccan cross ...	496	11 0	8 4	4,114 4	680
6	Ghári	Surat	325	16 4	12 0	4,010 4	446
7	Bhori	Do.	364	20 4	13 0	4,739 12	411
8	Gujar	Do.	429	15 8	8 8	3,658 0	649
9	Bhadra	Do.	336	13 8	9 0	3,050 8	381
10	Chandani	Do.	215	14 0	7 13	1,919 4	357
11	Wadabhari	Do.	283	12 0	7 0	2,000 4	401
12	Jamádár	Do.	408	14 0	10 12	4,403 0	600
13	Ganga	Do.	389	13 4	11 5	4,417 12	549
14	Gajara	Do.	326	15 0	11 12	3,837 4	396
15	Dalbhari	Do.	326	10 4	11 1	3,618 4	410
16	Guláb	Do.	252	7 12	5 8	1,387 4	343
17	Dhondi	Do.	461	14 0	9 1	4,202 12	625
18	Nishán	Do.	475	9 4	6 10	3,162 8	648
19	Navasari	Do.	235	8 4	5 15	1,408 4	367
20	Gajari	Do.	404	17 0	10 5	4,172 0	570
21	Mangi	Do.	411	13 8	9 4	4,087 8	636
22	Bijali	Do.	412	9 8	5 12	2,390 12	623
23	Mánaki	Do.	357	8 12	6 7	2,315 12	621
24	Chipda	Do.	273	19 12	12 13	3,513 8	400
25	Kaval	Do.	237	13 8	7 5	1,741 12	315
26	Patáli	Do.	301	5 0	2 9	735 8	730
27	Parali	Do.	346	16 12	9 7	3,282 4	400
			317	13 4	8 12	3,096 0	496

Accounts.

66. The cost of working the Farm during the current year was Rs. 4,743-11-3 as against Rs. 2,122-6-5 during the previous year. The cost includes an expenditure of Rs. 875-14-3 incurred on rinderpest experiments. The accounts do not include the value of gúl to the amount of Rs. 1,219, which was sold after the close of the financial year.

Receipts and value.	Amount.	Expenditure.	Amount.
	Rs. a. p.		Rs. a. p.
To value of Farm crops produced and in stock	1,829 8 10	By cost of Establishment	2,419 14 3
„ Ganeshkhind Garden's account	196 1 7	„ Office supplies	27 2 6
„ Hay-making account	1,792 6 7	„ Telegram and Service Stamps	53 3 0
„ Increase in valuation of all stock, live and dead, belonging to various departments, deducting Farm Dead Stock Account	593 4 4	„ Travelling allowance	87 12 0
		„ Incidental account	380 4 3
		„ Poona Farm labour	1,768 0 2
		„ Upkeep of work, cattle	648 5 6
		„ Repairs and construction	632 14 6
		„ Sugarcane experiments	1,501 10 10
		„ Dairy and Dairy Herd account... ..	697 5 4
		„ Store and seed account	59 10 0
		„ Rent account	100 0 0
		„ Rinderpest experiment account	875 14 3
Total	4,416 5 4		
Net Cost	4,743 11 3		
Total	9,160 0 7	Total	9,160 0 7

I have much pleasure in recording the keen and intelligent interest Mr. G. K. Kelkar, Assistant Superintendent, Poona Farm, continues to take in the discharge of his multifarious duties in connection with the Poona and Mánjri farms. Mr. Káshináth, the Overseer at Mánjri, has also worked with zeal, and takes great interest in the working of the new Sewage Experimental Farm.

APPENDIX A.

The New Sewage Experiments at Mánjri.

As the experiments with sugarcane and other crops irrigated with effluent from sewage, which had been purified biologically, have been so successful on a small scale during the past three years, it has been arranged to carry out a practical experiment on a large scale near the Government Farm at Mánjri in the heart of the sugarcane country and on the site of the proposed Effluent farm for the proposed Poona Drainage Scheme.

The experiments will be carried out for three years and will cost Rs. 50,000. The Government of India have borne half the cost of the experiments, up to a maximum of Rs. 25,000, and have advanced the balance to the Poona City Municipality on easy terms, repayable in 25 years, with interest at four per cent.

A plot measuring 15 acres has been acquired, of which 13.4 acres are under effluent irrigation. About 8 acres consist of good average sugarcane land, and the rest is light land where fodder crops will be grown during the monsoon when the effluent will not be required for sugarcane and vegetables.

The mixing tanks, septic tank, coarse filter and bacteria beds were constructed by Mr. J. Pottinger, the late Sanitary Engineer.

The septic tank will be practically open, as adopted at Manchester, Leeds and at the Mátunga Leper Asylum near Bombay, but a light roof of bent corrugated iron sheets has been provided to protect the surface bacterial scum from being disturbed by wind and rain. The Massachusetts experiments have also proved that the purification is as good in an open as in a closed tank.

The septic tank is 100½ feet long and 30 feet broad inside and 5½ feet deep with a 5 feet depth of sewage. It is divided into 16 compartments, each 5 feet wide, by partition walls running alternately from each side to within 5 feet and 3 feet of the opposite side. The velocity of flow is about one-seventh inch per second during the working hours. Each double compartment can be shut off (for scouring out or other purpose) by planks working in grooves at the end of the partition wall. Wash-out pipes with valves are also provided for the last three double compartments to allow of experiment as to the period required in India for sewage to remain in a septic tank. Floating scum boards one foot deep work in grooves near the end of each partition wall.

The contact beds are three in number. They are 50' × 16' × 3' deep or with a total capacity of 24,000 cubic feet. Each bed holds 10,000 gallons of sewage. It is expected that in course of time the capacity will decrease owing to the coating of bacteria film on the filtering material. They are filled with overburnt bricks broken to pass through a two-inch mesh.

The mixing tank is divided into two compartments each 20' × 10' × 4' and holds a charge of 5,000 gallons of crude sewage.

It is also proposed to make a separate experiment with a simple coarse sand filter on to which the crude sewage will run direct from the mixing tank. The report for 1899 of the Massachusetts State Board of Health states that it is practically a success. The analyses show a very high proportion of nitrates and an excellent purification. The experiments with the coarse sand filter have been postponed till Dr. Leather's return from furlough.

It has been arranged that the Agricultural Chemist and the Bacteriologist to the Government of India will undertake the investigation of the scientific problems involved in the question. The subject is a new one even in England and the climatic differences between the two countries are so great and so much in favour of India, that it is possible to improve upon the methods adopted in cold countries with the view of economizing the initial heavy expenditure on the construction of the tanks, &c.

Two sets of carts are used for carting the night-soil and urine from the city to the mixing tanks at Mánjri, a distance of about 9 miles. Each set consists of eleven ordinary cylindrical carts for urine with corks at the back and one of Watson's patent carts for night-soil with rack motion to allow of its being reversed for complete emptying. Each cart has a capacity of 150 gallons.

In his scheme for the disposal of the sewage of the city of Poona, Mr. Pottinger has estimated that 3,500 gallons of sewage can be disposed of per acre per day. Our effective area under experiment is 13.4 acres. We, therefore, prepare and consume 47,000 gallons of effluent per day.

The experiments in Bombay give 6 ounces of night-soil and 40 ounces of urine as the average per head for natives. For a supply of 47,000 gallons at 20 gallons of water per head this comes to 587 gallons of urine and 88 gallons of night-soil. The urine is collected from the cesspools attached to the public latrines in the city and is, of course, mixed with certain amount of water, probably three or four times the urine in the cesspools. But we cannot expect that the whole urine in the city will go into the drainage system, and the reduced amount of pure urine in the 1,600 gallons of liquid taken out by carts is taken to approximate to the production of the whole supply of urine which will go into the future sewers.

The experiments were commenced in the month of February last. The scheme of cropping is arranged as follows :—

No.	Area.	Remarks.
Plot 1 ...	2 acres ...	Sugarcane ; Pundia variety.
Plot 2 ...	16 gunthas ...	Surans planted in May and followed by fodder Jowár in January.
Plot 3 ...	16 gunthas ...	Turmeric and yams planted in May and followed by fodder Jowár in January.
Plot 4 ..	16 gunthas ...	Groundnut planted in June and followed by fodder Jowár in January.
Plot 5 ...	16 gunthas ...	Sanna Bile sugarcane.
Plots 1A to 5A.	.....	Duplicates of the above. <i>Plots 1 to 5 are irrigated with the effluent from the Septic Tank and Contact beds.</i> <i>Plots 1A to 5A are irrigated with effluent from the Septic Tank direct.</i>
Plot 6 ...	5.43 acres ...	Irregular light land. This area will be irrigated with effluent from time to time during the monsoon season and sown with various fodder crops.

SURAT FARM.

Season.

The season was most unfavourable during the year under report. The monsoon broke out in the beginning of July and the prospects at first appeared very bright. Throughout July and till the middle of August there were occasional but light showers, which, however, kept up the crops in fair condition. After the middle of August there was no rain and the standing crops dried up in the fields. Low-lying fields which retained moisture produced a few heads of grain here and there. In the case of Jowár the yield of fodder was from fair to good. Such was, however, not the case throughout the district. Only a few villages adjoining the farm were thus affected, namely, Abba, Gavier, Vesa, Bharthana, Umra, Piproad, Bhatar, Bamroli and Panas. Our experimental area is situated in the last-named village, which is at a distance of about a mile and a half from the rain gauge station.

2. The following statement compares the rainfall of 1900-1901 with the average of the ten preceding years :—

Month.		1900.		1901.		Average of ten years. 1891-1900.
		Rainy days.	Rainfall in inches.	Rainy days.	Rainfall in inches.	
May	1st fortnight	1	0·10	...	0·08	0·02
"	2nd "	...	0·00	...	0·00	
June	1st "	...	0·00	...	0·08	8·67
"	2nd "	1	0·10	1	0·13	
July	1st "	3	4·03	4	9·71	17·99
"	2nd "	7	9·32	6	2·56	
August	1st "	14	15·02	7	2·36	7·92
"	2nd "	9	2·82	4	1·09	
September	1st "	6	2·42	...	0·35	5·61
"	2nd "	2	0·35	...	0·00	
October	1st "	...	0·00	...	0·00	1·99
"	2nd "	...	0·00	2	0·44	
November	1st "	...	0·00	...	0·00	0·14
"	2nd "	...	0·00	...	0·00	
December	1st "	...	0·00	...	0·00	0·01
"	2nd "	...	0·00	...	0·00	
Total ...		43	34·19	24	16·80	42·35

Dry Crop Experiments.

3. The experimental plots practically failed to produce any crop. Under the circumstances the comparative statements and other details have not been furnished as usual.

4. The following statement shows the outturn per acre of dry-crop sown on the whole of the experimental area :—

Crop.	Area.		OUTTURN PER ACRE.	
			Principal product.	Fodder.
			Lbs.	Lbs.
Cotton ...	17	5	129	.....
Jowár and Tuver ...	29	12	Jowár... 33 Tuver... 4	2,036 11
Tal and Tuver ...	11	30	Tal ... 39	.....
Tuver ...	0	20	.....	.....
Gram ...	0	20	.....	.....

5. It is to be regretted that some of the varieties of Jowár, which were grown continuously for the past several years, have been entirely lost. In order to avoid a disaster of a similar nature in future two wells have now been provided. It is most important that the new experiments in connection with the improvement of seeds by cross breeding and by selection should not in the future be thwarted by unfavourable seasons.

6. A collection of Jowárs has again been made from all the districts of the Presidency as well as, through the Inspector-General of Agriculture, from other parts of India.

Irrigated Crops.

7. It will be noticed from the statement given below that the outturn of groundnuts was poor compared with that on the Poona Farm. Wheat, Surans and chillies yielded a fair return, but the other crops were below the average. It has been remarked before that the soil of the farm is not suitable for growing expensive irrigated crops. And although it has been improved by manuring, the irrigated crops cost a considerable sum where all the labour has to be paid for in cash. It has been decided not to grow Surans, yams and such expensive crops on this area in future. The area will be mostly devoted to the varieties of wheat for the intended cross breeding operations.

Statement showing the outturn per acre of irrigated crops.

Crop.	Outturn per acre.	Value of outturn per acre.
	Lbs.	Rs. a. p.
Onions { Red	5,898	38 5 7
Onions { White	238	
Wheat... ..	1,385	69 4 0
17 Varieties of wheat	577	28 13 7
<i>Groundnut varieties.</i>		
(a) Japanese small, red	870	35 5 6
(b) Japanese big, red	853	34 10 5
(c) Japanese little, red	1,775	72 1 9
(d) American Virginia select	1,355	55 0 9
(e) American Spanish peanut	75	3 0 9
(f) Mauritius	843	34 3 11
Castors on ridges of the beds of groundnut... ..	270	12 10 6
Surans	13,364	358 7 8
Chillies	2,658	
Turmeric	780	78 2 10
Yams	334	
Chillies	4,212	
Guinea grass	22,802	114 0 2

CROSS BREEDING EXPERIMENTS.

8. Experiments were conducted here on wheats and cottons. There were in all 17 varieties of wheat and 7 varieties of cotton under experiment. Owing to the adverse character of the season the results were not so favourable as at Poona.

DAIRY AND DAIRY HERD.

9. The following statement shows the strength of the dairy herd on the Surat Farm :—

Description.	Strength on the 31st March 1901.	INCREASE.			DECREASE.				Strength on the 31st March 1902.	VALUATION.		Increase or Decrease.
		Purchased or transferred.	Born.	Total.	Sold.	Died.	Transferred.	Total.		On the 31st March 1901.	On the 31st March 1902.	
<i>Cows.</i>												
Stud bulls	1	...	...	...	...	...	...	...	1	Rs. 90	Rs. 80	Rs. -10
Cows	17	...	...	...	1	...	...	1	16	725	730	+55
Heifers	3	...	...	...	...	...	...	...	3	65	80	+15
Cow calves	2	...	2	2	...	...	...	...	4	10	26	+16
Bull calves	1	...	4	4	...	...	...	...	5	20	120	+100
Total	24	...	6	6	1	...	...	1	29	910	1,086	+176
<i>Buffaloes.</i>												
Bull-buffaloes	3	...	...	...	...	...	1	1	1	60	40	-20
She-buffaloes	23	...	...	...	4	...	...	4	18	1,490	1,230	-260
Heifers	15	...	...	...	...	...	13	13	2	285	70	-215
She buffalo calves	5	...	4	4	1	...	5	6	3	25	15	-10
Bull buffalo calves	3	...	5	5	...	1	2	3	5	6	16	+10
Total	47	...	9	9	5	1	21	27	29	1,846	1,421	-425
Grand total	71	...	15	15	6	1	21	28	68	2,756	2,507	-249

10. The following balance sheet shows the net cost to Government of the working of the Surat Farm and the Dairy during the year 1901-1902:—

Receipts and Value.	Amount.	Expenditure.	Amount.
	Rs. a. p.		Rs. a. p.
To Value of Farm crops produced and in stock	781 5 10	By Cost of Establishment account	1,289 4 0
„ Profit on seed and store account	48 2 11	„ Cost of office supplies account	69 11 9
„ Profit in Hay-making account	657 0 6	„ Telegram and service stamps account	52 4 0
„ Increase in valuation of all stock, Live and Dead	843 4 3	„ Travelling Allowance account	112 5 3
		„ Incidental account	372 14 11
		„ Rent and Taxes account	2,209 0 0
		„ Farm Labour account	1,903 6 5
		„ Up keep of work cattle	1,456 7 8
		„ Repairs and skilled labour account	32 7 6
		„ Dead stock account	161 6 0
		„ Working of the Dairy and maintaining Dairy Herd	1,086 11 6
		„ Bad Debt account	37 6 3
Total	2,329 13 6		
Net Cost to Government	6,633 7 9		
Total	8,963 5 3	Total	8,963 5 3

11. Mr. Bhimbhai M. Desai was in charge of the Surat Farm throughout the year under report. His services have been transferred to the Hissar Farm, United Provinces, since April last. Mr. M. L. Kulkarni, the manager of the Northcote Gowshala, has been appointed to fill up the vacancy.

THE NORTHCOTE GOWSHALA.

This institution is under the control of the Honourable Mr. F. S. P. Lely, Commissioner, N. D., and President of the Gujarát Cattle Preservation Association, and is managed by the Deputy Director of Agriculture. There are at present 633 head of cattle. Since the 1st of January last 79 castrated male calves have been sold, 50 out of which were purchased by His Excellency the Governor through the Honourable Mr. Lely and distributed among some of the Pátidárs who have been hit hard by the famine. The stock is in excellent condition so far, but it may well be imagined that the present is an anxious time for the management owing to the withholding of the rains.

From
THE HONORARY SECRETARY,
 Agricultural Association, Nadiád;
 To
THE COLLECTOR OF KAIRA.

Nadiád, 2nd July 1902.

SIR,

I have the honour to submit a brief report on the working of the Nadiád Agricultural Association's Experimental Farm for the year ending 31st March 1902.

SEASON.

2. The season commenced very late in July. The fall in that month was sufficient and well distributed for sowing kharif crops. The rain in August gave much vigour to the standing crops, but towards the end of that month it ceased altogether. The early cessation of the monsoon did much damage to all the standing crops. Then appeared rats which destroyed all what was spared through the drought. The scanty rains, an attack of caterpillars, and an unparalleled plague of rats did their worst during the year under report.

Series I.

3. Each plot measures one-fifth of an acre. The objects of the experiment are to test tobacco grown in rotation with jowár and bájri with tobacco grown continuously without rotation; the effect of deep ploughing on tobacco as compared with ploughing at ordinary depth; and to compare indigenous with Sumatra tobacco.

The continuous plots are manured every year with 30 cart-loads (about 15 tons) of farm-yard manure and top-dressed with 300 lbs. of nitre per acre in December-January. The rotation plots receive a similar treatment in the year of tobacco. It may be stated that the farm is situated in the centre of a tobacco-growing country, where the local practice is to grow tobacco in the same fields without rotation. These fields are manured every year and are kept up in a state of high fertility.

Description.	Cured Tobacco per acre.				
	1897-98.	1898-99.	1899-1900.	1900-1901.	1901-1902.
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
Tobacco in rotation	956½	1,036½	1,187½	780	1,470
Tobacco continuous (ploughed in the ordinary way).	982½	1,296½	1,056½	690	1,820
Tobacco continuous (deeply ploughed) ...	1,162½	1,674½	1,393½	850	1,840
Sumatra tobacco (continuous) ... ..	...	...	...	...	1,240

4. The above figures tend to the conclusions —

(a) That a better yield is obtained by growing tobacco continuously than in rotation. It may be also observed that tobacco is a much more valuable crop than bájri, jowár or tur grown in rotation; whereas the outturn of the former averages Rs. 150 per acre, that of the latter comes to about Rs. 40 and under.

(b) That deep tillage increases the outturn.

(c) That the cultivation of tobacco in rotation is less liable to *Agio*—a root parasite (a species of *orabanche*).

(d) That the Sumatra tobacco cannot be grown profitably for the local market.

5. In the middle of August the rain stopped and made the transplanting of tobacco a difficult task. The rotation plot had to be transplanted thrice. The Sumatra tobacco ripened first. The characteristic of this variety is that the

lower leaves ripen earlier than the upper ones. This influences greatly the quality and quantity of the crop, as according to the local practice the whole crop is harvested at one time. Next year we intend to remove the leaves individually as they ripen. In the month of January *Agio* appeared in tobacco plots. The continuous tobacco-growing plots were severely attacked. To check its growth next year these plots were put under hot weather or *sundhia jowár*. The results of the *jowár* are as under :—

Plot.	Description.	Grain per Acre.	Fodder per Acre.
		Lbs.	Lbs.
6	Jowár grown on continuous tobacco-growing plot.	925	6,165
7	Do. do. do. but deeply ploughed.	945	5,240
8	Jowár grown on plot where Sumatra tobacco was planted.	1,010	6,300

6. The results of *jowár* of this year with those of the previous years are as below :—

Year.	Grain per acre.	Straw per acre.
	Lbs.	Lbs.
1897-98	702½	787½
1898-99	612½	701¼
1899-1900	335	265
1900-1901	655	500
1901-1902	980	1,390

7. The results of *bájri* are as under :—

Year.	Grain per acre.	Straw per acre.
	Lbs.	Lbs.
1897-98	668¾	3,110
1898-99	512½	2,042½
1899-1900	270	3,625
1900-1901	515	1,455
1901-1902	1,110	5,450

Series II.

8. A comparative experiment to show the results of growing *bájri* in rotation with tur and tobacco with *bájri* grown continuously with pulse mixture. The rotation plot is manured with 30 cart-loads (about 15 tons) of farm-yard manure and 300 lbs. of castor cake in the year of tobacco, whereas the continuous plot receives one-third of this quantity annually.

9. The results of *bájri* alone are noted below :—

Year.	Grain per acre.	Straw per acre.
	Lbs.	Lbs.
1897-98	688¾	3,701½
1898-99	543¾	3,037
1899-1900	287	4,020
1900-1901	232½	1,125
1901-1902	1,275	5,830

10. In comparison with the above the mixed crop results are as below :—

Crop.	OUTTURN PER ACRE.									
	1897-98.		1898-99.		1899-1900.		1900-1901.		1901-1902.	
	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.
Bájri	592½	2,556½	106½	651½	220	2,920	107½	600	1,000	4,810
Mag	105	...	...	...	85	...	...	...
Math	15	...	...	...
Chola	80	...	...	...	25	...	...	...
Tur

The pulses in this plot came to nothing. After the harvest of bájri what was left in the field was destroyed by rats.

The results of white tur are as under :—

Year.	Outturn per acre.	Bhusa per acre.
	Lbs.	Lbs.
1897-98	1,056½	Figures not available.
1898-99	1,043½	Do.
1899-1900	342½	Do.
1900-1901	715	1,415
1901-1902	240	610

This is the only year when tur gave such a low yield. Tur resists drought, but there was no moisture at all in the soil owing to the failure of rains for the last three years.

11. The results of the tobacco plot are as below :—

Year.	Outturn per acre.	Remarks.
	Lbs.	
1897-98	912½	} Manured with 30 loads of farm-yard manure and 300 lbs. castor cake per acre.
1898-99	1,572½	
1899-1900	1,806½	
1900-1901	905	
1901-1902	1,890	

12. The following table shows the details of all the tobacco plots in the above two series. The cost of cultivation is high when all the labour is paid for. It, however, means that the cultivator who grows his own crop of tobacco receives a better remuneration for his labour than the cultivator of ordinary crops. Castor cake has proved more effective than nitre, but this requires confirmation by further trial.

Description.	Manure per acre.	Outturn per acre.	Cost of cultivation per acre.	Value of outturn per acre.
		Lbs.	Rs.	Rs.
Tobacco grown in continuous plot.	30 loads of farm-yard manure and 300 lbs. nitre.	1,820	112	148
Tobacco, continuous plot deeply ploughed.	Do. ..	1,840	110	149
Tobacco in rotation with bájri and jowár.	Do. ...	1,470	117	119
Tobacco in rotation with bájri and tur.	30 loads of farm-yard manure and 300 lbs. castor cake.	1,890	93	154
Sumatra tobacco ...	30 loads farm-yard manure and 300 lbs. of nitre.	1,240	93	101

Series III.

13. The object of the experiment is to determine how long a rotation of bájri, tur and castors can be successfully grown on land which will be well cultivated and cleaned every year but not manured. The results of bájri, castors and tur are tabulated below :—

Year.	OUTTURN PER ACRE.							
	Bájri.		Tur.		Castor.			
	Grain.	Straw.	Grain.	Bhusa.	Nuts.			
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.			
1897-98	576½	2,971½	1,053½	...	396½
1898-99	491½	2,370	1,006½	...	265
1899-1900	830	...	...	...
1900-1901	515	1,980	225	500	190
1901-1902	950	5,910	137½	250	135

Series IV.

14. The object of the experiment is to compare Farfario jowár with Amario jowár, both to be rotated with tur, tal and soy-beans. The results are as under :—

Crop.	OUTTURN PER ACRE.				REMARKS.			
	1900-1901.		1901-1902.					
	Grain.	Straw.	Grain.	Straw.				
	Lbs.	Lbs.	Lbs.	Lbs.				
Farfario	117½	2,327½	685	5,430	Each plot is manured every third year, when under jowár, with 20 loads of farm-yard manure per acre.
Tal	35	...	
Tur	255	550	10	140	
Soy-bean	225	375	55	2,395	

Crop.	OUTTURN PER ACRE.				REMARKS.			
	1900-1901.		1901-1902.					
	Grain.	Straw.	Grain.	Straw.				
	Lbs.	Lbs.	Lbs.	Lbs.				
Amario	75	2,285	1,080	5,250	Each plot is manured every third year, when under jowár, with 20 loads of farm-yard manure per acre.
Tal	10	...	
Tur	342½	650	5	65	
Soy-bean	175	275	50	2,750	

The crop of tal was a promising one, but was destroyed by rats. Soy-beans grew very luxuriantly, but failed for want of sufficient moisture. An attempt was made to introduce soy-bean Dál (split pulse) into the market, but the strong and unpleasant flavour of the cooked pulse is not liked by the people. It gives a nourishing fodder to the milch cattle, and cattle of this place eat it greedily.

Series V.

15. The object of this series is to compare Deshi bájri with giant Bháv-nagari bájro, each to be rotated with a mixed crop of kodra with pulses. The bájri and bájro to be manured with 20 cart-loads of farm-yard manure every year; the kodra mixture to be unmanured.

16. The results of bájri and bájro are as under :—

Years.					OUTTURN PER ACRE.			
					Giant Bájro.		Deshi Bájri.	
					Grain.	Straw.	Grain.	Straw.
					Lbs.	Lbs.	Lbs.	Lbs.
1897-98	...	...	...	...	762½	3,852½	686½	3,192½
1898-99	...	...	...	...	658½	2,700	358½	2,290½
1899-1900	...	...	...	...	...	...	...	840
1900-1901	...	...	...	...	285	1,260	595	2,250
1901-1902	...	...	...	...	1,205	7,085	1,515	6,750

17. The results of kodra and subordinate mixture are as below :—

Crop.	1897-98.		1898-99.		1899-1900.		1900-1901.		1901-1902.		
	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.	
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	
<i>Bájro Rotation.</i>											
Kodra	...	251½	280	136½	179½	...	...	375	800	210	1,075
Tal	7½	...	115	...
Tur	...	392½	495	617½	1,690	...	...	35	100	...	...
Sheria	21½	...	...	...	...	...	45	65 fibre
Gowár	36½	32½	...	...	250	200	135	145
<i>Bájri Rotation.</i>											
Kodra	...	393½	445	113½	143½	...	...	325	700	150	875
Tal	6½	...	205	...
Tur	...	442½	545	557½	1,525	...	...	...	...	...	...
Sheria	18½	...	...	...	...	...	35	60
Gowár	31½	27½	...	...	165	125	30	55

In this series the crop of Deshi bájri was very good. The results of kodra mixture show the advantage of growing a subordinate mixture crop. This year the kodra failed on account of scanty rains, but a good crop of tal, gowár, sheria, &c., was obtained.

Non-Experimental Area.

18. The following three varieties of bájri were tried on the farm :—

(1) *Málbandro or Madhodri.*—A local variety. The straw is finer and thinner than that of the Deshi bájri.

(2) *Awoned Bájri.*—This is grown in the Ahmednagar District. The spikes have a hairy or bristly appearance. These bristles when fully developed protect to some extent the head of grain from birds. Straw coarse and grain smaller than the Deshi variety.

(3) *Vizágápatam Bájri.*—A small parcel of bájri seed was received from Mr. B. B. Wood, Assistant Collector, for trial on this farm. The seed was sown in seed beds at the beginning of monsoon. In July, when the rain

was sufficient the seedlings were taken up, 2 inches of the top of the blades cut off and transplanted a foot apart in a field specially prepared. It tillered very well and grew taller. The grain is very small and hard. It is inferior in quality and cannot be sold in the market for the prices prevailing. The ears are thin and of medium size and the stalk long, thin and fine. The results per acre are as below :—

Crop.	Grain.	Straw.	Cost of cultivation.	Value of outturn.
	Lbs.	Lbs.	Rs.	Rs.
Málbandro ...	880	6,136	25	36
Awne'd ...	1,160	7,910	25	46
Vijágá pattam ...	1,132	5,400	28	42

Garden Crops.

19. *Suran* (*Amorphophallus campanulatus*) was planted in May and in July; chillies were planted in the water channels. When the suran plants dried, a few seeds of Dudhi (*Lagenaria vulgaris*) in each bed were sown. Suran grew vigorously, but was attacked twice by white ants. The first attack was checked by an application of castor cake, but after three months it was again attacked. The results per acre are as under :—

Crop.	Yield.	Cost of cultivation.	Value of outturn.
		Rs.	Rs.
Suran ...	12,670	766	635
Dudhi ...	6,120		
Chillies ...	1,975		

The initial cost of this crop is always heavy. The seed was purchased at a very high price. Besides, the crop was required to be watered constantly at a very high expenditure owing to dry season. An artificial irrigation does not give the same vigour as the natural rainfall.

20. *Turmeric* (*Curcuma longa*).—This was a poor crop. The outturn was much below the average on account of unfavourable season :—

Crop.	Yield per acre.	Cost of cultivation per acre.	Value of outturn per acre.
		Rs.	Rs.
Turmeric ...	800	302	130
Yams ...	1,314		
Chillies ...	1,805		

21. *Groundnut* (*Pondicherry*).—The seed was supplied by the Agricultural Department. The crop flourished well up to the beginning of October, when rats appeared. The vermin ate the pods as soon as they were formed in the ground. The whole field was thus destroyed. A small quantity of seed was distributed to cultivators for trial, but that too shared the same fate. We wish to give a further trial to this crop the next year.

22. *Sweet Potatoes (Ipomœa batatas)*.—Two kinds were planted. The white variety is unknown here. It was imported from Poona. The red variety gave a fair outturn, while the other was poor in yield owing to the appearance of rats. The white variety produced only long thin roots. The rats in their zeal to get at the tubers earthed up the sweet potato vines in many places. The vines took root where earthed up and produced bunches of small and useless tubers instead of a few developed ones:—

Crop.	Yield per acre.	Cost of cultivation per acre.	Value of outturn per acre.
		Rs.	Rs.
Red variety	9,960	86	172
White variety	5,180	86	83

23. *Guinea-grass (Panicum jumentorum)*.—A small area was under Guinea-grass during the year under report. It grew luxuriantly in August and September, but it did not grow well in other months. The yield of the crop is very low. The results are as under:—

Crop.	Yield per acre.	Cost of cultivation per acre.	Value of outturn per acre.
		Rs.	Rs.
Guinea-grass	11,939	136	60

24. *Tobacco Varieties*.—The following varieties of tobacco were grown on the farm. The object was to show the cultivators the different varieties existing in the Presidency and allow them to select the best:—

(1) Shamru or Deshi	...	...	... Nadiad.
(2) Peelio	...	...	... Do.
(3) Peelio	...	...	... Baroda.
(4) Kalio	...	...	... Do.
(5) Kelio	...	...	... Do.
(6) Shendi Surati	...	...	... Belgaum.
(7) Bhopli	...	...	... Do.
(8) Karibágláni	...	...	... Do.
(9) Yával I	...	...	... Khándesh.
(10) Yával II	...	...	... Do.

These varieties are described in detail by Mr. Mollison on page 11 of the Poona Farm Report for 1900. Instead of describing them again I will give the opinions of cultivators on them. These varieties were seen and examined by many cultivators. They group all these into four varieties, which are shown below in the order of their merit:—

- (1) Shamru, Yával II, Kalio.
- (2) Peelio, Kelio.
- (3) Karibágláni, Shendi Surati, Bhopli.
- (4) Yával I.

In the opinion of the cultivators Shamru comes first in quality and quantity, and the Belgaum varieties second. The cultivators want a variety of tobacco that will give a fleshy thick leaf which will smoke strong. The yield from all these varieties per acre was 1,780 lbs.

25. We had this year taken a piece of land for rabi cultivation near our farm on condition that we should give the owner one-third of the produce. The owner supplied the manure. The plot was sown with Jiru (*Cuminum cyminum*) and Ajmo (*Carum copticum*). The results per acre are as below:—

Crop.		Outturn.	Cost of cultivation, excluding the cost of manure.	Value of outturn.
			Rs.	Rs.
Jiru	...	426	} 49	} 88
Ajmo	...	166		

Out of Rs. 87-15-9, the value of the whole produce, Rs. 29-5-3 were paid to the owner and there was thus a net profit of Rs. 10 after deducting the cost of cultivation.

26. The work of the Seed Depôt was performed by the Superintendent of the farm and by the Association's clerk. Various kinds of seeds, amounting to Rs. 124-15-0, were sent to Poona, Surat, Nagar, Nágpur, Hissár, Burdwán, &c. A little demand was made by the local cultivators.

The sales in the preceding four years were as under :—

Year.			Rs.	a.	p.
1897-98	894	4 3
1898-99	208	5 3
1899-1900	494	11 11
1900-1901	259	15 4

27. Mr. D. H. Tagáre was the Superintendent of the Farm during the year, and I am glad to write that he has given every satisfaction in the management of the farm. He was deputed to Ahmedabad to receive cattle that were despatched from Hissár. He also accompanied Mr. Burkill, the Reporter on Economic Products to the Government of India, to show him the places of agricultural interest.

28. The Agricultural Association in the year under report spent Rs. 116-13-5 in repairing the farm well and cattle-shed.

29. The following statement shows the income and expenditure in the year under report :—

Receipts.	Amount.	Expenditure.	Amount.
	Rs. a. p.		Rs. a. p.
To cash balance on 1st June 1901	6,867 9 4	By pay of the Superintendent	600 0 0
„ Sale-proceeds of the Farm	514 5 7	„ Pay of the Servants	127 0 0
„ Miscellaneous receipts...	73 1 10	„ Pay of the Association's Clerk	120 0 0
„ Sale of green grass	25 7 0	„ Travelling allowance	15 13 0
„ Interest on the capital	210 14 0	„ Purchase of Stationery and Postage Stamps, &c.	19 7 0
„ Subscriptions of the Agricultural Pamphlet for the previous years	461 12 9	„ Purchase of seed	172 0 8
„ Donation from the Nadiád Municipality	150 0 0	„ Labour	277 2 8
„ Contribution from the District Local Board, Kaira	500 0 0	„ Purchase of concentrated food and fodder for four bullocks	152 1 9
„ Value of manure on hand on 1st June 1901	71 5 0	„ Purchase of manures	105 0 6
„ Value of seed on hand on 1st June 1901	3 13 6	„ Purchase of dead-stock and repair of implements	33 15 3
		„ Tax on the bungalow	3 4 0
		„ Miscellaneous	8 11 6
		„ Printing pamphlet	25 8 0
		„ Repair of well and cattle-shed	116 13 8
			1,776 13 0
		„ Seed on hand on 1st June 1902	131 5 9
		„ Fodder on hand on 1st June 1902	31 7 6
		„ Amount to be recovered for supplying Jowár to Hissár, Burdwán, &c.	22 12 4
			1,962 6 7
		„ Cash balance in the Saving Bank	6,896 8 3
		„ Cash balance on hand on 1st June 1902.	19 6 2
		Balance	6,915 14 5
Total	8,878 5 0	Total	8,878 5 0

30. In conclusion I beg to express my thanks to the members of the Association, and especially to Mr. Mehta, Deputy Director of Agriculture, who frequently visited the farm and assisted the Association in the work. The Association is also much thankful to the Collector of Kaira.

I have the honour to be,

Sir,

Your most obedient Servant,

JHAVERBHAI SAMALBHAI,

Honorary Secretary,

Agricultural Association, Nadiád.

The above report is published for the first time under the orders of Government. The Association maintains a small experimental farm, measuring 7 acres, near Nadiád in the Kaira District. The land is granted free of assessment for the purposes of agricultural experiments. The farm is managed by the Association in consultation with the Deputy Director of Agriculture by whom this report has been approved.

FROM

THE JOINT HONORARY SECRETARIES,
Agri-Horticultural Society of Western India,
Poona;

TO

THE CHIEF SECRETARY TO GOVERNMENT,
Revenue Department,
Bombay.

Poona, 23rd May 1902.

SIR,

With reference to Government Resolutions Nos. 771 and 5226, Revenue Department, dated, respectively, 18th February 1892 and 13th July 1897, we have the honour to forward the financial statements of the Empress and Bund Gardens, Poona, for the year ending 31st March 1902.

2. The accounts were audited as usual by the Director, Land Records and Agriculture's office. The audit memorandum is attached.* The balance sheets show that the total expenditure on account of both gardens was Rs. 14,676-4-5 and the receipts Rs. 14,237-14-11, leaving a deficit of Rs. 438-5-6 to be met from the grant of Rs. 3,000 guaranteed by Government. We request early sanction for the payment of this amount. The receipts and disbursements both are Rs. 1,500 higher than those of the previous year, leaving the deficit for this year about the same as for last year.

The Empress Gardens.

3. It is satisfactory to note that the remarkable progress indicated last year has been more than maintained contrary to anticipations. The net income from all sources shows an increase of Rs. 1,000 over that of the preceding year. The following statement will serve to make a comparison of the income derived from the four principal sources:—

	1898-99.	1899-1900.	1900-1901.	1901-1902.
	Rs.	Rs.	Rs.	Rs.
Sale of seeds	2,966	2,485	3,183	3,477
Sale of cut flowers	1,578	1,909	2,016	2,796
Sale of plants	2,354	2,689	3,717	4,425
Sale of fruits and vegetables	1,598	1,730	2,614	2,239

It will be observed, there is a large increase in the sale of seeds, cut flowers and plants, while there is a falling off in the income from fruits and vegetables. The reputation of the gardens for supplying reliable seed has been established.

4. The gardens are always well stocked with flowers. The continued increase of income from cut flowers is a decided indication that the attractiveness of the gardens is appreciated by the public. The revenue derived under the head consists of:—

	Rs.
Cut Flowers	1,863
Bouquets and Button Holes	406
Wreaths and Crosses	427
Flower Decorations	100
Total	2,796

5. The great increase in the sale of plants commented on in our report for last year has been further augmented. The demand for garden plants and roadside trees has been large, being for this year of the value of Rs. 3,046 as against Rs. 2,364 for last year, an increase of Rs. 700 nearly.

6. Fruits and vegetables both show a decrease as below:—

	1899-1900.	1900-1901.	1901-1902.
	Rs.	Rs.	Rs.
Fruits... ..	1,330	2,121	1,869
Vegetables	400	493	370

The vine crop has proved a failure owing to unseasonable showers and to the fungoid disease which is always more or less present. The vegetables yielded less owing to the restricted area available for them and the absence of heavy manuring, which is necessary to the impoverished land.

* Not printed.

7. On the expenditure side the increase in some items is due to the greater volume of business done, now amounting to nearly Rs. 30,000 on the debit and credit sides taken together. The increase is in the items of seeds, pots, tools and in garden labour.

8. The following "Special improvements" were undertaken during the year at costs given against them:—

	Rs.
Building residential quarters for the Mális	600
Building tharolas or platforms to two of the wells in the garden	450
Wire fencing on two sides of the compound of the Superintendent's bungalow and two sides of the field at north-west corner	665
Levelling roads, &c.	92
Total ...	1,807

The necessity of quarters for the Mális was felt, as they were badly housed in out-houses; also of a water-supply independent of that from the canal for vegetable and fruit cultivation. Such expenditure is on capital account and must be considered as an asset of the gardens, adding to its financial value, and if not taken into account in the ordinary expenditure of the garden, the balance sheet would show an excess of income over expenditure of more than Rs. 2,100.

9. The term for which the gardens were given in the management of the Society has expired with the year under report. During the ten years, the Society has had charge of the gardens, improvements tending to beautify and extend the gardens have been effected to which their great popularity testifies. Fresh plots of ground have been brought under fruit and flower cultivation, new roads made, office and other buildings erected, wells repaired and brought into use, trees and plants labelled (a task carried out by Mr. Symonds), a very large addition made to the number of plants in pots and in the ground, the affairs of the garden placed on a sound basis, which unforeseen circumstances only can shake. The Society trust that Government will consider that the trust has been discharged satisfactorily.

Bund Gardens.

10. The balance sheet for the year is appended, giving also figures for the previous year for ready comparison. There is an improvement in the receipts under the two principal heads of "cut flowers" and "plants" of Rs. 266 over the last year. A contribution of Rs. 100 was received from the Suburban Municipality. The deficit for the year under report is Rs. 775, of which, however, Rs. 335 are due to sums spent on "Special improvements"; the actual deficit in the working would, therefore, be Rs. 440 as against Rs. 788 in the previous year.

11. The "Special improvements" cost Rs. 115 for repairs to the Bandstand which was sadly in want of them. Rs. 30 for repairing and painting the seats and tubs, and Rs. 190 for erecting a new corrugated iron covered seed and store room. It was considered advisable to have a place where seed could be kept for sale, as frequent enquiries were made to buy seed of the several annuals growing in the Bund Gardens, by visitors who had to be referred to the Empress Gardens, where in many cases probably they did not find it convenient to go. It is hoped that with a stock of seed obtainable on the spot, the sale will soon repay the outlay on the seed room.

12. The Bund Gardens have now been for 3 years in the management of the Society, and they are now gradually being brought to a state, something like what they were when they were considered to be one of the sights of Poona.

We have the honour to be,

Sir,

Your most obedient Servants,

N. PUDUMJEE,

H. M. PAGE,

Joint Honorary Secretaries,

Agri-Horticultural Society of Western India.

ANNUAL REPORT

ON THE

EXPERIMENTAL FARMS

IN THE

BOMBAY PRESIDENCY

For the year ending 31st March 1905.



BOMBAY :
PRINTED AT THE GOVERNMENT CENTRAL PRESS.

1905.

[Indian Price—14 Annas.]

[English Price—1s. 4d.]

OFFICIAL AGENTS FOR THE SALE OF INDIAN
OFFICIAL PUBLICATIONS.

In England.

E. Arnold, 41 & 43, Maddox Street, Bond Street, W., London.
Constable & Co., 16, James Street, Haymarket, W., London.
P. S. King & Son, 2 & 4, Great Smith Street, Westminster, S.W.,
London.
Kegan Paul, Trench, Trübner & Co., Charing Cross Road, W.C.,
London.
B. Quaritch, 15, Piccadilly, W., London.
Henry S. King & Co., 65, Cornhill, E. C., London.
B. H. Blackwell, 50 & 51, Broad Street, Oxford.
Deighton Bell & Co., Cambridge.

On the Continent.

Friedlander & Sohn, 11, Carlstrasse, Berlin.
Otto Harrassowitz, Leipzig.
Karl W. Hiersemann, Leipzig.
Ernest Leroux, 28, Rue Bonaparte, Paris.
Martinus Nijhoff, The Hague.

In India.

Higginbotham & Co., Madras.
V. Kalyanarama Iyer & Co., Madras.
Thacker, Spink & Co., Calcutta.
W. Newman & Co., Calcutta.
S. K. Lahiri & Co., Calcutta.
R. Cambay & Co., Calcutta.
Thacker & Co. (Ld.), A. J. Combridge & Co., and Curator,
Government Central Book Depot, Bombay.
D. B. Taraporevala, Sons & Co., Bombay.
Sunder Pandurang, Bookseller, etc., Bombay.
N. B. Mathur, N. K. H. Press, Allahabad.

ANNUAL REPORT

ON THE

EXPERIMENTAL FARMS

IN THE

BOMBAY PRESIDENCY

For the year ending 31st March 1905.



BOMBAY :
PRINTED AT THE GOVERNMENT CENTRAL PRESS.

1905.

List of Annual Reports on Government Farms.

						Pages.
I.—By the Deputy Director of Agriculture—						
1.	Surat Farm	...	...	...	...	8—19
2.	Nadiád Farm	...	...	...	...	20 & 21
3.	Dhárwár Farm	...	...	...	...	22—25
4.	Chhárodi Plot	...	...	...	...	26
5.	Jalgaon Plot	...	...	...	...	27
6.	Dhoronáro Farm	...	...	...	...	28—30
7.	Mirpurkhás Farm	...	...	...	...	31—33
II.—By the Professor of Agriculture—						
8.	Poona Farm	...	...	...	...	39—50
9.	Dairy and Dairy Farm	...	...	...	...	53—63
10.	Mánjri Farm	...	...	...	...	67—80
11.	Rice Experiments	...	...	...	...	83—94
12.	Sewage Farm	...	...	...	...	97—100
III.—By the Economic Botanist—						
13.	Ganesb Khind Botanical Gardens	...	...	...	...	103—106

CONTENTS.

	Page.	Para.
Farms under Report	7	1
Notes on the Season	7	2—5
Operations on the Surat Farm—		
Season and Rainfall	8	6
Experiments planned	8	7—11
Manurial Experiments—		
Various manures on Cotton, Jowár, Tuer and Til	8—10	12, 13, 15—17
Night soil	9	14
Cultural Experiments	10	18
Insecticidal Experiments	10	19
Varietal Experiments on Groundnuts...	11	20
Experiments that failed entirely	11	21 & 22
Cotton Breeding	11—13	23
Rotation and Manurial Experiments (permanent plots)—		
Scheme	14	24
Continued investigation of the error	14, 16—18	25, 29—35
Results of the year under report	14—16	26—28
Dairy Herd	18	36
Distribution of seed, manures, cattle and implements	18 & 19	37—39
Visitors	19	40
Statements of Accounts	19	41
Operations on the Nadiád Farm—		
New constructions	20	42—45
Season and Rainfall	20	46 & 47
Only one reliable result obtained	20 & 21	48—50
Seed Distribution	21	51
Visitors	21	52
Statement of Accounts	21	53
Operations on the Dhárwár Farm—		
Season	22	54
Steeping Experiments	22	55
Manurial Experiments—		
On wheat	22	56
On jowár	22	57
On cotton	23	58
Varietal Experiments—		
With cotton	23	59
With jowár	23	60
With wheat	23	61
Cultural Experiments—		
On time of sowing of cotton	23 & 24	62—65
On drills for cotton	23	58
Failure of potatoes	24	66
Pests	24	67
Distribution of seed, implements, &c.	24	68 & 69
Visitors	24	70
Accounts	25	71
Operations on the Chhárodi Plot	26	72
Operations on the Jalgaon Plot	27	73—75
Operations on the Dhoronáro Farm—		
Initiation of Experiments in growing Egyptian Cotton	28	76—79
Method of cultivation employed	28	80

	Page.	Para.
<i>Operations on the Dhoronáro Farm—continued.</i>		
Yields and valuations of cottons grown . . .	28 & 29	81—83
Comparison with returns from the local variety . . .	29	84
Notes on varieties and quantity of water required... . . .	29 & 30	85 & 86
Question of Deterioration	30	87 & 88
Accounts	30	89
<i>Operations on the Mirpurkhás Farm—</i>		
Situation and soil	31	90
New crops introduced—		
Egyptian and American Cotton	31	91
Groundnuts	31	92
Bersim (Egyptian Clover)	31	93
Varietal trial of wheats	31 & 32	94 & 95
Accounts	32	96
Egyptian Cotton other than that grown on the farms	32	97
Groundnut other than that grown on the farm	33	98
White ants	33	99
Alkali in soils	33	100 & 101
Area in Sind cultivable with long staple cotton	33	102
Work of Superintendents	33	103

The following is a list of the Botanical and English equivalents of the vernacular names of the crops mentioned in this Report.

Botanical.	English.	Vernacular.
<i>Cereals.</i>		
Andropogon sorghum var. vulgare ...	Great millet ...	Jowári, Jowár (Chapti, &c.).
Do. var. cernuus ...	Do. ...	Sundhia.
Pennisetum typhoideum ...	Bulrush millet ...	Bájri, Bájro.
<i>Pulses.</i>		
Cajanus indicus ...	Pigeon pea ...	Tuer, Tur.
<i>Oil-seeds.</i>		
Sesamum indicum ...	Sesame ...	Tal, Til.
Arachis hypogea ...	Groundnut ...	Bhui-mung.
<i>Fibre Plants.</i>		
Crotolaria juncia ...	Bombay hemp ...	San.
Gossypium barbadense ...	Egyptian and Sea Island cotton.	
Do. hirsutum ...	American cotton.	
Do. herbaceum ...	Broach, Goghári, Lálio and Kumpta cotton.	Deshi Kapás.
Do. neglectum ...	Khándesh, Nágpur and Sind cotton.	Jari or Varádi Kapás.
Do. indicum ...	Hinganghát cotton ...	Bani Kapás.

Kadbi = Stem and leaves of Jowár.

I.—Report by the Deputy Director of Agriculture.

During the year under report the following farms and plots were under my charge, *viz.* :—

Serial No.	Name of Farm or Plot.	Name of nearest town.	District in which situated.	Area of Farm.	Kind of Soil.	Average rainfall.	Rainfall, 1904.
1	2	3	4	5	6	7	8
1	Surat ...	Surat ...	Surat ...	84 acres and 150 acres pasture.	Káli, Black cotton soil (clay).	42·00	14·23
2	Nadiád ...	Nadiád ...	Kaira ...	4½ acres.	Gorádu (sandy) ...	35·00	12·87
3	Dhárwár ...	Dhárwár ...	Dhárwár ...	7½ acres.	(a) black clay, (b) red sandy.	32·73	26·93
4	Dhoronáro ...	Umarkot ...	Thar and Párkar ...	14½ acres.	Light loam ...	6·72	3·57
5	Mirpurkhás ...	Mirpurkhás ...	Do. ...	46 acres.	Light loam ...	5·88	7·02
6	Jalgaon Plot ...	Jalgaon ...	Khándesh ...	6 acres.	Black cotton soil.	31·55	30·12
7	Chhárodi Plot ...	Virangám ...	Ahmedabad ...	2½ acres.	Black loam ...	26·35	13·16
8	Hyderábád Plot ...	Hyderabad ...	Hyderabad (Sind).	4 acres.	Light loam ...	8·00	1·46

2. *Season.*—In the Presidency proper the monsoon was a very poor one in all the districts named in column 4 above except in the case of Dhárwár and Jalgaon and almost entirely failed in the case of Surat. The inadequate nature of the rainfall will be seen from a comparison of columns 7 and 8. In the case of the Surat Farm the rainfall was considerably less than that indicated above which was measured in the City. As a rain-gauge has only recently been erected on the farm it is impossible to say exactly how much rain the crops actually received.

3. Owing to this failure of the rains the majority of the experiments on the Surat and Nadiád Farms and the Jalgaon and Chhárodi plots lead to no conclusive results, practically no yield being given in the case of crops on the two first named except where irrigation was resorted to. In the case of the Nadiád Farm, moreover, a severe frost at the end of January very seriously injured many of the irrigated crops and this damage completely masked all results of their cultural treatment and makes it unsafe or impossible to draw any inferences therefrom. Further, the utility of the oil-engine recently erected on one of the wells could not be decisively tested since the level of the water in the well was about 5 feet below the normal and the engine could in consequence work at full efficiency for only about 40 minutes each morning, after which the water-supply gave out (see below paragraph 43); further, as this farm was occupied as recently as the monsoon of 1903-1904, the operations of the experiments under report were almost entirely of a preliminary nature.

4. In the case of the Dhárwár Farm the monsoon, though good, was not normal, the later rains being deficient; moreover, as this was the first season of the working of the farm, operations thereon were necessarily more or less preliminary in character owing to the relative capacities of the soil of the different parts of the farm being unknown.

5. Under abnormal seasonal conditions that prevailed on all the farms in the Presidency proper no very definite conclusions can be drawn even from many of the experiments which, owing to the failure of rain, were not a complete failure. The more important results are given below under the headings of the various farms.

OPERATIONS ON THE SURAT FARM.

Season.

6. The rainfall of the year was as follows :—

Month.	Rainfall in inches.	
	1904.	Average rainfall of 20 years (1885—1904).
	In. cts.	In. cts.
May	0 00	0 15
June	2 12	7 78
July	4 75	17 66
August	1 74	7 68
September	3 91	5 09
October	0 88	1 46
November	0 00	0 18
December	0 00	0 05
	13 40	40 05

Owing to lateness in the breaking of the monsoon it was impossible to commence sowing on the farm area before the 7th of July. A total failure of crops was averted only by the fall in September.

7. On this farm a large series of manurial experiments were initiated to test the feasibility of applying to the principal crops of the district artificial manures such as Nitrate of Soda, Crude Nitre (Nitrate of Potash), Dissolved Bones, etc.

8. It was also intended to definitely test against bazar seed, farm seed which has been carefully selected for some years but, owing to the succession of bad years, to a large extent lost. It was hoped that some superiority would be shown by the selected seed, but owing to the unfavourable seasons, not only can no definite verdict be pronounced, but the selected seed was entirely lost. The cotton alone yielded anything and the result is given below for what it is worth, but is not reliable :—

Serial No. of plot.	Area.	Crop.	Seed used.	Yield per acre in seed cotton.
	A. g.			lbs.
1	1 0	Deshi cotton ...	Bazar ...	76
2—4	3 0	Do. ...	Farm selected ...	106
5	0 23	Goghári cotton ...	Bazar ...	71
6	0 23	Do. ...	Farm selected ...	276

9. The other principal line of work on the farm was the continuation of the breeding and selection of the hybrid cotton.

10. The permanent manurial and rotation plots reached the eighth year of existence (see below paragraph 24).

11. In addition to this the programme of work on the farm included the selection of the seed of the common crops of the district and the effect of irrigation after the close of the monsoon on the indigenous cotton of the district. Both these objects had to be abandoned owing to the scanty rainfall.

Taken in order the results are as follows.

Manurial Experiments.

12. The crops being almost complete failures no practical information was obtained as to whether Crude Nitre, Sodium Nitrate, etc., can be profitably applied to such crops as cotton and Jowar. The difference in action of the

artificial manures on the two crops is, however, interesting and is readily explicable on grounds analogous to those given in paragraph 27 below. The results were as follows:—

Manure applied.	PER ACRE.					
	Yields in lbs. of seed cotton and Kadbi.*					
	Cotton.			Jowár.		
	Broach Deshi.	Goghári.	Goghári.	Chapti.	Perio.	Sholápurí.
Sodium Nitrate, 100 lbs. ... + Dissolved bones, 390 lbs. ...	126½	117	81½	3,846	3,318	4,062
Crude Nitre, 160 lbs. ...	104	116½	69½	3,258	3,210	3,654
No manure ...	154½	229½	141	2,778	2,466	2,088
Sodium Nitrate, 100 lbs. ...	165½	207½	114	3,576	3,252	3,282
Castor Cake, 600 lbs. ...	169½	248	222½	2,976	2,736	2,034
Farmyard Manure, 5 tons ...	181½	210½	166½	2,544	2,586	2,134

* No grain was produced by the Jowár except a negligible quantity in the case of the Chapti variety manured with castor cake and farmyard manure.

13. A plot of Perio Jowár of 30 gunthas, manured at the rate of 400 lbs. per acre with Dissolved Bones, yielded at the rate of 517 lbs. of grain and 2,230 lbs. of Kadbi per acre. This result is the only one in which Jowár yielded an appreciable quantity of grain except as stated in the following paragraph. The yield in this case is probably not due to the manure but to the previous cropping, a half-kharif half-rabi Jowár having been grown on the plot in the previous season.

Night-soil Experiment.

14. The results of the application of night-soil to a mixed crop of Jowár and Tur are unreliable owing to the manner in which the figures were entered by the then Acting Superintendent of the Farm, Mr. Nágarwádia. Further the land had to be left fallow in the previous season to allow of the application and the increased yield is due in a very measure to this fact. It is impossible that the application of this manure in the fresh state can become general for this reason combined with the fact that Gujaráti cultivators will not use the substance. The figures of yield are not given.

15. Further manure experiments with Crude Nitre on a mixed crop of Jowár and Tur gave the following results which are here included for what they are worth:—

Crop.	PER ACRE.			Remarks.
	Manure.	Yield of		
		Grain.	Kadbi.	
Jowár ... Tur ...	160 lbs. of Crude Nitre.	288 61	2,050 0	It is impossible, owing to the abnormal season, to say whether the application of Nitre to Jowár will pay.
Jowár ... Tur ...	No manure.	249 61	1,855 0	
Jowár ... Tur ...	600 lbs. of Castor Cake.	261 90	1,818 0	

16. Similar manures on Tur alone give the following results :—

PER ACRE.			Remarks.
Manure.	Yield of grain.		
	Plot 1.	Plot 2.	
Nitre (150 lbs.) ..	72	288	In plot No. 1 Til was sown with the Tur as a mixed crop, but entirely failed.
No manure ...	153	459	
Castor Cake (600 lbs.) ...	139	321	

The no-manure plot here as in so many instances during the year under report has given the best results.

17. Farmyard manure *versus* no-manure on Til and Tur (of which Til failed) gave the following results :—

Manure.	Yield of grain per acre.
Farmyard manure ...	176
No manure ...	148

Cultural Experiments.

18. Goghári and Deshi cotton gave contradictory results with narrow drills as opposed to broad drills :—

Serial No. of plot.	Variety.	Drill.	Yield per acre.	Remarks.
1	Goghári ...	36"	184½	The soil of plot No. 3 is somewhat inferior.
2	Do. ...	18"	177½	
3	Deshi ...	25"	136	
4	Do. ...	18"	186½	

Insecticidal Experiments.

19. Small separate plots of cotton were treated under instructions from the Entomologist to the Government of India as follows :—

Serial No. of plot.	Treatment.
1	Lime and Sulphur sprinkled round the base of each plant as a preventive of stem-borer.
2	<i>Nil.</i>
3	Sprayed with lead arsenate as a preventive of boll worm.
4	<i>Nil.</i>

Plot No. 1 yielded less than plot No. 2, while plot No. 3 yielded 40 per cent. more than plot No. 4.

Varietal Experiments.

20. Groundnuts (under irrigation) gave the following results :—

Serial No.	Name of variety.	Area sown.	Yield in lbs.	Value of outturn.		Yield in lbs. per acre.	Value of outturn per acre.	
				Rs.	a. p.		Rs.	a. p.
1	Spanish Pea-nut	... 0 7.2	240	15	0 0	1,333	83	5 0
2	Japanese, small	... 0 7.8	312	19	8 0	1,600	100	0 0
3	Japanese, big	... 0 8.0	498	31	2 0	2,490	155	10 0
4	Pondichery	... 0 7.6	630	39	6 0	3,315	207	3 0
5	Virginia	... 0 7.8	601	37	9 0	3,082	192	10 0
6	Local or Deshi	... 0 7.6	300	18	12 0	1,579	98	11 0

A comparison with the results given in my last year's report shows that the *Pondichery* variety has regained the position it lost last year, as being, together with Virginia, the heaviest yielding of the varieties tried. These two varieties will probably prove of much value to cultivators as they have with considerable consistency yielded much better than the local variety.

21. Other experiments, all more or less failures from want of rain, are given below :—

Serial No.	Experiment.	Remarks as to result of short rainfall.
1	Steeping as a preventive of smut in Jowár.	No grain was produced.
2	Shallow <i>versus</i> deep cultivation of cotton.	The seed in the deep cultivated plot did not germinate well.
3	Breeding of rice	... The beds had to be artificially irrigated.
4	Do. of wheat	... Do. do.

22. Experiments on the effect of Nitrate of Soda and Crude Nitre on rice were performed on cultivators' fields, but owing the complete failure of this crop in the neighbourhood of the experiment the latter entirely failed.

Cotton Breeding.

23. To prevent the hybrids from being destroyed by the drought it was necessary to irrigate them once. The water thus supplied represents probably two inches of rainfall. The fibre of many of them was very kindly valued independently by Messrs. R. J. Tata and Sons, and the Bombay Chamber of Commerce. Owing to the abnormal seasonal conditions the valuations are not a strict criterion of the relative values of the hybrid cottons as compared with that of the bulk of the produce that came into the market during the year under report. This notwithstanding, a comparison with the valuations of the same hybrids given at paragraphs 4 and 5 of the last year's report, shows that selection is proceeding on sound principles and that in a normal year such hybrids as 1014, 1015, 1016, 1018, 1027 and 1027a in the following tabular statement cannot fail to demonstrate a very considerable amount of real progress towards securing an improvement in the quality of the Surti-Broach growth.

No. of Hybrid.	Parents.		Valuation of Hybrids per Bombay Candy (784 lbs.)				Counts of yarn.	Remarks.
			By Messrs. Tata and Fens, on 13th April 1905.					
	Female.	Male.	Value. Rs.	Percentage of increase over Broach.		1903-1904.			1904-05.
1001	Goghári ...	Broach ...	225	-10.9	9.8	40s	Much improved every way; colour white, class superfine, staple long and strong.	
1002	Broach ...	Goghári ...	225	-10.9	9.8	40s	Do. do. ...	
1014	Kumpta ...	Broach ...	235	1.8	14.6	44s	Much improved; class fine, staple long and strong.	
1015	Do. ...	Do. ...	225	-5.4	9.8	40s	Barely fine class, good staple.	
1016	Broach ...	Kumpta ...	250	-1.8	21.9	50s	Feel soft, much improved; class barely fine, long staple.	
1017	Do. ...	Do. ...	215	-3.6	4.9	30s	Not improved; resembling Kumpta grown in the district.	
1018	Do. ...	Broach ...	235	Nil ...	14.6	44s	Much improved; class superfine, white, long and strong fibre.	
1019	Goghári ...	Do. ...	212	...	3.4	22s	Not improved; same as Broach grown in the district.	
1024	Do. ...	Goghári ...	208	...	1.5	20s	Class superfine, white, feel soft, staple medium.	
1025	Do. ...	Broach ...	220	...	7.3	30s	Superfine class; long staple.	
1027	Do. ...	Kumpta ...	220	...	7.3	30s	Much improved in class; staple same as Kumpta.	
1027A	Do. ...	Do. ...	235	5.4	14.6	44s	Improved both in class and staple.	
1028	Do. ...	Do. ...	220	...	7.3	30s	Improved in colour only; staple same as Kumpta, class fine, coarse.	
1049	Do. ...	Do. ...	215	...	4.9	24s	Class fine, good staple.	
1050	Do. ...	Kanvi ...	220	...	7.3	30s	Class superfine, staple long and silky.	
1058	Wágad ...	Broach ...	220	...	7.3	30s	Class superfine; staple long, silky.	
1060	Kanvi ...	Do. ...	205	...	Nil ...	20s	Not improved; same as Broach grown in the district, class barely fine.	

Valuation of parents per Candy.		Field notes on the Hybrids at the time of picking.	Percentage of fibre in seed-cotton of the Hybrids.	
Female.	Male.		1903-1904.	1904-1905.
Rs. 195 to 200	Rs. 200 to 205	Plants vigorous; fibre longer and softer than Broach.	33.33	37.6
200 to 205	195 to 200	Plants vigorous and prolific; fibre better than the parents in length and strength.	34.41	35.6
212 to 217	200 to 205	Plants good and prolific; fibre longer, stronger and whiter than Kumpta though not very thick on the seed.	25.97	30.4
Do.	Do.	Plants ordinary, not very prolific; fibre slightly thicker on the seed than Kumpta.	26.0	31.3
200 to 205	212 to 217	Plants ordinary; fibre softer and longer than the parents, but slightly thinner on the seed than Broach.	27.77	23.3
Do.	Do.	Plants neither vigorous nor prolific; fibre no way better than the parents.	27.8	26.12
Do.	200 to 205	Plants very vigorous and prolific; fibre softer and longer than Broach.	28.80	40.8
195 to 200	200 to 205	Plants vigorous and prolific; fibre long and fine like Broach.	36.8	40.2
Do.	195 to 200	Plants vigorous and fairly prolific; fibre soft and long like Broach.	34.02	40.2
Do.	200 to 205	Plants vigorous and fairly prolific; fibre softer, longer and whiter than Broach.	40.26	42.1
Do.	212 to 217	Plants vigorous and fairly prolific; fibre softer and longer than the parents.	33.91	39.2
Do.	Do.	Plants good, fairly prolific; fibre softer and much longer than the parents.	36.9	35.5
Do.	Do.	Plants vigorous and fairly prolific; fibre soft and long like Kumpta.	36.17	35.7
Do.	Do.	Plants vigorous and prolific; fibre soft and long like Kumpta.	31.48	33.6
Do.	200	Plants vigorous and prolific; fibre longer, softer and whiter than Broach.	34.62	36.9
185 to 195	200 to 205	Plants vigorous and prolific; fibre longer and softer than Broach.	31.56	37.3
180 to 200	Do.	Plants vigorous and prolific; fibre soft and long like Broach.	31.37	37.0

Rotation and Manurial Experiments.

24. *Permanent plots.*—The rotations and manures now being compared are indicated in the following statement :—

Serial letter of Rotations.	Kind of Rotation.	Crops in the Rotation.	Manurial treatment.
A ...	2-year successive	Cotton ... Jowár ...	Cotton crop manured each year with 5 tons of farmyard manure.
B ...	2-year compound	Cotton ... Jowár and Tur ...	Do. do.
C ...	3-year successive	Cotton ... Jowár ... Tuer ...	Do. do.
D ...	3-year successive	Cotton ... Jowár ... San (ploughed in as green manure).	Do. do.
E ...	3-year compound	Cotton ... Jowár ... San (ploughed in as green manure) followed by Tur and Tal.	Do. do.
F ...	3-year successive	Cotton ... Jowár ... San (ploughed in as green manure) followed by Tur.	Do. do.
G ...	3-year successive	Cotton ... Jowár ... Fallow ...	Do. do.
H ...	2-year successive	Cotton ... Jowár ...	Cotton crop to be manured each year with Rs. 10 worth of castor-cake per acre.
I ...	Do.	Cotton ... Jowár ...	Cotton crop to be manured each year with 5 tons of poudrette per acre.
J ...	Do.	Cotton ... Jowár ...	No manure.

25. In my last year's report I pointed out a serious error in the yield from those sets of plots that adjoined a set containing a fallow plot. This error was further investigated during the year under report. The investigation emphasises the enormous differences that exist between the demands on the soil made by Jowár and cotton.

26. The results for the whole series of permanent plots are tabulated below. Results from rotations marked * are vitiated by the error mentioned. It may be here stated that the plants of Jowár that bore flowers and fruit were confined to a single row along the sides of the plots and one or two rows along the ends of the plots due to the influence respectively of the two feet path between the plots and the roads along their ends.

Results from Plots 1 to 25.

Rotation.	Serial number of plot.	Crop.	RESULTS PER ACRE.			
			Yield of		Value of yield.	Cost of cultivation.
			Principal product.	By-product.		
			Lbs. ozs.		Rs. a. p.	Rs. a. p.
A {	1	Jowár ... ..	...	K. 3,524	11 11 11	8 1 8
	2	Cotton	156 0	.....	12 10 10	19 14 8
B {	3	Jowár and Tuer ... ..	...	K. 3,180	10 9 7	8 3 6
	4	Cotton	45 12	.....	3 14 0	19 14 8
*C {	5	Jowár ... ..	...	K. 2,880	9 9 7	8 1 8
	6	Tur ... ..	...	.....	.....	6 5 4
	7	Cotton	79 0	.....	6 6 8	19 14 8
*D {	8	Jowár	1 0	K. 2,912	9 11 10	8 1 8
	9	San as green manure. ... ..	...	.....	.....	7 7 0
	10	Cotton	407 4	.....	33 1 5	19 14 8
*E {	11	Jowár	0 12	K. 3,026	10 1 8	8 1 8
	12	San and then Til and Tuer ... ..	...	.....	.....	7 5 4
	13	Cotton	361 4	.....	29 5 7	19 14 8
*F {	14	Jowár	1 8	K. 2,876	9 10 1	8 1 8
	15	San and then Tuer ... ..	...	.....	.....	7 7 4
	16	Cotton	230 8	.....	18 11 8	19 14 8
G {	17	Jowár	20 0	K. 3,314	11 10 3	8 1 8
	18	Bare fallow ... ..	...	.....	.....	3 5 0
	19	Cotton	454 4	.....	36 14 6	19 14 8
H {	20	Jowár ... ..	...	K. 2,432	8 1 8	8 1 8
	21	Cotton	124 12	.....	10 2 2	18 7 8
I {	22	Jowár ... ..	...	K. 2,880	9 9 7	8 1 8
	23	Cotton	59 8	.....	4 13 4	16 11 8
J {	24	Jowár	13 0	K. 1,816	6 7 0	8 1 8
	25	Cotton	258 8	.....	20 5 7	7 11 8

NOTE.—K. = Kadbi. Principal product = Seed cotton and threshed grain.

Results from duplicates of the above.

Rotation.	Serial number of Plot.	Crop.	RESULTS PER ACRE.			
			Yield of		Value of yield.	Cost of cultivation.
			Principal product.	By-product.		
			Lbs. ozs.		Rs. a. p.	Rs. a. p.
A {	26	Jowár ... ..	...	K. 2,448	8 2 6	8 1 8
	27	Cotton	111 0	.....	9 0 3	19 14 8
B {	28	Jowár and Tuer ... ..	...	K. 2,380	7 14 11	8 3 6
	29	Cotton	47 12	.....	3 14 1	19 14 8
*C {	30	Jowár ... ..	...	K. 2,896	9 10 5	8 1 8
	31	Tuer ... ..	...	.....	.....	6 5 4
	32	Cotton	83 0	.....	6 11 11	19 14 8

Rotation.	Serial number of Plot.	Crop.	RESULTS PER ACRE.			
			Yield of		Value of yield.	Cost of cultivation.
			Principal product.	By-product.		
			Lbs. ozs.		Rs. a. p.	Rs. a. p.
*D	33	Jowár	4 0	K. 2,926	9 13 11	8 1 8
	34	San as green manure.	...	.....	.....	7 7 0
	35	Cotton	320 8	.....	26 0 8	19 14 8
*E	36	Jowár	4 0	K. 3,072	10 5 9	8 1 8
	37	San and then Til and Tuer ... ..	...	.....	.....	7 5 4
	38	Cotton	294 12	.....	23 15 2	19 14 8
*F	39	Jowár	5 0	K. 2,986	10 1 7	8 1 8
	40	San and then Tuer ... ..	...	.....	.....	7 7 4
	41	Cotton	194 4	.....	15 12 6	19 14 8
G	42	Jowár	25 0	K. 3,676	12 15 10	8 1 8
	43	Bare fallow ... ..	...	.....	.....	3 5 0
	44	Cotton	368 4	.....	29 14 9	19 14 8
H	45	Jowár ... ..	...	K. 2,888	9 10 0	8 1 8
	46	Cotton	118 8	.....	9 10 0	18 7 2
I	47	Jowár ... ..	...	K. 3,860	12 13 10	8 1 8
	48	Cotton	101 0	.....	8 3 3	16 11 3
J	49	Jowár	32 0	K. 2,220	8 5 7	8 1 8
	50	Cotton	225 8	.....	18 5 2	7 11 8

NOTE.—K.=Kadbi. Principal product=Seed cotton and threshed grain.

27. The comparatively high yields of the cotton in the no-manure plots (No. 25 and 50) might appear at first sight as somewhat remarkable since they have yielded better than all other plots except those of rotations D, E, G, *viz.*, 10, 13 and 19, while their average yield of previous years is surpassed by those of all other plots. Judged on the straw alone the Jowár of the "no-manure" plots has as usual given a less yield than that of any; in grain these plots have yielded better than any except plots 17 and 42. This apparent anomaly is in reality no more than could have been foretold and is easily explained by the fact that the organic matter contained in the soil of the manured plots both retained the slight rainfall near the surface of the ground where part of it was rapidly evaporated, and also held the remainder with such force that the roots of the plants could not abstract so large a percentage of moisture from the soil as was possible in the case of the unmanured plots which naturally contained a less amount of organic matter. Owing probably to the first of these methods of action cotton being deep rooted has suffered more than the shallow rooted Jowár.

28. Apart from the "no-manure" plots the results confirm the conclusions drawn in last year's report.

29. The investigation of the error mentioned in paragraph 25 above proved much more interesting and instructive than the comparison of the manures and rotations for which the plots were originally established. The enormous proportions that the error reached in this year of scanty rainfall is indicated by comparison of the yields of cotton in rotations B and D, etc., and more precisely by the tabular statement of paragraph 26 in some case reaching nearly 700 per cent.

30. The accompanying sketch plan (not to scale) shows the cropping of the plots during the year under report:—

Sketch plan of plots 1 to 25 showing the crops they bore in the year 1904-05.

Rotation.	A.		B.		C.		D.		E.		F.		G.		H.		I.		J.						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Plots and Crops.	Jowár.	Cotton.	Jowár and Tuer.	Cotton.	Jowár.	Tuer.	Cotton.	Jowár.	San as green manure.	Cotton.	Jowár.	San and then Tl and Tuer.	Cotton.	Jowár.	San and then Tuer.	Cotton.	Jowár.	Bare fallow.	Cotton.	Jowár.	Cotton.	Jowár.	Cotton.	Jowár.	Cotton.

NOTE.—Each plot is 191 yards long by 6½ yards broad. The double lines represent paths (2 feet wide) between the plots.

31. In plots 8, 10, 11, 13, 14, 16, 17 and 19 and (their duplicate plots 33, 35, 36, 38, 39, 41, 42 and 44) the 10 rows of plants comprising each plot were harvested in sections with the following results:—

Number of Plot.	Crop.	YIELD PER ACRE IN LBS.						
		2 rows next the fallow.		3 next rows.		5 remaining rows.		
		Grain or seed cotton.	Kadbi.	Grain or seed cotton.	Kadbi.	Grain or seed cotton.	Kadbi.	
		Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	
8	Jowár	...	5	3,100	...	2,786	...	2,912
33	Do.	...	20	2,600	...	2,653	...	3,220
10	Cotton	...	801	...	586	...	142	...
35	Do.	...	732	...	430	...	90	...
11	Jowár	...	4	3,300	...	2,093	...	3,476
36	Do.	...	20	3,400	...	2,386	...	3,352
13	Cotton	...	729	...	405	...	188	...
38	Do.	...	652	...	355	...	122	...
14	Jowár	...	7	3,140	...	1,446	...	3,328
39	Do.	...	25	3,300	...	2,493	...	3,176
16	Cotton	...	660	...	210	...	71	...
41	Do.	...	512	...	196	...	65	...
17	Jowár	...	100	4,600	...	2,000	...	3,588
42	Do.	...	125	4,900	...	2,640	...	3,808
19	Cotton	...	1,139	...	650	...	481	...
44	Do.	...	879	...	576	...	386	...

NOTE.—This season plots Nos. 9, 12 and 15 were practically fallow as the crop that should have been borne by them failed to germinate.

32. An inspection of the plots in the month of June led to the expectation of some such results. The cotton crop in plot No. 10, for instance, showing an uniform diminution in the height of the plants from 4½ feet on the side next to the fallow plot (No. 9) to 2½ feet on the side bordering plot No. 11.

33. The investigation of this error brings out *inter alia* the following points:—

(a) The unexpectedly large horizontal distance (more than the breadth of one of the plots, *i.e.*, 19 feet) through which a deep-rooted crop like cotton can draw on the soil for its moisture, Jowár being less deep rooted, has a much smaller circle of influence.

(b) The influence of differences of root development on the growth of the constituent elements of a mixed crop. It might have been expected for instance that the rows in the centre of the cotton plot No. 10 would yield less than the rows of that plot next the Jowár, since the latter had at least on one side a crop (Jowár) which could draw moisture from the soil only a short distance, while the middle had cotton on both sides; that

this did not prove to be the case is due to the fact that the rainfall being light the Jowár was able to utilize all the rain that fell and thus to prevent almost all from percolating either vertically or laterally. The opposite might have been expected in the case of the Jowár plots, but these show a uniformly lower rate of yield at their centres than on either side. The explanation of this is the converse of the above.

34. The deductions from these points will be of value if the suggested Tápti Canal, through similar heavy soil, is constructed. Had my office been in possession of a few simple chemical appliances very valuable observations on the method of movement of soil water should have been practicable.

35. It has been suggested to me that the increased yield on the border of the fallow plots is due to shade. That this is not the case is sufficiently proved by the fact that in the year under report the fruit-bearing rows of such crawling crops as Udid, velvet-beans, etc. (which cannot shade the centre of the plot in which they are grown), were also confined to the parts of the plots bordering on fallow ground, the remaining portions of the plots withering and dying at the time of flowering. The notoriously evil influence of Bábhul trees (*Acacia arabica*), etc., on neighbouring crops is in all probability due to the fact that they rob the latter of the soil moisture.

Dairy Herd.

36. The following statement shows the strength of the Dairy herd on the Surat Farm;—

Description.	Strength on 31st March 1904.	Increase.			Decrease.				Strength on 31st March 1905.	Valuation.		Increase or Decrease.
		Purchased or transferred.	Born.	Total.	Sold.	Died.	Transferred.	Total.		1904.	1905.	
Stud-bulls ...	4	...	...	...	...	...	...	...	4	187	190	+5
Bull-cows ...	17	...	...	...	...	...	...	...	17	715	665	-50
Heifers ...	9	...	...	...	...	...	...	...	9	180	185	+5
Cow-calves ...	6	...	6	6	...	...	...	...	12	48	108	+60
Bull-calves ...	12	...	6	6	...	...	...	...	18	355	510	+155
Total ...	48	...	12	12	...	...	...	...	60	1,483	1,658	+175
Bull-buffaloes ...	2	...	...	...	1	...	...	1	1	65	40	-25
She-buffaloes ...	16	3	...	3	1	...	...	1	18	835	800	-35
Heifers ...	8	...	...	...	1	...	...	1	7	89	85	-4
She-buffalo calves ...	3	1	5	6	...	1	...	1	8	15	64	+49
Bull-buffalo calves ...	9	...	8	8	2	1	...	3	14	57	70	+13
Total ...	38	4	13	17	5	2	...	7	48	1,061	1,059	-2
Grand Total ...	86	4	25	29	5	2	...	7	108	2,544	2,717	+173

Distribution of Seed, Implements, &c.

37. During the year the following seeds were distributed:—

Crop.	Quantity in lbs.
Cotton (several varieties) ...	3,442
Jowár do. ...	400
Groundnut do. ...	4,695
Various others ...	650

38. Also the following manures:—

Kind.	Quantity in lbs.
Nitre ...	1,600
Sodium Nitrate ...	500
Dissolved Bones ...	15

39. Distribution of implements and cattle included that of 112 native drills, harrows, hoes, etc., and several English ploughs and 16 work cattle.

Visitors.

40. Visitors to the farm included only a few cultivators, as the monsoon failed so completely and consisted for the most part of local and other officers.

Statement of Accounts.

41. Owing largely to failure of crops and the purchase, thus necessitated, of fodder for the cattle, the net cost to Government on the working of the farm was Rs. 8,959-1-10 against Rs. 2,658-2-9 in the previous year. Details are given below in the form of a profit and loss account.

Profit and Loss account of the Surat Farm for the year 1904-1905.

Date.	Losses.	Amount.	Date.	Profits.	Amount.
		Rs. a. p.			Rs. a. p.
31st March 1905.	To Dairy and Dairy Herd account.	601 9 8	31st March 1905.	By Artificial manure account.	22 0 6
"	" Farm incidental account (petty purchases, etc.)	735 6 2	"	" Farm crops account...	963 9 7
"	" Establishment account ...	1,820 5 5	"	" Seed account ...	33 1 7
"	" Farm Labour account	2,025 0 0	"	" Hay making account	505 5 0
"	" Petty Supplies account (stationery, etc.)	50 0 0			
"	" Work Cattle account (upkeep).	1,332 15 5			
"	" Store account ...	270 10 10			
"	" Dead Stock account ...	44 13 4			
"	" Travelling Allowance account.	413 3 0			
"	" Telegram and Service Stamps account.	90 12 0			
"	" Live Stock account ...	238 0 0			
"	" Packing account ...	45 2 9			
"	" Seed Distribution account.	199 2 2			
"	" Petty Repairs account ...	330 0 0			
"	" Rent and Taxes account.	1,263 0 0			
"	" Furniture account	25 0 0			
"	" Manure Distribution account.	126 5 3			
"	" Implement Distribution account.	174 10 0		Total ...	1,535 0 8
"	" Valuation account ...	651 2 6		Net cost to Government..	8,959 1 10
	Total ...	10,494 2 6		Total ..	10,494 2 6

OPERATIONS ON THE NADIA'D FARM.

42. The year under report is the first in which this Farm has been worked by this department. Operations on it were therefore for the most part preliminary in character.

43. A 6-horse power Oil Engine with rotary pump has been erected on one of the wells and it is intended to test this method of raising water with that by bullocks (*mot*) from the point of view of expense. For reasons in paragraph 3 above it has not yet been possible to carry out the test under normal conditions. As long, however, as the water in the well is sufficient in quantity to give a full supply to the pump, the cost of irrigating an acre (neglecting interest on capital) is Rs. 2 to 2½ as against Rs. 4¼ to .5 by bullock-power or *mot*; the depth of the water table below ground level is 55 feet and the quantity of water supplied to an acre is about 40,000 gallons.

44. Tanks have now been constructed for measuring the water required by different crops, and measurements will be taken (*vide* letter No. 2-5-1, dated 20th January 1903, of the Government of India printed in the preamble of Government Resolution No. 2132, dated 16th March 1904, R. D.).

45. Plans for a Tobacco Curing House have been drawn up and in future years experiments on the curing of tobacco for the European market will be conducted.

Season.

46. The unfavourableness of the season can be judged from the following statement of the rainfall:—

Month.	Rainfall in inches.	
	1904.	Average rainfall of 20 years (1885—1904).
June	0·49	4·63
July	6·15	12·45
August	1·00	10·26
September	2·60	4·99
October	0·03	0·64
Total	10·27	32·97

By the time the September fall occurred crops were beyond recovery.

47. Not only was the rainfall deficient, but even irrigated crops did not escape damage as a heavy frost at the end of January occurred and caused very serious losses. Owing to these causes none of the plots (irrigated or unirrigated) on the farm gave any intelligible results, and as this is the first year of the working of the farm it seems useless to include here the actual figures of the yields.

48. Results of the only experiment that has not almost completely failed, owing either to lack of rain or to frost in January, are given below.

A large series of manurial experiments on tobacco and other crops were included in the programme of the farm work, but failed to give any definite results for the reasons given in the preceding paragraph.

Effect of Sodium Nitrate on Tobacco.

49. 439 lbs. of sodium nitrate were distributed to the cultivators for trial on crops of tobacco. The fields were previously manured with farmyard manure as usual. The nitrate was applied as top-dressing to half the field at the rate of 1 cwt. per acre.

Serial No. of plot.	Area.	Manure.	Yield per acre of cured tobacco in lbs.	Value per acre of produce.	Increase in value per acre due to Sodium Nitrate.
	A. g.		Lbs.	Rs. a. p.	Rs. a. p.
1	0 30	Farmyard manure only ...	1,566	166 0 0	} 31 0 0
2	0 26	Do. + Sodium Nitrate.	1,880	200 0 0	
3	0 38	Farmyard manure only ...	1,719	183 0 0	} 38 0 0
4	0 39	Do. + Sodium Nitrate.	2,080	221 0 0	
5	1 3	Farmyard manure only ...	1,580	168 0 0	} 26 0 0
6	1 3	Do. + Sodium Nitrate.	1,828	194 0 0	
7	1 6	Farmyard manure only ...	2,171	31 0 0	} *29 0 0
8	1 7	Do. + Sodium Nitrate.	1,900	202 0 0	

* Decrease—The Sodium Nitrate plot was badly damaged by frost.

50. The experiment seems to show that Nitrate of Soda may be very profitably applied to tobacco in conjunction with farmyard manure. Omitting results from plots 7 and 8 an expenditure of Rs. 10-8-0 per acre on this artificial manure has given an increase in the value of the crop of Rs. 30-0-0. If next year's experiment confirms these figures, the manure may be confidently recommended to cultivators.

Seed Distribution.

51. The Superintendent of the farm was in direct charge of the collection and distribution of cotton seed. (Government Resolution No. 347, dated 16th January 1905.) In all 21,430 lbs. of the seed of the Lálío variety and 32,175 lbs. of that of the Wághad variety were carefully collected and distributed. On this a separate report is submitted.

Visitors.

52. Visitors to the Farm were few (excluding local officers) owing to failure of the crops. I have to thank the President, Mr. Becharás Viháridás, and the Vice-President, Mr. Purshotamdás Viháridás of the Nadiád Agricultural Association, for constant encouragement and advice as to the course the experiments should take; this indebtedness is especially great with regard to the tobacco experiments.

Statement of Accounts.

53. From the following Profit and Loss Account it will be seen that the loss on the working of the Farm was Rs. 3,310-8-4 and the net cost to Government Rs. 1,696-13-7:—

Profit and Loss account of the Nadiád Farm for the year 1904-1905.

Date.	Losses.	Amount.	Date.	Profits.	Amount.
		Rs. a. p.			Rs. a. p.
31st March 1905.	To Establishment account ...	1,004 0 0	31st March 1905.	By Farm crops account (for value of farm crops sold).	1,588 14 7
"	" Travelling Allowance account.	260 4 0	"	" Seed and Store account.	5 0 3
"	" Telegram and Service Stamps account.	57 13 0	"	" Artificial Manure account.	0 15 3
"	" Work cattle account ...	536 3 3	"	" Surat Farm account for artificial manure received.	95 6 9
"	" Farm incidental account.	101 15 6	"	" Interest account for interest on the Association's Capital.	113 10 9
"	" Rent and Taxes account.	539 12 9	"	" Donation from the Inspector General of Agriculture in India.	600 0 0
"	" Dead Stock account ...	33 12 0	"	" Donation from the District Local Board, Kaira.	500 0 0
"	" Farm Labour account ...	1,635 7 11	"	" Rent of the old Farm area for 1904-1905.	200 0 0
"	" Petty Supplies account :	45 6 6			
"	" Petty construction account.	308 9 6			
"	" Engine account (for kerosine oil, fitters' wages, etc).	384 5 9			
"	" Skilled Labour account .	12 3 0			
"	" Distribution account for seeds and manures distributed.	31 3 0			
	Total ...	5,000 13 2		Total ...	3,303 15 7
				Net cost to Government ..	1,696 13 7
				Total ...	5,000 13 2

OPERATIONS ON THE DHARWAR FARM.

Season.

54. The monthly rainfall was as follows :—

Month.	Rainfall in inches.	
	1904.	Average rainfall of 20 years (1885—1904).
March	0·30	0·31
April	1·2	1·96
May	6·19	3·46
June	6·23	4·99
July	5·66	6·23
August	3·17	3·56
September	1·17	4·68
October	3·12	5·66
November	0·7	1·17
December	.....	0·72
Total	26·93	32·74

The failure of late rains from September to November caused much damage to rabi crops.

55. The following are the principal points to which experiment was directed.

Steeping Experiments.

Steeping Jowár seed (local Fulgar variety) in $\frac{1}{2}$ per cent. solution of copper sulphate before sowing gave the following results :—

Serial No. of plot.	Treatment.	Number of smutted heads per acre.	Approximate percentage of crop destroyed by smut.
1	Steeped	0	0
2	Unsteeped	905	7
3	Steeped	3	0
4	Unsteeped	1,530	10

The cost of the treatment is about a quarter of an anna per acre and the damage prevented by it is represented by about Rs. $3\frac{1}{2}$ per acre. It is intended to publish this method of treatment widely among cultivators.

Manurial Experiments.

56. (a) *Wheat*.—On a portion of the farm growing wheat, where the soil was in a very bad physical condition, lime was applied at the rate of 4,400 lbs. per acre. The result was very marked, the treated plot giving 501 lbs. of grain and 793 lbs. of straw per acre against 290 lbs. of grain and 400 lbs. of straw on the untreated area. The result will need to be checked by further experiment.

57. (b) *Jowár*.—The local variety (Nandyal) was treated with one cwt. per acre of Sodium Nitrate. The result confirms the general experience that an expensive manure cannot profitably be applied to a crop of low value.

Serial No. of plot.	Area.	Drill used.	Manure applied.	Yield of plot per acre.			Value of produce.	Cost of cultivation.	Loss due to manure.
				Grain.	Kadbi.	Chaff.			
				Lbs.	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.	Rs. a. p.
1	A. 1 0	15"	1 Cwt. Nitrate of Soda	1,414	1,989	289	41 0 0	25 3 4	} 11 7 1
2	1 0	15"	Nil	1,360	2,353	248	41 7 1	14 3 4	
3	1 0	12"	1 Cwt. Nitrate of Soda	1,649	2,448	224	47 7 4	25 3 4	} 8 5 3
4	1 0	12"	Nil	1,512	2,286	312	41 12 7	11 3 4	

58. (c) *Cotton*.—The results of the treatment of this crop with Sodium Nitrate were very similar to those obtained in the case of Jowár, though the loss was not so great. The variety was the local Kumpta cotton :—

Serial No. of plots.	Total area.	Drill used.	Average per acre.				
			Manure applied.	Yield of seed cotton.	Value of produce.	Cost of cultivation.	Loss due to use of manure.
1 & 2	A. g. 2 0	18"	1 Cwt. Nitrate of Soda ...	Lbs. 567	Rs. a. p. 40 8 0	Rs. a. p. 24 8 0	Rs. a. p. 10 10 0
3-6	6 0	18"	Nil	562	40 2 0	13 8 0	} 10 4 0
7 & 8	2 0	21"	1 Cwt. Nitrate of Soda ...	555	39 9 0	24 7 0	
9-11	4 0	24"	Nil	538	38 7 0	13 1 0	

The experiment points also to the conclusion that the local practice of sowing with an 18" drill is correct.

Dhárwár-American on the other hand yielded at the rate of 430 lbs. per acre with a 24" drill and of 313 lbs. with an 18" drill.

Varietal Experiments.

59. (a) *Cotton*.—Besides the common varieties of the district, *viz.* Kumpta and Dhárwár-American (paragraph 62 below), a small plot of the Broach-Surat variety was grown and yielded at the high rate of 1,066 lbs. of seed cotton per acre. The variety has thus proved itself worthy of a further trial.

60. (b) *Jowár*.—The local variety (Nandyal) was compared with the Gujarát varieties (Perio and Chapti) with the following results :—

Serial No. of plot.	Name of Variety.	Area.	Drill used.	Yield of plot per acre.			Value of produce.	Cost of cultivation.	Remarks.
				Grain.	Kadbi.	Chaff			
1	Chapti Jowár ...	A. g. 1 25	18"	Lbs. 1,665	Lbs. 3,024	Lbs. 340	Rs. a. p. 51 13 4	Rs. a. p. 14 4 11	No manure was applied to these plots.
2	Perio ,, ...	1 0	18"	1,444	2,450	280	43 14 9	14 5 0	
3	Nandyal ,, ...	1 0	15"	1,360	2,353	248	41 7 1	14 3 4	

A comparison of plots 1, 2, 3 denotes that imported Gujarát varieties (Chapti and Perio) have yielded much better than the local (Nandyal).

These results will be checked next season.

61. (c) *Wheat*.—The local variety proved superior to the three non-local ones tried.

Cultural Experiments.

62. In paragraph 8 of my last year's report it was suggested that Dhárwár-American cotton might with advantage be sown earlier. To test this two-plots of Dhárwár-American cotton were grown, one in the middle of June and the other at the time customary in the district, *viz.* September.

The results are shown below :—

Serial No.	Crop.	Time of sowing.	Yield of seed cotton per acre in lbs.	Valuation* on April 27th of cotton per Candy (784 lbs.)
1	Kumpta cotton	June	690	Rs. 210
2	Do.	September	551	203
3	Dhárwár-American	June	969	205
4	Do.	September	371	190

* Good saw-ginned Dhárwár and good machine-ginned Kumpta on the same date were valued at Rs: 196 and Rs: 200 respectively.

63. The expectation was thus more than justified both as regards yield and quality. Possibly however with normal late rains (*vide* paragraph 62 above) a better time of sowing would be July. To gain information on this, observations were made as follows with regard to the period of flowering and ripening of the crop:—

Crop.	Date of sowing.	Date of commencement of flowering period.	Date of commencement of boll opening period.	Date of the average last heavy down-fall of rain.
Dhárwár-American ...	June 16th ...	August 15th ...	October 15th..	} October 15th.
Newly imported American .	Do. 24th ...	September 9th.	Beginning of November.	

Even had the late rains not failed during the season under report it is uncertain whether they would have seriously damaged the exposed fibre.

64. An interesting point brought out by the above tabular statement is the shortening that has occurred in the period of growth of the Dhárwár-American (saw-ginned Dhárwár) growth since its introduction in 1830. This is intimately associated with the deterioration of the staple (see last year's report, paragraph 5) and both these processes may possibly be checked by earlier sowings. By sowing in June-July it is hoped that the improvement of $7\frac{1}{2}$ per cent. obtained in the first year will be enhanced and that a strain will be evolved giving a much more valuable fibre than the present one.

65. Among any sample of Dhárwár-American seeds, are found some with grey fuzz, the rest having green fuzz. An experiment to determine whether these differences in outward appearances connoted differences in yield and quality of fibre showed a slight advantage in yield of the green seeds. The differentiation of the two types will be attempted and observations made as to whether the character referred to is heredity or not. If it is, the strain will be carefully bred and improved.

66. A small plot of potatoes was tried but suffered very much from disease. As this is becoming an important crop in the district, new varieties will be tried in the hopes of obtaining a more resistant strain.

Pests.

67. Besides the disease on potatoes (probably "Early Blight") this crop was also attacked by a boring caterpillar in the stem, identified by the Entomologist to the Government of India as *Leucinodes orbonolis*, belonging to the family Pyralidae.

Til was also attacked by a caterpillar (not identified) which later attacked cotton also.

Distribution of Seed, Implements, &c.

68. Under the instructions of Government (Government Resolution No. 347, dated 16th January 1905) 71,400 lbs. of the seed of the local Kumpta variety of cotton and 47,880 lbs. of acclimatized American have been carefully selected from fields in the district and distributed to cultivators for growth in the present season. On this a separate report is submitted.

69. Twelve English Turn-wrest ploughs and 60 small chaff-cutters were distributed to cultivators at cost price during the year under report. Purchasers now obtain the latter instrument direct from Bombay.

Visitors.

70. During the year under report the farm was visited by the local Revenue Officers and by about 171 cultivators.

OPERATIONS ON THE CHHARODI PLOT.

72. The season on this plot was of the same type as that experienced at Nadiad. Hybrid cottons were alone grown and yielded well considering the short rainfall. All the seed obtained from them has, however, been destroyed by the disastrous cyclone that broke over the district on the 23rd and 24th ultimo. The sale-proceeds of the plot were Rs. 20 and the cost of working it (including supervision) was Rs. 254-15-6 as shown in the appended statement of receipts and expenditure.

Receipts and Expenditure of the Chharodi Cotton Plot for the year 1904-05.

Receipts.	Amount.	Expenditure.	Amount.
	Rs. a. p.		Rs. a. p.
Balance on 1st April 1904 ...	19 0 5	By Manager's allowance ...	110 0 0
Sale of 5 maunds cotton at Rs. 3 per maund ...	15 0 0	" Wages ...	127 11 6
Sale of lint 20 lbs. at 4 lbs. a rupee ...	5 0 0	" Bullock hire ...	8 13 0
Received from the Office of the Deputy Director of Agriculture ...	240 0 0	" Miscellaneous ...	8 7 0
		Total ...	254 15 6
		Balance ...	24 0 11
Total ...	279 0 5	Total ...	279 0 5

OPERATIONS ON THE JALGAON PLOT.

73. The season experienced by this temporarily acquired plot was far from favourable, over 17 of the 30 inches of rainfall being precipitated in September. The chief object of the plot was a continuation of the growth of hybrid cottons with a view to obtaining a growth superior to that now produced in Khándesh. Careful selection of seed has been continued and this has now been sown on the permanent farm at Dhulia.

74. Jowár varieties were also compared at Jalgaon with the following results:—

Variety.	Yield in lbs. per acre.		
	Grain.	Kadbi.	Chaff.
Chapti	471	2,233	70
Perio	313	1,469	63
Mothi	159	1,173	50

75. The net cost to Government of the working of the plot was Rs. 779-12-0 as shown by the following statement:—

Balance Sheet of the Jalgaon Plot for the year 1904-05.

Receipts.	Amount.	Expenditure.	Amount.
	Rs. a. p.		Rs. a. p.
To balance in hand on 1st April 1904	25 0 0	By pay of Fieldman	300 0 0
To receipt from the Office of the Director, Land Records and Agriculture, during the year...	805 0 0	„ Travelling allowance of Fieldman	42 13 0
To sale-proceeds of the farm produce such as Jowári, cotton, etc. ...	56 0 0	„ Pay of Farm Servants	103 12 0
To value of produce on hand—		„ Wages	63 11 6
Jowár seed	2 0 0	„ Office expenses	7 14 9
Jowár Kadbi	33 4 0	„ Upkeep of work cattle	93 10 3
	35 4 0	„ Rent of Farm Land	151 0 0
To fodder, cotton-seed, etc., fed to cattle	16 12 0	„ Miscellaneous expenditure	136 4 6
To Miscellaneous receipts	14 6 0		
		Total	902 2 0
Total	952 6 0	* Balance	50 4 0
		Total	952 6 0

	Rs. a. p.
* Balance Cash	15 0 0
Jowár seed and Kadbi in stock	35 4 0
Total	50 4 0

OPERATIONS ON THE DHORONÁRO FARM.

76. In December 1903 I made a short tour in Sind (for the first time) and from analogy with Egyptian conditions formed the opinion that at least on the perennially irrigated tracts of that province, a much finer variety of cotton could be grown than the local Sind-Panjab growth which is about the shortest stapled variety in the world.

77. In April 1904 a small experiment was initiated at Dhoronáro with a view to testing the soundness of this opinion. The site of the experiment was on the Híral Wah, a new canal with an almost perennial supply; the larger Jámráo Canal (perennial) being closed during April-May for clearance, it was impossible to commence at once on it and therefore to prevent a season from being lost, the least favourable site on the Híral Wah was chosen as a temporary measure.

78. On the Dhoronáro Farm all four kinds of Egyptian cotton were sown and many of the American varieties including a small plot of "Sea Island".

79. Owing to the shortness of the time available for necessary preliminary operations, such as selection and acquisition of the site, clearing and channeling the land, etc., April 19th was reached before the first seed could be sown. It would have been preferable to have been able to sow part of the crop in different months beginning from February and ending in June.

80. No manure of any kind was used in the experiment; the land was however in somewhat better condition than much of the land under the Jámráo. The Egyptian method of sowing and cultivation was followed throughout the experiment in every detail. After sowing, the land was immediately irrigated to cause germination and then a month or 5 weeks was allowed to elapse before water was again applied. After this until the operation of picking was completed it was intended to apply water to part of the crop every 15 days and to the other part every 20 days. Owing, however, to the uncertain water-supply the irrigations could be applied only at irregular intervals. At each watering the quantity supplied I estimated at 380 cubic meters per acre, giving a duty for cotton of 100 and 133 acres per cusec according as it watered every 15 or 20 days respectively. For several reasons it was found impossible to actually *measure* the water, but this was roughly estimated by means of the very regular furrows between the rows on which the cotton was sown, it being found in Egypt with similar ridges and the water brought half-way up on them at each watering, that the above quantity is almost invariably given. On the new Farm at Mirpurkhás actual measurements are being carried out.

81. The yields of the different varieties and their valuations, etc., are given below. In the case of the American varieties the areas sown were too small to allow of the yield being estimated. I am very greatly indebted to Mr. Wolstenholme of the firm of Messrs. Wolstenholme and Holland of Liverpool for the extremely careful valuations of the 86 samples of fibre sent to him through the British Cotton Growing Association. Messrs. Ralli Brothers and Messrs. Volkart Brothers of Karáchi also very kindly valued a small number of samples and their valuations were as a general rule considerably higher than those here given.

82. The valuation on the same date (June 3rd, 1905) of the varieties grown in the country of their immediate origin are given in the table in brackets under the name of the variety. The values of fine Broach and fine Sindhi on the same date were respectively $4\frac{1}{2}$ and $3\frac{1}{2}$ pence per pound.

Yield and valuation of Egyptian and American cotton grown at Dhoronéro.

Variety.	Time of sowing.	Interval between waterings in days.	Yield in lbs. per acre of seed cotton.	Valuation (in pence per lb. of fibre) of several pickings.		
				First picking.	Second picking.	Third picking.
Yannovitch ("Fully good fair" Yannovitch 8 d.)	April ...	20	872	7	6½	6
	Do. ...	15	1,174	7½	7	6½-7
	May ...	30	805	7-7½	7	6½
	Do. ...	30	1,046	7½	6½-7	6½-7
	June ...	20	704	6½-7	6½-6¾	5½-5¾
	Do. ...	30	634	6½-7	5½	5-5½
Abassi ("Fully good fair" Abassi 7½ d.)	April ...	15	1,018	6½	6½	6½
	Do. ...	20	907	6-6½	6½	6½
	June ...	15	940	6½	6½	...
	Do. ...	20	519	6½	6½-6¾	...
Mitaffi ("Good fair" brown Egyptian 6½ d.)	April ...	15	1,489	5½	5½-5½	5½
	Do. ...	20	1,257	5½	...	5-5½
	June ...	15	1,196	5	5½-5½	5-5½
	Do. ...	20	744	5½-5½	5½	5½
	Do. ...	15	815	5½-5½	5½-5½	4½-5
	Do. ...	16	364	5½	5½	...
Ashmonii ("Good fair" upper Egypt 5½ d.)	April ...	15	1,227	5½-5½	5-5½	5
	Do. ...	20	972	5½-5½	5-5½	...
	June ...	15	899	5½-5½	5-5½	...
	Do. ...	15	900	5	5-5½	...

Variety.	Time of sowing.	Valuation (in pence per lb. of fibre).
American ("Middle-American" 4-70 d.)	Upland Georgian ...	May ... 4-30 to 4-35 d.
	Kemper county ...	Do. ... 4-50 to 4-55 d.
	Tata's Allen's Hybrid ...	Do. ... 4-80 d.
	Tata's Bigboll ...	Do. ... 4-60 to 4-70 d.
	Texas long staple ...	Do. ... 4-50 to 4-60 d.
	Doughty ...	Do. ... 4-60 to 4-70 d.

The Sea Island variety grew and flowered remarkably well, but owing to the too dry atmosphere, the bolls failed to open properly and the value of the produce was negligible.

83. As the area under each variety of Egyptian cotton was about 6 acres the yields given above are a fair criterion of what may be expected to be obtained on similar soil over large areas. The season was by no means favourable, the hot winds in April and May being said to be much more severe than is ordinarily the case. Had the season been good and earlier sowing been possible, there is no reason for doubting that larger yields would have been obtained, the later sown plots being very severely damaged by frost.

84. Comparing these results with those obtained with indigenous Sindhi cotton we may give the following approximate estimates:—

	The best plot of Egyptian cotton.	A maximum crop of Sindhi cotton on the Jámrao Canal.
	Rs.	Rs.
Value per acre	220	85
Cost of cultivation per acre	30	10
Gross profit per acre	190	75

The best Egyptian variety is thus more profitable to the cultivator by about 250 per cent. than the local variety.

85. Reviewing the figures given in the above tabular statements we note the following points among others:—

(1) Yannovitch, the finest of the Egyptian varieties, has shown least deterioration in staple (about 12½ per cent.) from the quality of the Egyptian grown product. This is somewhat remarkable as this variety in Egypt is considered to be the least robust of the four.

(2) Mitaffi shows the greatest amount of deterioration, though in Egypt it is the most robust of these varieties.

(3) Yannovitch, in Egypt the poorest of the varieties in yield, has not suffered much in this respect.

(4) The average yield of all varieties in Egypt is about 750—800 lbs. of seed-cotton per acre, a good crop yielding 1,500 lbs. It will thus be seen that the yields obtained at Dhoronáro are very satisfactory even compared with those obtained in Egypt (probably agriculturally the richest country in the world). A few zamindárs, who grew the crop on much poorer soil from seed distributed by this department, obtained yields above the Egyptian average (in some cases considerably above).

(5) Irrigation every 15 days gives both a better yield and a better quality than irrigation every 20 days, though as the waterings were irregular for reasons given above, much reliance cannot be laid on this point pending further experiment.

(6) With regard to the American varieties, of which only a few of the more promising and better known varieties are included in the statement, it will be noted that several are equal in quality to "Middling American."

86. It is considered that, in view of the facts summarised in the above tabular statement, there can be little reason to doubt the opinion expressed in paragraph 85 above, though the variety that is best suited to Sind can only be ascertained definitely after further trial. It is probable that one of the Egyptian varieties will be found most suitable for the perennial irrigated tracts, while possibly one of the American varieties may succeed on some at least of the inundation canals.

87. The question of deterioration of fibre deserves a passing notice, though actual experience alone can prove its ultimate extent or the rapidity of its course. It often happens that when a crop is introduced into and grown under new conditions of climate and soil, a marked deterioration occurs in the first season of trial, but that a recovery takes place during the next and succeeding years until the original deterioration is obliterated and in some known cases even converted into an improvement; that is, the base line of deterioration is reached in one bound immediately on importation. In other cases, as in the case of Exotic cottons hitherto introduced into India, the fall in quality continues year by year from the date of introduction. This latter statement in no way implies that the same will be the case with the cotton under discussion, since in former cases no such similarity between the new and old conditions under which the plants were grown exists as in the present case.

88. It is hoped that if deterioration continues it will be readily counteracted by proper selection and hybridization. The hybrids I obtained with Egyptian varieties in Egypt seem to show that the latter respond more readily to this method of improvement than the Indian varieties.

89. The following statement of accounts shows that the total expenditure on the working of the farm came to Rs. 3,068-10-1 and the net cost to Rs. 1,173-11-1:—

Receipts.		Amount.		Expenditure.		Amount.	
	Rs. a. p.	Rs. a. p.		Rs. a. p.	Rs. a. p.		Rs. a. p.
To value of farm produce of 1904-05—							
(a) Actually sold—				By cost of Establishment ...	532 13 5		
Cotton lint ...	1,258 8 11			" Travelling allowance to do. ...	50 4 0		
Cotton seed ...	70 9 9	1,329 6 8		" Postage and telegrams ...	11 6 0		
(b) Distributed or sown on farm—				" Petty supplies and stationery ...	35 14 3		
Cotton seed distributed ...	75 5 4			" Purchase of live-stock ...	519 0 6	630 5 8	
Sown on farm ...	45 0 0	120 5 4		" " implements ..	58 15 0		
(c) On hand—				" Erection of shed for bullocks ...	90 0 0		
Cotton with seed ...	45 5 0			" Construction of water channels ...	140 1 0		
Cotton seed ...	76 11 0			" Clearance of land ...	100 0 0	976 0 6	
Jowár Kudbi ...	254 1 0			" Farm labour ...	963 10 9		
Miscellaneous receipts ...	.....	376 1 0		" Upkeep of work cattle ...	134 14 2		
		69 6 0		" Purchase of seed ...	100 6 0		
Total ...	.. ..	1,894 5 0		" Miscellaneous ...	263 5 0		
Net cost to Government ...	.....	1,173 11 1		Total ..	.....	1,462 3 11	
Total ...	.....	2,068 10 1				3,068 10 1	

OPERATIONS ON THE MIRPURKHA'S FARM.

90. It having been decided to abandon the Dhoronáro site for a more central part of the perennial tracts, 46 acres were acquired at Mirpurkhás in October 1904. The land was intentionally chosen as being in quality rather below than above the average of the perennially irrigated soil of Sind. It will be one of the objects of the farm to devise some method of improving such soil. Green manuring is, I believe, unknown in Sind and this is one of the most promising lines on which experiments will be conducted.

91. Among the experiments so far initiated on this Farm are the following:—

Cotton.—The varieties grown at Dhoronáro have been sown in March and following months of this year on the Mirpurkhás Farm over an area of some 30 acres. The American varieties are being grown on a larger scale than at Dhoronáro.

92. *Groundnut.*—This crop is at present unknown to the cultivators of Sind. It is thought that its growth will do much towards improving the soil which in many cases has deteriorated from bad treatment, especially over-irrigation. It is also especially intended for those lands that are too sandy to profitably grow (at least now) such crops as cotton, wheat, etc. Soils of this description are often susceptible of reclamation by the growth of groundnut and similar crops.

Varieties from several parts of the world are now growing on the farm and promise well.

93. *Bersim or Egyptian Clover.*—A few acres of this leguminous crop were tried with gratifying results on the farm during the past rabi season. Its action as a revivifying crop on exhausted soil is most marked. It is also an excellent fodder crop, and fodder is extremely scarce in the part of Sind under the Jámráo Canal. It is hoped that the crop will thus serve a double purpose. The Egyptian method of cultivation which is extremely simple was intended to be followed in detail. The crop yielded at the rate of 17,236 lbs. of green fodder per acre. It was sown in September and ploughed up in June. Had the crop received rational treatment at the hands of the management of the farm, this yield would probably have been almost double. Seed for an extended trial next season has been ordered from Egypt.

94. *Wheat.*—Large quantities of wheat from the Punjab and other tracts were distributed under the orders of the late Commissioner in Sind, Mr. Muir-Mackenzie, and several varieties of them were grown on the farm. The real object of the experiment was to test the feasibility of growing wheat in Sind on a rational amount of irrigation water. In some parts of Sind as many as 15 waterings are given to this crop while too many are invariably applied. On the farm, part of the wheat was watered twice, part three times and part four times, the water given at each application being by no means heavy—about 4,000 cubic feet. This gives a duty for wheat of about 520, 400 and 260 acres per cusec according as 2, 3, or 4 waterings are given. The results of the experiment are given in the following tabular statement from which it appears that 2 or 3 waterings are in general better than 4, the optimum number for all the varieties not being the same. Much reliance in detail cannot be placed on these results as the experiment is in its first year; they will be checked next season.

No manure was applied to any of the plots.

Yields and valuations of varieties of Wheat grown at Mirpurkhás, 1904-05.

Serial No.	Variety.	Date of sowing.	Seed rate.	Number of waterings.	Yield.		Valuation per 656 lbs.	Remarks.
					Grain.	Bhusa.		
1	Delhi white	October	80	3	406	538	Rs. 26-1	} Damaged by frost.
2	Do.	Do.	80	4	726	772	26-8 to 26-10	
3	Do.	November	80	2	1,140	1,101	27	
4	Do.	Do.	80	3	1,256	1,238		} Damaged by frost.
5	Nandero white	October	80	3	596	970	26-12 to 26-14	
6	Do.	Do.	80	4	820	1,478	26-12	
7	Do.	November	80	2	1,054	1,220	= No. 5	}
8	Do.	Do.	80	3	1,440	1,444	26-14 to 27	
9	Do.	Do.	80	3	1,022	1,158	25-8	
10	Panjab red	October	80	3	736	923	26-12 to 25-14	}
11	Do.	Do.	80	4	736	923	26-12 to 25-14	
12	Do.	November	80	2	1,174	1,814	26	
13	Do.	Do.	80	3	916	1,421	25-12	}
14	Bubak	November beginning	80	3	80	1,296	27	
15	Do.	Do.	40	4	742	1,142	26-14 to 27	
16	Do.	November (end)	80	3	709	1,348	26	}
17	Do.	Do.	60	4	780	1,126	26-3	
18	Káhnó	November	80	2	902	1,940	Not valud.	
18	Do.	Do.	80	3	736	1,868		

NOTE.—On the date of valuation, "Choice white Karáchi" wheat was valued at Rs. 26-10 per 656 lbs.

95. Samples of the wheat grown were sent to Messrs. Clements and Robson, Karáchi, who very kindly valued them as above. The Panjab wheats show some deterioration from the quality of the seed from which they were grown and tend to assume the characteristic appearance of Jámráo wheat. All the Nandero and one of the Bubak samples show an improvement on the seed sown and are of 4 to 6 per cent. higher value than ordinary Mirpurkhás red wheat. Káhnó wheat has only a local sale. The experiment will be continued on an extended scale and the cause of deterioration of the Panjab wheats investigated.

96. The cost of working this farm was Rs. 4,307-2-8 as shown in the appended statements of receipts and expenditure:—

Receipts.		Amount.	Expenditure.		Amount.
	Rs. a. p.	Rs. a. p.		Rs. a. p.	Rs. a. p.
To value of produce of 1904-1905—			By Cost of establishment ...	293 2 0	
Wheat grain ...	250 14 0		" Travelling allowance to do.	158 7 0	
Clover seed ...	8 3 2		" Postage and telegrams ...	28 0 6	
Clover fodder ...	111 1 8		" Petty supplies and stationery.	11 2 11	490 12 5
Wheat chaff ...	57 0 0				
Jowár Kadbi ...	10 0 0	447 2 10	" Petty construction ...	983 13 5	
Miscellaneous receipts ...	...	25 4 0	" Purchase of implements ...	759 13 0	1,743 10 5
Total ...	.....	472 6 10	" Farm labour ...	1,342 5 1	
Net cost to Government ...	.....	4,307 2 8	" Upkeep of work cattle ...	465 15 9	
			" Purchase of seed ...	426 13 0	
			" Miscellaneous ...	310 0 10	2,545 2 8
Total ...	.....	4,779 9 6	Total ...	.....	4,779 9 6

97. In Sind, besides work on the two farms above mentioned, a plot of Egyptian cotton was grown at Hyderabad by this department with results similar to those above detailed. A small amount of Egyptian seed was also distributed to cultivators who received instructions and advice as to its growth; these plots were inspected as often as possible with the results stated above (paragraph 85 (4)). In February last the seed from the Dhoronáro crop and an additional 10 tons from Egypt was distributed among Zamindárs in Sind and as far as possible the sowing was done under my personal observation. In all cases full instructions for sowing were given. In all about 1,500 acres of Egyptian cotton have been sown in Sind during the current season and are continued and carefully watched by this department; up to date the appearance of the crop promises a very satisfactory yield. Mr. Chatfield, Colonization Officer, Jámráo Canal, has enthusiastically co-operated in this distribution and inspection; and without his invaluable assistance very little progress could have been made.

93. Small quantities of groundnut were distributed in Sind for trial during 1904-1905. The yield was quite satisfactory for a first trial and 4,100 lbs. have been distributed and sown during the current season.

99. The subjects of *white ants* and *salt lands* are being kept continually in view, as they cannot fail to make a most unwelcome intrusion on the attention of every one engaged in agriculture in Sind. *White ants* are a very serious pest of almost all crops in Sind. It is hoped that of the several methods now being tried on the Mirpurkhás Farm, at least one will prove both cheap and effective. On perennially irrigated areas the immediate command of supply of water should enable the cultivator to practise remedial measures, *the cost of which would be prohibitive* in the case of rain-grown crops.

100. *Salt lands* are of common occurrence in Sind and their extent is increasing on the tract commanded by the Jámráo Canal. The investigation of the whole question of alkali soils in Sind urgently demands very early attention, but until an Agricultural Chemist is attached to my office practically nothing can be done. The Agricultural Chemist to the Government of India has very kindly analysed several samples of soil and alkali for me. The samples are however too few in number for any general inference to be deduced from their analysis and have not yet felt justified in asking Dr. Leather to examine more, the demand made on his time having already exceeded proper limits.

101. It is not too much to say that the investigation of this question lies at the root of all agricultural experiments under the Jámráo Canal and until it is carried out there will always be the very near possibility that any improvement brought about in other respects will be swept away owing to lack of knowledge on the alkali question. Until a considerable acquaintance with the latter is obtained, experiment will be conducted very much in the dark.

102. It would be out of place in a report of this kind to speculate on the effect of being able to grow, in all parts of Sind, cotton with a Liverpool valuation of 7*d.* per lb. Before, however, this is a possibility perennial canals must become the rule and not the exception. Granted a considerable extension of perennially irrigated land, the rise in the value of the land itself would be very great. The effect would moreover not be confined to Sind and its agricultural community, since if a regular supply of locally grown long stapled cotton was assured, a new industry in the spinning of fine counts would quite possibly arise. On the Jámráo Canal about 100,000 acres of cotton are grown annually and this area being perennially irrigated could be readily made to grow the finer kinds. The area that could be immediately placed under Egyptian cotton on other canals in Sind is small and the further extension of the cultivation of this crop beyond these limits would proceed concomitantly with the extension of the area that might be brought, in the course of time, under perennial command from canals.

103. The work during the year under report was in direct charge of the following officers, all of whom worked well:—

Farm.	Superintendent.
Surat	Mr. Bhimbháí M. Desái.
Nadiád (and Chhárodi plot)	" D. H. Tagáre.
Dhárwár	" M. L. Kulkarni.
Jalgaon plot	" L. L. Kulkarni.
Dhoronáro	" J. M. Amin.
Mirpurkhás	" Bhimbháí up to January and then Mr. J. M. Amin.

The work of cotton breeding was in charge of Mr. K. D. Kulkarni.

In Sind Mr. Ali Mahomad was, at the request of the Commissioner in Sind, kindly released by the Karáchi Municipality, and in February was entrusted with the duty of advising Zamindárs in the method of sowing Egyptian cotton (paragraph 97) and inspecting the plots so sown. This duty he is performing energetically and well.

At the date of writing Mr. S. B. Máhli, M.R.A.C., is in charge of the Mirpurkhás Farm, having taken up these duties on 5th July 1905.

FRED. FLETCHER, M.A., B.Sc.,
Deputy Director of Agriculture.

Surat, 16th August 1905.

Glossary of crops referred to in the Poona and Mánjri Farm Reports.

No.	English name.	Vernacular name.	Latin name.
	Barley	Jav	Hordeum vulgare.
	Beet root	Bit	Beta vulgaris.
	Black gram	Udid	Phaseolus mungo var. radiatus.
	Brinjals	Vángo	Solanum Melongena.
	Broom corn	(Exotic)	Sorghum.
	Cassava	Do.	Manihot Utilissimum.
	Chillies	Mirchi	Capsicum frutescens.
	Clover	(Exotic)	Trifolium.
	Cotton	Kápus	Gossipium.
	Cow-pea	Chavli	Dolichos catiang.
	Field beans	Shrávan ghevda	Phaseolus vulgaris.
	Gram	Harbhara	Cicer arietinum.
	Great millet	Jowár	Andropogon Sorghum var. vulgare.
	Do.	Hundi (Hot weather Jowári).	Do.
	Do.	Nilwa	Do.
	Do.	Sundhia	Do. var. ceruus.
	Do.	Utáyli	Do.
	Green gram	Mug	Phaseolus mungo.
	Groundnut	Bhumug	Arachis hypogea.
	Guinea grass	(Exotic)	Panicum jumentorum.
	Horse gram	Kulthi	Dolichos biflorus.
	Indian bean	Vál	Do. lablab.
	Lima beans	(Exotic)	Phaseolus lunatus.
	Linseed	Javas	Linum usitatissimum.
	Lucerne	(Exotic); Lasun ghás	Medicago sativa.
	Maize	Maka	Zea Mays.
	Mulberry.	Tut	Morus indica.
	Oats	Vat	Avena sativa.
	Peas	Vátána	Pisum sativum.
	Pigeon-pea	Tur	Cajanus indicus.
	Plantain	Kel	Musa sapientum.
	Potatoes	Batáta	Solanum tuberosum.
	Rapeseed	Shiras	Brassica campestris var. Napus.
	Rice	Bhát	Oryza sativa.
	Rangcon beans	.....	.....
	San	Tág	Crotolaria juncea.
	Sorghum amber	(Exotic)	Sorghum sachharatum.
	Do. collier	Do.	Do.
	Soy bean	Do.	Glycine hispida.
	Spelt	Khapli	Triticum sativum var. Spelta.
	Spiked millet	Bájri	Pennisetum typhoidum.
	Sugarcane	Us	Sacharum officinarum.
	Sweet-potato	Ratálu	Ipomœa batatas.
	Tobacco	Tamáku	Nicotiana tabacum.
	Velvet beans	(Exotic)	.....
	Water grass	Do.	Panicum muticum.
	Wheat	Gahú	Triticum sativum.

POONA FARM.

	Page.	Fats.
I.—History and Aim of the Farm	39	1—3
II.—Area, Character of Soil and Irrigation	39	4
III.—Purchase of Live-stock	39	5
IV.—Lines of work	39 & 40	6—13
V.—Meteorology	40 & 41	14—17
VI.—Area planted to different crops	41	18 & 19
VII.—Crop diseases and pests	42	20 & 21
VIII.—Forage crops	42 & 43	22—26
IX.—Botanical Experiments—		
Classification of cotton and wheat	43 & 44	29—34
Wheat head experiments	44	35—37
Varieties for identification	44	38—42
X.—Trial of new crops	45	43—50
XI.—Miscellaneous crops	45	51
XII.—Trial of new methods of cultivation and care of crops—		
Fungous diseases	45—47	52—58
XIII.—Farm Implements—		
Implements sold to cultivators... ..	47	59
XIV.—Demonstration and teaching—		
Object lessons and students' plots	47 & 48	60
Training of Probationers	48	61
XV.—Seed growing and distribution—		
Seed grown for the purpose	48	62
List of Recipients	48 & 49	63
XVI.—Accounts	49	64 & 65
XVII.—Visitors	50	66
XVIII.—Remarks	50	67

II.—Reports by the Special Assistant, Agricultural Department.

POONA FARM.

I.—History and Aim of the Farm.

1. The Poona Farm had its origin in a small piece of land taken for the Agricultural Class at the College of Science, which was opened in 1879. In 1882 this area was extended to 66 acres. Up to 1888 it was in charge of the Lecturer of Botany and Agriculture of the College. But in that year it was handed over to the Agricultural Department, where it has remained ever since. The primary purpose of the Farm was for demonstration in agriculture to the students.

2. Upon other agricultural problems arising, the Farm was used for experimental purposes.

3. On account of its convenient location for observation and inspection, considerable area for the last three years has been devoted to raising varieties and hybrids of cotton, wheat and jowári, for Professor Gammie's botanical studies.

II.—Area, Character of Soil and Irrigation.

4. Poona Farm consists of Survey Nos. 57—59 and 60 of Bopudi, situated about 2 miles from Poona. Of this area about 35 acres are arable, while the rest is used for building and pasturage. 26 acres and 19 gunthas are medium black soil and 8 acres and 3 gunthas light soil. Survey Nos. 57—59 and 60 are irrigable from Mutha Left Bank Canal. Survey Nos. 16, 17, 19 and 57, which are occupied by the pasturage and most of the buildings, may be put as belonging to the Dairy.

III.—Purchase of Live-stock

5. One pair of Krishna Valley and one of Kámkreji bullocks were purchased for the purpose of instruction to the students. It is hoped to add a pair of each of the principal breeds of the Presidency.

IV.—Lines of Work for the year.

6. *Forage crops*.—These were chiefly grown on the area set apart as the Dairy Farm and will be treated of under the report of the Dairy, but guinea grass and some fodder was grown here and there on the experimental area.

7. *Variety tests*.—As many varieties of all our staple crops as were obtainable were grown.

8. *New crops*.—Several new crops and new varieties of common crops have been tried this year.

9. *Fungicides*.—Under Dr. Butler, Cryptogamic Botanist to the Government of India, fungicide experiments with the "tika" disease of groundnut and "wilt disease" of Tur and blight of gram were carried on.

10. *Educational*.—The Farm serves the purpose of demonstration in teaching—

- (1) Students of the College of Science ;
- (2) Probationers both from this Presidency and from other provinces ;
- (3) Junior Civilians who are sent to be instructed in agriculture (*vide* Government Resolution, Revenue Department, No. 4155, dated 25th June 1903);
- (4) Visitors, agriculturists and others.

11. For these purposes there is a growing collection of soils, manures, seeds, fibres, botanical specimens of different varieties of cotton, rice, etc., indigenous implements of the Presidency and imported implements. Yearly a portion of land is reserved for the growing of small plots of all the important varieties of the typical crops of the Presidency. Plant breeding is also carried on largely for demonstration for Probationers and others.

- (1) Each first-year student works on the farm daily.
 (2) Each second-year student cultivates a plot of one-tenth of an acre with his own hands.
 (3) Each third-year student manages one-fifth of an acre plot, keeping cultivation sheets, accounts of costs, etc.

12. *Distribution of Seeds.*—Seeds of all kinds have been distributed as far as the supply would admit. This farm is largely used to grow new crops and plants in a small way until sufficient seed is obtained to grow them on a large scale at Mánjri. Many varieties have been sent by the Inspector-General of Agriculture for testing here, and furnishing seed for Pusa and other experimental farms.

13. Many crops like gram are raised for rotation with the forage crops and to keep the land sown during the rabi season.

V.—*Meteorology.*

14. *Rainfall.*—The rainfall at Poona was 14 inches below normal and was not well distributed. The statement below compares the rainfall of the year under report with that of the last ten years:—

		1903.		1904.		Average of ten years (1894—1903).
		Number of rainy days.	Rainfall in inches.	Number of rainy days	Rainfall in inches.	
May	1st Fortnight	...	...	...	...	1.27
Do.	2nd do.	4	2.33	...	...
June	1st do.	5	4.94	1	0.24	4.87
Do.	2nd do.	...	...	3	0.54	
July	1st do.	7	5.19	7	2.51	8.92
Do.	2nd do.	11	4.90	3	0.72	
August	1st do.	3	1.17	2	0.54	4.77
Do.	2nd do.	1	1.19	...	0.16	
September	1st do.	1	0.14	5	3.32	4.27
Do.	2nd do.	4	2.79	3	0.61	
October	1st do.	2	3.07	4	1.81	4.11
Do.	2nd do.	1	0.82	3	4.85	
November	1st do.	...	...	...	...	0.38
Do.	2nd do.	...	...	...	...
December	1st do.	...	...	...	...	0.33
Do.	2nd do.	...	...	...	...
Total ...		39	26.54	31	15.30	28.92

15. The season was a very unfavourable one; from the beginning of May to the end of December only 15.30 inches of rain was recorded. The total rainfall of the season was little over half the average of the preceding ten years. There were no ante-monsoonal showers for the preparation of the fields. As the season for sowing was rapidly passing, cotton, groundnut and other miscellaneous crops of the farm were sown under irrigation. Less than an inch of rain fell in June. Clouds gathered only to be driven away by strong winds. The holding off of the rain caused the price of food-grains and fodder to rise steadily. It rained heavily on the 3rd and 4th of July. Sowing of fodder and other crops was commenced on the 5th. We had again heavy rainfall on the 6th, until a break was needed to finish the sowing operations. During the second fortnight of July it rained very little and all the crops began to suffer for want of moisture. All crops were therefore irrigated by canal water. There was great trouble during the year to get sufficient water to irrigate the farm crops in time. In Mr. Wadia's fields the water was available only after the crops were half withered. During this long break all the crops on the farm were attacked by various kinds of insects, caterpillars and borers. During August it rained in drizzles on the 7th, 8th, 14th and 20th, but the total rainfall of the month was not at all sufficient for the standing crops. Prices of food-grains and fodder continued high. Páshán Tank, which supplied drinking water, got dry in this month. The Bhám-burda Kurán had not yet produced a blade of grass and great anxiety began to be felt about the scarcity of fodder for the dairy cattle. On September 11th,

12th, 13th and 14th, it rained slowly and steadily 4 inches in all and quite opportunely for the standing crops. This rain extended over quite a large part of the rabi districts. By the beginning of October fodder crops on the farm were ready for harvesting, but had to wait till the end of the month as the weather was quite unsettled. In rice districts harvesting of early varieties was in progress, but late crops were in want of rain.

16. During the month of October it rained on the 10th, 11th, 12th, 14th and 21st instants. On the Farm it was favourable for the standing crops of maize and Shálu. It facilitated the sowing of wheat and other rabi crops. This rain was general and badly needed in the rabi districts and improved the condition of the people. The sowing of the rabi crops was at once taken in hand. Later on the rains were scant and the Shálu Jowár crop did not produce grain. The fodder produced was also insufficient and scarcity began to be felt from December.

17. The October rain helped the kurans, but less than half the usual quantity of grass in the Bhámburda and Nánda Kurans was obtained. The months of November and December ended completely dry.

VI.—Area planted to different Crops.

18. 15 acres and 15 $\frac{7}{10}$ gunthas were for kharif crops; 4* acres 35 $\frac{1}{2}$ gunthas for rabi; 4 acres and 31 gunthas for guinea grass and water grass.

19. The statement below shows the area cropped and the purpose of each crop:—

Field No.	Kharif crop.	Area.	Purpose of the crop.	Rabi crop.	Area.	Purpose of the crop.	Perennial crop.	Area.	Purpose of the crop.
3	Groundnut	1 0	To study tika disease.	.....	.....	.....	.....	.....	.....
3	.....	.....	.....	Gram	1 0	Rotation	.....	.....	.....
3	Cotton	0 33	Improvement of cotton crop.	.....	.....	.....	.....	.....	.....
3	Utáváli	0 36	For fodder	.....	.....	.....	Guinea grass.	0 13	Green fodder for Dairy.
3	.....	.....	.....	.....	.....	.....	.....	.....	.....
3	.....	.....	.....	.....	.....	.....	Water grass.	0 2	Do.
3	Students' plots	0 23	Practical work	.....	.....	.....	Plantains	0 2	Crop.
4	Fodder Nilva	0 14	For fodder	.....	.....	.....	.....	.....	.....
4	Sundhia	0 16	Do.	.....	.....	.....	.....	.....	.....
4	Maize	0 1	Do.	.....	.....	.....	.....	.....	.....
4	.....	.....	.....	Gram	0 1	Crop	.....	.....	.....
4	.....	.....	.....	Shálu	1 14	For fodder	.....	.....	.....
4	.....	.....	.....	Wheat	1 14	Wheat improvement.	.....	.....	.....
5	Object lesson plots	0 36 $\frac{1}{2}$	Object lessons for students.	.....	.....	.....	.....	.....	.....
5	Cotton	0 8 $\frac{1}{2}$	Improvement of cotton.	.....	.....	.....	.....	.....	.....
6	.....	.....	.....	.....	.....	.....	Guinea grass.	3 8	Green fodder for Dairy.
7	Students' plots.	1 20	Practical work	.....	.....	.....	.....	.....	.....
7	Utáváli	1 23	For fodder	.....	.....	.....	.....	.....	.....
7	.....	.....	.....	Wheat	0 6	Wheat improvement.	.....	.....	.....
7	.....	.....	.....	Shálu	0 6	For fodder	.....	.....	.....
7	.....	.....	.....	.....	.....	.....	Guinea grass.	0 9	Green fodder for Dairy.
8	Cotton	1 10	Cotton improvement.	.....	.....	.....	.....	.....	.....
8	Tur	0 0 $\frac{1}{2}$	Variety test	.....	.....	.....	.....	.....	.....
8	Bangoon beans.	0 12	Crop	.....	.....	.....	.....	.....	.....
8	Pulses	0 3	Miscellaneous crops.	.....	.....	.....	.....	.....	.....
8	Maize	0 1 $\frac{1}{2}$		.....	.....	.....	.....	.....	.....
8	Bájri	0 1 $\frac{1}{2}$	Variety test	.....	.....	.....	.....	.....	.....
8	Jowár	0 27	For fodder	.....	.....	.....	.....	.....	.....
8	Utáváli	0 3	.....	Shálu	0 3	For fodder	.....	.....	.....
8	.....	.....	.....	Shálu varieties.	0 2 $\frac{1}{2}$	Variety test	.....	.....	.....
8	.....	.....	.....	Wheat	0 1 $\frac{1}{2}$	Wheat improvement.	.....	.....	.....
8	Field beans	0 3	Miscellaneous crop.	.....	.....	.....	.....	.....	.....
8	Big seeded	0 1		.....	.....	.....	.....	.....	.....
9	Chavli.	0 3	For seed	.....	.....	.....	.....	.....	.....
9	Indigo	0 7	Do.	.....	.....	.....	.....	.....	.....
9	Tobacco	0 7	Do.	.....	.....	.....	.....	.....	.....
9	Broom corn	0 9	New crop	.....	.....	.....	.....	.....	.....
9	Maize	0 7	Do.	.....	.....	.....	.....	.....	.....
9	Curzo Maize	0 0 $\frac{1}{2}$	Do.	.....	.....	.....	.....	.....	.....
9	Sundhia	0 2	For fodder	.....	.....	.....	.....	.....	.....
9	.....	.....	.....	Shálu	0 7	For fodder	.....	.....	.....
9	.....	.....	.....	Do.	0 3		.....	.....	.....
9	Unsoan	0 4	.....	.....	.....	.....	.....	.....	.....
9	Clover	0 5 $\frac{1}{2}$	For fodder	.....	.....	.....	.....	.....	.....
10	Beet root	0 13	New crop	.....	.....	.....	.....	.....	.....
10	Sundhia	0 7 $\frac{1}{2}$	For fodder	.....	.....	.....	.....	.....	.....
10	Chillies	0 4 $\frac{1}{2}$	Crop	.....	.....	.....	.....	.....	.....
10	Brijals	0 4	Do.	.....	.....	.....	.....	.....	.....
10	Nursery beds	0 2	.....	.....	.....	.....	Mulberry	0 2	To start a plantation.
10	.....	.....	.....	.....	.....	.....	.....	.....	.....
11	Cotton	0 0	Cotton improvement.	.....	.....	.....	.....	.....	.....
11	Maize	2 21	For fodder	Shálu	0 18	For fodder	.....	.....	.....
11	.....	.....	.....	.....	.....	.....	.....	.....	.....
12	.....	.....	.....	.....	.....	.....	Guinea grass.	0 34	Green fodder for Dairy.

*4 acres 35 $\frac{1}{2}$ gunthas cropped second time.

VII.—Crop Diseases and Pests.

20. During the months of March, April, May and June the farm was successively visited by swarms of locusts. It was expensive watching the standing crop of Hundi. The small plantain plot was completely defoliated. The locusts did not touch Mahogany (*Sweetenia mahogany*), Neem (*Melia azadirachta*), Chiku (*Achras Sapota*), and Jámbhul (*Eugenia Jambolana*).

21. Other insects were more plentiful than usual on account of scantiness of vegetation due to poor rainfall. The attack of rust on cereals was not so severe as in some of the previous years.

VIII.—Forage Crops.

22. On account of the scarcity of fodder every available area was put down to fodder for the dairy animals. Four acres and 33 gunthas were down to guinea grass and gave average outturn of 12,549 lbs.

23. *Maize*.—Maize was grown for fodder in fields Nos. 4 and 11. The outturn per acre was 6,000 and 7,800 lbs., respectively. Field No. 11 was sown rather late in order to get a successive cutting of green fodder for dairy cattle. It was manured.

24. *Sundhia*.—In all 25½ gunthas. It was sown in July and August and harvested, field by field, as it was coming into flower. The average outturn was 15,668, giving a net profit of Rs. 17.

25. The other fodder crops gave good yields.

The statement below shows the outturn of the various green fodder crops:—

Field No.	Name of crop.	Results per acre.		
		Outturn.	Value of outturn.	Cost of cultivation.
		Lbs.	Rs. a. p.	Rs. a. p.
8	Guinea grass, 3 cuttings ...	8,111	54 1 0	30 12 0
6	Do. 6 „ ...	11,330	75 8 0	20 6 0
7	Do. 3 „ ...	13,822	92 2 0	46 12 0
12	Do. 4 „ ...	17,012	143 6 0	39 15 0
	Average ...	12,569	83 12 3	34 7 3
4	Maize ...	6,000	30 0 0	17 8 0
11	Do. ...	7,861	39 5 0	33 1 0
	Average ...	6,930	34 10 6	25 4 6
4	Sundhia ...	10,212	34 0 0	.....
9	Do. ...	16,500	55 0 0	.....
10	Do. ...	20,203	67 0 0	.....
	Average ...	15,668	52 3 4	34 13 8
4	Nilva ...	22,650	75 3 0	23 2 0
7	Utávali ...	19,800	66 0 0	29 4 0
8	Do. ...	54,333	187 12 0	40 13 9
	Average ...	38,066	126 11 0	35 0 6
8	Shálu ...	10,800	36 0 0	25 3 0
9	Do. ...	11,400	37 15 0	20 6 0
	Average ...	11,100	36 15 6	22 12 6

26. *Dry Fodder*.—A few plots here and there of the fodder crops were dried, including an 1 acre 14 guntha plot of Nilva.

The statement below shows the results :—

Field No.	Name of crop.	Results per acre.			
		Outturn.	Value of outturn.	Cost of cultivation.	Profit or loss.
		Lbs.	Rs. a. p.	Rs. a. p.	Rs. a. p.
4	Nilva	3,264	18 2 0	22 14 0	—4 12 0
3	Utávali	4 333	24 1 0	18 8 0	5 9 0
7	Do.	2,084	11 9 0	29 4 0	—17 11 0
	Average ...	3,208	17 13 0	23 14 0.	—6 1 0
4	Shálu	1,592	10 9 0	12 0 0	—1 7 0
7	Do.	3,333	22 3 0	14 3 0.	8 0 0.
9	Do.	5,143	34 4 0	11 15 0	22 5 0
11	Do.	2,600	17 5 0	9 4 0	8 1 0
	Average ...	3,167	21 1 3	11 13 6	9 3 9

IX.—Botanical Experiments.

27. Botanical experiments occupied 5 acres and 15 gunthas. Under this head comes the work done at the farm in connection with the several varieties of cotton, wheat, jowár, rice, tur, indigo, cucurbitaceous plants, brinjals, chillies and sweet-potatoes.

28. No cross-fertilization was done in the year under report, but the selection of the results of the previous year's crossing went on.

29. *Cotton*.—All the varieties grown in previous years were again sown in small plots to further observe any changes that might take place in the habit of growth of the plant—lint, colour or foliage due to the change of climate or character of soil.

30. In addition to the above, 309 new varieties were received during the year from the Inspector-General of Agriculture, among which are the cottons grown in Assam, Burma, Punjab, Madras, Bengal, Márwár, United Provinces, Central Provinces and Káthiáwár and in addition almost all kinds of tree cottons grown in India. Very few plants of the tree cotton produced any bolls. They will be kept over for the next season. During the early part of the season most of them did not thrive well. But since February the plants have put out new foliage and even in some cases flowers.

31. All cotton had to be irrigated from the canal. The annual varieties were sown 3 feet apart in rows, while the tree cottons were allowed 6 feet in each direction. Nearly all the varieties germinated well, but in some varieties of the tree cottons the seed had to be sown two or three times. During their growth the plants were very badly attacked by caterpillars, jassids and aphides. The affected plants and leaves were collected and burnt. The loss due to boll worms and wilt was very little. The plants have been classified by Professor Gammie according to his paper. Cotton plants were selected from each variety and cotton has been collected. All data collected were turned over to Professor Gammie and will appear in his paper. Next season the growing of cottons for purely botanical work is to be transferred to the Ganeshkhind Gardens. Work on this farm will be confined to agricultural tests of the more useful types and their selection.

32. *Wheat*.—In the year 1903, all the wheat varieties then grown on the farm were divided by Professor Gammie into six principal classes and each class was again sub-divided according to the colour and consistency.

A representative variety of each sub-class was sown in small beds as well as the mixture of several varieties in a separate bed to prove the work of the last year.

All the varieties were found to grow true to type.

33. Seventeen new varieties were received in October 1904 from the Inspector-General of Agriculture and have been included in Professor Gammie's classification.

34. The selected seeds from several crosses of wheat varieties were sown along with the crosses of 1903-1904. The latter were first raised in earthen pots and thence transplanted in the field and grew well, producing heads of medium size.

In the crosses of Kálákusal plus Khapli seven distinct kinds of heads as described on page 40 of the last year's report, were collected and sown separately. The characteristics are not so pronounced in the present year's crop. In this cross the grains are improving. The plot produced two kinds of spikelets—one like Khapli having seeds enclosed in glumes which cannot be easily separated, and in another the glumes do not adhere so tightly. Selected heads of each type will be sown next year.

35. During the year the heads will be selected from each promising variety as well as crosses and will be sown next year on a larger area to find out the outturn. Samples of all the varieties as well as those of crosses will be sent for valuation and opinion to the Chamber of Commerce and the results separately published by Professor Gammie.

36. The head experiments of the last two years were continued and the statement below shows the results:—

Ex- peri- ment No.	Purpose of Experiment.	Bed No.	Treatment of beds.	Number of heads counted.	Number of heads with			Percentage to the number of heads counted of head with		
					23 Spikelets.	18 Spikelets.	14 Spikelets.	22 Spikelets.	18 Spikelets.	14 Spikelets.
I	To see whether those heads bearing the largest number of spikelets would produce extra large heads.	1	Sown with seed from heads having a large number of spikelets per head	160	84	87	28	42.20	43.70	14.10
		2	Sown with seeds from the heads having small number of spikelets per head	108	63	31	14	58.3	23.2	12.5
II	To ascertain the respective value of the seed from the middle and outer spikelets of a head of wheat to reproduce the plant.	3	Sown with small middle seeds	287	132	121	34	46.0	45.2	11.8
		4	Sown with outside grains	373	123	162	88	33.0	43.4	23.0

The results are somewhat contrary to those of last year in the second series, while the first series shows little change.

37. There was no smut at all, but rust made its appearance in January and February chiefly among Kálákusal, Popatia and Daudkháni varieties. The disease having appeared so late in the year, the damage done to the crop was not appreciable.

38. *Jowárs*.—These were grown under irrigation and were classified by Professor Gammie into 31 varieties. Some of the noticeable differences in the varieties were as follows: (1) colour of seed, as white, creamy-coloured, yellow, *kháki*, red or black; (2) position of head, either drooping or erect; (3) density of the head, either loose or dense; (4) shape of the head; and (5) number of seeds in a glume.

39. *Rice*.—Fifty-three varieties of rice grown at Poona and Lonávla, were classified by Professor Gammie. He has made 15 distinct classes by appearance of ears and cleaned rice. A note on rice will be separately published by him.

40. *Tur*.—Eighty-seven lots of Tur were sown in small beds, but during their growth they cross-fertilized to such an extent that it was impossible to identify them.

41. *Indigo*.—Very little has been done regarding indigo except selection of seed during the year.

42. *Cucurbitaceæ*.—Thirty-three varieties of cucurbitaceous plants grown in the Bombay Presidency were collected through the District Agricultural Inspectors and sown in Field No. 5. The creepers were trained on bowers; the fruits were photographed and classified by Professor Gammie. Brinjals, chillies, and sweet potatoes were also grown in small beds for identification.

X.—*Trial of new Crops.*

43. *Yams*.—The varieties of yams received from the Reporter on Economic Products to the Government of India were planted at the Ganeshkhind Gardens.

44. *Rangoon beans*.—In Field No. 8 about three-fourths of a guntha of land was sown with each of the varieties of Rangoon-beans. There were eight white and eight red varieties of beans. The white are shining creamy white in colour. The red are mottled. The seeds were dibbled by hand in rows of three feet apart. The germination was fair and uniform. When the creepers were sufficiently grown, they were trained on trellis. The yield per acre of red varieties was from 550 to 2,050 lbs. and that of white from 826 to 1,840 lbs. All the red varieties seemed to be identical and all the white varieties are also identical, there being therefore only two varieties. These beans were received in large quantities from Rangoon during the last famine, but there seems to be no market for them at present and their growth except in the object lesson plots will be discontinued.

45. *Field-beans*.—Field-beans yielded at the rate of 1,050 lbs. per acre.

46. *Velvet-beans*.—These were grown in small beds of the object lesson plots. They are grown in America for green manuring, as well as for cattle fodder. It being a leguminous crop produces a very nutritious and succulent fodder like cowpea and will be tried during the coming season for this purpose.

47. *Soy-beans*.—All the varieties were grown in small beds in the object lesson plots.

48. *Maize*.—American Southern Dent and Khândesh maize were grown in small plots to get seed for a larger area next year.

Seeds from Messrs. Prashkauer and Company.

49. (1) *Curzo-maize*.—It was a total failure owing to the attack of insects. The seed from last year's crop was unfit for sowing.

(2) *Peruvian cotton*.—During the whole year this cotton gave only four or five bolls. It will be turned over to Professor Gammie.

(3) *Castor-seed*.—The capsules of this castor require about one month more to ripen than the indigenous varieties.

(4) The *Lima beans* from Peru were also sown in small patches. They have yielded a good outturn.

50. *Broom-corn*.—This is a variety of Sorghum and it is chiefly grown in America for manufacture of brooms. Brooms of various sizes are made from the flower-stalks. They serve as carpet, table and floor brushes. Brooms manufactured from the crop grown at the Poona Farm were exhibited at the Bombay Exhibition.

In a small plot of Broom-corn the growth was very good. This crop reached a height of 12 feet.

XI.—*Miscellaneous Crops.*

51. Several varieties of pulses were grown in Field No. 8 for identification. One small line of each was alternated with jowár. The creepers were trained on jowár plants. They grew well and were studied by the Botanist. Seed for more extended trial was obtained.

XII.—*Trial of new Methods of Cultivation and Care of Crops.*

Fungous Disease.

52. *Tika disease of Groundnut*.—The experiment with the disease was carried on in the same field as last year which has been infested since the first appearance of the disease in 1902, groundnuts being grown yearly since then. Consequently the field is much worse affected than any field in which rotation has been practised.

53. The experiments of the year under report consisted of steeping seed in copper sulphate, spraying with Bordeaux mixture of different strengths and trial of resistant powers of various varieties.

The field was laid out for experiments as follows:—

It was divided into six sections, each being sown with one of the following varieties: Spanish groundnut, Small Japanese, Tata's groundnut, Pondicherry, Selected Virginia, Large Japanese. Each section was again divided transversely into eight plots:

Plot 1 of each section was sprayed over on the 17th of July with Bordeaux mixture at the rate of 50 gallons per acre.

Plot 2 was sprayed once on the same date but at the rate of 75 gallons per acre.

Plot 3 also was sprayed on the same date, but at the rate of 100 gallons per acre.

Plots 4 and 5 were unsprayed.

Plot 6 was sprayed twice, the first on July 17th and the second on August 8th, both times at the rate of 50 gallons per acre.

Plot 7 was sprayed three times as follows: July 17th, August 8th and August 29th. The rate of each application was 50 gallons.

Plot 8 received two applications, one on the 17th July and one on August 8th, but at the rate of 100 gallons per acre.

The seed sown in plots 1—4 was steeped; that of plots 5—8 was unsteeped.

54. The disease was very severe and only a small crop was secured from any plot. Still the results show very hopeful signs for the treatments if made under ordinary conditions. The steeped plots showed an average yield of $684\frac{1}{2}$ lbs. per acre as against $586\frac{2}{3}$ lbs. of the unsteeped, a gain of nearly $16\frac{1}{2}$ per cent. The average of the sprayed plots was $667\frac{1}{2}$ lbs. per acre against 510 of the unsprayed or a gain of nearly $23\frac{4}{5}$ per cent., while the plots receiving the combined treatment gave an average outturn of $726\frac{2}{3}$ lbs. compared with the untreated plots yielding only 520 lbs., a gain of $50\frac{1}{5}$ per cent. With regard to the strength of the mixture, 50 gallons per acre gave just as good or a little better results than stronger solutions. Unfortunately the second spraying was only given to the unsteeped portion and the results are not comparable with the single-sprayed plots. But the plot No. 7 was sprayed three times as against the twice-sprayed plots, *viz.* Nos. 6 and 8, and the outturn of $701\frac{2}{3}$ lbs. from the former is $24\frac{4}{5}$ per cent. higher than that from the latter.

55. There was a great difference in the yield of the different varieties, varying from 246 lbs. of Small Japanese to 1,045 lbs. of Pondicherry or a difference of $285\frac{2}{3}$ per cent., although even the average for the Pondicherry is only about one-fourth of a crop. Tata's groundnut and Big Japanese showed resistant power and selected Virginia was also much better than the Spanish Pea-nut or Small Japanese. The Pondicherry variety in plots both steeped and sprayed gave an average outturn of 1,536, nearly one-half of a crop, and a gain over the poorest plot which was the unsprayed, unsteeped Small Japanese at 96 lbs. per acre, of 1,500 per cent. While no treatment produces complete freedom from the disease, yet even under the worst conditions by the three treatments, selection of variety, steeping and spraying, the yield may be increased 1,500 per cent. But further experiments on fields not so badly infested should be tried. This will be done next season.

56. It was also observed that certain individual plants showed greater resistant power than others. It is believed that if these plants were selected a more resistant variety might be obtained.

The results are tabulated below.

Groundnut was sown on 14th June 1904 and harvested from 29th September 1904.

Results per acre.

Variety.	Steeped				Unsteeped				Average of all plots per acre.
	At 50 gals per acre 17-7-04.	At 75 gals. 17-7-04.	At 100 gals. 17-7-04.	No mixture.	No mixture.	50 gals. 17-7-04; 50 gals. 8-8-04.	50 gals. 17-7-04; 50 gals. 8-8-04; 50 gals. 29-8-04.	100 gals. 17-7-04; 100 gals. 8-8-04.	
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	
Spanish	176	304	192	192	192	112	512	448	266
Small Japanese	283	288	352	160	96	96	368	320	246
Tata's groundnut	704	768	512	768	896	1,083	1,152	576	808
Fondicherry	1,664	1,536	1,408	684	576	763	960	768	1,045
Selected Virginia	736	736	608	632	430	480	576	704	619
Big Japanese	896	960	944	928	880	832	640	560	830
Average	744	765	669	561	520	563	701	563	...

57. *Wilt disease of Tur.*—The resistant power of the different varieties of Tur to this disease was to be tried here, but the field on which the experiment was carried on had so little moisture that all plants died before maturity, all varieties succumbing at about the same time to the combined action of disease and drought. The experiment will be continued next year.

58. *Gram disease.*—Three varieties of gram followed the groundnut crop in Field No. 3 during the rabi season. The gram was badly diseased.

XIII.—Farm Implements.

59. During the year under report 8 big reversible Arlington ploughs, 6 small reversible ploughs, 6 Doe's ploughs, and a ridging plough were imported.

Almost all the reversible ploughs were sold during the year and a fresh consignment has been ordered out from America.

The demand for reversible ploughs has been largely increased since the demonstration of implements in the Bombay Exhibition.

The statement below supplies the names of recipients of ploughs and small hand chaff-cutters:—

Village and District.	Name.	Number of ploughs.	Number of chaff-cutters.
Poona	Sirdar Abásáheb Purandhare	...	1
Mudhol	Private Secretary to the Chief of Mudhol.	...	1
Ráhuri	Doctor Ballantine	1 T. W. 3 Doe's	...
Nira Station	Ráo Bahádur M. B. Kinjale	2	1
Phaltan	Mr. Appáji Vináyak Joshi	2	...
Bársi	Mr. G. P. Sulákhe	2	...
Bársi	Mr. Náráyan R. Mule	...	...
Pandora, Poona	Mr. Venichand Virchand Gujar	1	...
Poona	Mr. Laxman Vásudev Paránjpe	2	...
Poona	Mr. Tátyásáheb Nátu	...	1
Ráne-bennur	Mr. Vyankatesh Shrinivás Náik	1	...
Poona	Mr. B. K. Sáthe	...	1
Bárámati	Mr. Mahárudra Vishwanáthaya	2	...
Poona	Mr. Mártand Wáman Shrotri	...	1
Wedshi, Sholápúr	Mr. Dinánáth Gajánan Phadke	1	...

XIV.—Demonstration and Training.

60. As in previous years the object lesson plots were sown in Field No. 5 with all the varieties of cereals, pulses, oil-seeds, fibre plants and dye-plants.

Several varieties of chillies, brinjals, sweet-potatoes, indigo, cucurbitaceous plants were also grown in this field with the object of enabling the students to study the crops of the Presidency.

61. *Training of Probationers.*—During the year three probationers from Madras, one from Mysore and one from Sind returned to their provinces after finishing their course. Several probationers were also trained from Bombay for the use of the farms.

XV.—Seed-growing and Distribution.

62. Varieties of tobacco and indigo were grown for seed distribution. The demand for good seed is increasing from out-stations. The larger quantities of seeds were supplied from the Mánjri Farm.

63. The statement given below shows the distribution of seeds from the Poona Farm during the year :—

Serial No.	Date of distribution.	Village to which seed distributed.	Name of person.	Description of seed.	Amount of seed.
1	2	3	4	5	6
1	9th April 1904 ...	Ichhalkaranji ...	Mr. Hongouda Peergouda l'átil.	Jowári ... 4 varieties of cotton ...	12 lbs. 2 lbs. 13 oz.
2	21st do. ...	Caloutta ...	The Director of Botanical Survey in India.	Ambádi and Táq ...	4 oz. each.
3	26th do. ...	Balichak, B. N. Railway, Midnápur.	Ponorary Joint Secretary, Sabangsi Agricultural School.	Soy-beans ...	10 lbs.
4	30th do. ...	Surat ...	Deputy Director of Agriculture.	Falhi and Saidi clover varieties.	2—11 and 6 oz.
5	30th do. ...	Sibpur ...	Overseer, Sibpur Farm ...	4 varieties of cotton-seed	14 oz.
6	15th June 1904 ...	Dharwár ...	Principal, Training College.	Milletts, 4 varieties ... English peas ... Pulses, 3 varieties ... Beans, 4 varieties ... Groundnut ... Maize ... Tur ... Indigo ... Sesam ... Tapioca ... Tobacco ... Báji ... Castor ...	1 lb. 4 oz. 1—1 oz. 14 oz. 4 lbs. 2 cobs. 10 oz. 6 oz. 40 lbs. 12 cuttings. 1½ oz. 4 lbs. 8 oz.
7	12th do. ...	Chittagong ...	Overseer, Government Farm.	Water-grass ...	1 basket.
8	12th do. ...	Cuttack ...	Do. ...	Do. ...	Do.
9	12th do. ...	Rusa ...	Do. ...	Sweet-potato cuttings ...	1 basket of each variety.
10	9th do. ...	Pittapuram, Madras.	Superintendent of Farm...	5 varieties of fodder-seeds.	2 lbs. each.
11	18th do. ...	Poona ...	Professor of Botany, College of Science.	Maize ...	2 cobs.
12	23rd do. ...	Lyallpur ...	Director of Agriculture, Punjab.	Sesamum, 3 varieties ...	8 oz. each.
13	2nd July 1904 ...	Do. ...	Manager, Farm ...	Sesamum ...	1 lb.
14	12th do. ...	Sámalkot, Madras.	Agricultural Inspector ...	Tobacco-seed, 8 varieties.	½ oz. each.
15	12th do. ...	Kolhápur ...	Mr. T. B. Seeford ...	Sweet potato cuttings, 8 varieties.	1 basket each.
16	15th do. ...	Surat ...	Mr. K. D. Kulkarni, field man to Deputy Director.	Brazilian cotton-seed ...	½ oz.
17	15th do. ...	Do. ...	Assistant Superintendent, Government Farm.	Sweet-potato cuttings, 3 varieties.	1 basket each.
18	15th do. ...	Ahmedabad ...	Agricultural Teacher, Training College.	Maize and groundnut ...	10 lbs. each.
19	21st do. ...	Dehra-dun ...	Agricultural Chemist to the Government of India	Nilva and Utávali seed.	1 lb. each.
20	26th do. ...	Siripur ...	Superintendent, Siripur Farm.	Náchni, Kulthi, Udíd ...	8 oz. each.
21	29th do. ...	Báramati ...	Mr. V. M. Sahasrabudhe ...	Sweet-potato cuttings, 3 varieties.	1 basket each.
22	6th Aug. 1904 ...	Mount Abu ...	Honorary Superintendent, Municipal Gardens.	Do. ...	Do.
23	6th do. ...	Saidapeth ...	Principal, Madras College of Agriculture.	Groundnut, 4 varieties ... Sorghum Amber ... Broom-corn ... Kábuli gam ...	1 lb. each. 1 lb. 1 lb. 1 lb.
24	10th Sept. 1904 ...	Dahwadi, Átára.	Mr. Narhar Govind Ranude.	Forghum Amber ...	20 lbs.
25	14th Sept. 1904 ...	Chowk ...	Mr. R. M. Deshpánde ...	Betel vines ...	1 basket.

Serial No.	Date of distribution.	Village to which seed distributed.	Name of person.	Description of seed.	Amount of seed.
1	2	3	4	5	6
26	13th Oct. 1904	Koilpatti, Madras.	Inspector, Government Farm.	Awneed Bajri	5 lbs.
27	26th do.	Karachi	Mr. F. J. F. Beaumont, Sind Club.	Linsced	16 lbs.
28	29th Nov. 1904	Oundh, Poona.	Mr. Ganpati Kelkar	Guinea grass sets	1 cart-load.
29	12th Dec. 1904	Madras	P. F. Fyson, Esq., Professor of Biology, Presidency College, Madras.	4 varieties cotton-seed	1 oz. each.
30	17th do.	Do.	C. A. Parhar, Esq., Government Botanist.	6 varieties groundnut	10 lbs. each.
31	29th do.	Do.	P. F. Fyson, Esq., Professor of Biology, Presidency College, Madras.	2 varieties cotton-seed	1½ oz. each.
32	30th do.	Colombo	Superintendent, Stock Gardens.	Niger-seed	oz.
33	28th Jan. 1905	Mundhwa, Poona.	Mr. T. C. R. Iyengar	Guinea grass sets	1 cart-load.
34	14th Feb. 1905	Rajpur Pipra, Pongal.	E. F. Hudson, Esq.	Chilli-seeds, 8 varieties	2 oz. each.
35	27th do.	Tandacherry, Chitragong.	Kumar R. M. Roy	Castor-seed	5 lbs.
36	28th do.	Surat	Deputy Director of Agriculture.	Cotton-seed	50 seeds.
37	17th March 1905	Dhond	Mr Albert Norton	Velvet beans Cow-peas Soy-beans, 3 varieties	1 lb. 8 oz. 8 oz. each.
38	28th Feb. 1905	Akalkot	The Administrator	Guinea grass sets	2 bags.
39	19th Jan. 1905	Pusa	Director of Agricultural Research Institute.	8 varieties of Indigo seed.	4 oz. each.

XVI.—Accounts.

64. The net cost for the year is Rs. 5,138-3-5 as compared with that of last year's Rs. 4,148-2-0. Of the fodder shown as sold to Dairy, Rs. 581-2-11 was balanced by upkeep of bullocks and the balance Rs. 162-2-10 is due to Poona Farm.

65. The reason for the additional cost is largely due to the greater use the farm has been made of for teaching. There are 50 students in F.Ag. to be taught ploughing, harrowing, etc., which necessitated the purchase of more bullocks. S.Ag. and L.Ag. students each cultivated an area of 4 gunthas and 8 gunthas respectively. Another increase of expense has been the increase of varieties. In this year 1,110 varieties of different crops were grown altogether, each requiring separate sowing, harvesting, recording and seed-bags. The unfavourable season also affected the yield. The balance sheet is given below:—

Balance Sheet of the Poona Farm for the year 1904-05.

Receipts.	Amount.	Total.	Expenditure.	Amount.	Total.
1	2	3	4	5	6
	Rs. a. p.	Rs. a. p.		Rs. a. p.	Rs. a. p.
To sale of farm produce for 1904-05—			By cost of Establishment ...	.....	2,561 1 10
Oil-seeds ...	2 8 0	.....	„ Telegram and Service	.....	50 0 0
Cotton ...	20 0 0	.....	„ Stamps	.....	122 0 0
Garden crops ...	32 8 3	.....	„ Rent of land	.....	.....
Fruits ...	10 0 0	.....	„ Irrigation charges	286 0 6	.....
Live-stock ...	39 0 0	.....	„ Petty improvements	689 15 3	.....
Miscellaneous ...	43 2 6	147 2 9	„ Labour	940 4 8	.....
* To sale of green and dry fodder to the Dairy Cattle.	.....	743 5 9	„ Upkeep of farm work cattle.	720 0 0	.....
To seeds unsold on 31st March 1905 and on hand...	.....	208 8 0	„ Purchase of seeds for sowing.	158 3 5	.....
To increase in valuation of—			„ „ implements	227 14 0	.....
Farm implements ...	292 2 0	.....	„ „ petty supplies	71 12 9	.....
Live-stock ...	365 0 0	657 2 0	„ „ furniture	50 0 0	.....
Total ...	.....	1,751 2 6	„ „ books	40 13 11	.....
By net cost ...	.....	5,138 3 5	„ „ manures	205 14 1	.....
Total ...	.....	6,889 5 11	„ „ live-stock	200 0 0	.....
			„ Miscellaneous expenses	479 5 6	.....
			„ Rent of land	66 0 0	4,136 4 1
			Total ...	.....	6,889 5 11

* Of this Rs. 139-13-1 was paid cash and the balance by book adjustment.

XVII.—Visitors.

66. The farm is open to visitors every day and an effort is made to induce the surrounding cultivators to come. In all 55 persons visited the farm during the year under report. Of these 18 were cultivators and land-holders, 16 were officers, and the remaining were private persons following other professions than cultivation.

XVIII.—Remarks.

67. The farm was under the superintendence of Mr. Kelkar up to the 16th of January 1905, and from that time Mr. H. K. Dándekar, D.Ag., took the charge. Mr. V. K. Kogekar, L.Ag., was appointed farm clerk from the 1st of February 1905. Mr. Kelkar has been promoted to be Inspector of Farms. The new officers are giving satisfaction.

Kirkee, 17th July 1905.

J. B. KNIGHT, M.Sc.,
Special Assistant, Agricultural Department.

POONA DAIRY AND DAIRY FARM.

						Para.	Page.
I	Introduction	...	...	...	...	1-3	53
II	Purpose	...	...	...	...	4	53
III	Health of animals	...	...	...	...	5	53
IV	Milk supply	...	...	...	...	6-9	53
V	Yield of milk	...	...	...	...	10 & 11	54 & 55
VI	Strength of the herd	...	...	...	...	12 & 13	55 & 56
VII	Breeds kept; service of bulis	...	...	...	...	14-16	56
VIII	Dairy Farm—						
	(A) Fodder growing experiments; Leguminous crops -						
	San, Chavli, mixed crops	...	...	...	...	18 - 21	56 & 57
	(B) Comparative tests of fodder	...	...	...	...	22	57 & 58
IX	Feeding Experiments—						
	Molassine; Peas and oats; Chavli and Bajri; Sugar-beets	...	...	...	...	24-27	58-60
X	Accounts	...	...	...	...	28	60 & 61
	Appendix—Castration Experiments	...	...	...	...	...	63

POONA DAIRY AND THE DAIRY FARM.

I.—Introduction.

1. Milk is one of the healthiest of human foods, being palatable, easily digested, and a complete food furnishing all the substances needed to support life. It is thought that the importance of dairying is not appreciated in India. Good milk brings as high a price in Bombay and Poona as it would in New York, Boston and London, while all other foods are very much cheaper.

2. It is believed that this is due in part to the fact that milkmen buy all the food for their dairy animals instead of growing most of it. In buying the foods the services of a middleman are resorted to, which increases the expenses.

3. Dairying in most countries is considered a branch of farming and is carried on by regular farmers; but in India, the dairyman is seldom a landholder or producer of fodder. This no doubt is not as it should be; but the producer of fodder should also turn it into milk, thereby saving the manure for his land. In Gujarát many farmers keep a few she-buffaloes and send their milk to separating stations and the cream comes to Bombay. It is with the idea of showing the advantages of combining dairying with farming that part of the area of the farm has been set apart as a dairy farm and an adjoining area rented. It is proposed to have a supply of green fodder constantly on hand; for without a silo or green fodder it is impossible to keep the milk flow up during the hot weather.

II.—Purpose.

4. The purposes of the dairy are—

- (1) To serve for instruction to the agricultural students of the College of Science.
- (2) To show as a model dairy to the public.
- (3) To give opportunity for experiments in feeding and dairying.
- (4) To improve dairy breeds.
- (5) To supply pure milk to invalids and children of Poona.

III.—Health of Animals.

5. The general health of the animals was affected by the peculiar climatic conditions of the year and many animals remained thin throughout. There was a very serious outbreak of foot and mouth disease. Forty-three animals were attacked. The attack lasted from 20th October to 20th November. Three animals died from the after-effects of the disease, and several others were a long time recovering. An epidemic of diarrhoea broke out among the small calves in November, killing 11. It is proposed to make arrangements to prevent the buffaloes and cows from going on the public highway. Outside cattle and our own working bullocks will be kept away from the dairy animals. This, it is hoped, will save us from an attack of foot and mouth disease this year.

IV.—Milk Supply.

6. The extreme scarcity of rain seriously affected the dairy. Green grass was not available and our own green crops yielded poorly. The grass and fodder purchased were of poor quality, although expensive.

The demand for milk in Poona was very great during the season; for the famine conditions affected the local Gavlis very badly. In order to meet the demand one lot of buffaloes was obtained from Bombay.

7. During the prevalence of enteric there was a large demand for cows' milk, whose superiority for enteric patients causes it to be prescribed by all physicians. To meet this increased demand it became necessary to obtain a lot of cows from Káthiáwár.

8. 240,183 lbs. of milk was produced; 104,422 lbs. sold to Military Hospitals; 31,399 lbs. sold to customers, and 101,819 lbs. turned into butter.

9. The contract with the Military Hospitals expired on 1st April 1905 so that next year we enter a new phase of dairying, depending entirely upon private customers.

V.—Yield.

10. The comparative average yields of this year and last year are given below:—

Kind of animal.	1903-1904.		1904-1905.	
	Average per year.	Daily average.	Average per year.	Daily average.
	Lbs.	Lbs. oz.	Lbs.	Lbs. oz.
Buffalo ...	2,805	10 8	2,760	11 3
Cow ...	2,067	7 14	2,411	8 1

11. Of 20 cows of which a record of three years is available, 11 gave less and 9 more than last year. But in 16 buffaloes of over two years' record there has been a diminution in yield over the average of 689 lbs. This in part is due to the fact that only 23 freshened during the year, but also due to dry year and scarcity of fodder which affected these animals much more than the cows.

The statement below shows milk record, feeding charges and profits of the entire period:—

No.	Names.	Age.	Total number of years.	Total number of days in milk.	Total number of dry days.	Yearly average output.	Yield of milk during 1904-05.	Average of maximum yield.	Average yield per day.	Value of milk.	Cost of feeding.	Cost of attendance.	Net profit.	Net profit per year.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
		Y. m. d.				Lbs.	Lbs.	Lbs. oz.	Lbs. oz.	Rs.	Rs.	Rs.	Rs.	Rs.
COWS.														
<i>Aden.</i>														
1	Bakuli	6 1 8	1½	380	15	2,140	2,312	18 14	5 12	200	145	15	40	37
2	Bhāgi	Medium	6	1,655	626	2,728	2,231	13 9	10 0	1,453	551	264	638	106
3	Mādi	5 0 8	1½	328	15	2,083	2,388	8 0	6 1	224	102	16	106	91
4	Nāri	8 9 11	5	1,180	645	2,301	1,604	13 13	9 7	1,009	353	214	472	94
5	Sansāri	10 7 26	6	2,018	172	3,823	4,249	17 4	11 9	2,018	675	264	1,079	180
6	†Harishi (cross)	Medium	3	657	425	3,466	4,233	25 9	15 1	943	374	114	455	152
<i>Sindhi.</i>														
7	Annapurna	Young	1	181	184	...	526	5 6	2 14	44	30	7	7	...
8	Dabi	5 4 7	1	162	203	...	1,019	10 12	6 5	85	35	6	44	...
9	Hira	Medium	3	728	367	1,895	1,014	12 11	7 12	562	327	114	111	37
10	Houshi	Young	3	1,094	1	3,563	2,906	13 8	9 12	1,026	286	114	626	209
11	Kanai	Medium	5	857	238	2,620	2,252	12 12	9 2	748	280	114	354	118
12	†Keshar	Young	1½	412	43	1,825	2,090	10 4	7 0	247	138	17	92	74
13	†Kshipra	5 9 20	1½	411	164	2,275	2,245	13 8	11 2	419	145	22	252	159
14	Lāhiri	Young	3	847	248	2,238	1,256	14 12	7 13	618	165	114	349	116
15	Makhamal	Do.	3	773	322	1,913	1,661	11 5	7 12	545	229	114	205	68
16	Mutari	Aged	3	882	213	2,140	1,745	12 12	7 8	612	161	114	337	112
17	Mori	Young	3	937	158	2,444	2,439	13 7	7 11	692	270	114	398	103
18	†Mutri	4 8 18	3	358	...	...	2,423	12 4	9 6	202	71	10	101	...
19	†Pāri	Medium	5	1,302	523	2,438	1,654	14 5	9 12	1,143	412	214	617	103
20	Piri	9 2 26	6	1,633	537	2,151	604	12 11	8 3	1,225	451	264	510	85
21	Pitambari	9 7 18	6	1,628	382	2,923	3,079	14 3	9 9	1,552	549	264	739	123
22	Polāri	Medium	5	1,126	899	2,039	1,318	16 6	9 5	621	380	214	327	65
23	†Putali	Young	5	1,207	614	2,061	1,969	14 13	8 0	933	415	214	894	61
24	†Rādhī	Do.	3	921	170	2,795	2,891	13 5	9 1	790	274	114	402	134
25	Sābani	Medium	6	1,458	732	2,360	2,647	15 4	10 0	1,247	536	264	447	74
26	Samārthi	12 0 0	6	1,544	646	1,838	1,551	11 4	7 6	670	478	264	227	38
27	Sukhi	Young	1½	541	129	1,763	1,688	11 14	6 9	326	105	26	195	176
28	Tambari	Do.	3	812	283	2,175	2,165	12 3	8 2	616	252	1 4	250	83
29	Tuphāni	Medium	3	607	488	2,086	2,527	14 9	10 6	584	192	114	278	93
30	Yeshi	Young	3	317	18	...	2,819	13 0	8 15	267	82	18	172	...
31	Zankar	Do.	1½	848	247	3,259	3,708	16 4	12 0	915	311	114	490	163
<i>Sindhi (cross).</i>														
32	Bhasmi	8 11 22	5	1,227	598	2,204	2,642	13 11	8 13	1,011	169	214	629	126
33	Kara	7 8 10	4	827	533	2,110	3,171	13 9	9 11	815	410	164	241	69
34	Mekini	Medium	6	1,647	543	2,779	3,342	15 12	10 3	1,407	578	264	625	124
35	Sarji	12 6 10	6	1,822	398	2,301	815	14 2	7 2	1,218	449	264	545	91
36	Sārangī	6 5 20	1½	507	163	1,757	1,560	11 6	6 4	285	135	26	124	68
37	Shanwāri	6 6 21	1½	630	10	2,026	2,509	14 0	9 12	557	183	24	350	200
38	†Tiki	Young	3	908	183	2,426	2,317	13 4	8 3	689	249	114	326	166
<i>Gir.</i>														
39	*Bhāvālī	Young	1½	91	...	...	1,232	20 0	14 2	107	37	3	67	...
40	*Budhī	Do.	1½	87	...	...	321	8 0	3 11	27	33	3	—9	...
41	*Gōdī	Medium	1½	380	45	2,693	3,029	14 4	9 13	820	116	16	189	161
42	*Kābarī	Young	1½	96	...	...	435	9 0	4 9	36	37	3	—4	...
43	*Kamālī	Do.	1½	162	...	...	1,028	8 0	6 5	85	41	6	38	...
44	*Lāhīri	Do.	1½	162	...	...	1,826	16 0	11 5	158	51	6	96	...
45	*Līngādī	Medium	1½	162	...	...	589	5 0	3 10	49	39	6	4	...
46	*Mukhārān	Do.	1½	111	...	...	402	17 0	11 8	33	9	1	23	...
47	*Nabādī	Do.	1½	111	...	...	490	11 0	4 7	41	33	5	3	...
48	*Pāvālī	Do.	1½	163	...	...	828	11 0	5 1	60	39	0	24	...
49	*Sugārān	Young	1½	131	...	...	590	12 8	4 8	49	31	5	13	...
50	*Tāpī	Do.	1½	110	...	...	556	9 0	5 1	89	31	5	2	...
51	*Umbarī	Aged	1½	20	...	...	51	6 0	2 9	4	16	1	—13	...
<i>Gir (cross).</i>														
52	†Bigul	Medium	6	1,659	527	2,289	1,878	13 1	8 5	1,194	473	264	457	70
53	†Pāndhārī	Do.	1½	24	...	...	45	0 4	1 14	4	8	1	—5	...

Note.—Average yearly yield per cow ... = 2,411 lbs. Average yearly yield per cow for last year ... = 2,007 lbs.
Do. daily do. ... = 8-1 lbs. Do. daily do. ... = 7 14 lbs.
Do. cost of feeding per cow ... = 75 Rs. Do. cost of feeding per cow for last year ... = 80 Rs.
Do. net profit per cow ... = 89 Rs. Do. net profit do. do. ... = 69 Rs.

The average yield of the cows and buffaloes that have been bought during the year under report and of those that are newly calved, has not been taken into account while calculating the yearly yield.

The milk yield of first five years was charged at the rate of 10 lbs. per rupee and that of the year under report has been charged at 12 lbs. per rupee.

Last year the attendance was charged at Rs. 50 per head, but by actual calculations it comes to only Rs. 14 per head per year. This does not include delivery charges.

The 8 cows that have been marked (†) had been sent to Mahalleshwar and consequently their year is less by four days when the record was not kept, they being on their way. The cows Nos. 2, 6 and 13 were sent to Bombay for exhibition and consequently in their case 9 days have been deducted from the year.

The cows marked thus (*) were bought during the year.

No.	Names.	Age.	Total number of years	Total number of days in milk.	Total number of dry days.	Yearly average output.	Yield of milk during 1904-05.	Average of maximum yield.	Average yield per day.	Value of milk.	Cost of feeding.	Cost of attendance.	Net profit.	Net profit per year
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
		Y. m. d.				Lbs.	Lbs.	Lbs. oz.	Lbs. oz.	Rs.	Rs.	Rs.	Rs.	Rs.
BUFFALOES.														
<i>Jafferabadi.</i>														
1	Kundal	Medium	2	491	239	2,540	2,443	17 6	10 6	407	187	64	156	78
2	Magna	Do.	2	89	...	...	731	16 8	8 3	61	30	3	28	...
3	Mandan	Do.	2	548	184	877	1,465	11 12	8 4	345	173	64	169	64
4	*Ratan	Do.	2	520	206	3,899	2,683	24 8	15 0	617	208	64	317	173
5	†Sardari	Do.	2	161	...	...	3,314	24 0	21 1	253	68	6	249	...
6	Houda (cross)	Do.	2	553	177	4,569	3,950	21 13	16 5	728	204	64	458	229
<i>Dolbi.</i>														
7	Mahalan	Aged	6	1,567	623	4,013	2,206	25 13	15 5	1,847	764	264	619	136
8	*Purna	Medium	2	503	232	3,524	2,677	19 0	12 1	559	180	64	305	152
9	Rambha	11 11 19	6	1,391	609	2,252	1,098	13 15	10 6	1,080	673	264	193	32
10	†Salu	Medium	2	115	...	...	1,811	17 0	16 11	151	39	5	107	...
11	†Savali	Do.	2	225	...	...	1,465	16 12	6 8	122	68	8	46	...
<i>Surti.</i>														
12	*†Aditwari	Medium	2	221	...	...	2,789	17 0	13 10	232	76	8	148	...
13	Barshi	Do.	2	536	194	3,290	2,389	16 12	12 0	621	201	64	256	129
14	Biyaja	13 6 24	6	1,633	557	2,540	2,275	14 4	9 5	1,175	630	264	281	67
15	†Bhandari	Aged	2	498	232	2,302	1,006	21 10	9 0	370	178	64	130	65
16	†Bhawari	Medium	2	225	...	...	2,451	13 4	10 15	204	65	8	131	...
17	Bhori	Aged	6	1,735	455	3,410	2,681	16 15	11 13	1,664	728	264	574	98
18	Chabeli	13 9 11	6	1,652	583	3,304	2,678	17 0	12 0	1,627	674	264	589	93
19	Chandani	Aged	2	428	302	1,712	1,520	16 0	8 11	277	154	64	169	79
20	†Chauri	Medium	2	225	...	...	2,218	15 12	9 13	185	65	8	112	...
21	Dalbhari	12 6 9	6	1,561	629	2,758	1,941	15 4	10 9	1,267	678	264	425	71
22	Durga	Young	2	487	243	2,314	1,429	17 0	9 4	369	182	64	123	61
23	*†Gahina	Medium	2	40	...	...	565	15 0	14 2	47	11	1	35	...
24	*Gajari	Aged	6	1,496	690	2,658	2,068	17 5	11 0	1,200	620	264	837	56
25	Ganga	Do.	6	1,522	683	3,377	3,083	18 1	12 9	1,683	674	264	825	104
26	*Ghari	Medium	6	1,465	721	3,100	2,839	17 3	12 12	1,426	641	264	521	87
27	†Ghosadi	Young	2	225	...	...	2,078	11 12	9 4	173	61	8	104	...
28	†Ghumbari	Medium	2	225	...	...	2,785	17 0	12 6	232	105	8	159	...
29	Girji	Do.	2	215	...	...	1,910	14 12	8 14	159	61	8	90	...
30	*Gujar	Aged	6	1,471	715	2,174	1,488	14 0	9 0	997	565	264	168	28
31	*Jamadar	12 3 27	6	1,410	776	2,483	2,063	15 14	10 5	1,148	689	264	295	49
32	*Kakadi	Aged	2	225	...	...	2,256	17 0	10 0	188	67	8	113	...
33	*Kaveri	13 3 17	6	1,628	580	3,215	2,792	17 8	12 3	1,482	687	264	531	88
34	Mahitap	Medium	2	573	157	3,820	3,303	21 0	13 4	608	213	64	331	165
35	Mauci	11 3 18	5	1,067	553	1,920	1,949	12 12	9 6	780	451	214	115	23
36	*Mori	Medium	2	221	...	...	3,146	20 0	14 14	262	68	8	186	...
37	Parali	Do.	6	1,476	704	2,245	2,164	14 13	9 2	1,040	552	264	224	37
38	†Patangi	Young	2	215	...	...	2,322	18 12	13 2	235	69	8	158	...
39	*Putali	Aged	5	1,136	685	2,320	1,246	13 2	10 0	838	452	214	192	38
40	*Ranga	Medium	3	545	546	2,023	351	16 3	11 9	468	291	114	63	21
41	†Rupi	Young	2	225	140	...	2,808	13 0	11 9	217	64	8	145	...
42	†Sewari	Medium	2	419	311	1,822	885	16 6	9 3	284	153	64	67	33
43	Tavali	Young	2	372	...	...	2,325	16 0	10 6	235	72	10	153	...
44	†Zankari	Medium	2	225	...	...	2,235	14 0	10 2	190	64	8	118	...

Note.—Average yearly yield per buffalo ... = 2,760 lbs. Last year's average yearly yield per buffalo ... = 2,905 lbs.
 Do. daily do. ... = 11-3 lbs. Do. daily do. ... = 10-8 lbs.
 Do. cost of feeding per buffalo ... = 98 Rs. Do. cost of feeding per buffalo ... = 104 Rs.
 Do. net profit per buffalo ... = 73 Rs. Do. net profit per buffalo ... = 63 Rs.

Of the buffaloes, 12 marked (*) had been sent to Mahableshwar and so in their case only 361 days are taken.
 The buffaloes marked (†) were bought during the year.

VI.—Strength of the Herd.

12. The total number which is 189 is 47 less than that of the last year. Fifty-eight animals not showing satisfactory record for five years were disposed of, as also 80 of the young animals that were not promising. The great scarcity of fodder led us to dispose of all extra animals, even though the price was low, as this step was better than buying fodder for so many.

13. There is an increase of valuation of Rs. 348. But if to last year's valuation of Rs. 8,424 be added the price of cattle bought of Rs. 4,213, a total of Rs. 12,637 is obtained, and to this year's valuation of Rs. 8,772 the value of the animals sold, viz. Rs. 2,156, the sum obtained is Rs. 10,928; then it will be seen that there has been a loss in the value of cattle of Rs. 1,709, which is due to three causes:—

1st.—Loss of animals by foot and mouth and other diseases—about Rs. 400.

2nd.—Difference in valuation of animals in 1903-04 and actual amount received Rs. 1,040.

3rd.—The remaining Rs. 269 is due to the general loss of health due to the season, increasing age, animals not covered, &c. The usual statement is given below:—

Description.	Strength on the 1st April 1904.	Increase.			Decrease.				Strength on the 1st April 1905.	Valuation.		Increase or Decrease during year.
		Purchased or transferred.	Born.	Total.	Sold.	Died.	Transferred.	Total.		1904.	1905.	
<i>Cows.</i>												
Stud-bulls	7	7	...	7	2	...	...	2	13	Rs. 355	Rs. 604	+249
Cows	68	19	...	19	32	...	...	32	55	3,695	3,201	-494
Heifers	9	11	...	11	3	...	...	7	13	225	214	-11
Cow-calves	42	3	24	27	32	10	11	53	16	138	66	-122
Bull-calves	25	4	23	28	23	9	4	41	10	197	69	-138
Total	151	44	46	90	97	19	19	135	106	4,570	4,147	...
<i>Buffaloes.</i>												
Buffalo-bulls	3	2	...	2	...	...	...	...	5	140	240	+100
She-buffaloes	53	22	...	22	26	3	...	29	46	3,470	4,100	+630
Heifers	5	2	...	2	...	...	1	1	6	70	165	+85
She-buffalo calves	11	10	18	23	9	14	1	24	15	69	40	-23
Bull-calves	13	7	16	23	8	17	...	25	11	195	84	-111
Total	85	49	34	77	43	34	2	79	63	3,854	4,625	...
Dairy cart horses	2	...	...	...	...	...	...	...	...	350	330	-20

VII.—Breeds kept.

14. Three milking breeds of cows are kept, *viz.* Aden, Sindhi and Gir, and three of buffaloes, *viz.* Surti, Delhi and Jafferabadi.

15. The breeding of cows has gone on for 10 years, and 23 heifers farm-bred have come into milk. Among the young ones, Mutri (No. 16), Yeshi (No. 30), Bhasmi (No. 32) and Shanvári (No. 37) have shown yields of nearly 2,500 lbs. each, which is promising.

There are 6 Sindhi stud-bulls now fit for service. Of these 5 are farm-bred and 1 imported from Sind. There are 25 Sindhi cows, out of which 10 are farm-bred.

The Aden herd is small, but contains some very good animals.

Most of the Girs are new, and it is too early to judge of their merits.

Next year a comparison of the yields of the different breeds will be made.

Of buffaloes there are two fine specimens of Jafferabadi and a bull of the same breed.

The Gujarát or Surti buffaloes number 33 and 2 bulls.

There are 5 Delhis, including Mahálan (No. 7), with the best record of the herd.

Service of Bulls.

16. Free service of bulls is given to the public. Four cows and 7 buffaloes were covered for private persons. Of these 2 by Aden, 2 by Sindhi, 3 by Jafferabadi and 4 by Surti stud-bulls.

VIII.—Farm.

17. In the rented area and that made over from the Poona Farm of 32 acres 12½ gunthas, 1 acre and 22 gunthas were down to Guinea grass; twenty-one gunthas were sown with hot weather Jowár and 30 acres 31 gunthas to monsoon fodder; 4 acres 22 gunthas to rabi Jowár. Of this area 9 acres 1 guntha were fed green. The cost of cultivation of the fodder crops was Rs. 1,024-13-6, producing 94,328 lbs. of green fodder and 130,936 lbs. of dry fodder. If this be estimated by bazár rates it is worth Rs. 1,276-3-6 and the net profits of cultivation Rs. 251-6-0.

(A)—Fodder-growing experiments.

18. The experimental work on the farm consisted of trial of leguminous crops as fodder, comparative trial of other fodder crops and manure tests for foders. The unfavourable season affected the yield of all these crops.

19. *Leguminous crops.*—San and big and small-seeded Chavli were tried.

San.—The experiment of growing san for green fodder was continued in 1904. It was found in the previous year that unless fed at the right age cattle refused to eat it. To obviate this difficulty, the area to be sown was divided for successive sowings of small area, but on account of no rain only one sowing was made. The seed was sown broadcast. The fodder was eaten alright.

Chavli.—The small-seeded Chavli gave the best yield. It is impossible to estimate the value of outturn of these new crops without feeding tests. These were made and the results appear in the section of the report on feeding tests. Plant-lice seriously affected the outturn.

20. *Mixed crops*.—Three mixtures were grown, *viz.* large-seeded Chavli and Bájri, small-seeded Chavli and Bájri and peas and oats. The mixtures furnished a better fodder than either plants alone. The last mixture is a favourite one with dairymen in the United States, and it was thought it would make a good rabi fodder. It matures in 77 days. The outturn was 9,768 lbs. per acre, costing 5 annas 11 pies per 100 lbs. An attempt was made to determine the feeding value of these mixed feeds by feeding experiments.

21. The outturn, cost of cultivation and cost per 100 lbs. of green fodder from these crops is given below:—

Name of crop.	Outturn per acre.	Cost of cultivation.			Cost per 100 lbs. of green fodder.	Date of sowing.	Date of flowering.	Time required for the crop.
	Lbs.	Rs.	a.	p.	Rs. a. p.			Days.
1. San	3,622	25	0	11	0 11 1	5th July 1904.	23rd August 1904.	49
2. Big-seeded Chavli.	2,088	29	1	2	1 6 3	7th August 1904.	17th September 1904.	41
3. Small-seeded Chavli.	10,400	28	12	3	0 4 5	Do ...	11th October 1904.	65
<i>Mixed Crops.</i>								
1. Big-seeded Chavli and Bájri.	4,666	29	5	1	0 13 7	7th August 1904.	18th September 1904.	42
2. Small-seeded Chavli and Bájri.	16,544	30	9	10	0 2 11	Do ...	20th September 1904.	44
3. Peas and oats ...	9,768	36	3	7	0 5 11	26th December 1904.	13th March 1905.	77

(B)—*Comparative tests of Fodder.*

22. The two sorghums, Sundhia, Utávali and Nilva were grown. Of these fodders each has its particular use. Sundhia produces the best feed, but is not so well able to withstand excessive drought or rains on poor soil. Nilva is more hardy and still produces a good fodder. Utávali grows more quickly. Hundi is the hot season fodder crop.

In all nearly 1 acre 20 gunthas of Sundhia was grown. It was sown in July and August and harvested field by field as it was coming into flower. The average outturn was 11,986 lbs., which cost 3 annas 3 pies per 100 lbs.

In United States maize for fodder is heavily manured and the outturn is very large. It was thought desirable to ascertain if maize under liberal treatment would not prove a valuable fodder crop for dairy animals in India. Consequently 1 acre and 25 gunthas was heavily manured at the rate of 60 loads of manure per acre during the hot weather of 1904. The field was ridged 3 feet apart: The maize seed was thickly sown in the furrows and covered over. The crop had to be irrigated from the canal on account of unfavourable season. The first crop was harvested in the month of September, yielding 16,600 lbs. of green fodder per acre, which at a cost of Rs. 55-4-6 per acre for the year, making the fodder cost only Re. 0-5-3 per 100 lbs. Furrows were again made in the uncultivated portion and re-sown with maize. The outturn per acre was about half of the first crop. From the same piece a third crop of oats and peas was taken.

Maize was also grown for fodder in field No. 1-C. The outturn per acre was 4,100 lbs. It was sown after two crops of Hundi, without extra manure, and hence the outturn is low.

The peculiarities of the season nullified the results of the manure experiments.

The statement shows detail:—

Name of variety.	Area.	Outturn per acre in lbs. green.	Cost of cultivation per acre.		Date of sowing.	Date of flowering.	Time required for the crop.		
			Rs. a. p.	Rs. a. p.					
Sorghum Amber	2 36	9,126	12 3 0	0 2 1	5th July 1904.	20th September 1904.	77		
Do. Collier	0 20	22,800	28 2 8	0 1 10	Do. ...	15th September 1904.	72		
Sundhia	1 27	11,986	24 5 7	0 3 3	Do. ...	5th September 1904.	62		
Utávali	11 15	14,456	14 8 9	0 1 7	10th July 1904.	13th September 1904.	65		
Nilva	7 25	12,828	14 13 4	0 1 10	9th July 1904.	19th September 1904.	72		
Maize ...	Without manure	0 21	4,095	20 13 4	0 8 2	3rd October 1904.	12th November 1904.	40	
	With manure ...	1st crop ...	1 25	16,675	55 4 6	0 5 8	6th July 1904.	26th August 1904.	51
		2nd crop ...	1 25	10,114	17 7 5	0 2 9	29th September 1904.	26th November 1904.	58
Guinea grass	1 22	9,230	43 6 2	0 7 5	4 cuttings.				
Hundi	0 21	28,040	31 0 8	0 1 9	20th April 1904.	10th July 1904.	81		
Shálu	2 20	5,402	10 11 0	0 3 2	20th September 1904.	17th December 1904.	88		

IX.—Feeding Experiments.

23. The following feeding experiments were tried:—Molassine, Peas and Oats, Chavli and Bájri, and Sugar-beets.

• 24. *Molassine*.—Molassine was sent by Messrs. Marshal Reid and Co. for testing as to its feeding value. Four buffaloes and four cows were selected for the experiment giving as near as possible the same amount of milk. They were fed as follows from 1st September to 30th September 1904:—

Animal.		Bran.	Oil-cake.	Molassine.	Cotton-seed.
		Lbs.	Lbs.	Lbs.	Lbs.
Cows (Nos. 3 and 4)	...	5	2	4	...
Buffaloes (Nos. 1 and 2)	...	4	2	4	...
Cows (Nos. 7 and 8)	...	5	2	...	4
Buffaloes (Nos. 5 and 6)	...	4	2	...	4

The four animals receiving the molassine were giving at the beginning of the test 57 lbs. 10 ozs. of milk. This steadily decreased to 52 lbs. 8 ozs. Those receiving cotton-seed gave 51 lbs. 4 ozs. at the beginning and held to about this throughout giving at the end 51 lbs. 15 ozs.

It would, therefore, seem that molassine for food is inferior to cotton-seed. Still the fall in yield is so little that this substance has considerable feeding value. The statement shows average yields for each 5 days' period:—

No.	Names.	Breed.	Date of calving.	Period of 5 days before experiment.	Average of the 1st period of 5 days.	Average of the 2nd period of 5 days.	Average of the 3rd period of 5 days.	Average of the 4th period of 5 days.	Average of the 5th period of 5 days.	Average of the 6th period of 5 days.	Average of the 5 days after experiments.	Feed given.	
<i>Buffaloes.</i>													
1	Gajara	Burti	5th July 1904	14.3	13.12	13.9	12.15	11.14	13.0	15.1	14.2	} Molassine.	
2	Wairág	Do.	11th June 1904	14.0	14.0	13.2	14.2	14.1	13.10	13.0	12.0		
<i>Cows.</i>													
3	Sansári	Aden	23rd March 1904	15.7	15.10	17.2	16.1	16.4	14.14	14.4	14.9		
4	Zankar	Sindhi	16th April 1904	14.0	13.14	12.11	13.6	13.0	13.14	12.71	11.13		
<i>Buffaloes.</i>													
5	Kundal	Jafferabadi.	27th July 1904	13.10	14.11	15.10	16.6	16.10	17.9	16.6	16.6	} Cotton-seed.	
6	Rustum	Delhi	Do.	14.7	14.0	15.10	13.9	13.7	14.2	13.10	13.6		
<i>Cows.</i>													
7	Tamburi	Sindhi	14th April 1904	10.6	9.11	10.4	9.14	8.13	8.14	9.4	9.2		
8	Kara	Cross	21st June 1904	12.13	12.2	12.12	12.4	10.14	10.6	12.1	13.1		

25. *Peas and Oats*.—This mixture was fed to the entire herd for 25 days. The yields of 6 animals have been selected for study. At the beginning they were giving 79 lbs. of milk; at the close 88 lbs. of milk, which is a good gain for cold season. They were given only 10 lbs. daily each, this giving an increase of $1\frac{1}{2}$ lb. per head worth 2 annas which brings the value of this feed to Re. 1-6-6 per cwt. or 80 lbs. per rupee and places this among our leading fodders. Further experiments are necessary however. Statement shows average yield of milk for each period of 5 days :—

No.	Names.	Dates of calving.	Average of 5 days before experiment 8th—12th March.	Average of					Average of 5 days after experiment 7th—11th April.
				1st period of 5 days.	2nd period of 5 days.	3rd period of 5 days.	4th period of 5 days.	5th period of 5 days.	
	Cows.		Lbs. oz.	Lbs. oz.	Lbs. oz.	Lbs. oz.	Lbs. oz.	Lbs. oz.	Lbs. oz.
	<i>Aden.</i>								
1	Bhági ... <i>Sindhi.</i>	18th October 1904.	12 9	13 13	12 14	12 10	12 10	13 14	14 7
2	Pitámbari ... <i>Gir.</i>	26th November 1904.	16 6	16 14	16 3	16 12	16 6	15 11	16 4
3	Godhi ...	10th November 1904.	14 8	14 14	14 2	14 7	14 15	14 12	14 9
	Total ...		43 7	45 9	43 3	43 13	43 15	44 5	45 4
	BUFFALOES.								
	<i>Jafferabadi.</i>								
1	Sardári ... <i>Surti.</i>	.....	17 6	17 4	18 3	19 14	19 14	18 14	18 6
2	Ghumbari ...	5th August 1904.	8 4	9 2	9 4	9 11	9 7	7 11	7 14
3	Shevri ...	20th January 1905.	10 6	9 14	12 14	15 6	15 12	15 9	17 4
	Total ...		36 0	36 4	40 5	44 15	45 1	42 2	43 8

26. *Charli and Bájri*.—This was fed to the entire herd and 10 cows and 10 buffaloes were selected for study. The quantity given was only 5 lbs.

No apparent gain is observed; on the contrary a loss of 9 lbs. in 20 animal, which is probably the natural reduction due to increasing distance from calving. Statement shows details :—

No.	Names.	Date of calving.	Average of 5 days before experiment (24th to 28th September).	Average of			Average of 5 days after experiment.
				1st period of 5 days.	2nd period of 5 days.	3rd period of 5 days.	
	BUFFALOES.		Lbs. oz.	Lbs. oz.	Lbs. oz.	Lbs. oz.	Lbs. oz.
	<i>Delhi.</i>						
1	Mahálan ...	26th June 1903	8 7	5 13	3 4	5 2	5 2
	<i>Surti.</i>						
2	Gajara ...	5th July 1904	11 14	13 0	15 1	15 6	12 10
3	Girji ...	5th August 1904	13 10	13 14	13 0	12 5	12 1
4	Ghumbari ...	Do.	15 9	15 14	15 10	13 2	14 2
5	Mori ...	Do.	18 2	18 12	19 3	18 8	18 12
6	Patangi ...	Do.	17 11	17 13	17 8	17 8	17 4
7	Rupi ...	Do.	13 10	14 6	14 0	12 15	13 3
8	Soni ...	Do.	17 10	19 2	18 15	16 13	16 1
9	Wairág ...	11th June 1904	14 1	13 10	13 9	12 2	12 4
10	Zamkári ...	5th August 1904	13 6	13 10	13 6	13 7	12 14
	Total ...		144 0	145 14	144 2	137 4	134 5

No.	Names.	Date of calving.	Average of 5 days before experiment (24th to 28th September).	Average of			Average of 5 days after experiment.
				1st period of 5 days.	2nd period of 5 days.	3rd period of 5 days.	
	Cows.		Lbs. oz.	Lbs. oz.	Lbs. oz.	Lbs. oz.	Lbs. oz.
	<i>Aden.</i>						
1	Sansári ...	23rd March 1904 ...	16 4	14 14	14 4	14 9	14 10
	<i>Sindhi.</i>						
2	Kanaya ...	5th June 1904 ...	10 8	10 0	11 8	11 10	10 14
3	Mutri ...	24th July 1904 ...	8 1	10 1	10 1	8 7	9 1
4	Sábani ...	29th June 1904 ...	12 4	11 13	13 0	12 4	12 0
5	Tamburi ...	14th April 1904 ...	8 13	8 14	9 4	9 0	9 1
6	Tupháni ...	14th July 1904 ...	11 14	12 6	13 5	13 1	12 6
7	Zankar ...	15th April 1904 ...	13 0	12 14	12 11	11 10	12 3
8	Kara (cross) ...	21st June 1904 ...	10 14	11 5	12 1	12 15	12 11
9	Mekini ...	22nd January 1904 ...	11 14	11 10	12 2	11 1	10 12
10	Yeshi ...	31st July 1904 ...	9 5	9 6	9 12	10 6	9 14
	Total ...		112 13	113 8	118 10	114 5	113 8

27. *Sugar-beets.*—These were fed to the entire herd at the rate of 12 lbs. daily. Fifteen animals whose record was taken for study showed a slight increase which was lost immediately after discontinuing the feed. The statement below shows results:—

No.	Names.	Date of calving.	Average of 5 days' period before experiment (12th to 16th February).	Average of 1st period of 5 days.	Average of 2nd period of 6 days.	Average of 5 days after experiment.
	<i>Jafferabadi.</i>					
1	Ratan ...	4th November 1904.	17 15	18 3	18 12	17 15
2	Sardári ...	20th October 1904.	19 14	19 2	20 13	19 8
3	Zabula ...	2nd September 1904.	10 2	9 12	9 1	8 11
	<i>Delhi.</i>					
4	Sálu ...	7th December 1904.	17 5	18 4	18 9	17 9
	<i>Surti.</i>					
5	Aditwári ...	5th August 1904	10 4	9 6	10 12	9 10
6	Bhawari ...	Do.	10 0	9 12	9 12	7 14
7	Gajari ...	20th January 1905	17 9	18 4	19 8	17 5
8	Ghári ...	10th December 1904.	15 13	16 1	16 1	15 14
9	Ghumbari ...	5th August 1904	10 5	10 15	11 7	10 6
10	Gujar ...	17th January 1905	10 12	13 13	14 7	13 12
11	Jamádár ...	25th November 1904	13 6	13 14	14 15	14 8
12	Káveri ...	3rd November 1904.	14 10	14 2	15 9	15 9
13	Mahitáp ...	5th September 1904.	11 12	10 2	12 1	10 10
14	Shevari ...	20th January 1905	11 2	11 6	11 9	11 3
15	Houda (S. + J.)	9th September 1904.	15 6	15 14	16 3	14 12
	Total ...		206 3	208 14	219 7	198 2

X.—Accounts.

28. The dairy has been worked at a loss of Rs. 1,149-6-7 as compared with the profits of the last year of Rs. 6,137. This may be ascribed entirely to four causes, all the result of poor rainfall:—

(1) A large part of the loss to the dairy is due to the loss of the cutting of the grass of the Kurans which this year yielded only one-half of the usual yield.

(2) The feed and fodder was more expensive.

(3) The milk yield of the buffaloes was very low on account of the scarcity of green fodder and poor quality of the fodder bought.

(4) There being no adequate green fodder-supply, more animals succumbed to the attacks of the foot and mouth disease, and others were much slower in recovering. One of the effects of this disease is the formation of ulcers in the mouth and throughout the alimentary canal and the dry coarse fodder irritated these.

The balance sheet is given below :—

Receipts.	Amount.	Expenditure.	Amount.
	Rs. a. p.		Rs. a. p.
To sale of dairy produce ...	20,941 5 6	By cost of establishment ...	1,774 5 10
„ „ live-stock ...	2,156 13 0	„ concentrated food bought.	7,548 11 2
„ „ manure ...	127 14 0	„ fodder bought ...	3,495 11 3
„ „ food-grains and fodder ...	248 4 5	„ rent of kurans and grass lands ...	614 12 0
„ grazing recoveries ...	20 0 0	„ hay making expenses ...	1,768 8 8
„ miscellaneous recoveries ...	20 0 0	„ labour on herd and dairy .	2,587 0 0
„ grazing and attendance recoveries from castration animals ...	370 2 5	„ rent of Mr. Wadia's field.	300 0 0
„ upkeep of farm bullocks .	581 2 11	„ irrigation charges ...	106 15 0
„ increase in value of apparatus on hand ...	450 1 0	„ water-rate ...	230 13 2
„ increase in value of live-stock ...	323 0 0	„ office charges— Rs. a. p.	
„ increase in value of food and fodder on hand over that of last year ...	969 1 7	Tele gram charges ...	7 15 0
„ value of butter on hand on 1st April 1905 ...	11 4 3	Travelling allowance ...	10 14 0
„ preparatory charges on the crop of 1905-06 ...	302 1 2	Stationery ...	43 11 3
		Printing charges ...	100 5 9
	26,526 2 3		162 14 0
To net cost ...	1,149 6 7	By Railway charges on butter ...	10 10 0
		„ purchase of live-stock ...	4,213 0 9
	27,675 8 10	„ „ dairy apparatus ...	586 4 0
		„ dairy supplies for working dairy and herd ...	2,442 0 5
		„ purchase of uniforms ...	185 4 4
		„ petty repairs ...	512 10 9
		„ butter on hand on 1st April 1904 ...	185 15 10
		„ labour on farm ...	919 15 8
			27,675 8 10
Assets—		Liabilities—	
Value of byres ... 11,825		Bills payable—	
Value of live-stock ...	9,102 0 0	Due to Poona Farm ...	162 2 10
Money advanced for purchase of tools ...	792 10 6	Due to Mánjri Farm (lucerne bill) ...	35 0 1
Money advanced for castration experiments ...	280 0 0		
Other advances ...	1,566 8 1		
Cash on hand ...	9,058 0 8		
Bills recoverable on dairy produce ...	2,463 15 4		
	23,263 2 7		197 2 11

J. B. KNIGHT, M.Sc.,

Kirkee, 25th July 1905.

Special Assistant, Agricultural Department.

APPENDIX TO THE DAIRY AND DAIRY FARM REPORT.

Castration Experiments.

The improvement of the cattle of the Deccan is largely handicapped from the common practice of allowing all bulls to remain uncastrated and graze with the village cows and thus become sires of calves. These immature animals are not suitable for breeding and tend to reduce the size and stamina of the off-spring. When remonstrated with, the villager says that early castration unfits bullocks for the plough as their necks do not develop properly.

To determine the effect of early castration, 20 bull-calves ranging from 6 months to 2½ years old were purchased in Nagar District at a bazar. Ten were immediately castrated. The remainder will be kept entire till ready for work. Three systems of castrating were used—(1) by incision, (2) by mulling, and (3) by rubbing the cord.

Measurements and weights were taken. These bull-calves have been grazed at the Mánjri Kuran. In addition to the grazing, on account of the season it became necessary to purchase fodder and feed. Two died from tympanites owing to feeding Hundi. The remaining animals are all in good condition now. The expenses of the experiment are shown underneath :—

			Rs.	a.	p.
Initial cost of calves	...	...	265	8	0
Cost of transporting	...	...	14	8	0
„ attendance	...	...	90	2	5
„ fodder and feed	...	...	280	0	0
„ grazing charges due to the dairy	...	...	
Total	...	...	650	2	5

MA'NJRI FARM.

No.	Contents.	Para.	Page.
I	History and Aim of the Farm	1—3	67
II	Area and Character of the Soil	4	67
III	New Buildings	5	67
IV	Live-Stock	6	67
V	Lines of Work	7	67
VI	Meteorology	8	68
VII	Area planted to different Crops	9	68
VIII	Experiments in care and cultivation of Crops—		
	<i>A.</i> —Manure Experiments—		
	Farmyard and safflower-cake manures	10—12	69
	Sewage experiments with Lucerne	13 & 14	69
	Plant food experiment with Lucerne	15 & 16	70
	<i>B.</i> —New methods of cultivation—		
	Systems of planting sugarcane	17 & 18	70 & 71
	Tillage experiments	19—21	71
	Clipping experiments of groundnut	22	71
	<i>C.</i> —Use of fungicides and insecticides	23—26	71 & 72
IX	Botanical Experiments	27	72
X	New Crops—		
	English peas, Rapeseed, Soy-beans, American field-beans, Rangoon beans, Vál, Chavli, Cowpea, Tapioca .	28—39	72—74
XI	Comparative Variety Test—		
	Sweet-potatoes, Maize, Jowár, Wheat, Bájri, Tur, Cotton	40—47	74—77
XII	Miscellaneous Crops	48	77
XIII	Selection and Distribution of Seed	49 & 50	77—79
XIV	Accounts	51	79 & 80
XV	Visitors	52	80
XVI	Remarks	53	80

MA'NJRI FARM.

I.—*History and Aim of the Farm.*

Up to 1894 sugarcane experiments were carried out at Poona. When it became necessary for sanitary reasons to discontinue them there, a tract of 9 acres was leased at Mánjri in the heart of sugarcane district.

2. The following lines of experiments were suggested:—

(1) To study the more economic system of manuring cane.

(2) To ascertain the most profitable manner in which bone-manures can be used.

(3) To test various methods of cultivation.

(4) To acclimatize newly imported varieties of sugarcane from Mauritius.

(5) To compare sugar sorghums with cane as sugar producers.

Questions (2) and (5) have been quite thoroughly settled.

Question (4) has been carried on for 11 years.

During the year under report attention was mainly given to (1) and (3).

3. In 1895, 13 acres were purchased including the 9 acres already leased. In 1902, 31 acres adjoining were purchased. The present year an additional area of 17 acres has been acquired. When this area was taken up, it had a standing crop of cane and was useless for experimental purpose till the harvest of this crop.

II.—*Area and Character of the Soil.*

4. Mánjri Farm consists of four survey numbers 61 to 64 inclusive, a total area of 62 acres and 10 gunthas, situated 8 miles from Poona. Of this area 21 acres 38 gunthas are deep black soil, 6 acres light soil, and 1 acre 31 gunthas rock or *murmád* soil.

The present buildings and the *nála* occupy about 5 acres. The entire tract is commanded by the Mutha Right Bank Canal, so that irrigation is always possible.

III.—*New buildings.*

5. As this farm was originally only for sugarcane cultivation a few buildings were erected. But as the farm was increased in area and other lines of work taken up, the need for better and larger accommodation began to be seriously felt. During the year plans for a complete set of farm buildings were drawn and sanctioned, and the work of construction commenced. They are to consist of office, Superintendent's quarters, clerks' quarters, fieldmen's quarters, probationers' quarters, additional labourers' quarters, vegetable barn, implement shed, cattle byre and visitors' quarters. The old buildings will be used as seed-barn and storage room for special manures. Most of the new buildings are located on the new area. When these are completed, the equipment of the farm will be very good. A permanent *gurhál* (sugar-boiling furnace and shed) and power-crusher are necessary to give greater accuracy to the experiments with cane. A well has been dug near the new quarters to give a pure water-supply to the employés.

IV.—*Live-stock.*

6. During the year three pairs of large Krishna Valley bullocks were purchased at a cost of Rs. 737.

V.—*Lines of Work.*

7. In the ratoon area the variety tests of sugarcane and the trial of the system of planting was continued. Some manure experiments were also made with this crop. The lucerne experiments were continued. The intertillage experiments with staple crops went on, as also the variety test of Tur, cotton, Bájri and Jowár. Several new crops were tried.

VI.—*Meteorology.*

8. The season was unfavourable. There were no ante-monsoon showers. Up to July 1st, only 56 cents were recorded, which was not at all sufficient for sowing. Therefore this operation was carried by means of irrigation. The sowing occurred from 2nd to 22nd of July. The rainfall of July, August and September was not enough for the growth of the plant, and irrigation had to be resorted to. This was put off as much as possible hoping for rain. As a result all the crops were poor.

The October rain was the only one of consequence. The rabi cultivation was carried on by irrigation alone. The Kuran (grass pasture) gave only one-fourth the normal grass supply.

The statement below compares the rainfall with that of last year :—

Month.		1903.		1904.	
		Rainy days.	Rainfall in inches.	Rainy days.	Rainfall in inches.
May	1st Fortnight	...	...	...	...
Do.	2nd do.	4	1·89	...	...
June	1st do.	4	3·45	1	0·49
Do.	2nd do.	...	...	1	0·07
July	1st do.	6	3·86	9	1·88
Do.	2nd do.	3	2·42	8	0·53
August	1st do.	1	0·78	8	0·38
Do.	2nd do.	2	1·42	3	0·18
September	1st do.	...	0·10	5	1·99
Do.	2nd do.	2	2·55	4	0·94
October	1st do.	2	3·09	5	3·35
Do.	2nd do.	1	0·32	3	2·10
Total		25	19·88	47	11·91

VII.—*Area planted to different Crops.*

9. The statement below shows the area cropped and the purpose of each crop :—

Field No.	Kharif crop.	Area.	Purpose.	Rabi crop.	Area.	Purpose.	Remarks.
1	Sugarcane	0 7	Trial of planting	.....	.....	.....	} Perennial.
1	Do.	0 18	Ratoou	.....	.....	.....
1	Sweet-potatoes	0 5	Trial of varieties	.....	.....	.....	} Trial of new crops.
1	.....	.....	.....	Rape seed	0 12	Do.	
1	.....	.....	.....	English peas	0 3	Do.	} Trial of varieties.
1	.....	.....	.....	Sweet-potatoes	0 4	Do.	
2	Soy beans	1 36	Trial of varieties	Oats	0 34	Trial of new crops.	} Trial of new crops.
2	Kangoon beans	0 2	Do.	Barley	0 4	Do.	
2	Val	0 4	Do.	Tapioea	0 9	Do.	} Trial of new crops.
2	Chavli	0 4	Do.	Onion seed	0 1	Do.	
3 & 4	Ratoou sugarcane	5 0	Methods of planting	Sweet potatoes.	0 19	.....	} Perennial.
5	Lucerno	2 8	Manure experiments.	.....	.....	.....
6 & 7	Tur	5 37	Trial of varieties	.....	.....	.....	} Do.
8	Cotton	4 35	Do.	.....	.....	.....
9	Rice	0 28	Miscellaneous crops...	.....	.....	.....	} Trial of new crops...
10	American cotton	0 8	Tillage experiments	.....	.....	.....
10	Groundnut	0 8	Clipping experiments.	.....	.....	.....	} Trial of new crops...
10	Field beans	0 4	.....	.....	.....	.....
10	Velvet beans	0 4	.....	.....	.....	.....	} Trial of new crops...
10	Tapioea	1 0	.....	.....	.....	.....
10	.....	.....	.....	Khaphi	0 16	Seed.	} Trial of varieties.
10	.....	.....	.....	Potatoes	0 4	Seed.	
11 & 12	Bajri and maize varieties.	2 28	Trial of varieties	Wheat	2 14	Trial of varieties.	} Trial of varieties.
12 & 13	Jowar	2 20	Do.	.....	.....	.....
13	Bajri	0 16	Tillage experiments	.....	.....	.....	} Trial of varieties.
13	Maize	0 16	Do.	.....	.....	.....
13	Jowar	0 16	Do.	.....	.....	.....	} Trial of varieties.
14	Do.	1 20	Fodder and steeping experiments.	.....	.....	.....
14	Maize	0 8	Do.	.....	.....	.....	} Trial of varieties.
14	Sweet-potatoes	0 28	Trial of varieties	.....	.....	.....
14 & 15	Sugarcane	0 30	Distribution	Linseed	0 30	Seed.	} Trial of varieties.
15	Do.	1 20	Manure experiments.	.....	.....	.....
New area.	Do.	14 13	Crop	.....	.....	.....	} Trial of varieties.
Total		48 23			6 20		

VIII.—*Experiments in Care and Cultivation of Crops.*A.—**MANURE EXPERIMENTS.**

10. The lodging of the hard varieties of cane, Vánsi and Sannabile, on the sewage area and on the farm proper, where manured with 400 lbs. of nitrogen per acre, led us to suppose that these varieties would do with much less manure and experiments to ascertain their actual nitrogen requirements were commenced as follows.

Three 10-guntha plots of each variety were manured with farmyard manure and safflower cake in such quantities as to furnish 100, 200, 300 lbs. of nitrogen per acre respectively. On account of late planting the yields are rather low; but they are comparable.

The following statement gives the results:—

No. of Plot.	Variety.	Quantity of Nitrogen furnished by the manure given.	Outturn of Gul per acre.	Percentage of juice to cane.	Outturn of canes per acre.	Percentage of Gul to juice.	Value of outturn.	Cost of cultivation.
1	2	3	4	5	6	7	8	9
		Lbs.	Lbs.		Lbs.		Rs. a. p.	Rs. a. p.
1	Vánsi	100	6,236	53	61,848	19	407 9 4	200 8 4
2	Do.	200	7,568	54	76,440	19.1	514 4 0	252 7 8
3	Do.	300	9,428	58	91,808	17.7	616 3 4	311 7 4
4	Sannabile	100	5,304	52	56,360	18.1	346 10 8	193 0 8
5	Do.	200	8,360	56	79,296	18.7	546 6 4	259 15 8
6	Do.	300	8,212	57	86,240	16.8	686 11 8	303 15 0

11. The results are inconclusive. But in the case of Sannabile at least the nitrogen requirements would seem to be between 100 and 200 lbs. per acre. Vánsi needs further experiments, since all manure experiments need to be verified by several trials.

12. One interesting disclosure in the statement is the effect of quantity of nitrogen upon percentage of juice to cane and Gul to juice, the extra nitrogen making the cane more juicy without corresponding increase in sugar. This may be attributed to the more vigorous growth.

Sewage Experiments with Lucerne.

13. The old sewage area continued under lucerne throughout the whole year. But owing to the want of Bhangis (sweepers) the sewage effluent had to be stopped from December 1904. The following comparative statement details the outturn of the plot in 8 cuttings for seven months:—

No. of Plot.	Kind of manure.	Quantity of manure.	Supplying			Outturn per acre.
			Nitrogen.	Potash.	Phosphoric Acid.	
		Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
1	Safflower cake	3,864	271	44	80	27,990
2	Niger-seed cake	5,080	267	54	122	29,720
3	Farmyard manure	14,920	117	175	64	30,230
4	Poudrette	23,365	210	252	233	39,140
5	Macerating tank	12 waterings =1,089,000 gals.	262	517	205	45,530
6	Dibdin's filter	Do.	119	205	135	51,730
7	Septic tank	Do.	395	517	205	46,980

14 The crop in general was affected with aphides (plant lice) which told severely on the outturn, thus to a great extent nullifying the effects of several manures. The crop was sprayed with resin and kerosine emulsion with good results. However with all that the sewage plots, especially Dibdin's filter beds, are ahead of the plots treated with other manures as they did last year.

Plant-food Experiments with Lucerne.

15. This experiment has for its object the investigation of Mánjri soil agriculturally with regard to its requirements of potash, phosphoric acid and nitrogen, since it is thought that a chemical analysis is of only doubtful value unless supported by agricultural evidence. The lucerne plots of the plant-food experiments gave rather less outturn than last year. The separate returns for four cuttings are not available; so the figures shown are only for eight cuttings:—

No. of Plot.	Kind of manure.	Quantity.	Supplying			Outturn per acre.
			Nitrogen.	Potash.	Phosphoric acid.	
		Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
8	Ashes	1,000	3	24	15	24,710
9	Do.	600	2	15	9	24,340
10	Ashes and Nitre	600+160	2+25	15	9	25,560
11	Ashes and Bonemeal	600+300	2	15+02	83·69	25,770
12	Bonemeal	300	...	2	73·8	20,940
13	Bonemeal and Nitre	300+160	25	2	73·8	23,460
14	Nitre	160	25	...	...	18,470
15	Bonemeal and Nitre and Ashes... ..	300+160+600	25+2	2+15	83·6	26,450
16	No manure ... ..	.....	...	...	...	14,300
17	Farmyard manure	10 tons	175	262	96	20,220
18	Pondrette	5 tons	92·96	121	112	20,970
19	Safflower cake	300	21	2·3	7	15,900
20	Quicklime	200	...	...	...	14,490

16. The statement shows some very interesting things. The outturn of second year's lucerne is not so great as the first year's, although in the sewage area there is a less decrease, in some cases even a gain. The plots receiving manures containing potash lead in outturn as last year; but both nitrogen and phosphoric acid influenced the yield, and of these two elements phosphoric acid seems to affect the yield most. It must be borne in mind that this land may contain a good deal of residual manure from previous sugarcane cropping and also that lucerne being a leguminous crop is particularly benefited by potash. These plots will be manured along the same lines for a period of years even though the cropping varies. A larger area plotted in the same manner will be prepared in the new area until it is proved just what elements Mánjri soil is deficient in and which elements and in what quantities are most beneficial to different crops of this region.

B.—NEW METHODS OF CULTIVATION.

17. The further trial of Mauritius system of planting was continued in the ratoon plot and the statement shows the results:—

Variety.	Method of planting.	Results per acre.		
		Gul.	Value of Gul.	Cost of cultivation.
		Lbs.	Rs. a. p.	Rs. a. p.
Vánsi	Ordinary	9,730	635 15 0	258 7 5
	Mauritius 3' x 3'	8,425	550 10 5	239 6 0
Sannabile	Do. 2½' x 2½'	8,577	567 10 7	239 8 6
	Ordinary	8,776	573 10 2	239 4 4
Red Mauritius	Mauritius 3' x 3'	7,910	517 0 11	230 7 11
	Do. 2½' x 2½'	8,650	573 10 1	234 13 11
Green Mauritius	Ordinary	8,652	565 8 4	202 5 1
	Mauritius 3' x 3'	9,370	612 6 9	202 4 3
Pundia	Do. 2½' x 2½'	9,687	633 2 7	204 8 2
	Ordinary	9,552	624 5 7	199 12 8
Mauritius	Mauritius 3' x 3'	10,665	637 0 11	206 7 9
	Do. 2½' x 2½'	8,235	538 3 8	194 12 8
Mauritius	Ordinary	9,115	595 11 10	195 1 8
	Mauritius 3' x 3'	8,200	535 15 0	191 4 10
Do.	Do. 2½' x 2½'	8,277	573 10 11	190 6 8

18. From this it will be seen that the Poona system gave better results with all varieties except the Mauritius. The behaviour of the Green Mauritius is inexplicable, since in the $2\frac{1}{2}' \times 2\frac{1}{2}'$ plots it was poorer than when planted according to the Poona system, while $3' \times 3'$ was the best plot of cane in the entire series.

Tillage.

19. *Tillage—Cotton, Maize, Jowár and Bájri.*—The tillage experiments of last year were repeated this year. The statement shows the results :—

Name of crop.	OUTTURN PER ACRE.				Increase or decrease.		Total value of increase or decrease.	Cost of intertillage.	Net gain or loss.
	Intertilled.		Not intertilled.		Grain.	Fodder.			
	Grain.	Fodder.	Grain.	Fodder.					
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.			
Jowár	1,130	4,400	1,045	7,325	+ 85	—2,925	—2 0 3	2 9 8	—4 9 11
Bájri	1,150	3,105	1,000	2,990	+150	+ 115	+4 7 7	1 3 2	+3 4 5
Maize	1,180	11,700	905	15,500	+275	—3,800	+3 8 4	2 9 8	+0 14 8
	Seed cotton.		Seed cotton.		Seed cotton.				
Cotton—									
Broach	040		895		+45		+3 3 5	1 0 0	+2 3 5
Varádi	620		545		+75		+5 5 8	1 0 0	+4 5 8
Dhárwár American...	415		475		—60		—4 4 7	1 0 0	—3 4 7

20. In the case of Bájri, maize and Broach and Varádi cotton it is a paying increase. We shall still continue this line of work. If principal product alone were considered there would be a gain in all cases except Dhárwár American cotton. In villages removed from big centres the grain is often more important than the fodder. If the crops are planted for fodder the seeding should be much thicker.

21. *Sweet-potatoes by Tubers.*—It is the general practice to plant sweet-potatoes by cuttings; but because the new varieties seemed to be running out it was decided to try propagation from tubers. The tubers did not sprout well, so the yield was very little.

22. *Clipping experiments of Groundnut.*—The main shoot of groundnut plant produces no seed and its growth is simply a drain upon the plant. If this main shoot could be clipped at an early stage, it is thought that the yield might be increased. The following varieties were tested and the statement shows the results :—

Name of variety.	Per acre.					
	Outturn from clipped plants.	Outturn from Unclipped plants.	Gain or loss.	Value of gain or loss.	Cost of clipping.	Net gain or loss.
	Lbs.	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.	Rs. a. p.
Spanish peanut ...	1,784	1,136	+648	+32 6 5	} 1 14 0 {	+30 8 5
Small Japanese ...	812	1,948	—1,136	—56 12 10		—58 10 10
Virginia ...	2,020	1,900	+120	+ 6 0 0		+ 4 2 0
Pondicherry ...	2,040	3,000	—960	—48 0 0		—49 14 0

Tika disease and unevenness of the soil nullify the results.

C.—USE OF FUNGICIDES AND INSECTICIDES.

23. (a) *Fungicides.*—The steeping experiments with Bájri and Jowár were again tried as a preventative of smut; but as no diseased heads were found on the farm no results were obtainable. It is hoped to try some of these experiments in private fields infested with the disease, and with grain also, if such fields are found during the year.

24. (b) *Insecticides.*—Spraying the lucerne plots with resin mixture was quite satisfactory against plant lice.

Arrangements were made to try lead-arsenate treatment against cotton boll worm and sulphur mixture treatment with Tur for pod caterpillar; but neither of these pests appeared.

25. Experiments of planting maize and Jowár among cane to catch the borers were equally fruitless, as the borers did not enter these plants in preference to the cane.

26. Bhandi (*Hibiscus esculantus*) which belongs to the same botanical order as cotton was planted near the cotton plants as a trap for insects affecting the cotton. But this plant did not thrive on black soil.

IX.—Botanical Experiments.

27. All the varieties of Tur were grown here to give further chance for Professor Gammie to study them; but as at Poona Farm they were hopelessly intercrossed.

X.—New Crops.

28. The English peas were planted on a small plot of about 3 gunthas. A good outturn of pods was obtained. These brought a high price in the bazar. They were much longer and sweeter than the indigenous varieties, but the plants were subjected to mildew.

29. Rapeseed was tried but unsuccessfully.

30. Nineteen varieties of soy-beans were sown. The average yield was less than last year; Nos. 5, 6, 7, 12 and 13 only giving anything like a paying outturn, even though the cost of cultivation was low. However the soil was rather poor and the season unfavourable to any crop, especially to those on light soil. Nos. 6, 11 and 13 are to be tried as fodders for the Dairy. Nos. 5, 6, 7, 12 and 13 will be tried on better land, while the others will only be grown in small plots. The use of this crop in India has not been demonstrated. The statement shows the results:—

Name of variety.	Yield per acre.	Value.			Cost of cultivation.		
		Rs.	a.	p.	Rs.	a.	p.
Soy-bean No. 1	106	5	5	0			
" No. 2	179	9	0	0			
" No. 3	142	7	2	0			
" No. 3A	187	9	8	0			
" No. 5	243	12	4	0			
" No. 6	293	14	3	0			
" No. 7	216	10	12	0			
" No. 8	153	7	0	0			
" No. 9	91	4	0	0			
" No. 10	61	3	0	0	17	14	7
" No. 11	183	9	0	0			
" No. 12	230	11	0	0			
" No. 13	285	14	0	0			
" No. 14	142	7	0	0			
" No. 15	133	6	0	0			
" No. 16	50	2	8	0			
" No. 17	121	6	0	0			
" No. 18	133	6	8	0			
" No. 19	155	7	8	0			

31. *American field-beans*.—These continue to flourish in India. They grow on poor soil and give a larger outturn than other Indian legumes. The bean is sweet and is liked by natives whenever tried. The yield was 1,070 lbs. per acre, which is about one-third that obtained in America for this crop. An attempt to introduce this into the bazar of Poona is being made.

32. *Rangoon beans* were tried to ascertain the outturn that could be expected from them in a large area. It comes to about 400 lbs. per acre. This is not a crop of promise for this locality.

33. *Vál*.—Four varieties of Vál were grown to get seeds for further trial on larger area. The average outturn was 800 lbs. per acre.

34. *Chavli*.—Big and small seeded Chavli were grown. The yield was 400 lbs. per acre in both cases.

35. *Cow-pea*.—This is a variety of Chavli and appears to be nearly identical with the small-seeded variety. However its seed is not so sweet; its outturn was 800 lbs. per acre.

36. The statement below shows the yields of these pulses :—

Name of crop.			Outturn per acre.
			Lbs.
Vatania Vál	...	...	680
Mitha	„	...	375
Kadwa	„	...	840
Poona	„	...	1,225
Big Chavli	...	...	400
Small	„	...	400
Iron cowpea	...	...	800

37. A plot of 33 gunthas was sown to oats and another of 33 gunthas to barley. They have given an outturn of 816 and 888 lbs. per acre, worth Rs. 27 and Rs. 26, and the cost of cultivation was Rs. 12 and Rs. 11-1-8 respectively.

38. *Tapioca*.—The tapioca plantation was continued. The outturn from the following varieties was obtained as under :—

Name of variety.			Yield of tubers per acre.	Will produce starch.
			Lbs.	Lbs.
Balanqueta	...	...	22,390	3,717
No. 11	...	...	13,020	3,333
No. 13	...	...	15,610	2,888
No. 12	...	...	14,110	2,527
Negritta	...	...	16,110	3,335

39. The other varieties were in too small plots to make an estimate of outturn of value. Starch was extracted from 30 varieties. 25 lbs. of each variety were taken. The tubers were cleaned of bark and dirt and then grated by hand and the starch extracted by water. The cost of this operation was annas 7 for 100 lbs. of roots. The starch was sent to Dr. Leather for analysis who reported it to be free from poison and safe to use. It looks very nice and will soon be put upon the market.

The statement shows the results of starch extracted :—

No.	Name.	Weight of tubers.	Weight of tubers after the rind was removed.	Weight of dry refuse.	Starch recovered.	Percentages of		
						Bind to tubers.	Starch to clean tubers.	Starch to whole.
		Lbs.	Lbs. oz.	Lbs. oz.	Lbs. oz.			
1	Balanqueta	25	22 3	2 13	4 2½	11.9	18.8	16.6
2	No. 11	25	19 9	2 1	6 6½	21.7	32.7	25.6
3	No. 8	25	19 14	2 5	4 10	20.5	23.2	18.5
4	No. 12	25	18 10	2 9	4 7	25.5	23.8	17.7
5	Negritta	25	19 14	2 12	5 3	20.5	26.1	20.7
6	Languadenalo	25	19 4	2 10	3 5	23.0	17.1	13.2
7	Cunagio	25	20 14	2 12	4 15½	16.5	23.6	19.6
8	Chingala	25	18 10	2 6	4 6	25.5	23.4	17.5
9	No. 3	25	19 8	2 1	4 15	22.0	25.3	19.7
10	Eutta Marvan	25	22 8	3 3½	5 0	10.0	22.2	20.0
11	Mintro	25	19 0	2 7	5 3½	24.0	27.4	20.8

No.	Name.	Weight of tubers.	Weight of tubers after the rind was removed.	Weight of dry refuse	Starch recovered.	Percentages of		
						Rind to tubers	Starch to clean tubers.	Starch to whole.
		Lbs.	Lbs. oz.	Lbs. oz.	Lbs. oz.			
12	Chenkomlan T. V. ...	25	22 0	2 10	4 12½	12.0	21.7	19.1
13	Pachai avean ...	25	19 12	2 0	4 2½	21.0	21.07	16.6
14	No. 2 ...	25	21 0	2 11½	5 3½	16.0	24.8	20.8
15	Malai Vellai ...	25	21 3	2 2½	5 ½	15.2	23.9	20.1
16	Anai Maravan T. V. ...	25	23 0	2 11	4 11	8.0	20.3	18.7
17	Avanaku Elaven ...	25	22 2	2 11½	5 0	11.5	22.5	20.0
18	Vellai Marai Chini ...	25	23 0	3 13	5 2½	8.0	22.4	20.6
19	Piede perdize ...	25	20 12	2 15	5 8	17.0	26.5	22.0
20	Saletto Marila ...	25	20 4	2 3½	5 ½	19.0	24.8	20.1
21	No. 15 ...	25	20 9	2 4	4 12	17.7	23.1	19.0
22	Kudalore ...	25	20 0	2 10½	4 9½	20.0	22.9	18.3
23	Malbar white ...	25	21 1	2 5½	4 9½	15.7	21.8	18.3
24	Malbar red ...	25	21 8	2 11	4 14	14.0	22.6	19.5
25	Malbar blue ...	25	20 2½	2 3	4 7	19.3	22.01	17.7
26	Karai Maraven ...	25	21 0	2 3	4 3	16.0	19.9	16.7
27	Pachai Shavaby ...	25	21 4	2 11	5 6½	15.0	25.4	21.3
28	Pache ...	25	20 2	3 4	3 10½	19.5	18.1	14.6
29	Chenkomlan ...	25	21 1	2 6	4 14	15.7	23.1	19.5
30	Madras Agri-Horticulture Society.	20	17 2	2 1	3 14	15.0	22.7	19.3

XI.—Comparative Variety Tests.

40. *Sweet-potatoes*.—Nineteen varieties of sweet-potatoes were grown again this year, including three new West Indies, three American and 11 indigenous. Of these the Huffs and Red Sealy gave the highest yield. But the area of the plots was too small to admit of proper comparison. Several indigenous varieties did quite well.

The statement below shows comparative yields:—

Serial No.	Name of variety.	Source of original seed.	Yield per acre.
1	Deshila red ...	Bengal	5,560
2	Mogalwa red ...		17,440
3	Thanwa white ...		15,520
4	Cawnpur red ...		15,680
5	Japan brown ...		11,520
6	Bengal red ...		8,560
7	Thegonia white ...		15,520
8	Cawnpur white ...	Poona	18,400
9	Dhamakia white ...		21,280
10	Local red (Poona) ...	Bengal	18,240
11	Thegonia red ...		16,600
12	Telentia white ...		18,400
13	Karamia white ...	America	6,120
14	New Jersey ...		12,590
15	Nansemond ...		8,310
16	Virginia ...		8,400
17	Huffs ...	West Indies	34,094
18	Red Sealy ...		27,744
19	White Silk ...		5,110

41. *Maize*.—Seven American and three Indian varieties were on trial. The yields were affected by the pooriness of the season. Golden Beauty yielded best with 1,175 lbs. of ears per acre; the Yellow Dent and Hickory King also giving fair yields closely followed by the two local varieties.

The statement below shows details:—

Name of variety.	Outturn per acre.		Value of outturn.	Cost of cultivation.
	Grain.	Fodder.		
	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.
Golden Beauty	1,170	14,575	30 5 4	} 82 14 7
Yellow Dent	885	10,775	22 14 9	
Extra Early Waterloo	485	7,755	12 8 6	
Early Mastadon	295	7,150	19 8 9	
King Phillips	300	4,550	15 4 6	
Jaunpur	980	7,610	38 1 5	
Cawnpore	830	5,300	30 5 7	
Hickory King	1,120	4,780	37 0 0	
Poona Local	890	7,800	36 1 2	
Southern Maize	320	7,450	20 11 5	

42. *Jowár*.—Eight varieties of *Jowár* were grown for grain, Sholápurí, Gidgap, Khondi being best. The statement shows results:—

Name of variety.	Outturn per acre.		Value of outturn.	Cost of cultivation.
	Grain.	Fodder.		
	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.
Gidgap	745	4,360	22 5 11	} 42 4 8
Kumbhária	550	4,725	18 8 4	
Sholápurí	810	7,335	27 12 5	
Haldi	570	5,115	19 7 9	
Ganer	455	5,235	17 1 3	
Perio	335	4,000	12 12 5	
Gudghi	495	3,650	15 13 10	
Khondi	735	6,500	25 0 0	

43. Five varieties of *Jowár* were grown as fodder; Kági Jola gave the best yield, 11,070 lbs. per acre. The variety is the largest yielder of fodder of all varieties tried on the farm. In quality it is equal to Nilva.

44. *Wheat*.—Rust injured the wheat varieties so severely that the results are valueless for comparison.

45. *Bájrí*.—Plots alternately with the maize plots were sown to *Bájrí*. The outturn is low. Fresh seed was obtained from Gujarát for these varieties and in the case of Bhávnagri a large increase in yield was given.

The statement below shows the results:—

Name of variety.	Outturn per acre.		Value of outturn.	Cost of cultivation.
	Grain.	Fodder.		
	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.
Bearded bájrí	600	4,085	23 10 9	} 28 0 0
Bhávnagri M. F.	445	2,315	16 8 2	
Nadiád do.	505	2,360	18 4 8	
Málbandro do.	515	2,210	18 3 11	
Poona select	680	1,950	22 10 9	
Bazár séed	700	2,310	23 14 1	
Nadiád fresh	650	2,500	22 8 11	
Bhávnagri fresh	730	1,230	22 13 4	
Málbandro	500	1,290	16 5 7	

46. *Tur*.—Forty-six varieties of Tur seed were sown. Arhar gave a yield of 2,000 lbs. per acre. The yield of several other varieties is good. These large Tur's grown as a single crop are profitable and may have a place in rotation for sugarcane as it renovates the land and grows with little or no irrigation so that the land may rest from irrigation.

The statement shows results:—

Serial No.	Name of variety.	Yield per acre.	Value.			Cost of cultivation.		
			Lbs.	Rs.	a.	p.	Rs.	a.	p.
1	Biláspur	790	19	12	0			
2	Do.	880	22	0	0			
3	Do.	935	23	6	0			
4	Sambalpur	1,120	28	0	0			
5	Do.	840	21	0	0			
6	Do.	1,075	26	14	0			
7	Do.	990	24	12	0			
8	Do.	1,120	28	0	0			
9	Do.	1,100	27	8	0			
10	Do.	965	24	2	0			
11	Do.	1,140	28	8	0			
12	Do.	1,720	43	0	0			
13	Red Bangalore	1,360	34	0	0			
14	Do.	1,300	32	8	0			
15	Do.	1,090	27	4	0			
16	Do.	1,100	27	8	0			
17	Do.	1,240	31	0	0			
18	Do.	1,320	33	0	0			
19	Do.	1,220	30	8	0			
20	Variégated Bangalore	815	20	6	0			
21	Do.	825	20	10	0			
22	Do.	950	23	12	0			
23	Do.	700	17	8	0			
24	Red Salem	1,280	32	0	0			
25	Do.	1,240	31	0	0			
26	Do.	1,310	32	12	0	22	10	0
27	Do.	1,840	46	0	0			
28	Do.	1,120	28	0	0			
29	Do.	960	24	0	0			
30	Do.	780	19	8	0			
32	Red Bellary	1,440	36	0	0			
33	Do.	1,040	26	0	0			
34	Do.	1,240	31	0	0			
35	Do.	1,200	30	0	0			
36	Do.	1,105	27	10	0			
37	Do.	1,250	31	4	0			
38	Do.	1,080	27	0	0			
39	Do.	1,380	34	8	0			
40	Do.	920	23	0	0			
41	Do.	1,080	27	0	0			
42	Do.	1,110	27	12	0			
43	White Tur from Red Tur Bellary	1,600	40	0	0			
44	Red Tanjore	1,300	32	8	0			
46	Arhar	2,000	50	0	0			
47	Do.	1,260	31	8	0			
A	Do.	1,080	27	0	0			
B	Red Tur, Nadiád	890	22	4	0			
C	White Tur, Nadiád	835	20	14	0			
D	Red Tur, Ratnágiri	825	20	10	0			
E	White Tur, Bárámati	900	22	8	0			
F	Red Tur, Khándesh	1,360	34	0	0			

47. *Cotton*.—Five varieties of cotton were grown under irrigation. Of these the *Gossypium* herbaceum varieties gave a good outturn paying a net profit of Rs. 40 to 50 per acre. Most of the *indicum* varieties yield only about one-third as much, while the *neglectum* varieties, although yielding fairly, do not equal the herbaceum types. Dhárwár yielded only about the same as the

neglectum, but the soil was a little too heavy for *Gossypium hirsutum*. The *Gossypium hirsutum* American varieties and the Egyptian *Gossypium barbadense* were failures.

The statement below shows the results:—

Name of Variety.	Outturn per acre of seed cotton.	Value.	Cost of cultivation.	Net Profit.	
<i>Plots for Lefroy's Experiments.</i>					
		Rs. a. p.	Rs. a. p.	Rs. a. p.	
Treated with Lead Arsenite ...	352	25 2 3	}	7 3 10	
Treated with Sulphur mixture ...	324	23 2 3		5 3 10	
Untreated ...	388	27 11 5		9 13 0	
<i>Varieties.</i>					
<i>Gossypium herbaceum—</i>					
Broach ...	1,000	71 6 10	}	53 8 5	
Kumta ...	820	58 9 2		40 10 9	
Goghári ...	990	70 11 5		52 13 0	
<i>Gossypium indicum—</i>					
Bani ...	320	22 13 8		4 15 3	
Chánda, cold weather ...	350	25 0 0		7 1 7	
Cawnpore, Deshi ...	500	35 11 5		17 13 0	
<i>Gossypium neglectum—</i>					
Vaiádi ...	580	41 6 10		23 8 5	
Jari ...	560	40 0 0		22 1 7	
Kil (partial failure) ...	120	8 9 2	-9 5 3		
<i>Gossypium hirsutum—</i>					
Dhárwár-American ...	550	39 4 7	21 6 2		
Upland-Georgian ...	300	21 6 10	3 8 5		
Griffin and Doughty ...	10	0 11 5	-17 3 0		
<i>Gossypium barbadense—</i>					
Egyptian ...	Failure.	.....	-17 14 5	

XII.—Miscellaneous Crops.

48. *Paddy*.—Three varieties of paddy were sown on the farm in an irregular piece of 28 gunthas. The statement below compares the yield of these:—

Name of variety.	Outturn of grain per acre.
	Lbs.
Ambemohor ...	3,103
Kamod ...	2,230
Dodka ...	2,200

XIII.—Selection and Distribution of Seed.

49. An area of 6 gunthas of sugarcane of each of the four varieties, Mauritius green and red, Vánsi and Sannabile, was grown for distribution.

50. Other seeds were taken from the Experimental plots after careful selection, and marked thus — X, XX, XXX. XXX contains the most characteristic perfect ears and is reserved entirely for farm sowing. This is necessary in order that the high standard of purity may be maintained. X, XX, are for distribution. Seeds not included in these classes will not be distributed. The statement below shows the names of persons to whom seed was distributed:—

Serial No.	Date of Distribution.	Village to which seed distributed.	Name of Person.	Description of Seed.	Amount of Seed.
1	2	3	4	5	6
1	2nd April 1904...	Ichalkaranji ...	Patil of Ichalkaranji, Cultivator.	Haldi Jowár ...	1 lb.
2	6th do. ...	Nágpur ...	Insp.ctor-General of Agriculture.	Singua Jowár ... Cotton of the following varieties— Upland Georgian, Chánda cold weather and Bani.	1 " 4 lbs of each.

Serial No.	Date of Distribution.	Village to which seed distributed.	Name of Person.	Description of seed.	Amount of Seed.
1	2	3	4	5	6
3	12th April 1904	Surat Farm	Assistant Superintendent, Surat Farm.	Velvet beans	30 lbs.
4	13th do.	Dhond	Rev. E. Norton, Missionary in charge of Orphanage doing agricultural work.	Maize of the following varieties— (1) Golden Beauty, (2) Extra Early, (3) Waterloo, (4) Early Mastadon, (5) Yellow Dent, and (6) King Phillips.	12 lbs. of each.
5	19th do.	Kirkee	Assistant Superintendent, Poona Farm.	Báji of 6 varieties Maize Sweet potato creepers of 10 varieties.	8 ozs. of each. 100 lbs.
6	20th do.	Mánjri	Mrs. Jafrey, cultivator	Maize	30 lbs.
7	24th do.	Goryáchi wádi, tálika Mádhá, district Sholápur.	Ránu walad hawani Máng, cultivator.	White Mauritius canes	2 in number.
8	25th do.	Surat	Deputy Director of Agri culture.	Egyptian clover	3½ lbs.
9	30th do.	Pusa	Overseer, Government Farm.	Sweet potato, 3 American varieties and 13 indigenous varieties.	.....
10	30th do.	Lonand	Appáji Vináyak Joshi, Esq., cultivator.	3 American varieties of sweet potato.	.....
11	7th May 1904	Hyderabad	D. L. Náráyanráo, Esq., proprietor of Fodder Farm.	Do.	.....
12	16th do.	Mánjri	A. Bunter, Esq., cultivator.	Maize	30 lbs.
13	30th do.	Dumraon	Overseer, Dumraon Farm.	Soy beans Nos. 9, 13, 16 and 16.	4 ozs.
14	1st June 1904	Kirkee	Assistant Superintendent, Poona Farm.	Awneé báji 17 varieties of Soy beans, Pondicherry groundnut.	1 lb. 4 ozs. each.
15	12th do.	Dhárwár	Assistant Superintendent, Dhárwár Farm.	Awneé báji Nadiád do. Red Tur, Khándesh Do. Nadiád.	4 " 5 " 5 ozs. 5 "
16	15th do.	Kirkee	Assistant Superintendent, Poona Farm.	Groundnut, small, Japan Do. Spanish peanut	20 lbs. 20 "
17	15th do.	Sibpur	Principal, Civil Engineering College.	Soy beans Nos. 14 and 16.	8 ozs. each.
18	18th do.	Mánjri	A Bunter, Esq., cultivator.	Groundnut, small, Japanese Do. Spanish peanut. Do. Pondicherry Do. Virginia	5 lbs. of each.
19	20th do.	Ahmedabad	Agricultural Teacher, Training College.	Maize, Golden Beauty, King Phillips, Early Mastadon.	2 ear heads of each.
20	24th do.	Dehra Dun	Cryptogamic Botanist	Groundnut, Pondicherry	50 lbs.
21	25th do.	Kirkee	Assistant Superintendent, Poona Farm.	Maize, Golden Beauty	3 ear heads.
22	26th do.	Lyallpur	Manager of Lyallpur Farm.	10 varieties of fodder jowár.	1 lb. of each.
23	3rd July 1904	Karád	O. P. Láte, Esq., Pleader, Land-holder.	Groundnut, Spanish peanut. " Pondicherry " Virginia	400 lbs. 320 " 80 "
24	25th do.	Sholápur	Mr. Náráyan Apa, agricultural manager to Rao Saheb Mallápa Várád.	" Spanish peanut. " Pondicherry	1 lb. each.
25	8th August 1904	Bijápur	P. A. Desai, Esq., Pleader.	" Spanish peanut. " Pondicherry " Virginia	13 lbs. of each. " each.
26	10th do.	Mánjri	Vithal Náráyan Dátár, cultivator.	" Spanish peanut. " Pondicherry	50 lbs. of each.
27	13th do.	Madras	Principal, Agricultural College.	Maize seed Soy beans Tur varieties	20 lbs. 29½ "
28	17th do.	Bombay	R. D. Fethna, Esq., High Court Registrar, Land-holder.	Maize Cawnpore " Early Mastadon " Extra early Waterloo.	2 cobs of each.
29	28th do.	Kirkee	Assistant Superintendent, Poona Farm.	Maize seed	100 lbs.
30	30th do.	Do.	Do.	Do.	300 "
31	3rd Sept. 1904	Fursangi	Bápu Gopál Hadpála, cultivator.	Maize, Yellow Dent	4½ "
32	9th do.	Mánjri	Bápu Balvant Bhinge, cultivator.	Bronch Cotton seed	1 lb.
33	12th do.	Do.	Jija Mánáji Jagatáp, cultivator.	Maize	27 lbs.
34	12th do.	Fursangi	Shripati Parasharám, cultivator.	Do.	13½ "
35	13th do.	Hadapsar	S. M. Bhágwat, Esq., cultivator.	Jowár seed	12 "

Serial No.	Date of Distribution.	Village to which Seed distributed.	Name of Person.	Description of Seed.	Amount of Seed.
1	2	3	4	5	6
36	19th Sept. 1904 ..	Fursangi	Mr. Bhagvantráo Tirgul, cultivator.	Maize seed, Extra Early Waterloo.	22½ lbs.
37	27th do. ...	Do.	Do.	Do.	11½ "
38	14th Oct. 1904 ...	Mánjri	Hari Rámaji Ghule, Esq., cultivator.	Cuttings of Cawnpur white, Dhanakia white, and Bengal red (Sweet-potatoes).	.....
39.	1st Nov. 1904 ...	Poona	Superintendent, Empress Gardens.	Hissar gram ... Cábuli gram ... Black gram ... Khándesh gram ... Poona Lentil ... Bakshi wheat, Sangamner ... Kálakusal, Poona ... Pán wheat, Sàngli ... Tapioca cuttings ... Balanquette Nos. 1, 2 ...	2 lbs. 2 " 2 " 2 " 2 " 4 " 4 " 8 "
40	10th do. ...	Bellary	The Agricultural Inspector, Bellary Farm.	Fodder seed, Motichur " Rájhansa " K&gi Jola " Imphee	10 lbs. 10 " 10 " 10 "
41	3rd Dec. 1904 ...	Mánjri	Yeshwantráo Jádhav, cultivator.	Maize	30 "
42	8th do. ...	Bombay	Superintendent, Victoria Gardens.	Tapioca cuttings of vareties.	5
43	15th do. ...	Karáchi	Chairman, Karáchi Municipality.	Spanish peanut	10 lbs.
44	17th do. ..	Mánjri	Genu More, cultivator	Pondicherry " Wheat	10 " 20 "
45	19th do. ...	Alandi	Pátíl of Alandi, cultivator.	Maize	30 "
46	26th do. ...	Baropa Chakia Champaraon.	McDonald, Esq.	Spanish peanut Pondicherry " Small Japanese " Virginia " Maize	20 " 20 " 20 " 20 " 60 "
47	2nd Jan. 1905 ...	Loni	Keshav Bábaji Bhogate, cultivator.	Do.	25 "
48	17th do. ...	Fursangi	Khandu Bápu Kámate, cultivator.	Do.	25 "
49	19th do. ...	Pusa, Bengal	Director of Agricultural Research Institute, Pusa.	Cuttings of 32 varieties of Tapioca.	...
50	3rd Feb. 1905 ...	Varavande, Bára-mati.	Apa Bábaji Shelke, cultivator.	Maize	22½ lbs.
51	19th do. ...	Ganeshkhind	Botanical Assistant	Tapioca cuttings	...
52	19th do. ...	Fursangi	Bála Rámaji Harpule, cultivator.	Maize	27 lbs.
53	20th do. ...	Mál Douli Dápli, Katnágiri	Mr. R. K. Karandikar, landholder.	White Mauritius sugarcane. Red do.	4 canes of each.
54	6th March 1905 ...	Fursangi	Sábádu Fákira, cultivator.	Maize	13½ lbs.
55	7th do. ...	Mánjri	Jijába Gondáji More	Do.	6½ "
56	15th do. ...	Karáchi	Superintendent, Sewage Farm, Karáchi.	Turmeric Ginger Field beans	1,000 " 200 " 5 "
57	15th do. ...	Bangalore	Agricultural Chemist to Government of Mysore.	Sugarcane	5 in number.
58	16th do. ...	Kirkee	Superintendent, Poona Farm.	Maize Do. Poona Local Do. Cawnpur Soy bean No. 14 Small Japanese groundnut.	200 lbs. 4 ozs. 4 " 4 " 1 lb.
59	17th do. ...	Mánjri	Yesa Náráyan, cultivator.	Maize	4½ lbs.
60	19th do. ...	Aundh	Kárbhári, Aundh state	Virginia groundnut Pondicherry "	400 " 240 "

XIV.—Accounts.

51. Including the receipts from the new area there is a net profit to Government in the working of this farm of Rs. 2,931-0-11 as compared with last year's net cost of Rs. 1,099-10-1. Of this Rs. 2,000 came from the new area which is partly offset by the price paid for the standing crop of Rs. 1,075 bringing the actual profits of Rs. 925.

The balance sheet is given below :—

Receipts.	Amount.		Expenditure.	Amount.
	Rs. a. p.	Rs. a. p.			Rs. a. p.
To Sale of Produce of 1904-05—				
Gul	0 4 0	.....	By Cost of Establishment	1,201 2 3
Grains and seeds	79 5 3	.....	" Labour	2,527 1 0
Fodder	486 15 8	.....	" Upkeep of cattle	131 10 1
Vegetables	103 0 0	.....	" Purchase of seed for sowing	28 14 0
Miscellaneous	94 9 6	764 2 5	" " Dead stock and furni- ture	190 14 8
" Value of—			" " Manures	1,148 9 11
Gul in stock	6,750 2 8	.....	" Railway charges on seed parcels... ..	95 10 3
Sots in stock	692 5 0	.....	" Purchase of Cloth... ..	74 2 3
Grains and seeds in stock	386 4 5	.....	" " Live stock	737 11 3
Cotton in stock	200 0 0	.....	" " Stationery	133 10 0
Vegetables	5 0 0	8,033 12 1	" " Oil	50 5 0
" Increase in valuation of—			" " Service Stamps	5 0 0
Dead stock	147 9 9	.....	" Petty construction	291 2 10
Live stock	738 0 0	885 9 9	" Miscellaneous expenses	133 9 10
			Total	6,749 7 4
			By net profit	2,934 0 11
Total ... ..	.....	9,683 8 3	Grand Total	9,683 8 3

XV.—Visitors.

52. Visitors are at all times welcome to the farm, and an attendant will show and explain the experiments in progress.

Forty-five persons visited the farm during the year under report. Of these, 15 were cultivators and land-holders, 24 were officers and the remaining were private persons following other professions than cultivation.

XVI.—Remarks.

53. Mr. Káshináth Thamáji Shinde was transferred to the Karáchi Municipal Sewage Farm on the 7th February 1905 and Mr. J. D. Limaye, B.A., a probationer, took his place. The post of the farm clerk was newly sanctioned and Mr. V. L. Apte was appointed to that place. New officers are giving satisfaction.

J. B. KNIGHT, M.Sc.,

Special Assistant, Agricultural Department.

Kirkee, 17th July 1905.

RICE EXPERIMENTS.

					Para.	Page.
	Introduction	...	...	...	1	83
	Rainfall	...	...	...	2	83
II	Lonávla Experiments—					
	Selection of Fields	...	...	...	3	83
	Plotting	...	...	...	4	83
	Season	...	...	...	5	83
	Ráb Experiments	...	...	...	6—8	84
	Treatment of Seed-beds	...	...	...	9—11	84—88
	Transplanting	...	...	...	12	88
	Results	...	...	...	13—15	88—90
	Potash and Nitre Experiments	...	...	...	16	90 & 91
	Variety tests	...	...	...	17 & 18	91 & 92
III	Trial of Nitre in cultivator's fields—					
	Varieties, time of application; rate and method of application.				19—28	92 & 93
	Inspection and harvesting—					
	Thána Series	...	...	...	29	93
	Chowk Series	...	...	...	30	93 & 94
	Wadgaon Series	...	...	...	31	94
IV	Accounts	...	...	...	32	94

RICE EXPERIMENTS.

I.—Introduction.

1. The rice experiments of the year consist of the ráb experiments, the nitre and potash experiments, and the trial of varieties at Lonávla and the trial of nitre in cultivators' fields at Chowk, táluca Karjat (district Kolába), Parsik (Thána), and Wadgaon (Poona District).

Rainfall.

2. Rainfall at these stations is given in statement below :—

	Wadgaon (Mával.)		Lonávla.		Thána.		Khálápúr (for Chowk)	
	Rainy days.	Rainfall.	Rainy days.	Rainfall.	Rainy days.	Rainfall.	Rainy days.	Rainfall.
		In. cents.		In. cents.		In. cents.		In. cents.
May	0	0 0	0	0 0	0	0 0	0	0 0
	0	0 0	0	0 0	0	0 0	0	0 0
June	4	2 11	10	13 39	10	22 19	7	9 48
	8	2 67	15	27 75	14	25 40	15	19 80
July	11	7 41	16	29 73	14	16 58	14	21 11
	9	3 17	15	17 36	16	7 53	11	7 83
August	10	3 40	15	23 33	13	7 47	15	10 88
	2	0 86	13	7 65	12	3 62	13	4 52
September	4	3 69	15	20 65	7	4 24	11	14 36
	1	1 91	6	2 91	3	0 74	6	2 15
October	4	1 67	5	2 93	3	1 9	3	1 60
	3	1 48	1	0 28	3	1 4	2	0 33
Total	56	23 37	111	146 1	95	89 20	97	92 11

II.—Lonávla experiments.

3. *Selection of fields.*—Lonávla was selected on account of its easy access from Poona. Duplicate experiments should be made at other stations. Selection was made in April at which time most fields had been rábed, so that a good selection could not be obtained for a seed-bed. Nos. 26 and 51 were the best available. No. 26 is quite near the town and receives some washings, which, no doubt, increase its fertility. It is also near a hill which harboured crabs that did great damage to the seedlings. No. 51 was a very uniform field which had been out of cultivation for several years, but otherwise it was very satisfactory. It was obtained rent-free. But the cost of first ploughing and re-making the bunds may be put down as rent.

Statement shows areas, rent and assessment :—

Survey No.	Area.	Rent.	Assessment.
	A. g.	Rs.	Rs. a. p.
26	5 4½	50	17 0 0
51	4 37	*	9 0 0

* Cost of first ploughing and re-making bunds, Rs. 44-10-6.

4. *Plotting.*—This was done by the Circle Inspector in part and in part by a probationer. No. 26 was divided into five sub-fields which were plotted and used as follows :—

Sub-field 1 contained 25 one-guntha plots, each treated differently with regard to ráb. Sub-fields Nos. 2, 3 and 4 contained 49 one-half guntha plots devoted to raising seedlings of varieties. The remaining area of sub-fields 3 and 4 and sub-field 5 contained 18 two-guntha plots for transplanting varieties and 5 eight-guntha plots for the manure experiments. Survey No. 51 was devoted to raising the crop from seedlings of ráb experiments.

5. *Season.*—The rainfall was less than usual, but sufficient if it had been well distributed, which it was not. The monsoon broke on 6th June and preparation of the fields commenced. Transplanting took place from July 10th to 30th.

Ráb experiments.

6. Rice may be sown direct in the field or, as is the usual custom in Konkan part of the Bombay Presidency, it may be sown first in the seed-beds and then the seedlings transplanted to the field. In the preparation of the seed-beds in this tract, it is the custom to cover them with a layer of branches, grass, leaves or cowdung or a mixture of all and slowly burn. The ground is then lightly stirred with a harrow and the seed sown. The burning of this material constitutes the process known in vernacular as *dádha bhájane* and the material used is *ráb*.

7. Certain experiments were conducted in 1885 by the then Director of Agriculture, Mr. E. C. Ozanne, at Lonávla, Khandála, Igatpuri, Karjat and Alibág to ascertain what the value of *ráb* is due to, the relative value of different *rábs* and what substitute could be used.

He carried on the experiments for one year only, but left on record that his experiments were inconclusive and required verifying by experiments covering several years. His conclusions were that *ráb* is beneficial for three reasons:—

- (1) That it burns the soil and improves it;
- (2) That weeds are killed; and
- (3) That plantfood is added direct.

The statement shows briefly the results Mr. Ozanne arrived at.

Comparative statement showing the yield per acre of rice from the varieties of ráb experimented with during the year 1885 by Mr. E. C. Ozanne, Director of Agriculture, Bombay.

Place.	Cow-dung.	Ain.	Fangal.	Leaf and grass.		Unrábed manured.	Unrábed un-manured.	Oil-cake.	Dried sh.	Remarks.
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	
Lonávla ...	1,589	1,558	1,230	1,323	1,303	730*	...	...	...	* Pit manure.
Khandála ...	2,827	2,558	2,375	1,326	...	1,873†	...	...	...	* Cowdung.
Igatpuri ...	1,905	...	1,701	1,559	...	1,840‡	1,416	...	...	‡ Sheep folded.
Karjat ...	3,912	3,807	3,138	1,655	...	...	1,043	...	...
Alibág ...	2,127	...	...	2,208	1,949	...	1,357	2,099	1,914	

“Cowdung *ráb* is decidedly superior to all other *rábs*. Ain comes next and Fangal is inferior to both unrábéd and unmanured plots. Fair results are obtained from leaf and grass *ráb*.”

8. The practice of *ráb*ing as at present carried on is very injurious on forest growth and in the case of cowdung there is a great loss of manurial substance. The present experiments were instituted to investigate the following questions:—

Objects of the present experiments.

- I.—What does the efficiency of *ráb* depend upon?
- II.—What *rábs* are the most beneficial?
- III.—Can any substitute for the present custom be found?
- IV.—Will any after-treatment of the crop secure the effects of *ráb*?

Treatment of seed-beds.

9. Twenty-five one-guntha plots were treated as follows:—

Plot No. 1.—*Leaf ráb*.—Covered with usual quantity of grass and earth. All materials were weighed and burnt.

No other treatment was given to the plot except at the time of sowing.

Plot No. 2.—This was treated with Ain *ráb*, covered with grass and earth and burnt in the usual manner. Quantity of each material was separately weighed and recorded.

Plot No. 3.—This was treated with cowdung covered with grass and earth. Weighed and burnt as usual.

Plot No. 4.—This was treated with grass ráb covered with earth and burnt. All materials were weighed.

Plot No. 5.—This was treated with mixed branches covered with grass and earth; materials were weighed and burnt.

Plot No. 6.—This was treated with ashes obtained in the following way:—An equal quantity of leaves, grass and earth was spread on corrugated iron sheets in the same thickness as plot No. 1. The material was weighed and burnt, ashes were collected, weighed and spread out equally on the plot and mixed lightly with earth by rakes (Dantále).

Plot No. 7 was treated with ashes obtained by burning equal quantity of cowdung, grass and earth as in plot No. 3. The same directions were observed as in plot No. 6.

Plot No. 8 was treated with half the quantity of cowdung used in plot No. 3. The manure was ploughed in shallow. The land was harrowed several times until the whole earth was turned into powder.

Plot No. 9 was treated with ashes obtained from Ain, grass and earth with the same quantity as in plot No. 2. The same directions were followed as in plot No. 7.

Plot No. 10.—The earth to the depth of 3 inches was taken off and spread in a layer 3 inches deep on 4 sheets of corrugated iron raised on stones 1 foot high. This earth was heated for one hour by putting fuel underneath the sheets. When the earth was cooled down it was collected and spread again evenly on the plot.

Plot No. 11.—This received no treatment. It received only the cultivation as the other ráb plots.

Plot No. 12.—75 lbs. of powdered lime were evenly distributed and mixed with the soil.

Plot No. 13.—200 lbs. of fish manure were evenly spread on the plot and mixed. The spreading was done 4 days before sowing.

Plot No. 14.—Sheep were folded in this plot for 7 days.

Plot No. 15.—Two loads of poudrette from the Lonávla Municipality poudrette depôt were evenly spread out on the plot and mixed.

Plot No. 16.—200 lbs. of safflower cake was spread out on the plot and mixed.

Plot No. 17.—10 lbs. of nitre from United Provinces were put on the plot just before sowing. The plot was harrowed after the application of the nitre and afterwards the seed was sown.

Plots Nos. 18—22 received no ráb or other treatment, but instead, the fields to which the seedlings were transplanted were treated as follows:—

Plot No. 18.—Cotton seed furnishing nitrogen equal to two maunds of crude nitre (160 lbs).

Plot No. 19.—Safflower cake furnishing nitrogen equal to two maunds of crude nitre (160 lbs).

Plot No. 20.—Nitre 160 lbs. per acre.

Plot No. 21.—No treatment of any kind.

Plot No. 22.—Cowdung furnishing nitrogen equal to two maunds of crude nitre (160 lbs).

Plot No. 23.—The soil in this plot was pulverized until a condition similar to that of road earth was obtained.

Plot No. 24.—This plot received ashes of mixed branches, grass and earth. The quantity used was the same as in plot No. 5. Details of directions put forth in plots Nos. 6, 7 and 9 were followed.

Plot No. 25 was treated with ashes obtained from outside. The weight put on was the average weight of ashes as used in plots Nos. 6, 7, 9 and 24.

10. The quantities of ráb put on appear below :—

No. of plot.	Kind of ráb,	Quantity of ráb materials for one-guntha plot.	Cost of ráb materials and application charges.
			Rs. a. p.
1	Leaf ráb	1037 lbs. dry leaves	} 2 5 10
		236 „ of grass	
		390 „ earth	
2	Ain ráb	1201 „ ain branches	} 3 13 10
		243 „ grass	
		297 „ earth	
3	Cowdung	1106 „ of cowdung	} 6 8 4
		146 „ grass	
		280 „ earth	
4	Grass	512 „ grass	} 1 4 4
		362 „ earth	
5	Mixed branches	500 „ mixed branches	} 5 3 10
		240 „ grass	
		380 „ earth	
6	Ashes of leaves	477 „ ashes of leaves	2 9 4
7	Ashes of cowdung	588 „ cowdung ashes	6 9 4
8	Cowdung ploughed in	553 „	2 11 7
9	Ashes of ain branches	425 „	4 5 10
10	4 inches of earth dug and burnt.	.....	6 4 10
11	No treatment	.....	.....
12	Lime	75 lbs.	1 3 1
13	Fish	200 „	10 14 4
14	Sheep dung	140 sheep folded for 3 days	2 11 1
15	Poudrette	2 cart-loads	4 7 7
16	Safflower cake	200 lbs.	5 5 1
17	Nitre	10 „	2 0 0
18	No ráb	.....	.....
19	Do.	.....	.....
20	Do.	.....	.....
21	Do.	.....	.....
22	Do.	.....	.....
23	Earth pulverized	.....	0 8 10
24	Ashes of mixed branches	512 lbs.	5 3 10
25	Outside ashes	500 „	1 4 1

11. Samples were taken from all plots as below :—

- The total ráb material contained in 4 square feet of the bed.
- The total ashes after burning from 4 square feet.
- The earth to a depth of 2 inches from 4 square feet.
- The unburnt earth from adjacent path from 4 square feet.

These samples were sent to Dr. Leather for analysis. His report and comments on the same by the Inspector-General of Agriculture in India, and the analysis, are given below :—

I have the honour to submit my report on the samples of “ráb” materials, and earths, which were forwarded by the Assistant Superintendent, Poona Farm, with his letter No. 484, dated 5th June 1904.

In submitting them to a chemical investigation I have endeavoured to detect what changes had occurred during the process.

In paragraph 125 of “Improvement of Indian Agriculture,” Dr. Voelker suggested that the effect of this process may be partly mechanical and render the soil less liable to retain too much water; and secondly, that soils, like the black cotton soil, may contain sufficient organic matter, and thus make the ashes of the rábed material as effective as the dung itself. At page 109 he suggests again the value of the process lies in part in an improvement of the physical state of the soil, and then adds that the wastefulness of the process may be more apparent than real. Then (on the same page) he adds: “This results in the liberation of some of its dormant constituents, and the supply of ready formed food for the plant.”

"There is a further possible benefit in the destruction, through burning, of any weed seeds, which might choke the rice in its early stages."

I believe that the three most probable effects of the process are here referred to. Of these, the question of the destruction of weeds is one, which I could not properly test with the small amounts of material supplied; it is one which could be more satisfactorily tested in the field.

Regarding, secondly, the question of physical improvement, I can offer no opinion. This could only be satisfactorily studied on the spot. I may say, however, that although most black cotton soils enjoy an excellent physical texture, still if the lime falls to as low a proportion as is the case in these samples, it may be that this class of land is liable to become physically bad. The only "regar," which I know of, as being physically imperfect, is some of the Godávári District of Madras, and this contained low proportions of lime. All the samples of physically good "regar," which have come into my hands, contained about two per cent. or more of lime in one form or another.

Turning, thirdly, to the question whether the burning of such soil liberates plantfood, one might have expected it to do so. I should have expected an increase in the amount of readily soluble mineral food, potash, phosphoric acid and lime. As a matter of fact, there is a very considerable increase in the amount of readily soluble potash, and there is also a distinct, though small, increase in that of readily soluble phosphoric acid, and the same applies to the lime in four cases out of five.

Lastly, regarding the amount of nitrogen, it will be seen that the process has not had the effect, which one would have expected. In three out of the five earths the rábéd-earth contains rather more nitrogen than the unrábéd. The differences observed are, I believe, due to the difficulty of taking a proper sample perfectly in such a case, but the fact that the rábéd earth contains as much nitrogen as the unrábéd earth is established, and thus it certainly cannot be said that the process dissipates all or even any large proportion of this valuable ingredient from the soil. Of the nitrogen in the ráb materials most of it is apparently dissipated. I calculate that approximately $\frac{2}{3}$, $\frac{11}{12}$, $\frac{3}{4}$, $\frac{19}{20}$ and $\frac{12}{13}$ of this constituent of the ráb materials has passed into the air.

The combustion is apparently a "slow" one effected at a low temperature in a limited supply of air. For, the ashes of the ráb material included much charcoal and they contain very much more nitrogen than ashes of dung do, when burnt for cooking purposes.

Statement showing Chemical Analysis of "Ráb" materials.

	Moisture.	Organic matter.	Nitrogen.	Ash.	Total Phosphoric acid.	Total Potash.	Available Phosphoric acid.	Available Potash.	Lime.	Carbonic acid.
No. 1.										
718—04 Leaf ráb	6.01	63.22	.63	30.77	.23	.47	...	...	1.75	...
719—04 Ashes	3.62	27.13	.512	69.25	.41	.83	.047	.653	2.39	.88
720—04 Rábéd earth	3.46	9.62	.174	...	.273	...	.012	.054	.33	.20
721—04 Unrábéd earth	4.89	12.26	.210	...	.397	...	.0095	.030	.25	.13
No. 2.										
722—04 Leaves and branches...	8.41	79.62	.534	11.97	.174	.73	...	...	1.99	...
723—04 Ashes	3.47	15.80	.303	80.73	.509	2.00	...	1.42	5.477	4.32
724—04 Rábéd earth	3.06	10.45	.211	...	.267	...	.0227	.27	.226	.46
725—04 Unrábéd earth	...	12.08	.175	...	.378	...	.0133	.017	.213	.15
No. 3.										
726—04 Dung	7.96	72.47	.882	19.57	.446	.512	...	...	.728	...
727—04 Ashes	3.20	26.32	.780	70.47	.957	1.073	.166	.904	1.63	.54
728—04 Rábéd earth	3.26	12.70	.186	...	.256	...	.016	.047	.68	.15
729—04 Unrábéd earth	4.30	11.65	.141	...	.362	...	.0158	.0763	.20	.10
No. 4.										
730—04 Grass	7.24	83.67	.291	9.091	.133	.464	...	...	.478	...
731—04 Ashes	3.25	15.29	.139	81.46	.509	1.450	...	...	1.55	.66
732—04 Rábéd earth	3.23	11.43	.146	...	.261	...	.0135	.061	.22	.02
733—04 Unrábéd earth	4.40	11.03	.160	...	.384	...	.0112	.051	.24	.17
No. 5.										
734—04 Branches and grass	6.29	83.60	.619	10.11	.201	.675	...	...	.822	...
735—04 Ashes	3.27	23.09	.343	73.64	.573	2.03	...	...	2.37	1.7
736—04 Rábéd earth	3.10	12.79	.203	...	.275	...	.0208	.196	.47	.33
737—04 Unrábéd earth	4.07	11.92	.159	...	.420	...	.0105	.054	.32	.21

In reference to your Endorsement No. 472-2-1, dated 26th instant, forwarding copy of No. 471-2-1 of same date, addressed with accompanying analysis, to the Director of Land Records and Agriculture, Bombay Presidency, I have the honour to state that the soil, before it was rábed, was surely in high manurial condition, and, therefore, unusual in character. In all the samples there is a high percentage of organic matter (I suppose the percentages noted include combined water) and also high percentages of nitrogen. The rice lands on and under the gháts which are usually rábed, are of a very different character and in order to get a reliable information regarding the effects of rábing, it would, I think be well to repeat the experiments under more ordinary conditions.

J. MOLLISON.

Referring to your letter No. C-1058, dated 31st August 1904, I have the honour to say that I know very little of the circumstances of the ráb experiments at Lonávla. The samples of materials and earths were simply sent to me "for analysis," and I applied those tests which I thought most likely to yield useful information. Since samples of the ashes of the burnt "ráb" were supplied, it would seem that this material could not have been covered with loose soil in the manner described by you in your Agriculture (Volume I, page 83).

As to the proportion of organic matter and nitrogen, I was myself surprised that the proportion was so high, but much would depend on the previous treatment of the land. You will recollect that similar high proportions of nitrogen were present in the samples of earth which you sent to me from Kánara in 1899.

J. W. LEATHER.

12. Transplanting was done under favourable circumstances. Survey No. 51 was plotted into 4-guntha plots. In each of these plots Transplanting. the seedlings from the one-guntha rábed seed-beds were transplanted for experiment with the after-growth of these seedlings.

13. At the inspection the plots treated with cowdung ráb, ashes of cowdung, pouquette, safflower cake, fish, sheep folding and Inspection. nitre were greener and taller than the others. They were graded according to colour, size and general appearance on 4th July 1904, as follows:—

XIII.—Fish.	VII.—Ashes of cowdung.
XVI.—Safflower cake.	XXIII.—Earth pulverized.
XV.—Pouquette.	XXIV.—Ashes of mixed branches.
III.—Cowdung.	XI.—No ráb.
II.—Ain.	XII.—Lime.
I.—Leaves.	XVIII.—No ráb.
VIII.—Cowdung ploughed in.	XIX.—No ráb.
VI.—Ashes of leaves.	XX.—No ráb.
XIV.—Sheep folded.	XXI.—No ráb.
X.—Land heated.	XXII.—No ráb.
IV.—Grass ráb.	XVII.—Nitre.
V.—Mixed branches.	XXV.—Village ashes.
IX.—Ashes of Ain.	

14. The number of seedlings from each plot was affected by the destructive work of crabs. In the statement given below the actual Results with regard to seedlings. area transplanted from one guntha of seedlings is shown and also the corrected area. If this last be taken we find that the fish and the ashes plots Nos. 13 and 25 furnished seedlings for 8 gunthas. Leaf ráb, Ain ráb, nitre and heated earth furnished for over 6 gunthas and other plots from 4 to 5 gunthas. Plot No. 8 is not comparable as the soil was rather poorer. The cost per acre of seedlings by the different methods varies greatly, being least in the unrábed plots. The average area transplanted from five no-ráb plots was 4.7 gunthas. Average of five rábed plots was 5.7 gunthas, a gain of nearly 25 per cent. more seedlings from the same area, but the average cost was Rs. 27-12-0 against Rs. 3-13-2 of the unrábed beds.

The average area transplanted from burned plots of 5.7 gunthas may be compared with that from the plots getting ashes from equal amount of ráb materials, but burnt under similar conditions upon plates of iron which is 4.9 gunthas, while the plot in which the earth was heated grew seedlings for 6 gunthas.

The cost of such manures as fish, oil-cake and cotton seed would vary largely at different places so that these figures for these materials would not apply in Thána or elsewhere. The cowdung is usually in the possession of the rayat, and our figure which is its selling rate is altogether too high. Statement below shows the details :—

No. of Plot.	Kind of ráb.	Area actually transplanted.	Corrected for crab-eaten portion.	Cost of raising seedlings sufficient for transplanting one acre.	
		Gunthas.	Gunthas.	Rs.	a. p.
1	Leaf ráb	5	6.6	14	5 3
2	Ain ráb	5	6.6	23	6 8
3	Cowdung	5	5	52	2 8
4	Grass	4	5.3	9	9 5
5	Mixed branches	4	5.3	39	8 8
6	Ashes of leaves	2.8	5.6	18	7 3
7	Ashes of cowdung	3.2	4.26	63	1 1
8	Cowdung ploughed in	2	2	54	7 8
9	Ashes of Ain branches	2.3	3.06	58	3 1
10	4 inches of earth dug and burnt	5.5	6.3	40	0 2
11	No treatment	3.4	3.9	4	8 8
12	Lime	3.4	3.9	12	3 8
13	Fish	8	8	54	7 8
14	Sheep-dung	5.5	5.5	19	9 4
15	Poudrette	6.2	6.2	28	13 9
16	Safflower cake	5.0	5.0	42	8 8
17	Nitre	1.7	6.8	11	12 3
18	No ráb	2.1	4.2	4	3 5
19	Do.	2.4	4.8	3	11 0
20	Do.	4.0	5.3	3	5 5
21	Do.	4.0	5.3	3	5 5
22	Do.	4.0	5.3	3	5 5
23	Earth pulverized	4.0	5.3	4	2 8
24	Ashes of mixed branches	5.8	5.8	36	2 2
25	Outside ashes	4.0	8.0	6	4 5

Statement showing the cost of raising seedlings and the outturn results per acre of Ráb experiments, 1904-05.

Plot No.	Ráb material.	Per acre.				Per acre.					Profit or loss.
		Cost of raising seedlings.	Cost of after treatment.	Cost of cultivation in the transplanted area.	Total cost of cultivation.	Grain.	Straw.	Value of grain.	Value of straw.	Total value of outturn.	
1	2	3	4	5	6	7	8	9	10	11	12
		Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.	Lb.	Lbs.	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.
1	Leaf ráb	14 5 3	...	24 13 1	39 2 4	1,370	1,920	42 13 0	0 0 0	43 13 0	+ 9 10 8
2	Ain ráb	23 6 8	...	24 13 1	48 9 9	1,450	2,150	45 5 0	6 11 6	52 0 6	+ 3 12 9
3	Cowdung	52 2 8	...	24 13 1	76 15 9	1,420	1,900	44 0 0	5 15 0	50 5 0	-26 10 9
4	Grass	9 9 5	...	24 13 1	34 6 0	1,450	2,010	46 4 0	6 4 6	52 8 6	+18 2 0
5	Mixed branches	29 8 8	...	24 13 1	64 5 0	1,440	2,070	45 0 0	6 7 6	51 7 6	-12 14 3
6	Ashes of leaf ráb	19 7 3	...	24 13 1	43 4 4	1,480	2,140	46 4 0	6 11 0	52 15 0	+ 9 10 8
7	Do. cowdung	63 1 1	...	24 13 1	87 14 2	1,430	2,100	44 11 0	6 9 0	51 4 0	-36 10 2
8	Cowdung ploughed	54 7 8	...	24 13 1	79 4 9	1,320	1,800	41 4 0	5 10 0	46 14 0	-32 6 9
9	Ashes of Ain ráb	58 3 1	...	24 13 1	83 0 2	1,720	2,180	53 12 0	6 13 0	60 9 0	-22 7 2
10	Land heated	40 0 2	...	24 13 1	64 13 3	1,700	2,180	53 2 0	6 13 0	59 15 0	- 4 14 3
11	No ráb	4 8 8	...	24 13 1	29 5 9	1,410	2,090	44 1 0	6 8 6	50 9 6	+21 3 9
12	Lime	12 3 8	...	24 13 1	37 0 9	1,220	1,800	38 2 0	5 10 0	43 13 0	+ 6 11 3
13	Fish	54 7 8	...	24 13 1	79 4 9	1,640	2,200	51 4 0	6 14 0	58 2 0	-21 2 9
14	Sheep folded	19 9 4	...	24 13 1	44 6 5	1,180	1,770	36 14 0	5 6 6	42 6 6	- 1 15 11
15	Poudrette	28 13 9	...	24 13 1	53 10 10	1,420	2,240	44 6 0	7 0 0	51 0 0	- 2 10 10
16	Safflower cake	42 8 8	...	24 13 1	67 5 9	1,730	2,480	54 1 0	7 12 0	61 13 0	- 5 8 9
17	Nitre	11 12 3	...	24 13 1	36 9 4	1,360	2,730	59 2 0	8 8 6	68 10 6	+30 1 2
18	Cotton seed applied after transplantation	4 3 5	10 7 2	24 13 1	39 8 1	2,780	4,020	83 14 0	12 9 0	99 7 0	+59 14 11
19	Safflower cake applied after transplantation	3 11 0	5 9 6	24 13 1	34 1 7	2,120	3,650	66 4 0	11 6 6	77 10 6	+43 8 11
20	Nitre applied after transplantation	3 5 5	23 14 8	24 13 1	51 1 2	1,010	1,440	31 9 0	4 8 0	36 1 0	-15 0 2
21	No ráb no manure	3 5 5	...	24 13 1	28 2 6	1,460	1,660	45 10 0	5 13 0	51 7 0	+23 4 6
22	Cowdung applied after transplantation	3 5 5	6 11 3	24 13 1	33 13 9	1,480	2,220	46 4 0	6 16 0	53 3 0	+19 5 3
23	Earth pulverized	4 2 8	...	24 13 1	28 16 9	1,310	2,250	40 15 0	7 0 6	47 15 6	+18 15 8
24	Ashes of mixed branch.	36 2 2	...	24 13 1	60 15 3	1,250	2,010	39 1 0	6 4 6	45 5 6	-15 9 9
25	Outside ashes	6 4 5	...	24 13 1	31 1 6	1,280	1,730	33 7 0	5 6 6	43 13 6	+12 12 0

15. During the early growth in the fields the biggest plants grew best but they did not tiller, as well as the plants that were smaller at the time of transplanting. By far the best growth was made by those plants which were top-dressed. The yields given in statement above bear out this. It would seem from this statement that the kind of ráb is not important if the seed-bed be naturally rich as in the case of the present field, but that all manure may be more advantageously applied to the field.

Potash and Nitre experiments at Lonávla.

16. These were tried on No. 26. The results give no very satisfactory information unless it be that Field No. 26 was rich enough for rice cultivation without any manure. The statement below shows outturn:—

No.	Area.	Quantity of manure.	Value of manure.	Per acre.		Remarks.
				Grain.	Straw.	
		lbs.	Rs. a. p.	lbs.	lbs.	
1	8	80*	11 7 4	1,665	2,000	
2	8	160*	22 14 8	1,380	1,650	
3	8	240*	34 6 0	1,050	1,590	*Crude Nitre.
4	8	190†	13 8 2	1,440	2,075	†Sulphate of Potash.
5	8	.....	.....	1,675	2,550	

Variety tests at Lonávla.

17. Fifty-three varieties were tried. The seed-bed was raked with cow-dung. Bárka Máhádyá, Bodka Garvel, Támsál Garva and Jhina Kolamba have given yields of nearly 3,000 lbs. worth about Rs. 100. The cost of cultivation is rather high on account of it being our first year. The statement below shows details:—

No.	Names of Varieties.	Outturn per acre.				Total value of outturn.	Cost of Cultivation.
		Grain.	Straw.	Value of Grain.	Value of Straw.		
		Lbs.	Lbs.	Rs. a. p.	Rs. a. p.		
1	Támsál Halva	1,300	1,640	40 10 0	5 1 8	45 11 8	
2	Mahádi	1,260	1,600	39 6 0	5 0 0	44 6 0	
3	Halvár Halva	1,640	2,800	51 4 0	8 12 0	60 0 0	
4	Ghosálvel	860	1,500	26 14 0	4 11 0	31 9 0	
5	Bhadas	1,560	2,200	48 12 0	6 14 0	55 10 0	
6	Halva Mahádi	1,140	2,240	35 10 0	6 15 0	42 9 0	
7	Ambemohor Halva	1,560	2,400	51 14 0	7 8 0	59 6 0	
8	Malbhat Halva	1,660	2,860	51 14 0	7 3 0	59 1 0	
9	Halva Ambemohor	1,260	1,840	39 7 0	5 10 0	45 1 0	
10	Halvi Patni	1,820	2,500	50 10 0	7 13 0	58 7 0	
11	Dodka Semi Garva	1,700	2,800	53 2 0	8 12 0	61 14 0	
12	Ghudyá Semi Garva	20	120	0 10 0	0 6 0	1 0 0	
13	Tulsia	900	2,200	28 2 0	6 11 0	35 0 0	
14	Hemdi	1,420	1,960	44 6 0	5 5 0	49 11 0	
15	Khári Patni	1,800	2,800	59 6 0	8 12 0	63 2 0	
16	Bárka Mahádyá	3,040	4,560	95 0 0	14 1 0	109 1 0	
17	Garva Dodka	2,620	6,000	81 14 0	18 12 0	100 10 0	
18	Kachora Garva	1,320	3,400	41 4 0	10 10 0	51 14 0	
19	Garvi Patni	2,240	5,000	70 0 0	15 10 0	85 10 0	
20	Ambemohor Garva	2,440	3,800	76 4 0	11 14 0	88 2 0	
21	Souwel Garva	2,560	4,500	80 0 0	14 1 0	94 1 0	
22	Támsál Garva	2,960	4,960	92 8 0	15 5 0	107 13 0	
23	Ghosálvel Garva	2,240	4,600	70 0 0	14 6 0	84 6 0	
24	Jáda Kolamba	2,220	3,660	69 6 0	11 4 0	80 10 0	
25	Rájáwal Garva	80	160	2 8 0	0 10 0	3 2 0	
26	Nirpunj Garva	2,500	3,960	78 2 0	12 3 0	90 5 0	
27	Mahádyá Warangal	2,740	4,160	85 10 0	12 13 0	98 7 0	67 8 4
28	Bodka Garva	3,040	3,200	95 0 0	10 0 0	105 0 0	
29	Jhina Kolamba	2,800	2,840	87 8 0	8 12 0	96 4 0	
30	Bárka Kolamba	1,080	1,200	33 2 0	3 12 0	36 14 0	
31	Dodka	2,320	4,900	72 8 0	15 0 0	87 8 0	
32	Dodka (Khadakvásla)	1,200	3,000	37 8 0	9 6 0	46 14 0	
33	Kudurtki	400	1,860	12 8 0	4 1 0	16 9 0	
34	Patni	940	1,840	29 6 0	5 10 0	35 0 0	
35	Mahádi	1,100	2,400	34 6 0	7 8 0	41 14 0	
36	Torna (Thána)	200	360	6 4 0	0 15 0	7 3 0	
37	Ráta	840	2,200	26 4 0	6 14 0	33 2 0	
38	Munda Ráta	30	160	0 15 0	0 6 8	1 5 8	
39	Bhura	1,440	2,000	45 0 0	6 4 0	51 4 0	
40	Dagi or Dāngri	1,080	5,200	33 12 0	16 4 0	50 0 0	
41	Welchi	1,260	2,200	39 6 0	6 14 0	46 4 0	
42	White Sál (Khadakvásla)	1,900	2,500	59 6 0	8 12 0	68 2 0	
43	Kamod Jiri Patni	1,980	3,560	61 14 0	10 15 0	72 13 0	
44	Káli Sál	2,220	2,400	69 6 0	7 8 0	76 14 0	
45	Ambemohor Lámbodi	2,100	3,000	67 8 0	9 6 0	76 14 0	
46	White Kolamba	1,760	4,000	55 0 0	12 8 0	67 8 0	
47	Tin Pakhi Kudai	80	200	2 8 0	0 10 0	3 2 0	
48	Kowd	440	760	3 12 0	2 6 0	6 2 0	
49	Ambemohor Bodka	2,520	3,400	78 12 0	10 10 0	89 6 0	
50	Konkani Garva	2,260	3,100	70 10 0	9 11 0	80 5 0	
51	Konkani Halvai	2,500	3,600	78 2 0	11 4 0	89 6 0	
52	Chimansál	2,040	2,440	63 12 0	7 10 0	71 6 0	
53	Támb Kudai	1,680	2,600	52 8 0	8 2 0	60 10 0	

18. Notes were taken as to the characteristics of these varieties and are shown in the statement below :—

No.	Names of Varieties.	Colour of Stem.	Height.		Length of Ear.	Date of Flowering.	Date of Harvesting.
			Ft. in.	Inches.			
1	Támsál Halva ...	White ...	3	9	9	10th September 1904.	22nd October 1904.
2	Mahádi ...	Red ...	3	0	6	15th "	22nd "
3	Halwár Halva ...	White ...	3	9	9	5th "	24th "
4	Ghosálwel ...	Do. ...	4	3	9	3th "	22nd "
5	Bhadás ...	Do. ...	3	9	9	11th "	24th "
6	Halva Mahádi ...	Do. ...	3	6	6	3th "	26th "
7	Ambemohor Halva ...	Reddish ...	4	6	1	4th "	25th "
8	Malbhat Halva ...	Red ...	4	0	6	4th "	26th "
9	Halva Ambemohor ...	.....	3	9	9	1st "	26th "
10	Halvi Patni ...	White ...	3	9	9	8th "	26th "
11	Dodka Semi Garva ...	Red ...	5	0	1	22nd "	28th "
12	Ghudyá Semi Garva ...	White ...	4	11	11	19th "	1st November 1904.
13	Tulsia ...	Do. ...	5	0	1	12th "	26th October 1904.
14	Hemdi ...	Reddish ...	5	0	1	1 th "	25th "
15	Khári Patni ...	Red ...	4	9	10	21st September 1904.	2nd November 1904.
16	Bárki Mahádi ...	White ...	5	0	1	21st "	3rd "
17	Garva Dodka ...	Red ...	5	6	1	10th "	29th October 1904.
18	Kachora Garva ...	White ...	4	0	6	22nd "	30th "
19	Garvi Patni ...	Red ...	4	9	9	27th "	3rd November 1904.
20	Ambemohor Garva ...	White ...	4	0	6	22nd "	13th "
21	Sonwel Garva ...	Do. ...	4	11	11	24th "	13th "
22	Támsál Garva ...	Do. ...	4	8	8	20th "	29th October 1904.
23	Ghosálwel Garva ...	Do. ...	4	11	11	10th "	29th "
24	Jáda Kolamba ...	Do. ...	4	9	9	25th "	2nd November 1904.
25	Rájáwal Garva ...	Do. ...	2	11	5	29th "	1st "
26	Nirpunj Garva ...	Do. ...	5	4	10	7th "	2nd "
27	Mahádyá Warangal ...	Do. ...	4	9	9	24th "	3rd "
28	Bodka Garva ...	Do. ...	4	9	9	24th "	2nd "
29	Jhina Kolamba ...	Do. ...	4	0	6	23rd "	3rd "
30	Fárka Kolamba ...	Do. ...	3	6	6	23rd "	3rd "
31	Dodka Kolamba ...	Red ...	5	0	9	23rd "	29th October 1904.
32	Dodka (Khadakwásla) ...	Do. ...	4	0	6	10th "	22nd "
33	Kundurki (Thána) ...	Do. ...	3	6	6	14th "	19th "
34	Patni ...	White ...	4	0	6	9th "	19th "
35	Mahádi ...	Reddish ...	3	6	6	9th "	19th "
36	Torna (Thána) ...	White ...	2	10	4	8th "	19th "
37	Ráta ...	Reddish ...	3	10	4	5th "	19th "
38	Munda Ráta ...	White ...	2	8	5	8th "	19th "
39	Bhura ...	Do. ...	3	10	4	5th "	20th "
40	Dagi or Dangri ...	Reddish ...	5	4	10	2nd "	20th "
41	Welchi ...	Do. ...	3	11	5	6th "	20th "
42	Sál white (Khadakwásla) ...	White ...	4	0	6	14th "	20th "
43	Kamod Jiri Patni ...	Reddish ...	4	0	6	23rd "	8th November 1904.
44	Káli-sál ...	White ...	4	10	10	27th "	7th "
45	Ambemohor Lámbodi ...	Do. ...	4	9	9	16th "	7th "
46	White Kolamba ...	Do. ...	4	6	6	20th "	30th October 1904.
47	Tin Pakhi Kudai ...	Do. ...	3	0	6	29th "	10th November 1904.
48	Kowd ...	Do. ...	2	11	5	28th "	1st "
49	Ambemohor Bodka ...	Do. ...	3	11	5	21st "	11th "
50	Konkani Garva ...	Do. ...	3	8	8	21st "	11th "
51	Konkani Halva ...	Do. ...	4	6	6	6th "	30th October 1904.
52	Chiman Sál ...	Do. ...	4	8	8	19th "	1st November 1904.
53	Támb Kudai ...	Do. ...	4	6	6	17th "	20th October 1904.

III.—Trial of Nitre in cultivators' fields.

19. The trial of nitre in cultivators' fields in continuation of last year was made as follows :—

Name of village and District.	Number of Plots.	Area treated with Nitre.	Area not treated.	Remarks.
<i>Thána District.</i>		Gunthas.	Gunthas.	
Kalve	4	25.04	25.40	
Parsik	4	25.16	30.92	
<i>Kolába District.</i>				
Chowk	9	69.19	55.67	
<i>Poona District.</i>				
Wadgaon	3	36	36	2 Rice and one Jowár.

20. The selection of the sites was made on the 28th of June and every enquiry possible made as to previous treatment of the fields.

21. *Varieties.*—The following varieties were selected. They include both early and late varieties. At Thána Dodka, Early Patni, Kudurki; at Chowk Early Támsál Halva, Ghosálvel, Halvár, and Mahádi; at Wadgaon Ambemohor.

22. Measurements were made by the Circle Inspector.

23. *Time of application.*—The nitre was applied at Parsik and Kalve on the 1st of August when the transplanted seedlings were well established and the crop was almost uniform.

24. The height of the seedlings varied from 1½' to 2¼'. At Chowk the nitre was applied on the 2nd of August when the height of the crop varied between 1½' to 2'. At Vadgaon the manure was applied to plots on the 22nd August 1904.

25. *Rate of application.*—The rate of application was one maund of 80 lbs. per acre except in two plots where it was double that amount.

26. *Method of application.*—Before the application of nitre all water from the rice-beds was drawn off as far as possible. The dry nitre was spread out by hand.

27. *Inspection and harvesting.*—The fields were all inspected once. The harvesting was in charge of a fieldman or a probationer of the farms except at Chowk where Mr. Deshpánde supervised it.

28. The nitre cost four times as much as last year and the prices for the coming year are also about the same.

Thána Series.

29. At these rates a profit was obtained in the case of only four plots. If the nitre were priced as last year there would have been a paying increase in all but two plots. In one plot (No. 5) there was a less yield in the nitre plot than in the unmanured plot of about 700 lbs. I am unable to explain this. Statement below shows details:—

Survey No.	Plot No.	No. of plots.	Outturn per acre.				Increase of treated plot over untreated in grain per acre.	Value of increase.	Cost of Nitre per acre.	Net gain per acre to ryot.	Cost of Nitre per acre in 1903-04.	Net gain per acre to ryot on the prices of 1903-04.
			Plot treated with nitre.		Plot not treated with nitre.							
			Grain.	Straw.	Grain.	Straw.						
			Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Rs. p. a.	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.
104	4	1	1,860	1,600	1,196	1,521	664	19 5 10	11 7 4	7 14 6	3 1 6	16 3 4
103	8	1	2,493	3,400	2,347	3,200	146	4 4 1	11 7 4	Nil.	3 1 6	1 2 7
96	4	3	2,080	3,020	1,780	2,670	300	7 13 0	11 7 4	Nil.	3 1 6	4 11 6
84	7	4	3,200	4,243	2,240	2,720	960	25 0 0	11 7 4	13 8 8	3 1 6	21 14 6
55	2	5	2,757	2,372	3,488	3,500	Nil.	Nil.	11 7 4	Nil.	3 1 6	Nil.
54	6	6	2,688	3,072	2,133	2,323	555	16 3 0	11 7 4	4 11 8	3 1 6	13 1 6
8	2	7	2,880	4,430	2,880	5,700	Nil.	Nil.	22 14 8	Nil.	6 3 0	Nil.
8	4	8	3,629	3,690	2,725	3,055	895	25 1 8	22 14 8	3 3 0	6 3 0	19 14 8

Chowk Series.

30. The experiments here were seriously affected by the character of the season and only in two cases was there a paying increase, while in seven cases there was a loss. It may be that the presence of the nitre in the absence of sufficient water burned the crops. Recently manured fields often suffer in a drought. The statement below gives the results:—

Survey No.	Plot No.	Plot No.	Outturn per acre.				Increase per acre of treated plot over untreated in grain.	Value of increase per acre.	Cost of Nitre per acre.	Net gain per acre to ryot.	Cost of Nitre per acre in the year 1903-04.	Net gain per acre to ryot on the prices of Nitre in 1903-04.
			Plot treated with Nitre.		Plot not treated with Nitre.							
			Grain.	Straw.	Grain.	Straw.						
120	2	1	Lb. 2,008	Lbs. 4,000	Lbs. 2,210	Lbs. 3,187	Lbs. 450	Rs. a. p. 11 0 0	Rs. a. p. Nil	Rs. a. p. Nil	Rs. a. p. 7 14 0	
119	1	2	3,000	4,000	1,920	2,400	1,080	27 0 0	15 8 8	23 14 6		
105	5	3	1,806	2,755	1,935	2,698	Nil	Nil	Nil	Nil		
105	2	4	1,714	2,142	1,142	1,523	572	19 1 0	7 9 8	15 15 6		
105	6	5	1,102	1,600	1,920	2,860	Nil	Nil	11 7 4	3 1 0	Nil	
139	2	6	1,500	2,350	1,950	2,550	Do.	Do.	Do.	Do.		
133	1	7	369	533	960	1,383	Do.	Do.	Do.	Do.		
134	2	8	1,908	2,329	1,563	2,096	Do.	Do.	Do.	Do.		
118	2	9	1,004	1,489	1,136	1,684	Do.	Do.	Do.	Do.		

Wadgaon Series.

31. The Wadgaon plots both show a slight increase but not enough to pay for the nitre:—

Plot No.	Outturn per acre.				Increase per acre of treated plot over untreated in grain.	Value of increase.	Cost of Nitre per acre.	Net gain per acre to ryot.
	Plot treated with Nitre.		Plot not treated with Nitre.					
	lbs.	lbs.	lbs.	lbs.				
1	533	800	493	866	40	Rs. a. p. 1 4 0	Rs. a. p. 11 7 4	Nil.
2	440	536	344	376	96	3 0 0	11 7 4	Nil.

IV.—Accounts.

32. The net cost of all the experiments is Rs. 1,398-9-5, of which Rs. 1,184-13-11 may be allotted to those at Lonávla and Rs. 213-11-6 for the remaining experiments.

The balance sheet is given below:—

Balance Sheet of Rice Experiments, 1904-05.

Receipts:	Amount.		Total.	Expenditure.	Amount.		Total.
	Rs. a. p.	Rs. a. p.			Rs. a. p.	Rs. a. p.	
To sale of Farm produce, 1904-05—				By Fieldmen's pay	223 5 4		
Rice	258 0 0			Rent of quarters	52 4 0	275 9 4	
To the value of Farm produce, 1904-05—				Do. for land 1904-05	50 0 0		
Unsold on 31st March 1905.				Labour	706 6 6		
Rice seed	19 10 6			Purchase of seeds	14 5 0		
Rice straw	142 0 0			Do. Manure	117 15 0		
To the value of Live stock and implements	115 0 0	534 10 6		Do. Nitre	213 11 6		
				Do. Rab materials	30 7 3		
				Do. Buffaloes	75 2 0		
				Do. Ploughs, cart hire, &c.	36 4 8		
				Upkeep of buffaloes	134 3 6		
				Railway fare for men	14 8 9		
				Do. charges on buffaloes	22 14 0		
				Do. on other articles	21 8 6	1,440 6 3	
				Miscellaneous	52 6 6		
				Construction of chhapar	164 13 10	217 4 4	
Total		534 10 6		Total		1933 3 11	
By net cost		1,398 9 5					
Total		1,933 3 11					

J. B. KNIGHT, M.Sc.,

Kirkee, 21st July 1905.

Special Assistant, Agricultural Department.

SEWAGE FARM.

Contents	Page.	Para.
Crop rotation	97	1
Experiments with strong and weak sewage	97	3—6
Light soil area	97	7
Sugarcane	97	8—11
Vegetables	97 & 98	12
Accounts	98	13
Conclusion	98	14
Statements of results	98 & 99	15

SEWAGE FARM.

According to the original plan the crops grown at the Sewage Farm were rotated this year. The areas occupied by sugarcane in the previous two years being planted to vegetables and those occupied by vegetables to sugarcane. Plots 11 and 16 however, which were planted to Sannabile sugarcane, were ratooned a second time.

2. The general health of the crops has been better than the other two years.

3. At the end of December last at the end of the period of growth of all the crops except sugarcane, which had at that time received sufficient manure, it was recommended to Government that the expensive practice of carrying night-soil by cart from Poona City be discontinued, three full years having elapsed since the experiments were commenced.

4. At the end of the last year it was proved that conclusive results had been obtained as to the comparative value of the filter-beds from an agricultural standpoint. It being finally decided that agriculturally these were not necessary, their use was discontinued during the year under report.

5. At the suggestion however of the Sanitary Engineer and in consultation with the Agricultural Chemist, the Director, Land Records and Agriculture, and the Inspector-General of Agriculture, it was decided that an experiment should be made to ascertain the effect of very strong sewage. For this purpose the Septic Tank was divided and half of the experimental area received sewage made of double strength.

6. The results do not show any gain for the increase of manurial matter which goes to prove that the previous strength of the sewage furnishes all the plant-food that plants can use. The extra strength caused the sugarcane to grow so rapidly that we were obliged to stop the watering with the sewage very early. No signs of soil sickness were observed. But the extra manurial matter contained in the strong sewage was a complete agricultural loss.

7. Of the light-soil area 1 acre 27 gunthas raised two crops of Hundi and the remaining 24 gunthas only one crop. The monsoon was so very light that this area was not required for the disposal of the sewage. The outturn of Hundi from the first crop was 6,500 lbs. per acre of dry fodder worth Rs. 33; the second crop yielding 4,750 lbs. of dry fodder worth Rs. 24:

8. Three acres and 8 gunthas were planted with *Pundia* variety of sugarcane. This crop grew very luxuriantly yielding over 11,000 lbs. per acre of Gul of a quality higher than that of the last year which fetched in the Poona market Rs. 17-8-0 per *palla* of 252 lbs.

9. Thirty-two gunthas were down with the third year ratoon crop of Sannabile. The yield of 6,196 lbs. per acre is as high as could be expected from the third year ratoon.

10. The newly planted Sannabile sugarcane plots did not thrive well owing to the attack of sugar-borers in the early stage of their growth and to the soil being very deep, which confirms our last year's experience that sugarcane on such soil does not do well. Besides that the yield which the plots might have given under ordinary circumstances was less, there was the necessity of crushing before the crop was completely ripe in order that all results might be available for the final report, and thus the crop yielded a poor outturn of an inferior sort of Gul which fetched a low price.

11. In marketing the Gul there is always a loss in weight between that shown at the Gurál and that for which returns are actually received. The prices given this year show the net cash actually received.

12. All crops have yielded a paying profit except Surans and groundnuts.

Surans.—The *Surans* do not seem to be adapted to this region. The outturn is only medium and the quality very inferior. This crop does not form

a common article of diet of people in this part of the Presidency. The price therefore fetched in the market is very small, being 68 lbs. per rupee.

Groundnuts.—In the case of groundnuts the loss was due to the attack of disease. The price for this article was rather low, being 32 lbs. per rupee.

Ginger.—The ginger did not germinate satisfactorily, and a catch crop of chillies was taken, bringing the total profits from these two crops to Rs. 55-10-9 per acre in the case of strong sewage plots and to Rs. 29-4-4 per acre in the case of weak sewage plots.

Turmeric.—The turmeric gave a good crop yielding a profit of about Rs 150 per acre.

Maize.—After the harvesting of vegetable maize was dibbled in all the plots, and this crop, which is now nearly ready for cutting, is worth about Rs. 40 per acre, which is a clear profit and as the cultivation charges amount to less than Rs. 3 per acre.

It is to be noted in this connection that the maize crop following the ginger and chillies crop is much poorer than when following the other vegetables and has a sickly and starving appearance.

13. The financial results of the year are very satisfactory. The purification charges amounted to Rs. 831-9-2 less than the last year. The cultivation charges amount to Rs. 1,905-3-9, while the total receipts amount to Rs. 3,569-9-0 or a profit from the agricultural operations of Rs. 1,664-5-3.

14. The large increase of profits over that of the previous years may be partly due to higher rates and to the land now being abundantly supplied with all the elements of plant-foods and also to our experience in this new branch of agriculture. It would seem that the quantity of sewage for this field might be somewhat reduced in the future.

15. The statements below are as follows:—

No. 1 shows the outturn details of cultivation per acre.

No. 2 shows the details of waterings, &c.

No. 3 shows the cash account.

No. 4 gives the cultivation account.

Statement No. 1—Outturn of Crops.

Plot No.	Area.	Irrigated with strong or weak sewage.	Name of Crop.	OUTTURN PER ACRE.				
				Canes.	Juice.	Gul or other product.	Value of outturn.	Cost of cultivation.
	A. g.			Lbs.	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.
1	0 16	} Strong ...	Ginger and chillies	{ 2,930	73 9 10	} 93 10 9
2	0 16		Turmeric ...	...	...	{ 3,517	65 0 0
3	0 16		Surans ...	...	...	{ 32,820	312 13 5
4	0 16		Groundnut ...	...	...	{ 3,552	35 3 3
5	0 16		Sannabile (new) ...	...	...	{ 3,475	118 4 6
6	0 16		65,005	35,360	6,025	363 12 9	170 11 8	
7	0 16	} Weak ...	Ginger and chillies	{ 1,145	23 12 3	} 90 4 4
8	0 16		Sannabile (new) ...	58,490	30,780	{ 4,722	87 0 0	
9	0 16		Turmeric ...	...	...	{ 5,037	304 2 6
10	0 16		Surans ...	...	...	{ 3,1025	295 11 6
11	0 16		Groundnut ...	...	...	{ 3,692	38 4 5
12-15	1 24		60,827	32,082	5,767	348 3 9	143 7 10	
16	0 16	} Strong ...	Pundia ...	86,146	60,343	11,651	703 8 10	205 4 6
17-20	1 24		Sannabile (ratoon) ...	71,125	39,070	6,635	400 10 6	167 12 0
			Pundia ...	92,653	66,732	11,012	664 14 6	214 2 9

Statement No. II—Details of Application.

Plot No.	Area.	Name of crop.	Date of planting.	Date of harvesting.	Number of turns of sewage irrigation.	Total quantity of gallons of strong or weak sewage per acre.	Number of canal waterings.
	A. G.						
1	0 16	Ginger and chillies.	{ 26th April 1904 ... 28th July 1904 ...	{ 15th February 1905 ... 3rd February 1905 ...	10	561,935	9
2	0 16	Turmeric ...	22nd April 1904 ...	6th February 1905 ...	12	702,015	8
3	0 16	Surans ...	3rd May 1904 ...	9th November 1904 ...	10	593,375	3
4	0 16	Groundnuts ...	5th June 1904 ...	14th December 1904 ...	6	313,625	5
5	0 16	Sugarcane ...	24th April 1904 ...	.....	16	1,156,127	19
6	0 16	Ginger and chillies.	{ 26th April 1904 ... 29th July 1904 ...	{ 19th February 1905 ... 3rd February 1905 ..	9	566,092	12
7	0 16	Sugarcane ...	24th April 1904 ...	.....	16	1,245,537	20
8	0 16	Turmeric ...	22nd April 1904 ...	13th February 1905 ..	13	691,420	10
9	0 16	Surans ...	29th April 1904 ...	19th November 1904 ..	7	490,313	3
10	0 16	Groundnut ...	6th June 1904 ...	1st December 1904 ...	2	132,187	8
11	0 16	Sugarcane (ratoon).	9th March 1904 ...	25th February 1905 ..	11	894,770	20
12-15	1 24	Pundia ...	13th March 1904 ...	11th March 1905 ...	19	1,366,896	20
16	0 16	Sugarcane (ratoon).	9th March 1904 ...	28th February 1905 ..	18	791,840	20
17-20	1 24	Pundia ...	13th March 1904 ...	2nd March 1905 ...	21	1,247,368	18
	Light soil area.						
	2 36	Maize ...	19th April 1904 ...	26th June 1904 ...	4	40,517	8
	2 36	Sorghum ...	28th June 1904 ...	16th December 1904 ..	15	661,764	4
	0 8	Sugarcane ...	23rd March 1904 ...	22nd March 1905 ...	16	122,825	9
	2 9	Hundi ...	25th February 1904 ...	14th July 1904 ...	8	258,764	11
	1 27	Hundi (ratoon) ...	5th August 1904 ...	27th October 1904 ...	...	.....	2
	0 9	English vegetable ...	13th August 1904 ...	28th December 1904 ..	9	468,133	3
	0 19	Sau ...	28th July 1904 ...	29th September 1904 ..	...	.....	2
	1 26	Maize ...	4th November 1904 ...	24th February 1905 ...	1	1,28,182	6

Statement No. III—Cash account of the new Sewage Farm at Mánjri for 1904-05.

Receipts.	Amount.		Total.	Expenditure.	Amount.		Total.
	Rs.	a. p.			Rs.	a. p.	
To balance from previous year	.....		92 5 3	By cultivation charges—			
„ money drawn from the Treasury in the year 1904-05 ...	.....		4,126 9 3	Labour	1,095 9 3	.....
„ sale-proceeds of 1903-04—	.....			Irrigation charges ...	295 6 0	.....
Recovered in 1904-05 ...	.....		1,410 7 2	Purchase of seed ...	4 8 0	.....
„ sale-proceeds during 1904-05—				Miscellaneous expenses ...	62 0 6	1,457 7 9	
Surans	30 1 0	.....		By Purification of sewage—			
Turmeric	244 9 5	.....		Cartage of sewage, including Superintendent's pay	2,248 5 1	.....
Groundnut	133 12 4	.....		Purchase of fodder ...	551 1 6	.....
Fodder	167 13 7	.....		Concentrated foods ...	171 6 9	.....
Chillies	62 7 8	.....		Shoing bullocks	84 8 3	.....
Ginger	40 15 3	.....		Repair of carts	341 8 2	.....
English vegetables ...	9 12 9	.....		Purchase of oil	105 14 9	.....
Gul	2,875 8 0	.....		Miscellaneous expenses ...	132 13 3	3,635 9 9	
Miscellaneous receipts ...	14 9 0	3,569 9 0		By amount refunded in the Treasury			201 6 0
„ Refunded by the P. W. D.	.....	34 3 9					
				Total			5,294 7 6
				Balance on hand			3,938 10 11
Total		9,233 2 5		Total			9,233 2 5

Statement No. IV—Cultivation account of the Sewage Farm at Mánjri for 1904-05.

Receipts.	Amount.		Total.	Expenditure.	Amount.		Total.
	Rs.	a. p.			Rs.	a. p.	
To sale-proceeds of the year 1904-05—				By Cultivation charges—			
Fodder	157 13 7	.....		Labour	1,395 9 3	.....
Chillies	62 7 8	.....		Irrigation charges ...	295 6 0	.....
Ginger	40 15 3	.....		Purchase of seed	152 4 0	.....
Surans	30 1 0	.....		Miscellaneous expenses ...	62 0 6	1,905 3 9	
Turmeric	244 9 5	.....		„ net profits of cultivation .	.....	1,664 5 3	
Groundnut	133 12 4	.....				
Gul	2,875 8 0	.....				
English vegetables ...	9 12 9	.....				
Miscellaneous receipts ...	14 9 0	3,569 9 0					
Total		3,569 9 0		Total			3,569 9 0

J. B. KNIGHT, M.Sc.,
Special Assistant, Agricultural Department.

Kirkee, 20th August 1905.

GANESH KHIND BOTANICAL GARDENS.

	Para.	Page.
Indigenous Trees and Shrubs	1	103
Rubber plants; <i>Cryptostegia grandiflora</i> ; <i>Hevea braziliensis</i> ; <i>Kickxia africana</i> ; Camphor; Fibre experiments	2	103 & 104
Exotic plants; Fruit trees; Rare trees; Yam culture	3—6	104 & 105
Miscellaneous	7—10	106
Balance Sheet	11	106

III.—Report by the Economic Botanist.

GANESH KHIND BOTANICAL GARDENS.

1. *Indigenous trees and shrubs*.—In an area of about 4 acres selected for the growing of these, 327 species belonging to 84 Natural Orders were planted. Notes on their periodical growth, time of flowering and many other details are written out in a register and experiments are being conducted to test the most suitable methods for their reproduction, &c. This area will, in time, be of great value to students of Botany. The majority of the specimens have made excellent progress, although they were severely checked by the attacks of locusts at the beginning of the year.

2. *Rubber plants*.—The Ceara rubber plants put out in July 1903 and in August 1904 have grown well. The average increment of growth of the first mentioned in twenty months is: height $4\frac{3}{4}$ feet; girth $2\frac{3}{4}$ inches. Of the other series of plants, in 8 months it is: height 2 feet; girth $1\frac{1}{2}$ inch. The plants proved to be exceedingly intolerant of moisture and being deciduous during the greater part of the hot weather, irrigation is not then necessary. This species gives promise of adapting itself to the climate of the Deccan and also thrives as well in the Konkan. The present stock of plants, being strictly reserved for seed production, is not tapped for rubber.

Cryptostegia grandiflora.—This plant which becomes a large climber or rambling shrub in hedge rows and on banks of streams round Poona is particularly common in these Gardens. Experiments were made on the extraction of its latex which was collected in a shallow-pot and dried in the sun. One man working for two or three hours per day in the morning for a week collected 10 ozs. of coagulated rubber. A small quantity was sent to the Industrial and Agricultural Exhibition at Bombay.

Dr. Leather, the Agricultural Chemist to the Government of India, kindly supplied the following analysis of the rubber sent to him:—

Water, Gums, etc.	...	...	...	12.7 per cent.
Resin	...	...	...	3.9 „
Caoutchouc	...	...	...	83.4 „
			100.0	

The Reporter on Economic Products to the Government of India in his last annual report states that samples of this rubber completely degenerated within one year in the moist climate of Calcutta. In the drier climate of Poona it has remained without change so far, but a few months' further experience is necessary before I can confidently make a definite statement on this point. The quantity of rubber yielded by each plant is very trifling. The plant, however, grows so luxuriantly and spreads itself so quickly, that it might become a valuable adjunct to the resources of Deccan and Konkan villages.

Hevea brasiliensis and *Castilloa elastica*.—Seeds and plants of these were introduced from Ootacamund, but with the exception of two plants of the latter species, all are now dead. I am not sanguine as to the success of these two species, but further trials will be taken in hand.

Kickxia africana, also introduced from Ootacamund, is progressing slowly but satisfactorily.

Camphor—Cinnamomum Camphora.—About 50 plants of this were introduced in July 1903. All are growing well. Experiments are now being conducted to prove the best method of reproduction in the absence of seed. They seem to thrive better when exposed to the full force of the sun and air than when grown under shade and shelter from winds.

Fibre experiments.—The following is a schedule of experiments conducted on various fibre plants by various methods:—

Name of plant.	By Machine.			By retting.			Percentage of fibre to leaf.		Remarks.
	Weight of leaves.	Weight of dry fibre.	Number of days' work of one man.	Weight of leaves.	Weight of dry fibre.	Number of days' work of one man.	By machine.	By retting.	
	Lbs.	Lbs.		Lbs.	Lbs.				
Agave Sisalana ...	98	7	7	778	32	7	3.71	3.85	
Agave vivipara (large) ...	120	6½	7	917	45	7	6.12	6.66	
Do. (small) ...	122	4	7	888	22½	7	4.5	4.47	
Agave americana ...	146	1	5	1,343	21	7	2.73	1.69	
Furcraea gigantea ...	200	3	7	1,261	17	7	2.00	1.78	
Yucca gloriosa ...	18	2	7	120	12	7	19.17	10.00	
Sansevieria trifasciata ...	2½	...	1	...	...	...	...	...
Pandanus fascicularis ...	...	...	...	75	3	7	...	4.00*	* Fibre cannot be extracted by machine.

Leaves of *Sansevieria trifasciata* could not be successfully worked by the machine, nor can fibre be extracted by retting. Experiments made on *Calotropis gigantea* also proved unsuccessful.

3. *Exotic plants*.—Seeds of a number of exotic plants were introduced for future experimental purposes.

4. *Fruit trees*.—The following fruit trees were introduced for cultivation :—

Anona squamosa.	Orange de societé.
Apple crab.	" " Malta.
Citron turanj.	" " Scur florida.
" finger.	Peach, country, No. 1.
Dewberry.	" " No. 2.
Diospyros Kaki.	" " No. 3.
Psidium Cattleyanum.	" " No. 4.
Eugenia Jambolana.	Pear, China.
Lime At. Anni.	" La Caute.
" " " kala.	Prunus Puddum.
Deshi kalamba.	Vine Almanick.
Lemon Florida rough.	" Black hamburg.
Lime galgal.	" " prince.
" " " Jamberi.	" " Buchlando sweet water.
" " " brown.	" " Cancard American.
" " " kágzi.	" " Catamba.
" " " khatta.	" " Gras colman.
" " " sylhet.	" " Harrini Kábul.
" " " sweet chickna.	" " Japan.
" " " galgal.	" " Kandhári.
Lemon Bijori.	" " Mascat of Alexandria.
" Malta.	" " Royal Mascadin.
" Italian No. 76.	" " Shurbati.
" Edratin de calabra.	" " country white.
Oranges from Nágpur.	Mascat pomegranates.
Pumelos from Chembur near Bombay.	Cabul pomegranates.
Orange de calabra.	

5. *Rare trees*.—A number of specimens of rare trees were kindly presented by the Superintendent, Royal Botanic Gardens, Sibpur, Calcutta.

6. *Yam culture*.—A large series of yams were grown for botanical identification by the Reporter on Economic Products to the Government of India. Botanical specimens were collected and preserved during the season. The following schedule gives the details of outturn from these plants :—

Serial No.	Register No.	Name of variety.	Whence obtained.	Number of sets planted.	Number of plants living.	Outturn of tubers in lbs.	Remarks.
1	14113	<i>Dioscorea alata</i> ...	Bengal ...	5	5	65	
2	.....	Do. ...	From N. C. Mukerji, Sibpur, Bengal.	5	5	60	
4	13857	Ratálu Madhubani ...	Do. ...	5	5	46	
5	14042	Hali Dauli ...	Do. ...	3	3	46	
6	.....	<i>D. alata</i> Purce bok L. Rato Tural P. ...	Darjiling ...	5	1	7	
7	13815	Karkura Alu ...	Barseli, Bengal ...	5	5	6	
8	14016	<i>D. alata</i> (Man. Alu) ...	Pubna do. ...	5	5	31	
9	.....	Do. Sangar ...	Singor, Darjiling ...	2	...	...	Germi n a t e d well but died afterwards.
10	13952	<i>D. alata</i> Khán Alu ...	Yessore, Bengal ...	1	1	9	
12	.....	<i>D. globosa</i> ...	Sibpur ...	5	5	57	
14	12076	Do. ...	.....	5	5	11	
15	.....	Do. (Khásálu) ...	Chittagong ...	4	4	2	
16	13914	Do. do. ...	Alipur ...	3	1	9	
18	13816	Do. Rubella Gorum Alu. ...	Barasal ...	4	4	18	
19	.....	Do. bulbifera ...	Banli Birbhun ...	2	2	1	
22	15492	Do. do. (Kanta). ...	Madlapur ...	1	...	...	Died.
23	.....	Do. do. ...	Darjiling ...	1	...	...	Do.
25	9155	<i>D. Bulbifera</i> (Kand) ...	Alipur ...	2	2	½	
29	15466	Do. (Karba) ...	Jabalpur ...	2	2	2	
30	16208	Do. (Kárand) ...	Bombay ...	2	2	3½	
31	15493	Do. (Ribsundkhand gumgi). ...	United Provinces ...	3	3	4	
32	16295	Do. (Nai kalu) ...	Burma ...	2	2	½	
33	16819	Do. (Bhihikand) ...	.....	2	2	3	
34	11481	Do. (Chandari kand) ...	.....	2	2	4	
36	14084	Do. Walchi kalat... ..	Shange teneo ...	5	4	3	
43	18113	Do. Atala ...	Godávári, Madras ...	5	3	65	
44	17966	<i>D. pendulum</i> ...	Krishna do. ...	5	2	18	
45	18111	Do. ...	Godávári do. ...	5	2	16	
46	17955	Do. (V e n t u l a i Vallikilangu). ...	Tanjore ...	2	1	7	
47	18115	<i>D. alata</i> (chenchugodedu) ...	Karnul ...	5	1	50	
48	Corey No. 124	Do. (fariciniformis) ...	Parlu Khindi, Ganjam. ...	2	1	2	
49	17967	Do. (pendulum) ...	Kadappa ...	1	1	15	
50	18112	Do. do. ...	Salem ...	2	2	60	
51	18523	Do. (Weltulai Vellai-kilango). ...	S. Arcot ...	4	4	11	
52	18522	Do. (Veltulsaika Vellai-kilango). ...	Do. ...	4	4	10	
53	14589	Do. (fariciniformis) ...	Calcutta ...	4	4	46	
54	18972	Do. do. Matia Alu. ...	Jalpaiguri, Bengal ...	2	...	...	Died.
55	18114	Do. Deva Pendulum ...	Ganjam ...	3	3	31	
56	17953	Do. (Veya Pendulum) ...	Do. ...	3	3	46	
57	Bourdillon No. 6.	Do. (fariciniformis) Kadial. ...	Travancore ...	4	4	45	
58	Bourdillon No. 25.	Do. (succiformis) ...	Do. ...	2	2	19	
59	Bourdillon No. 12.	<i>D. rubella</i> (Ootiyal Kacchal). ...	Do. ...	1	1	8	
61	17623	Do. (Koddi Kavel-linga). ...	Trichinopoly ...	1	1	26	
62	17757	<i>Dioscorea</i> ...	Madras ...	5	5	34	
63	17612	<i>D. alata globosa</i> ...	Do. ...	5	5	27	
64	17759	<i>Dioscorea</i> ...	Do. ...	2	2	17	
65	17756	Do. ...	Do. ...	3	3	37	
66	17608	<i>D. alata</i> (Vithivalli kilango). ...	Do. ...	5	4	24	
67	17761	<i>Dioscorea</i> ...	Do. ...	4	3	61	
68	17611	<i>D. alata</i> ...	Do. ...	2	2	9	
69	17758	<i>D. fasciculata</i> ...	Do. ...	5	5	39	
70	19509	<i>D. alata</i> (fariciniformis) ...	(Tenugya, Burma) ...	5	4	28	
71	19521	Do. (Sinche Myauk) ...	Tangya Lawk Sawk (State Burma). ...	4	4	28	
72	.....	Do. rubella (Myank) ...	Tanugyi Mambkok (State Burma). ...	4	2	10	
73	19526	Do. (Sincha Myank V.). ...	Tanugyi Lawk Sawk (State Burma). ...	1	1	12	
74	19524	Do. (Hpa. Hpaw Myank or B. A. Baw Myank). ...	Tangui (State Burma). ...	3	3	8	
75	Gajé ...	Do. (sacciformis Myank) ...	Minbn, Burma ...	3	3	1	
76	Do. ...	Do. (fariciniformis) Myank Kyinegye. ...	Do. ...	2	2	5	
77	Do. ...	Do. (sacciformis Myank) ...	Do. ...	4	2	25	
80	19130	Do. (Purpara Ratálu) ...	Ghatal, Midnapur ...	4	3	63	
81	F. N. ...	Do. Globella ...	Western India, Bombay. ...	5	4	50	
82	.....	Western India Yams ...	.....	5	4	24	
83	.....	Kárand ...	Thána ...	5	1	2½	

7. Botanical researches were conducted on a number of selected plants belonging to Malvaceæ Leguminosæ and Cucurbitaceæ.

A revised classification of Indian cottons with coloured illustrations was sent to the Inspector-General of Agriculture for publication.

A similar work is in progress on the cottons of American origin.

8. Preliminary classifications of Jowárs and Rices were circulated to the Superintendents of Farms for further test.

By the kindness of the Commissioner in Sind, seeds of the cultivated Indigo were sent from several districts for trial and botanical determination.

An enquiry was also instituted as to the identity of the crop lumped as *Bhádli* in the returns.

9. A collection of seeds of the finer wild plants was brought in. These will be tested and reported on next year.

10. Arrangements have been made to ascertain the methods most suitable for vegetable culture around Poona.

11. The balance sheet of the Gardens is given below :—

*Balance Sheet of the Ganesh Khind Botanical Gardens, Kirkee, from
1st October 1904 to the 31st March 1905.*

Receipts.	Amount.	Expenditure.	Amount.
			Rs. a. p.
<i>Nil</i>	By cost of establishment	584 3 2
		" travelling allowance	19 12 0
		" postage charges	22 0 0
		" purchase of office furniture	200 4 0
		" paid irrigation charges for the year 1904-05.	35 6 0
		" wages of labourers	1,003 7 4
		" petty supplies	37 11 9
		" purchase of plants and seeds	279 2 11
		" purchase of books	198 7 0
		Total ...	2,480 6 2

Kirkee, 21st June 1905.

G. A. GAMMIE, F. L. S.,
Economic Botanist.

ANNUAL REPORT

ON THE

AGRICULTURAL AND BOTANICAL STATIONS

IN THE

BOMBAY PRESIDENCY

For the year 1905-06.

BY THE

BOMBAY
PRINTED AT THE GOVERNMENT CENTRAL PRESS
1907

[Price—Re. 1-2a. or 1s. 8d.]

OFFICIAL AGENTS FOR THE SALE OF INDIAN
OFFICIAL PUBLICATIONS.

In England.

- E. A. Arnold, 41 & 43, Maddox Street, Bond Street, W., London.
Constable & Co., 16, James Street, Haymarket, W., London.
Grindlay & Co., 54, Parliament Street, S. W., London.
Henry S. King & Co., 65, Cornhill, E. C., London.
P. S. King & Son, 2 & 4, Great Smith Street, Westminster, S.W.,
London.
Kegan Paul, Trench, Trübner & Co., 43, Gerrard Street, Soho, W.,
London.
B. Quaritch, 15, Piccadilly, W., London.
B. H. Blackwell, 50 & 51, Broad Street, Oxford.
Deighton Bell & Co., Cambridge.

On the Continent.

- Friedlander & Sohn, 11, Carlstrasse, Berlin.
Rudolf Haupt, Halle-a-S., Germany.
Otto Harrassowitz, Leipzig.
Karl W. Hiersemann, Leipzig.
Ernest Leroux, 28, Rue Bonaparte, Paris.
Martinus Nijhoff, The Hague.

In India.

- Higginbotham & Co., Madras.
V. Kalyanarama Iyer & Co., Madras.
P. R. Rama Iyar & Co., Madras.
Thacker, Spink & Co., Calcutta.
W. Newman & Co., Calcutta.
S. K. Lahiri & Co., Calcutta.
R. Cambay & Co., Calcutta.
Thacker & Co. (Ld.), Bombay.
A. J. Combridge & Co., Bombay.
Curator, Government Central Book Depot, Bombay.
D. B. Taraporevala, Sons & Co., Bombay.
Sunder Pandurang, Bookseller, etc., Bombay.
Gopal Narayan & Co., Booksellers, etc., Bombay.
N. B. Mathur, N. K. H. Press, Allahabad.

ANNUAL REPORT

ON THE

AGRICULTURAL AND BOTANICAL STATIONS

IN THE

BOMBAY PRESIDENCY

For the year 1905-06.



BOMBAY
PRINTED AT THE GOVERNMENT CENTRAL PRESS
1907

CONTENTS.

	Paras.	Pages
I.—REPORTS BY THE DEPUTY DIRECTOR OF AGRICULTURE.		
Forwarding Letter	1—6	1—2
I.—Operations on the Surat Agricultural Station—		
Season and Rainfall	1—2	3—4
Manurial Experiments, Application of Artificial Manures to dry-crops; Night-soil Experiments; Green Manuring	3—10	4—6
Rotation and Manure Experiments (permanent series)	11	6—8
Cultural Experiments; Varietal Experiments; Experiments on New Crops; Crop breeding	12—15	8—9
Pests	16	9
Irrigation Experiments, Measurement of Irrigation Water applied to different crops	17—18	9—11
Experiments with new Implements	19	11
Artificial Manure Experiments made off the Station	20—21	11
Dairy-herd; record of Milk Yield	22—23	12—14
Distribution of Seeds; Implements and Manures	24	14—15
Visitors	25	15
Accounts	26	15
Appendix A—Valuation of Cottons	...	16
II.—Operations on the Nadiād Agricultural Station—		
Season and Rainfall	1—2	17
Manurial Experiments: Tobacco, Cotton, Brinjals, Rice	3—6	17—20
Rotation Experiments: Series I to Series IX	7—15	20—29
Experiments on crops grown continuously; Cultural Experiments; Trial of new Crops	16—26	29—33
Pests	27—32	34
Cross breeding	33	34
Irrigation Experiments	34	34
New Implements	35—38	35
Experiments made off the Station	39	35
Oil-engine and pump, its cost of working	40	35—36
Ensilage	41	36
Distribution of Seeds, Manure and Implements	42	36—37
Visitors	43	37
Accounts	44	37
III.—Operations on the Dhārwar Agricultural Station—		
Season	1	38
Rotation Experiments, their results	2—4	38—42
Manurial Experiments; Cultural Experiments; Varietal Experiments; new crops	5—13	42—46
Cotton breeding	14—15	46—48
Insect pests	16	48
New Implements	17	49
Manurial Experiments at Sirsi	18—19	49—50
Distribution of Seeds and Implements	20—22	50
Visitors	23	51
Accounts	24	51
IV.—Operations on the Dhulia Agricultural Station—		
Season	1	52
Manurial Experiments; Cultural Experiments; Varietal Experiments; Experiments with new Crops; Cross breeding Experiments	2—11	52—55
Pests	12	55
Irrigation Experiments, method of measuring water	13	55
Implements	14	55
Experiments made off the Station	15	56
Distribution of Seeds and Implements	16	56
Visitors	17	56—57
Accounts	18	57

	Paras.	Pages
I.—REPORTS BY THE DEPUTY DIRECTOR OF AGRICULTURE—continued.		
<i>V.—Operations on the Mirpur Khás Agricultural Station—</i>		
History	1	58
Season	2	58
Experiments with different Crops ; Crop breeding ...	3—15	59—62
Water requirements of Crops	16	62
New Implements	17	62
Distribution of Seeds, Implements and Manures ...	18—22	62—64
Visitors	23	64
Accounts	24	64
Appendix A—Analysis of Manures used on different Stations ...	...	65—67
II.—REPORTS BY THE PROFESSOR OF AGRICULTURE.		
Forwarding Letter	1	71
<i>VI.—Operations on the Poona Agricultural Station—</i>		
History and Aim of the Station	1	73
Area, Character of Soil and Irrigation ; Lines of Work for the year	2—3	73
Meteorology	4	73—74
Area planted to different Crops	5	74—75
Crop Diseases and Insect Pests	6	75
Forage Crops ; Botanical Experiments ; Trial of new Crops, Seed Selection ; Trial of new Methods of Cultivation and Care of Crops ; Miscellaneous Crops	7—19	75—79
Demonstration and Training	20	79
Farm Implements	21	79—80
Seed Distribution	22	80
Visitors	23	80
Accounts	24	80
<i>VII.—Operations on the Kirkee Dairy and Agricultural Station—</i>		
Purpose	1	81
Health of the animals ; Milk supply ; Yield ; Strength of Herd ; Breeds kept ; Services of Bulls	2—7	81—84
Farm : Forage Crops grown	8—14	84—86
Feeding Experiments	15	86—87
Accounts	16	88
<i>VIII.—Operations on the Mánjri Agricultural Station—</i>		
History and Aim of the Station	1	89
Area and Character of the Soil ; new Buildings ; Lines of Work. Meteorology	2—4	89—90
Area planted to different Crops	5	90
Area planted to different Crops	6	91
Experiments in Care and Cultivation of Crops : Manure Experiments ; Irrigation Experiments ; new Methods of Cultivation ; Systems of Planting ; Rotation Experiments ; Light-soil study ; Linseed for Fibre ; Sugar borer Experiments	7—19	91—97
New Crops ; comparative Variety Tests ; Fodder Crops ...	20—32	97—100
Selection and Distribution of Seed	33	100
Visitors	34	100
Accounts	35	100
<i>IX.—Operations on the Lanowli Agricultural Station—</i>		
Introduction	1	101
Rainfall	2	101
Lanowli Experiments : Season ; Rab Experiments ; Result of Seed-beds and Field crops ; variety tests at Lanowli ...	3—19	101—109
Trial of Nitre in cultivators' fields	20—28	110—111
Accounts	29	111
III.—REPORTS BY THE ECONOMIC BOTANIST.		
Forwarding Letter... ..	1	113
<i>X.—Operations on the Ganeskhind Gardens Botanical Station—</i>		
History	1	115—116
Season	2	116

CONTENTS.

iii

	Paras.	Pages
III.—REPORTS BY THE ECONOMIC BOTANIST— <i>continued.</i>		
X.— <i>Operations on the Ganeskhind Gardens Botanical Station—</i> <i>continued.</i>		
Distribution of Soils	3—4	116
Indigenous Trees and Shrubs	5	116
Experiments with Rubber; Fibre Experiments; Flower selection trials; Experiments with Crops; Grass Experiments ...	6—21	116—119
Herbarium and general collection	22	119
Visitors	23	119
Accounts	24	120
XI.— <i>Operations on the Bassein Botanical Station—</i>		
Opening of the Station; condition of the Ground; nature of Soil	1—6	121
Planting of Rubber, Cassava, Millets, Plantains, Betel pepper, Lemon grass, Pine apples, etc.	7—19	121—122

List showing the Botanical and English equivalents of the vernacular names of Crops referred to in the Agricultural Station Reports by the Deputy Director of Agriculture.

Botanical.	English.	Vernacular.
<i>Cereals.</i>		
Andropogon sorghum var. vulgare ...	Great millet ...	Jowári, Jowár (Chapti, etc.).
Do. var. cernuum ...	Do. ...	Sundhia.
Pennisetum typhoideum ...	Bulrush millet ...	Bájri, Bájro.
Triticum sativum ...	Wheat ...	Ghau.
Do. var. spelta ...	Spelt wheat ...	Ghau.
Zea mays ...	Maize ...	Makái.
Oryza sativa ...	Rice ...	Dángar.
Paspalum scrobiculatum ...	Kodra millet ...	Kodra.
Eleusine coracana ...	Muma do. ...	Bávto.
<i>Pulses.</i>		
Cajanus indicus ...	Pigeon pea ...	Tuer, Tur.
Cicer arietinum ...	Gram ...	Chana.
Ervum lens ...	Lentils ...	Masur.
Vigna catiáng ...	Chinese bean ...	Chola.
Dolichos lablab ...	Indian bean ...	Vál.
Cyamopsis psoralioides ...	Field vetch ...	Guvár.
Phaseolus aconitifolius ...	Kidney bean ...	Math.
Phaseolus mungo ...	Green gram ...	Mug.
<i>Oil-seeds.</i>		
Sesamum indicum ...	Sesame ...	Tal, Til.
Arachis hypogea ...	Groundnut ...	Bhui-mung.
Ricinus communis ...	Castor ...	Diveli.
<i>Fibre Plants.</i>		
Gossypium barbadense ...	Egyptian and Sea Island cotton.	
Do. hirsutum ...	American cotton ...	Viláyati hattí.
Do. herbaceum ...	Broach, Goghári, Lálio, Kumpta cotton.	Deshi Kapás, Jowári hattí.
Do. neglectum ...	Khándesh, Nágpur and Sind cotton.	Jari and Varádi Kapás.
Do. indicum ...	Hinganghát cotton ...	Bani Kapás.
Hibiscus cannabinus ...	Brown hemp ...	Sheria.
Crotolaria juncia ...	Bombay hemp ...	San.
<i>Condiments.</i>		
Pimpinella anisum ...	Anise ...	Variáli.
Cuminum cyminum ...	Cumine ...	Jiru.
Capsicum frutescens ...	Chillies ...	Marcha.
Allium cepa ...	Onion ...	Kánda.
<i>Sugár.</i>		
Saccharum officinarum ...	Sugarcane ...	Sherdi.
<i>Narcotics.</i>		
Nicotiana tabacum ...	Tobacco ...	Tambákhú.
<i>Vegetables.</i>		
Solanum Melongena ...	Brinjal ...	Vengan.
<i>Cucurbit.</i>		
Momordica charantia ...	Bitter gourd ...	Kárela.

NOTE.—One guntha is $\frac{1}{16}$ th of an acre.

From

F. FLETCHER, ESQUIRE, M.A., B.Sc.,
Deputy Director of Agriculture, Bombay;

To

THE DIRECTOR OF AGRICULTURE,
Poona.

Poona, 13th July 1906.

Sir,

I have the honour to submit herewith the Annual Reports for the year 1905-06 on the experimental work of the Agricultural Stations in my charge.

2. The agricultural stations in charge of the Deputy Director of Agriculture during the year under report were—

Serial No.	Name of Station.	Name of nearest town.	District in which situated.	Area of Station.	Kind of Soil.	Average rainfall.	Rainfall, 1905-06.
1	2	3	4	5	6	7	8
1	Surat ...	Surat ...	Surat ...	84 acres and 150 " pasture.	Káli, Black cotton soil (cla.).	Inches, 42·00	Inches, 19·82
2	Nadiád ...	Nadiád ...	Kaira ...	44½ "	Gorádu (sandy)...	35·00	31·09
3	Dhárwár ...	Dhárwár ...	Dhárwár ...	74 "	(a) black clay, (b) red sandy.	32·73	12·57
4	Dhulia ...	Dhulia ...	Khándesh ...	23½ "	Medium black ...	22·10	17·92
5	Mirpurkhás ...	Mirpurkhás ...	Thar and Párkar.	55 "	Loam ...	5·91	3·39

3. *Season.*—The monsoon on all the Stations in the Presidency was very bad and at Dhárwár completely failed. Details are given under each of the Stations separately.

4. *Scope of work on the Agricultural Stations.*—The work on all the Stations was a continuation of the previous experiments, which consists chiefly in testing and comparing manures (both natural and artificial), rotations of crops and methods of cultivation, in the improvement of seed by selection and hybridisation and the demonstration to cultivators of the results of such experiments.

5. *Extra-Station work.*—All Superintendents have distributed to cultivators seed and implements after these have received a thorough trial on the Stations and have also in some cases conducted manurial experiments on cultivators' fields either as a demonstration of the results of experiment or in case when the crop to be manured was not grown on the Station, as an experiment. Details are given under the several Stations.

6. The principal lines of work that have been followed by the Deputy Director of Agriculture, apart from the planning and inspection of experiments on the Stations above mentioned and of the extra-station work of the Superintendents, have included the following:—

(1) Organisation of the operations in connection with the growth of Egyptian cotton in Sind, supervision of the sowing of the crop and frequent inspection of the growing crop, covering about 1,500 acres in scattered plots. Details are given under the Mirpurkhás Station.

(2) Investigation of salt lands in Sind and also on the sea-board of Gujarát. The investigation has perforce been only superficial owing to the fact that the large number of chemical analyses of samples could not be obtained. Dr. Leather has kindly analysed a few samples and for this the thanks of the Department are due. A small experiment in reclamation

has been kindly initiated by the Administrator of Sachin State near Dumas (Gujarát) which will serve to indicate the practicability or otherwise of the reclamation on a large scale of the coastal salt lands of Gujarát.

In Sind the question of reclamation is quite different: a suitable site has been selected, but its initiation must await the provision of the necessary European supervision.

(3) An investigation into the decline of, and an attempt to resuscitate the cultivation of, groundnut in this Presidency.

(4) A further survey of the question of improvement of cotton as grown in this Presidency. On this a separate report has been submitted (*vide* Bulletin No. 29 of 1906 of the Bombay Department of Agriculture).

(5) A survey of the date-growing tract in Sind and of previous experiments to extend it.

(6) An investigation of the possibilities of agriculture in Sind, and in conjunction with the Irrigation Department, the possibilities of a proposed large canal from Rohri to Hyderabad.

(7) Distribution of 65,000 lbs. of cotton seed in the Southern Marátha Country.

(8) Supervision of an experiment in the cultivation of a tree cotton in the Belgaum district.

I have the honour to be,

Sir,

Your most obedient servant,

F. FLETCHER,

Deputy Director of Agriculture.

I.—OPERATIONS ON THE SURAT AGRICULTURAL STATION.

The following statement shows the rainfall of the year as compared with the average :—

Month.	1905-06.		Average.
	Number of rainy days.	Rainfall.	
		In. cts.	In. cts.
April ... { 1st Fortnight ...	.....	.....	.....
... { 2nd " ... ...	.....	.....	.....
May ... { 1st " ... ...	.....	.....	0 2
... { 2nd " ... ...	.....	.....	.....
June ... { 1st " ... ...	.....	.....	9 4
... { 2nd " 	3	1 0	.....
July ... { 1st " 	12	8 88	13 8
... { 2nd " 	9	7 61	.....
August ... { 1st " 	9	0 67	9 8
... { 2nd " 	5	0 33	.....
September ... { 1st " 	5	0 71	7 3
... { 2nd " 	1	0 39	.....
October ... { 1st " ... ...	.....	.....	1 4
... { 2nd " ... ...	.....	.....	.....
November ... { 1st " ... ...	.....	.....	0 1
... { 2nd " ... ...	.....	.....	.....
December ... { 1st " ... ...	.....	.....	0 1
... { 2nd " ... ...	.....	.....	.....
January ... { 1st " ... ...	.....	.....	.....
... { 2nd " ... ...	.....	.....	.....
February ... { 1st " 	1	0 4	.....
... { 2nd " 	1	0 19	.....
March ... { 1st " ... ...	.....	.....	.....
... { 2nd " ... ...	.....	.....	.....
Total ...	46	19 82	39 31

Season.

2. The season after giving hopes of a good monsoon in the beginning turned out even worse than last year. The total rainfall was about 6 inches and 42 cents more than that of the last year, but was less than half of the average of 40 inches and not well distributed.

In the last week of June there was an inch of rain and the season opened fairly well. In the first week of July about 8 inches of rain fell and sowing operations were started on the 9th of July and ended on the 17th. The rainfall in the second fortnight of July was equal to that of the first fortnight, but the heavy rain of the 23rd July, which amounted to 5 inches and 48 cents, caused a good deal of damage to the germinating crops, specially the last sown ones, either by burying them or washing them away. Many blanks were thus caused which had to be filled up by re-sowing or dibbling the seeds. But thereafter the showers were few and far between and so light (never equalling half an inch at a time) that the ground never became really moist. By the 18th of September the total rainfall was 19 inches 59 cents, of which 17 inches 29 cents fell before 23rd July and the remaining 2 inches 30 cents was made up by very light showers from 24th July to 18th September, never long enough to benefit any of the crops. From the middle of September until the middle of February, after which there were no crops for the slight shower that then fell to benefit, not a drop of rain was received. The air was dry and the dew-fall was less than usual. Little irrigation is at any time possible on the Station, and this was all given to keep alive the hybrid cotton plants, groundnuts and lucerne plots.

Of the kharif crops only Tur and cotton came to maturity. Jowár grew to a great height and a good fall of rain in the 2nd half of September or the 1st half of October would have produced a bumper yield, but this was not the

case and in many cases it failed to give any appreciable outturn. Tur gave a small yield in some fields, but a great many of the plants withered.

Manurial Experiments.

3. The object of laying out and conducting these experiments is to see whether costly artificial manures such as nitre, etc., could be profitably applied to such dry-crops as cotton, Jowár, Tur, etc. The crops being almost complete failures, no practical conclusions can be drawn on this point.

The results were as follows :—

Manure applied.	Yield in lbs. of Seed Cotton and Kadbi per acre.					
	Cotton.			Jowár.		
	Broach Deshi.	Goghári.	Goghári.	Chapti.	Perio.	Sholápurí.
Sodium Nitrate 100 lbs. ...	} 216½	168½	276	6,462	4,908	4,104
+ Dissolved bones 400 lbs. ...						
Crude Nitre 160 lbs. ...	196½	171½	250½	5,400	5,280	4,242
No manure ...	179½	230½	25½	6,264	3,468	2,84½
Sodium Nitrate 100 lbs. ...	159	276½	331	5,532	4,680	3,336
Castor Cake 600 lbs. ...	247½	262½	294	5,556	4,872	4,038
Farm-yard Manure 5 tons ...	291	289½	300	5,934	5,058	4,122

NOTE.—Each of the 36 plots was ½ acre in area.

No grain was produced by the Jowár, except a negligible quantity in the case of the Chapti and Perio varieties, in any of the manured plots, but the Sholápurí variety yielded a four to five-anna crop, being an early ripening variety. Generally the no-manure plots with all crops have given a little higher yield. (See paragraph 27 of last year's report.) The Tur crop failed totally in all the Jowár plots.

Though the results are inconclusive on account of the unfavourable season, the difference in action of the artificial manures on the crops treated was interesting so long there was sufficient moisture in the soil. The experiments will be continued till definite results are arrived at.

4. A similar set of manurial experiments were also made on Jowár, cotton, Tur and Til and Tur together to test the effect of gypsum with farm-yard manure and no-manure plots, and specially to see the effect of gypsum on the heavy black soil of the Station. The results were as tabulated below :—

Manure applied.	Yield in lbs. per acre of Seed Cotton, Grain and Kadbi.				
	Cotton.	Jowár.		Tur.	
	Broach Deshi.	Grain.	Kadbi.	Grain.	Chaff.
Gypsum 2,000 lbs. ...	167½	923½	7,963½	443½	580½
No manure ...	142½	866½	7,549½	35½	63½
Farm-yard Manure 5 tons ...	177½	588½	5,991	265½	579

NOTE.—Each plot of cotton was 17 gunthas and of Jowár and of Tur 26½ gunthas.

In the case of cotton the farm-yard manure plot yielded a little more than either the gypsum or no-manure plot.

In case of Jowár and Tur the gypsum plots have yielded best, while the farm-yard manure plots the least. The differences in yield may possibly be accounted for by the fact that the soil of these plots towards the south is a little inferior to that towards the north and also by the cropping previous to the experiment under report.

In the case of Til and Tur the result is, as is generally the case in years of scanty rainfall, that the no-manure plot has yielded more than either of the remaining two as shown in the following table :—

Number of plot.	Area.	Crop.	Treatment.	Yield in lbs. per acre of Til and Tur.	
				Grain.	Chaff.
28a	A. g. 0 26 $\frac{3}{4}$	{ Til Tur ... }	Gypsum 2,000 lbs. per acre ...	{ 174 18	{ ... 27
28b	0 26 $\frac{3}{4}$	{ Til Tur ... }	No manure 	{ 192·9 9 $\frac{3}{4}$	{ ... 31 $\frac{1}{2}$
28c	0 26 $\frac{3}{4}$	{ Til Tur ... }	Farm-yard manure 5 tons per acre.	{ 107·7 18	{ ... 24

It is interesting to note that many of the early sown kharif crops failed to yield any appreciable quantity ; the crop of Til and Tur sown at the end of the monsoon gave an eight-anna crop. This is mainly due to good cultivation from the beginning of the rains, thereby enabling the soil to absorb and retain as much moisture as it possibly could.

5. A plot of Goghári cotton of 30 gunthas manured at the rate of 400 lbs. per acre with dissolved bones yielded only 148 lbs. of seed cotton which is much less in comparison with other plots under Goghári cotton manured with other artificial manures.

Night-soil experiments of the previous year.

6. The plots receiving night-soil last year were re-arranged. On the plots which received night-soil last year the yields were taken separately to see how long the night-soil treated areas give an increased yield which might possibly compensate for the heavy cost of application of the manure in the first year. On account of the scanty rain, however, the results, as is generally the case, of no-manure plots and farm-yard manured plots turned out to be much better both in quantity and quality than those of the night-soil plots, which yielded only a negligible quantity. From the vigorous growth of the cotton plants on the night-soil area and the height attained by them, it was expected at first that the yield would be nearly twice as great as those of no-manure or farm-yard manured plots. The experiment will be continued till the night-soil plots begin to give the same yield as the plots of no-manure and farm-yard manure.

The results were as tabulated below :—

Manure applied.	Yield in lbs. per acre of Seed Cotton and Stalks.			
	Broach selected seed.	Goghári selected seed.	Broach Bazár seed.	Goghári Bazár seed.
	Plot 32.	Plot 33.	Plot 34.	Plot 34A.
Night-soil applied in beds in 1904, but none in 1905.	{ 28 1,960	{ 37 $\frac{3}{4}$ 1,920	As the area under this cotton was very small and irregular, yield per acre is not stated.	{ 59 $\frac{1}{2}$ 1,640
No manure in 1904, but 20 loads of farm-yard manure applied in 1905 to make it even with other plots.	{ 162 $\frac{1}{2}$ 540	{ 149 512		{ 108 576
Farm-yard manure applied in 1904, but none in 1905	{ 163 872	{ 166 720		{ 185 536
Night-soil applied in trenches made by Turn-wrest plough in 1904, but none in 1905.	{ 83 2,652	{ 67 $\frac{1}{2}$ 3,620		{ 103 2,288

7. Further manurial experiments on a mixed crop of Jowár and Tur with superphosphate gave the following results :—

Number of plot.	Area.	Crop.	Per acre.			Remarks.
			Manure.	Yield of		
				Grain.	Kadbi.	
30	1 0	Jowár ... Tur ...	400 lbs. super-phosphate.	{ 22½ 6	4,88½ ...	It is impossible owing to abnormal season to say whether the application of super-phosphate to Jowár will pay.
31	1 0	Jowár ... Tur ...	No manure ...	{ 301½ 8	4,372 ...	

The no-manure plot here again has given better results than the manurial plot.

The above two plots failed to give as much yield as plot 27 owing to sat year's cropping, as Jowár after cotton in years of scanty rainfall fails to give as good results as Jowár after other crops.

8. Another manurial experiment with superphosphate on a crop of Jowár alone *versus* no manure gave the following result :—

Number of Plot.	Area.	Manure.	Yield per acre.	
			Jowár grain	Kadbi.
38A	A. g. 0 20	Superphosphate ...	Lbs. 27	Lbs. 3,842
37	0 11	No manure ...	252½	3,585

9. A similar plot of Broach Deshi cotton of 20 gunthas manured with superphosphate at the rate of 400 lbs. per acre yielded 142½ lbs. of seed cotton, a yield similar to the plot of Ghoghári cotton (paragraph 11) manured similarly.

Effect of green manure.

10. On account of want of sufficient rains, the crops intended for green manures totally failed and could not be ploughed in. Green manuring is only practised on light *gorádu* soils in good condition where the crops grow very quickly and can be ploughed in early. But on the black cotton soils the crops take a very long time to attain sufficient height for ploughing in, so that they do not rot properly in the soil and the afterwards winter crops cannot be sown. Consequently the experiments are abandoned in next season's cropping scheme.

Rotation and Manurial Experiments.

11. In the year under report the cropping of the permanent plots was abandoned and Series I was sown throughout with Jowár and Series II with cotton except the first four plots half of each of which was treated differently. The yield of these plots is therefore calculated on half their areas.

The previous treatment of each plot is given in last year's report. No manure was applied to the plots in the year under report. Owing to the poor monsoon it was impossible to get an even stand of plants.

Series I (Jowár).

Serial letter of rotation.	Number of Plot.	Last year's Crop.	Yield in lbs. per acre.		Previous manurial treatment.
			Grain.	Kadbi and chaff.	
A {	1	Jowár	353½	4,951½	Five tons of farm yard manure to each plot every 2 years.
	2	Cotton	297	6,677	
B {	3	Jowár and Tur	145	4,987½	
	4	Cotton	171	7,796½	
C {	5	Jowár	207½	4,851½	
	6	Tur	108	6,543	
	7	Cotton	38	7,586½	
D {	8	Jowár	275	5,311	
	9	Fallow	1,360½	8,976½	
	10	Cotton	264	8,567	
E {	11	Jowár	Fallow.		Five tons of farm yard manure to each plot every 3 years.
	12	Fallow	1,770½	9,866	
	13	Cotton	175	8,537½	
F {	14	Jowár	Fallow.		
	15	Fallow	1,458	9,698	
	16	Cotton	31	8,288	
G {	17	Jowár	173	4,391½	
	18	Fallow	966	6,810½	
	19	Cotton	100	4,503	
H {	20	Jowár	312	2,599	Five hundred lbs. of castor cake to each plot every 2 years.
	21	Cotton	280	3,814½	
I {	22	Jowár	162	4,481½	Five tons of poudrette to each plot every 2 years.
	23	Cotton	300	6,460	
J {	24	Jowár	458½	1,620	No manure.
	25	Cotton	538	3,062	

Series II (Cotton).

Serial letter of rotation.	Number of Plot.	Last year's Crop.	Yield per acre in lbs.		Previous manurial treatment.
			Seed-cotton.	Stalks.	
A {	26	Jowár	221	768	Treatment same as in the rotations in Series I.
	27	Cotton	176½	826½	
B {	28	Jowár and Tur	97½	778½	
	29	Cotton	196	1,093½	
C {	30	Jowár	148	820	
	31	Tur	164	1,000	
	32	Cotton	90	1,400	
D {	33	Jowár	316	768	
	34	Fallow	264	1,620	
	35	Cotton	209	1,620	
E {	36	Jowár	Fallow.		
	37	Fallow	373½	2,060	
	38	Cotton	203	1,628	
F {	39	Jowár	Fallow.		
	40	Fallow	300½	1,852	
	41	Cotton	125½	1,304	

Serial letter of rotation.	Number of Plot.	Last year's Crop.				Yield per acre in lbs.		Previous manurial treatment.
						Seed-cotton.	Stalks.	
G {	42	Jowár	167½	832	} Treatment same as in the rotations in Series I.	
	43	Fallow	...	...	285	1,420
	44	Cotton	...	...	193½	980
H {	45	Jowár	...	...	196½	664
	46	Cotton	...	...	199½	860
I {	47	Jowár	...	...	184½	936
	48	Cotton	...	...	198	1,148
J {	49	Jowár	...	...	183½	652
	50	Cotton	...	...	203	868

The monsoon not being normal little of practical importance can be deduced from these results which in a normal year would doubtless in many cases be reversed.

It is noteworthy, however, that—

(1) The unmanured plots have yielded best (excepting always the plots that were last year fallow).

(2) Both cotton and Jowár have on the average yielded worse after Jowár than after cotton.

Cultural Experiments.

12. A set of plots were assigned to cotton and Jowár to test the effects of deep and shallow cultivation. In the case of Broach Deshi cotton the results were as under :—

Cultivation.				Yield of seed cotton per acre.	Remarks.
Deep cultivation	...	...	...	Lbs. 104	The results are much below the average on account of want of rain.
Shallow cultivation	...	...	...	100	

But in the case of Jowár, the results were negligible, only 17 lbs. of grain per acre under deep cultivation and *nil* under shallow cultivation. But there was a good deal of difference in the yield of Kadbi. The former gave 6,868 lbs. per acre while the latter gave 4,424 lbs.

Varietal Experiments.

13. Groundnut under irrigation gave the following results :—

Serial No.	Name of Variety.	Area sown in gunthas.	Yield in lbs. per plot.	Value of outturn.	Yield in lbs. per acre.	Value of outturn per acre.	Percentage of seed to husk.	Cost of Harvesting per acre.	Remarks.
1	Pondicherry groundnut	2½	210	Rs. a. p. 13 2 0	3,300	Rs. a. p. 210 0 0	76.4	Rs. a. p. 68 12 0	The object of these experiments is to fully ascertain the relative value of the foreign varieties against the local and also to see whether some of them yield better and with stand Tica disease.
2	Spanish Peanut	7.2	440	27 8 0	2,442	152 12 6	77.8	40 5 10	
3	Japanese small	7.8	440	27 8 0	2,250	141 0 0	76.4	26 13 6	
4	Virginia	7.8	746	46 10 0	3,925.6	239 1 3	78.12	89 5 6	
5	Japanese big	8	770	43 2 0	3,850	240 10 0	75.0	83 12 10	
6	Local or Deshi	7.6	534	38 6 0	2,510	175 10 0	75.0	100 12 3	

Note.—The yield per acre of the cropers of these varieties was 6,000, 3,200, 4,251, 3,561, 1,210 and 2,661 lbs., respectively.

A comparison with the results in the previous year's reports shows that the heaviest yielding varieties are in order of merit Virginia, Japanese big and Pondicherry.

In the year under report all the varieties have done very well but the three above-named have done exceptionally well. It is to be noted that the cost of uplifting the erect varieties, Spanish peanut and Japanese small, is less than half and one-third, respectively, than that of the other foreign varieties and about two-fifths and one-fourth, respectively, of the local variety.

The uplifting charges of the other three foreign varieties too are about 20 per cent. less than those of the local variety, a fact which makes the cultivation of the foreign varieties more profitable than that of the local variety.

The ease with which the varieties are uplifted has, however, the disadvantage of encouraging damage by birds, jackals, etc.

It will be also seen from the statement that the percentage of husk to seed in many of the foreign varieties is less than that in the local variety, a decided gain from the commercial point of view even though the local variety is valued by about 8 annas more per cwt. by Messrs. Ralli Brothers, Bombay.

The percentage of oil as kindly ascertained by Dr. Leather was as follows :—

Name of the variety.				Percentage of oil.
Virginia	...	...	...	47.21
Pondicherry	...	...	...	48.31
Japanese big	...	...	...	47.68
Japanese small	...	...	...	50.40
Spanish Peanut	...	...	...	51.43
Local	...	...	...	47.43

Experiments on new crops.

14. Saidi beans received from Egypt were tried but the yield was negligible. They will be tried another year.

Experiments on crop-breeding.

15. On the results of cotton-breeding experiments, a special report has been submitted. The valuation of samples has been shown in Appendix A.

Other breeding experiments on rice and wheat were more or less failures from want of rain though they were artificially irrigated.

Pests.

16. Practically speaking, there were no insect pests on the farm in the year under report except a casual attack on some of the Jowár plots by beetles in the absence of rain soon after germination or when the plants were too tender, and the common boll-worm disease in cotton.

Irrigation Experiments.

17. These experiments were started with Broach Deshi cotton and Lucerne in order to see whether the former gives a better yield both in quantity and quality by giving two waterings after the monsoon is over than its comparative plot similarly treated but not irrigated after the rains; in the latter case (*i. e.*, in the case of Lucerne) to ascertain the interval between each watering that may give the highest yield. For this purpose adjoining plots similarly treated were given irrigation water once every 15 days, once every 20 days and lastly every 30 days. The results are tabulated below :—

Deshi cotton.

Number of Plot.	Area.	Date of Sowing.	Dates of watering.		Yield per acre of seed-cotton in lbs.	Valuation of cotton in Rs. per candy.
			1st.	2nd.		
20b ¹	A. g. 0 10	14th July 1905 ...	25th October 1905.	13th November 1905.	420	258
20b ²	0 10	Do. ...		None.	128	230

Lucerne.

Plot Number.	Area.	Crop.	Date of Sowing.	Interval of watering.	Yield per Acre.	Value.	Remarks.
14a	A. G. 0 6.4	Lucerne...	18th October 1905.	15 days ...	Lbs. 9,400	Rs. a. p. 117 8 0	Seed inoculated and sown on ridges.
14b	0 6.4	Do. ...	Do. ...	Do. ...	10,606	132 9 2	Seed untreated and sown on ridges.
14d	0 9.5	Do. ...	Do. ...	Do. ...	10,517	131 7 6	Seed inoculated and sown on ridges. This is in comparison with 14e below which received irrigation water to which H ₂ SO ₄ had been added, when under the previous cotton crop.
14e	0 7.7	Do. ...	Do. ...	Do. ...	10,322	129 0 5	Seed untreated sown on ridges; in comparison with 14d above.
14f	0 11.0	Do. ...	16th October 1905.	Do. ..	6,851	85 10 2	Seed untreated sown in beds.
14c (1)	0 7.2	Do. ...	Established in October 1904.	Do. ...	15,422	192 12 5	Plot 14c of last year was subdivided into two plots for seeing the effect of watering at the intervals of 15 days and 20 days each which represent 14c (1) and 14c (2) in the statement; but after August the irrigation interval of 20 days plot, i. e., plot No. 2 was changed to 30 days and 15 days plot remained the same; but for comparison its yield too was separately noted from that date with the 30 days plot as is shown by the last two lines in the table.
14c (2)	0 7.2	Do. ...	Do. ...	20 days ...	12,261	153 4 2	
14c (1)	0 7.2	Do. ...	Do. ...	15 days ...	20,266	253 5 3	
14c (2)	0 7.2	Do. ...	Do. ...	30 days ...	11,944	149 4 10	

NOTE.—Plot 14c (1) has given the highest yield as compared with all other plots watered every 20 or 30 days. The difference is due only to irrigation water given every 15 days as against Plot No. 14c (2) watered every 30 days.

Plot 14c (2) and 14 (1) show the same difference on account of irrigation water.

Plots 14c (1) and 14c (2) were established in the year 1904 and have given better results than the remaining Plots 14a, 14b, 14d, 14e and 14f, established in the year under report.

Plot 14f growing lucerne in beds has given the poorest results as compared with all the others as plants began to die away gradually after the second cutting was taken. Now there are very few plants left in some of the beds.

The results given above in the case of Broach Deshi cotton are not conclusive owing to the abnormal season and will have to be repeated. In the case of Lucerne the results seem to show that 1st, the 15 days plot gave a much higher yield than either the 20 days plot or the 30 days plot; 2nd, that the Lucerne grown on ridges gave much better outturn than that grown in beds; 3rd that the inoculated seed has not as yet given better results than the uninoculated seed.

Measurements of Irrigation water applied to different crops.

18. These experiments were started to ascertain the actual amount of water required to irrigate an acre after the rainy season is over and the amount of water required per acre by the subsequent waterings. This was done by actually counting the Koses (leather water buckets) raised per day and then calculating out the quantity of water raised from the actual capacity of the Kos used. In order to verify the figures another system of measuring the flowing water in a water-course was adopted of putting a right angled notch in the water-course and then taking the vertical height at which the water flows over the notch. This was done for many of the irrigated crops grown on the Station to see whether they required water in different quantities either from their mode of growth or the way in which they are cultivated and treated. The results are briefly summarised below :—

(1) That crops, such as groundnut, lucerne, grown on thin black soil in beds or on ridges require irrigation water equal to 5" of rainfall for the first watering a month or a month and-a-half after the rains stop, and each subsequent watering is equal to between 2 to 3½ inches of rainfall. In the case of lucerne every watering after a month requires irrigation water equal to about 3" of rainfall and in the case of 15 days plot about 2½" rainfall.

In the case of drilled cotton 2 to 3 months after the rains cease when the soil has not cracked as badly as it does later, the first watering requires water equal to about 7" to 8" of rainfall and the subsequent waterings after 20 days require water equal to about 3½" to 4" of rainfall.

And lastly a fallow area which has fully dried up after the rains, if required to be flooded as in canal irrigation, requires irrigation water equal to 14" of rainfall. It appears that at the break of the monsoon it takes about ½ of an inch of rainfall to saturate each inch of the soil at least for the first foot.

Experiments with new implements.

19. No new implements were tried on the farm during the year under report.

Artificial Manurial Experiments made off the Station on cultivators' fields.

20. Experiments on the effect of nitrate of soda, crude nitre and ammonia sulphate on rice were performed on cultivators' fields at the village "At", taluka Jalálpur. The crop failed at several places in the district but fortunately the experimental plots under report were commanded by a big tank from which they were irrigated when the monsoon failed. The results are tabulated below:—

Survey Number.	Area gunthas.	Manure applied.		Manure per acre.	Outturn, actual.		Outturn per acre.	
		Name of Manure.	Actual quantity applied.		Grain.	Straw.	Grain.	Straw.
9	9	Sodium Nitrate ..	Lbs. 50	Lbs. 222	Lbs. 855	Lbs. 979	Lbs. 3,800	Lbs. 4,352
"	10	Nil	Nil.	Nil.	660	724	2,640	2,896
"	16	Nitre	100	250	1,200	1,368	3,000	3,420

The sodium nitrate valued at Rs. 20-13-0 produced an increase of outturn per acre valued at Rs. 38; in the case of nitre these figures are Rs. 30-15-0 and Rs. 12, respectively.

It should be noted that the nitre plot was not properly weeded and the yield is on this account diminished.

21. Similar experiments with the same manures were made on sugarcane at the same village At. The results are tabulated below:—

Plot No.	Area gunthas.	Manure.			Yield.				Value of outturn per acre.	Value of manure applied per acre.	Remarks.
		Kind.	Per plot.	Per acre.	Per plot.		Per acre.				
					Gul.	Leaf bundles.	Gul.	Leaf bundles.			
1	0 10	Nil	Lbs. ...	Lbs. ...	Lbs. 716	1,320	Lbs. 2,964	6,250	Rs. a. p. 218 8 0	Rs. a. p.	The experiment was tried at the village of "At" in S. No. 430 measuring 7 acres 16 gunthas and assessed at Rs. 75-10-0, owned by Práji Mithábhái Patil. Wánsi cane was grown in a separate plot measuring one acre of which the area under actual cultivation leaving out the head lands was 39.3 gunthas as shown in the statement. The crop was very good when it was manured and remained so till the end of August but afterwards it did not make any progress. The cause is attributed to deficient rainfall or to the salt-dust being blown towards it from Shriford village. The results are not conclusive as the yield of Gul per acre is much below the normal.
2	0 9.6	Ammonium Sulphate.	75	312	748	1,500	3,117	6,135	240 12 0	35 1 7	
3	0 8.8	Sodium Nitrate.	100	470	742	1,350	3,432	6,410	266 5 3	32 14 5	
4	0 11.2	Nitre	100	3.9	8.3	1,300	3,153	4,550	231 3 0	41 0 0	

The price of Gul is Rs. 2-8-0 per maund of 40 lbs. Leaf bundles Rs. 0-12-0 per 100 bundles.

Dairy Herd.

22. The following statement shows the strength of the dairy herd on the Surat Station :—

Description.	Strength on 31st March 1905.	Increase.			Decrease.				Strength on 31st March 1906.	Valuation.		Increase or Decrease.
		Purchased or transferred.	Born.	Total.	Sold.	Died.	Transferred.	Total.		1905.	1906.	
Stud-bulls ...	4	2	...	2	1	...	2	3	3	Rs. 190	Rs. 215	Rs. +25
Cows ...	17	3	...	3	...	1	7	8	12	665	565	-100
Heifers ...	9	6	...	6	4	...	3	7	8	165	141	-44
Cow-calves ...	12	...	6	6	6	...	6	12	6	108	42	-66
Bull-calves ...	18	...	1	1	13	...	4	17	2	510	65	-445
Total ...	60	11	7	18	24	1	22	47	81	1,658	1,023	-630
He-buffaloes ...	1	...	...	...	...	...	...	...	1	40	55	+15
She-buffaloes ...	18	...	...	...	7	...	...	7	11	800	575	-225
Heifers ...	7	...	...	...	6	...	...	6	1	85	35	-50
She-buffalo calves ...	8	...	4	4	4	...	...	4	8	64	88	+24
Bull-buffalo calves	14	...	7	7	12	...	...	12	9	70	51	-19
Total ...	48	...	11	11	29	...	...	29	30	1,059	804	-255
Grand Total ...	108	11	18	29	53	1	22	76	61	2,717	1,832	-885

23. The following statements show the monthly milk yield of each cow and buffalo, average monthly milk yield and dates of calving of each animal during the year 1905-06 :—

Cows.

		Names of Milch-cows on the Surat Station during the year 1905-1906.						
		Mathura.	Gavlan.	Bhima.	Hirkani.	Godavari.	Narbada.	Káshi.
		1	2	3	4	5	6	7
		Milk yield per month.						
		Lbs. ozs.	Lbs. ozs.	Lbs. ozs.	Lbs. ozs.	Lbs. ozs.	Lbs. ozs.	Lbs. ozs.
1	April 1905	71 0	138 8	119 0	227 0	241 8	219 12	240 0
2	May "	27 0	139 0	105 4	245 12	217 4	255 12	234 8
3	June "	...	30 8	...	198 0	221 12	229 12	206 12
4	July "	...	...	...	80 12	163 12	232 0	240 8
5	August "	...	...	...	...	...	105 4	103 0
6	September "	...	...	...	...	...	...	...
7	October "	...	...	...	...	...	...	...
8	November "	...	...	...	...	...	...	...
9	December "	...	...	...	...	...	...	...
10	January 1906	...	5 0	...	156 8	...	...	...
11	February "	...	208 0	...	324 0	...	...	...
12	March "	...	323 0	...	446 8	...	...	...
Total milk yield during the year.		98 0	839 12	224 4	1,678 8	874 4	1,072 8	1,024 12
Average milk yield per month.		49	139 15½	112 2	239 12½	218 9	214 8	204 15½
Dates of calving ...		16-3-04	2-4-04 and 30-1-06	3-4-04	23-8-04 and 15-1-06	17-11-04	17-12-04	19-12-04

		Names of Milch-cows on the Surat Station during the year 1905-1906.						
		Shiv.	Gopi.	Prayág.	Ruperi.	Tofáni.	Chandra- bhága.	Mula.
		8	9	10	11	12	13	14
		Milk yield per month.						
		Lbs. ozs.	Lbs. ozs.	Lbs. ozs.	Lbs. ozs.	Lbs. ozs.	Lbs. ozs.	Lbs. ozs.
1	April 1905	346 8	313 4	380 12	222 12	223 4	...	...
2	May "	348 12	323 4	381 4	321 0	323 4	127 8	84 4
3	June "	328 0	308 0	371 8	302 12	328 4	260 0	244 12
4	July "	337 8	351 8	403 8	363 0	382 4	345 4	330 8
5	August "	355 4	422 0	473 4	431 12	474 8	395 12	399 4
6	September "	323 4	377 8	405 12	392 4	423 4	397 0	395 0
7	October "	65 12	299 8	39 8	253 4	440 0	409 0	424 8
8	November "	...	116 0	...	...	429 0	379 4	438 4
9	December "	...	...	...	...	419 4	338 12	374 0
10	January 1906	...	...	...	...	413 8	252 0	342 12
11	February "	...	...	...	...	340 12	28 0	324 12
12	March "	189 0	...	...	41 4	366 12	...	346 8
Total milk yield during the year.		2,294 0	2,511 0	2,455 8	2,328 0	4,569 0	2,932 8	3,674 8
Average milk yield per month.		286 12	313 14	350 12½	291 0	380 12	293 4	334 11
Dates of calving		{ 27-12-04 and 10-3-06 }		2-1-05	2-2-05	{ 20-2-05 and 25-3-06 }	1-4-05	10-5-05

Buffaloes.

		Names of Milch-buffaloes on the Surat Station during the year 1905-1906.							
		Tápi.	Mani.	Gajra.	Koyna.	Mahálan.	Baina,	Bilor.	Bhingár.
		1	2	3	4	5	6	7	8
		Milk yield per month.							
		Lbs. ozs.	Lbs. ozs.	Lbs. ozs.	Lbs. ozs.	Lbs. ozs.	Lbs. ozs.	Lbs. ozs.	Lbs. ozs.
1	April 1905	76 0	132 0	215 4	98 4	238 2	182 8	166 8	315 12
2	May "	...	155 12	209 4	33 8	82 8	154 12	160 8	318 12
3	June "	...	17 0	44 4	...	...	6 8	34 0	327 0
4	July "	...	...	...	...	...	...	...	320 0
5	August "	...	...	...	68 4	33 8	...	...	338 0
6	September "	...	...	...	321 12	314 12	...	...	135 0
7	October "	...	...	...	418 4	424 0	153 8	...	...
8	November "	...	...	261 12	393 4	383 8	351 12	38 4	...
9	December "	...	...	546 12	981 12	387 12	391 14	256 4	10 12
10	January 1906	Sold.	Sold.	516 12	360 0	395 4	370 12	365 8	260 0
11	February "	...	...	403 12	262 12	343 4	305 12	324 8	356 12
12	March "	...	...	439 4	106 0	363 12	304 8	365 0	402 8
Total milk yield during the year.		76	304 12	2,637 0	2,443 12	2,966 6	2,221 4	1,705 8	2,782 8
Average milk yield per month.		76	101 9½	329 10	244 6	296 10½	246 12½	213 3	278 4
Dates of calving		4-7-04	22-7-04	{ 17-11-04 and 9-11-05 }	28-8-04 and 20-8-05	31-8-04 and 26-8-05	14-9-04 and 10-10-05	19-10-04 and 24-11-05	17-11-04 and 29-12-05

		Names of Milch-buffaloes on the Surat Station during the year 1905-1906.							
		Ichha.	Maina.	Jamna.	Bhuli.	Fachri.	Bhori.	Sarja.	Khandi
		9	10	11	12	13 *	14	15	16
		Milk yield per month.							
		Lbs. ozs.	Lbs. ozs.	Lbs. ozs.	Lbs. ozs.	Lbs. ozs.	Lbs. ozs.	Lbs. ozs.	Lbs. ozs.
1	April 1905	352 4	211 0	298 8	...	...	...	...	...
2	May "	343 0	196 4	298 8	...	...	...	...	...
3	June "	374 4	48 12	273 0	219 12	...	...	...	...
4	July "	396 4	...	360 8	349 12	68 4	62 0	...	...
5	August "	404 12	...	380 8	396 4	360 0	337 12	95 8	85 0
6	September "	351 8	...	63 0	67 4	400 4	379 0	357 12	361 8
7	October "	291 4	...	...	...	427 4	383 14	374 8	461 12
8	November "	229 8	...	...	...	273 0	400 12	330 0	463 8
9	December "	67 0	Sold.	Sold.	Sold.	248 0	374 8	329 0	456 8
10	January 1906	...	...	...	...	162 4	356 8	200 4	353 8
11	February "	...	...	...	...	152 12	253 4	...	330 4
12	March "	78 12	...	...	...	70 0	170 12	...	326 12
Total milk yield during the year.		2,888 8	456 0	1,668 12	1,033 0	2,161 12	2,718 6	1,667 0	2,808 12
Average milk yield per month.		288 13½	152 0	278 2	258 4	240 3½	302 ½	281 2½	358 9½
Dates of calving ...		{ 21-12-04 and 19-3-06 }	19-9-04	25-1-05	1-6-05	18-7-05	19-7-05	15-8-05	17-8-05

Distribution of Seeds, Implements and Manures.

24. The seeds, implements and manures distributed during the year under report are tabulated below :—

Seed distribution in 1905-06.

Variety of seed.	Bombay.	Bengal.	United Provinces.	Madras.	Sind.	Central Provinces.	Burma.	Hanoi Indo-china.	Assam.	Total of each kind.	Remarks.
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	
Jowár	83	...	2½	...	20	105½	
Groundnut	185	10	4,180	4	4,379	
Foreign cotton	14	14	
Rice	...	62	62	
Deshi cotton	9,246	132	32	1	20	...	5	9,436	The seed in Bombay was distributed in the Deccan.
Jámto seed	8½	...	...	...	...	...	...	...	...	8½
Vál	40	5	...	...	...	...	...	...	...	45
Saidi-beans	82	...	...	...	...	...	...	...	...	82
Guvár	3	...	...	...	...	...	...	...	...	3
Wheat	...	2	...	...	...	...	...	...	...	2
Barley	...	...	...	...	...	...	...	14	...	14
Gram	...	...	...	...	...	...	...	1	...	1
Fan-Hemp	...	...	...	...	...	...	...	10	...	10

Distribution of Manures during 1905-06.

Name of Manure.	Quantity in lbs.	To whom sent.
Nitre	5	Superintendent, Dhárwár Station.
Sodium Nitrate	785 (485 + 300)	Superintendents, Nadiád and Dhulia Station.
Ammonium Sulphate	300	Amalsád, district Surat.

Distribution of Implements in 1905-06.

Name of Implement.	Bombay.	Bengal.	Sind.	Central Provinces.	United Provinces.	Barna.	Total of each kind.
Hand-gins	3	6	...	13	...	1	23
Load, cart ... ..	...	1	...	...	...	...	1
Wheat threshing machine ...	...	1	...	...	...	...	1
Plough for sowing sugarcane.	...	1	...	...	...	...	1
Drill ... ..	...	12	1	...	...	...	13
Country plough	3	4	...	...	1	...	8
Karabdi ... ..	...	9	1	...	...	...	10
Karab ... ..	...	6	...	...	...	...	6

Visitors.

25. The total number of visitors to the Station was 140, of which 56 were cultivators, 55 officers and 29 following other occupations. Of the officers, the prominent persons were the Director of Agriculture, Bombay, the Collector of Surat, Deputy Director of Agriculture, United Provinces, Director of Agriculture, Baroda State, Executive Engineer, Surat, Superintending Engineer, Baroda State, and several others.

Accounts.

26. The following statement shows the Profit and Loss account of the Station during the year under report:—

Date.	Losses.	Amount.	Date.	Profits.	Amount.
31st March 1906.	To Establishment account ...	Rs. a. p. 2,190 14 7	31st March 1906.	By Farm crops account ...	Rs. a. p. 1,367 15 11
"	" Travelling Allowance account.	269 10 6	"	" Hay-making account...	972 2 7
"	" Telegrams and Service Stamps account.	88 1 0	"	" Store account ...	106 7 0
"	" Petty Supplies ...	75 0 0			
"	" Purchase of furniture ...	45 0 0			
"	" Dairy and Dairy herd ...	532 12 4			
"	" Bad debt account ...	0 7 3			
"	" Decrease in valuation of Dead Stock.	181 10 1			
"	" Upkeep of Farm Cattle .	1,107 2 2			
"	" Farm Labour ...	2,489 15 6			
"	" Farm Incidental ...	326 4 3			
"	" Seed for the Farm ..	73 14 0			
"	" Distribution of seeds, implements, manures, etc.	312 4 5			
"	" Packing ...	43 3 6			
"	" Purchase of Live Stock .	184 12 0			
"	" Petty Construction and repair.	1,451 9 7			
"	" Rent ...	1,243 4 0			
"	" Chhárodi cattle farm for 7 cows, and 2 bulls transferred.	335 0 0			
	Total ...	10,950 13 2		Total ...	2,446 9 6
				Net cost to Government.	8,504 3 8
				Total ...	10,950 13 2

APPENDIX A.

Statement showing the valuations of Samples by Messrs. Tata and Sons and Chamber of Commerce, Bombay.

Number of Sample.	Name of Hybrid Variety.	Valuations by Messrs. Tata and Sons.				Valuations by Chambers of Commerce.			Remarks by Messrs. Tata and Sons.
		Price of Broach fine on 14th March 1906.	Estimated value on 14th March 1906.	Count of yarn for which suitable.	Remarks.	Approximate market value in rupees per candy of 784 lbs. on 14th March 1906.		Valuation of sample in rupees per candy. Less 5½ per cent.	
		Rs.	Rs.			Rs.	Rs.	Rs.	
1001 1st sample ...	Goghári + Broach ...	285	260	20s	Class fine ; staple irregular ; Not improved.	Broach 270	Ghoghári 260	260	We find on examination that samples of hybrid varieties of cotton sent this season have very much deteriorated in staple as compared with those of last year. The fibres also seem to be weak and not so strong as those of last year's cotton and hence not suitable for fine counts except sample marked 1027A. Only samples of Wágad + Broach and Kánvi + Broach Nos. 1068 and 1060 first samples do not seem to have deteriorated as compared with those of previous year.
1001 2nd sample ...	Do. ...	235	230	10s-12s	Class fine ; staple short ; deteriorated.	Do. ...	Do. ...	237	
1002 1st sample ...	Broach + Goghári ...	265	260	20s	In all respects resembling 1001 (1st sample) except that it is a shady inferior in colour.	Do. ...	Do. ...	280	
1003 2nd sample ...	Do. ...	265	230	10s-12s	Same as 1001 (2nd sample) ...	Do. ...	Do. ...	250	
1014 1st sample ...	Kumpta + Broach ...	285	270	24s	Improved in strength compared with Broach but not so much in length of fibre as compared with Kumpta ; class fine.	Do. ...	Kumpta 270	255	
1014 2nd sample ...	Do. ...	285	240	20s	Same as above but short in length of fibre.	Do. ...	Do. ...	240	
1015 1st sample ..	Do. ...	265	235	16s	Same as 2nd sample of 1014 but a little weak fibre.	Do. ...	Do. ...	253 (Silkier)	
1715 2nd sample ...	Do. ...	265	240	20s	Same as 1014 (2nd sample) ; fibre strong ; feel harsh and not so soft as Broach.	Do. ...	Do. ...	230 (better staple).	
1016A	Broach + Kumpta	265	240	20s	A little dull in color ; same as above.	Do. ...	Do. ...	240	
1016B	Do.	265	235	16s	Same as 1015A (1st sample) ; staple in no way improved if anything deteriorated.	Do. ...	Do. ...	240	
1018A	Broach + Broach	265	265	20s	Same as fine Broach	Do. ...	Do. ...	250	
1018B	Do.	265	265	20s	Same as No. 1018A	Do. ...	Do. ...	275	
1019A	Ghoghári + Broach	265	225	13s-12s	Class barely fine. No way improved.	Do. ...	Ghoghári 260	230	
1019B	Do.	265	220	10s	Very much deteriorated in staple ; class fine.	Do. ...	Do. ...	218	
1024A	Ghoghári + Ghoghári	285	215	10s	Class fine ; staple very short ; same as Bengal superfine ; improved in color ; deteriorated in staple.	Ghoghári 260	Do. ...	212	
1024B	Do.	265	210	10s	Class barely fine ; same as above in other respects.	Do. ...	Do. ...	215	
1025A	Ghoghári + Broach	265	235	16s	A little bit better than 1001 (2nd sample) ; in other respects resembling it.	Broach 270	Do. ...	235	
1025B	Do.	265	225	10s-12s	Class fine ; staple short	Do. ...	Do. ...	220	
1027 1st sample ...	Ghoghári + Kumpta late.	265	235	14s-16s	Deteriorated both in class and staple ; fibres irregular.	Ghoghári 260	Kumpta 270	240	
1027 2nd sample ...	Do.	265	225	10s-12s	Mixed fibres ; class fine	Do. ...	Do. ...	230	
1027A	Do.	265	315	44s	Very much improved both in color and staple ; fine silky ; long staple ; fibre strong.	Do. ...	Do. ...	290	
1337	Ghoghári + Kumpta.	265	285	36s	Improved in color and staple ; class fine ; fibre strong.	Do. ...	Do. ...	290	
1028A	Ghoghári + Kumpta early.	265	225	10s-12s	A little inferior to 1027 (late).	Do. ...	Do. ...	230	
1028B	Do.	265	220	10s	Color dull ; staple short	Do. ...	Do. ...	220	
1049A	Ghoghári + Kumpta.	265	230	16s	Fibres weak ; not improved	Do. ...	Do. ...	220	
1049B	Do.	265	225	12s	Same as above but a little shorter in staple.	Do. ...	Do. ...	220	
1050A	Ghoghári + Kánvi	265	260	20s	Class fine ; fibres strong ; staple good.	Do. ...	Kánvi 259	235	
1050B	Do.	265	260	20s	Superior in class to the above but a little bit shorter in staple.	Do. ...	Do. ...	230	
1058A	Wágad + Broach	265	258	28s	Class superfine ; staple irregular and shorter than Broach.	Broach 270	Wágad 250	260	
1063B	Do.	265	258	16s-18s	Same as above	Do. ...	Do. ...	240	
1060	Kánvi + Broach	265	265	20s	Class fine ; soft feel ; staple good silky.	Do. ...	Kánvi 250	240	
1060B	Do.	265	258	16s	Inferior to the above both in feel and staple.	Do. ...	Do. ...	245	
G.	Dhárwár	265	350	50s	Class fine ; long staple	.....	.....	.....

II.—OPERATIONS ON THE NADIA'D AGRICULTURAL STATION.

Season.

The monsoon commenced a little earlier this season than last. The first shower of rain came on the 1st July. By the 4th of July there was sufficient moisture for sowing the seed. The season was quite favourable till the 22nd July. On the 22nd July it rained heavily 11.12 inches falling in 16 hours. The heavy rain did much damage to all the standing crops. Several rows of Bájri, Kodra, Jowár, etc., were washed away. The crop lost its vigour and became pale. Cotton, Tal and Tuer were required to be re-sown. The upper layer of the *gorádu* soil becomes very hard under heavy rains. The month of August passed practically without rain, the total rainfall during that month being only 21 cents. All standing crops began to wither. There was a break of 40 days. A good shower on the 9th September revived the prospects. The standing crop of Bájri was completely laid down by heavy showers and wind as if it had been levelled. The roots of Bájri and Jowár did not go down to their usual depth as the soil had become very hard by heavy rains and there was no rain during the interval of 40 days to soften the soil to allow the roots to go down. Hence as soon as the heavy rain came they were completely uprooted. The rain was rather late for Kodra and Tal, which were nearly withered. There was no rain at all after the 10th September. The once promising crops of Chola, Mag, Math, Tuer and Vál failed. Cotton was progressing well till December, but it began to wither afterwards. There was also heavy frost on the 13th January and some damage was done to standing crops of cotton, tobacco, chillies, sugarcane, Vál, etc. Owing to the abnormal season and to the Station being only newly established no definite conclusions can be drawn from the experiments.

2. The following statement compares the rainfall of 1905 with the average rainfall of the last 20 years :—

Month.	1905.		Rainfall	Average fall of 20 years from 1886—1905.
	Period.	Rainy days.		
			In. cts.	In. cts.
April	1st half	.....	.....	0 5
	2nd "	.....	.....
May	1st "	.....	.....	0 17
	2nd "	.....	.....
June	1st "	1	1 6	4 54
	2nd "	1	0 34	
July	1st "	7	9 18	12 65
	2nd "	5	17 39	
August	1st "	.....	0 8	9 91
	2nd "	.....	0 13	
September	1st "	1	2 81	4 22
	2nd "	.....	.....
October	1st "	.....	.....	0 64
	2nd "	.....	.....
November	1st "	.....	.....	0 44
	2nd "	.....	.....
December	1st "	.....	.....	0 4
	2nd "	.....	.....
January	1st "	.....	.....	0 3
	2nd "	.....	.....
February	1st "	.....	0 5	0 12
	2nd "	.....	0 5	
March	1st "	.....	.....	0 6
	2nd "	.....	.....
Total	.....	15	31 9	32 85

Manurial Experiments.

3. *Irrigated Tobacco.*—The object was (1) to compare the effects of the following manures :—

- (a) Farmyard manure.
- (b) Castor-cake.

- (c) Farmyard manure + Castor-cake.
- (d) Farmyard manure + Nitre.
- (e) Farmyard manure + Sodium Nitrate.
- (f) Farmyard manure + Ammonium Sulphate.
- (g) San ploughed in as green manure.

(2) To compare tobacco grown in rotation with tobacco grown continuously.

(3) To compare the effects of ordinary and deep ploughing on tobacco.

By deep ploughing is meant ploughing with the English Turn-wrest plough followed by a country wooden plough in the same furrow.

The following table shows the details of cultivation of several tobacco plots:—

Plot No.	Area.	Crop.	Tillage.	Manure.			Continuous or in rotation.	Crops grown in rotation.	Irrigated or not.
				Kind.	Quantity per acre.	Date of application of manure.			
1	2	3	4	5	6	7	8	9	10
	Gunthas								
1	10	Tobacco	Ordinary	F. Y. M.	15 tons	June	Continuous		Irrigated.
12	10	Do.	Deep	Do.	Do.	Do.	Do.		Do.
2	10	Do.	Ordinary	Castor-cake	2,000 lbs.	October	Do.		Do.
13	10	Do.	Deep	Do.	Do.	Do.	Do.		Do.
3	10	Do.	Ordinary	F. Y. M. + Castor-cake	10 tons	June	Do.		Do.
14	10	Do.	Deep	Do.	600 lbs.	October			
4	10	Do.	Ordinary	F. Y. M. + Nitre	10 tons	June	Do.		Do.
15	10	Do.	Deep	Do.	112 lbs.	October			
5	10	Do.	Ordinary	F. Y. M. + Sodium Nitrate	10 tons	June	Do.		Do.
16	10	Do.	Deep	Do.	112 lbs.	October			
23	10	Do.	Ordinary	Green manure of San.	San was sown in July and ploughed in in August.	Do.	Do.		Do.
34	10	Do.	Deep	Do.	Do.	Do.	In rotation	1st year Tobacco	Do.
24	10	Do.	Ordinary	Do.	Do.	Do.		2nd year Kodra	
25	10	Do.	Deep	Do.	Do.	Do.	Do.		Do.
23	10	Do.	Ordinary	F. Y. M.	15 tons	June	Do.	Do.	Do.
57	10	Do.	Deep	Do.	Do.	Do.	Do.	Do.	Do.
122	12	Do.	Ordinary	F. Y. M. + Ammonium Sulphate.	112 lbs.	October	Continuous		Do.

Results of Tobacco Plots.

Plot.	Cultivation.	Manure used.	Outturn of Cured leaves per acre.	Value of produce per acre.	Cost of cultivation per acre.					Remarks.
					Seedlings.	Manure.	Tillage.	Harvesting and Tying, etc.	Total.	
	4	5.	11	12	13	14	15	16	17	18
			Lbs.	Ra. s. p.	Rs. s. p.	Ra. s. p.	Ra. s. p.	Rs. s. p.	Rs. s. p.	
1	Ordinary	F. Y. M.	2,232	156 8 4	3 0 0	30 14 0	52 10 4	13 4 0	99 12 4	
12	Deep	Do.	2,564	165 7 8	3 0 0	30 14 0	57 4 4	18 8 0	107 10 4	
2	Ordinary	Castor-cake	2,060	144 7 4	3 0 0	24 10 8	62 5 4	16 4 0	168 4 0	
13	Deep	Do.	2,272	159 4 0	3 0 0	28 10 8	60 5 8	19 8 0	109 8 4	
3	Ordinary	F. Y. M. + Castor-cake.	2,356	165 5 0	3 0 0	28 14 0	59 12 0	15 15 0	107 9 0	
14	Deep	Do.	2,558	177 5 0	3 0 0	29 14 0	58 7 8	22 2 0	112 7 8	
4	Ordinary	F. Y. M. + Nitre.	2,568	175 10 8	3 0 0	32 1 0	63 2 8	15 13 0	114 0 8	
15	Deep	Do.	2,499	172 8 4	3 0 0	32 1 0	65 4 0	21 5 0	121 10 6	
5	Ordinary	F. Y. M. + Sodium Nitrate.	3,520	176 10 8	3 0 0	32 1 0	63 5 8	17 1 0	115 7 8	
16	Deep	Do.	2,436	170 14 4	3 0 0	32 1 0	65 3 8	16 7 0	116 11 4	
23	Ordinary	San as green manure.	2,220	156 8 4	3 0 0	4 14 0	60 4 8	17 1 0	65 3 8	Manuring includes ordinary ploughing before sowing San.
34	Deep	Do.	2,300	161 3 8	3 0 0	5 11 0	63 7 4	21 11 0	83 13 4	Manuring includes deep ploughing before sowing San.
24	Ordinary	Do.	2,456	172 3 0	3 0 0	4 14 0	57 0 0	15 13 0	80 11 0	Manuring includes ordinary ploughing before sowing San.
35	Deep	Do.	2,324	162 13 8	3 0 0	5 11 0	50 4 0	15 12 0	74 11 6	Manuring includes deep ploughing before sowing San.
26	Ordinary	F. Y. M.	2,768	194 0 4	3 0 0	30 14 0	45 8 4	20 3 0	99 9 4	To be grown in rotation with Kodra and mixture.
57	Deep	Do.	2,490	175 11 0	3 0 0	30 1 0	42 2 8	18 1 0	100 1 8	Do.
22	Ordinary	F. Y. M. + Ammonium Sulphate.	2,420	147 12 2	3 0 0	32 1 0	57 1 8	17 9 8	109 14 8	

On the whole deep ploughing seems to produce better results. Tobacco manured with nitre and sodium nitrate matured early and tobacco manured with castor-cake alone ripened late. Farmyard manure produced a thick leaf, while castor-cake alone produced a thin leaf. Green manure produced a whitish coloured leaf. Nitre produced a bright coloured leaf. No definite conclusions can be drawn as this is the first year of the trial.

4. *Broach Cotton*.—The object was to see the effects of nitre on cotton.

Plot 91-A.—Area $12\frac{1}{2}$ gunthas; ordinarily cultivated; sown with Broach cotton; not manured and not irrigated.

Plot 91-C.—Area $12\frac{1}{2}$ gunthas; ordinarily cultivated; sown with Broach cotton; not irrigated but manured with nitre at the rate of 100 lbs. per acre. The manure was applied as a top dressing in September.

The results are noted below:—

Plot No.	Crop.	Manure used.	Yield of cotton per acre.	Value of cotton per acre.	Cost of cultivation per acre.
91-A	Cotton	Nil	Lbs. 321	Rs. a. p. 28 4 3	Rs. a. p. 13 5 6
91-C	Do.	Nitre	427	37 5 10	20 13 7

The yield of both the plots is below average. By the application of Rs. 10 worth of manure (nitre) only an increase of Rs. 9 in yield is obtained. This is due to the failure of late rains.

5. *Brinjals*.—The object was to compare the effects of ammonium sulphate and nitre on brinjals.

Plot No. 116.—Area 9 gunthas; ordinarily cultivated; manured with nitre at the rate of 1 cwt. per acre.

Plot No. 123.—Area 6 gunthas; ordinarily cultivated and manured with ammonium sulphate at the rate of 1 cwt. per acre.

The results are as under:—

Plot No.	Crop.	Manure.	Yield per acre.	Value of produce.	Cost of cultivation.
116	Brinjals	Nitre	Lbs. 15,213	Rs. a. p. 167 9 1	Rs. a. p. 96 5 1
123	Do.	Ammonium Sulphate	15,420	166 6 2	106 10 8

The yields of the plots is identical.

6. *Rice*.—The object was—

(1) to compare farmyard manure with nitre.

(2) to compare rice manured and irrigated with rice manured but not irrigated.

(3) to compare rice grown unmanured and unirrigated with rice grown manured but not irrigated.

The results are as under:—

Plot No.	Area.	Crop.	Tillage.	Manure.			Irrigation.	Yield per acre.		Value of Produce.	Cost of cultivation.
				Kind.	Quantity per acre.	Time of application.		Grain.	Straw.		
	Gunthas							Lbs.	Lbs.	Rs. a. p.	Rs. a. p.
85	6	Rice	Ordinary	F. Y. M. + Nitre	7½ tons	June	Nil	106	1,780	6 14 0	43 1 11
86	6	Do.	Do.	Nil	Nil	August		86	2,166	7 0 2	20 0 0
88	5.5	Do.	Do.	F. Y. M.	7½ tons	June	Irrigated 4 times	450	923	15 14 6	24 15 4
89	6	Do.	Do.	F. Y. M. + Nitre	7½ tons	June		2,466	3,140	83 5 4	59 11 0
90	8.5	Do.	Do.	F. Y. M.	80 lbs.	August	Do.	1,971	2,917	69 5 0	62 8 9
				F. Y. M.	7½ tons	June					

Unirrigated rice totally failed.

Plot 90, irrigated and manured with farmyard manure, has produced only an average yield though irrigated. By the application of nitre worth Rs. 8 an additional produce worth Rs. 14 is obtained.

Cost of cultivation is very high owing to the irrigation. The variety of rice grown was Sutarsál.

Rotation Series Experiments.

7. *Series I.*—The object was to see the effects of deep and ordinary ploughing on the following rotation and to compare it with others:—

1st year { (a) Bájri.
(b) Jiru + Kárela.

2nd year Sundhia.

3rd year Kodra and mixture.

The following statement shows details of plots and cultivation in this series:—

Plot No.	Area.	Crop.	Tillage.	Manure.			In rotation or continuous.	Irrigated or not.	Remarks.
				Kind.	Quantity per acre.	Time of application.			
6	10	(a) Bájri	Ordinary	Nil	Nil	Nil	In rotation	Nil.	Jiru + Kárela were not sown owing to difficulty of irrigation.
		(b) Jiru + Kárela	.....	F. Y. M.	10 tons	November	.....	Irrigated
17	10	Do.	Deep	Do.	Do.	Do.	In rotation	Nil.	
7	10	Sundhia	Ordinary	Nil	Nil	Nil	Do.	Nil.	
18	10	Do.	Deep	Nil	Nil	Nil	Do.	Nil.	
8	10	Kodra and mixture.	Ordinary	Nil	Nil	Nil	Do.	Nil.	
19	10	Do.	Deep	Nil	Nil	Nil	Do.	Nil.	

The results of Bájri are as under:—

Crop.	Plot No. 6—Ordinarily ploughed.				Plot No. 17—Deeply ploughed.			
	Yield per acre.		Value of produce.	Cost of cultivation.	Yield per acre.		Value of produce.	Cost of cultivation.
	Grain.	Straw.			Grain.	Straw.		
	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.
Bájri	560	2,016	27 1 5	12 6 4	768	2,868	37 2 0	13 13 4

The results of Sundhia are as under:—

Crop.	Plot No. 7—Ordinarily ploughed.				Plot No. 18—Deeply ploughed.			
	Yield per acre.		Value of produce.	Cost of cultivation.	Yield per acre.		Value of produce.	Cost of cultivation.
	Grain.	Straw.			Grain.	Straw.		
	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.
Sundhia	776	2,592	43 11 0	19 2 4	984	2,948	45 10 4	17 11 4

The Jowár heads in No. 7 were very small and hence the expenditure of plucking heads is higher than in No. 18.

The yield of Bájri and Sundhia is below average. The value of the yield is higher than usual owing to the high price of grain and fodder prevailing. The deep ploughing seems to have a good effect.

The results of Kodra and mixture are as under :—

Crop.	Plot No. 8—Ordinary ploughing.				Plot No. 19—Deep ploughing.			
	Grain.	Straw.	Value.	Cost of cultivation.	Grain.	Straw.	Value.	Cost of cultivation.
	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.
Kodra ...	148	521	3 7 4	} 15 0 8	140	472	3 4 4	} 15 9 8
Guvár ...	304	392	8 3 8		336	424	9 1 4	
Tal ...	6	...	0 7 2		24	...	1 12 0	
Tuer ...	60	63	3 1 0		44	76	2 4 4	
Sheria ...	30	16	1 6 4		28	12	1 1 0	
			16 9 6			17 7 8		

The yield is poor. There is not much difference between deep and ordinary ploughing.

8. *Series II.*—The object was to see the effects of deep and ordinary ploughing on the following rotation and to compare it with others :—

1st year ... Bájri, Math and Tuer.
 2nd year ... Kodra and mixture.
 3rd year ... Sundhia.

The following statement shows the details of plots and cultivation under this series :—

Plot No.	Area.	Crop.	Tillage.	Manure.			In rotation or continuous.	Irrigated or not.
				Kind.	Quantity per acre.	Time of application.		
9	10	Bájri, Math, Tuer	... Ordinary	... F. Y. M.	5 tons.	June.	In rotation.	Nil.
20	10	Do.	... Deep	... Do.	Do.	Do.	Do.	Nil.
10	10	Kodra mixture	... Ordinary	... Nil.	Nil.	Nil.	Do.	Nil.
21	10	Do.	... Deep	... Nil.	Nil.	Nil.	Do.	Nil.
11	10	Sundhia	... Ordinary	... Nil.	Nil.	Nil.	Do.	Nil.
22	10	Do.	... Deep	... Nil.	Nil.	Nil.	Do.	Nil.

The results for Bájri, Math and Tuer are as under :—

Crop.	Plot No. 9—Ordinarily ploughed.				Plot No. 20—Deeply ploughed.			
	Yield per acre.		Value of produce.	Cost of cultivation.	Yield per acre.		Value of produce.	Cost of cultivation.
	Grain.	Straw.			Grain.	Straw.		
	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.
Bájri ...	384	1,236	18 10 8	} 21 12 8	592	2,263	28 6 0	} 22 5 8
Math ...	36	492	2 3 0		24	332	1 14 8	
Tuer ...	52	92	2 11 0		23	44	1 7 4	
			23 8 8				31 12 0	

The results for Sundhia are as under :—

Crop.	Plot No. 11—Ordinarily ploughed.				Plot No. 22—Deeply ploughed.			
	Yield per acre.		Value of produce.	Cost of cultivation.	Yield per acre.		Value of produce.	Cost of cultivation.
	Grain.	Straw.			Grain.	Straw.		
	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.
Sundhia ...	544	3,182	40 3 0	13 0 4	432	3,188	41 0 0	17 4 0

The results of Kodra are as under :—

Crop.	Plot No. 10—Ordinarily ploughed.				Plot No. 21—Deep ploughing.			
	Yield per acre.		Value of produce.	Cost of cultivation.	Yield per acre.		Value of produce.	Cost of cultivation.
	Grain.	Straw.			Grain.	Straw.		
	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.
Kodra ...	116	700	4 10 0	14 3 0	240	852	5 9 8	14 6 0
Guvár ...	556	700	15 1 0		608	764	16 7 4	
Tal ...	10	...	0 12 0		28	...	2 1 4	
Tuer ...	8	12	0 6 8		76	140	4 0 0	
Sheria ...	64	28	2 7 4		60	32	2 8 0	
			23 5 0				30 10 4	

It seems that the deep ploughing has a good effect on the yield.

9. *Series III.*—The object was to see the effects of deep and ordinary ploughing on the following rotation and to compare it with others :—

- (a) 1st year Tobacco manured with farm yard manure.
 2nd year Kodra.
 (b) 1st year Tobacco manured with green manure.
 2nd year Kodra.

The details of plots and cultivation in this series are as under :—

Plot No.	Area.	Crop.	Tillage.	Manure.			In rotation or continuous.	Irrigated or not.
				Kind.	Quantity per acre.	Time of application.		
24	10	Tobacco	Ordinary	Green manure	of San.	In rotation.	Irrigated.	
35	10	Do.	Deep	Do.	Do.	Do.	Do.	
25	10	Kodra mixture	Ordinary	Nil.	Nil.	Nil.	Nil.	
36	10	Do.	Deep	Nil.	Nil.	Nil.	Nil.	
26	10	Tobacco	Ordinary	F. Y. M.	15 tons.	June.	Irrigated.	
37	10	Do.	Deep	Do.	Do.	Do.	Do.	
27	10	Kodra mixture	Ordinary	Nil.	Nil.	Nil.	Nil.	
38	10	Do.	Deep	Nil.	Nil.	Nil.	Nil.	

The results of tobacco are already noted.

The results of Kodra in rotation with tobacco manured with green manure are as under :—

Crop.	Plot No. 25—Ordinarily ploughed.				Plot No. 36—Deeply ploughed.			
	Yield per acre.		Value of produce.	Cost of cultivation.	Yield per acre.		Value of produce.	Cost of cultivation.
	Grain.	Straw.			Grain.	Straw.		
	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.
Kodra ...	110	512	2 13 4	14 13 0	92	388	2 3 4	15 7 0
Guvár ...	248	308	6 11 0		408	512	11 0 8	
Tal ...	28	...	2 1 4		36	...	2 11 0	
Tuer ...	44	76	2 4 4		88	160	4 10 4	
Sheria ...	36	16	1 14 4		16	8	0 10 4	
			15 12 4				21 3 8	

The results of Kodra in rotation with tobacco manured with farm yard manure are as under :—

Crop.	Plot No. 27—Ordinarily ploughed.				Plot No. 38—Deeply ploughed.			
	Yield per acre.		Value of produce.	Cost of cultivation.	Yield per acre.		Value of produce.	Cost of cultivation.
	Grain.	Straw.			Grain.	Straw.		
	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.
Kodra ...	504	2,176	11 14 8	13 8 4	328	1,248	7 9 8	14 13 4
Guvár ...	320	400	8 10 8		288	364	7 12 4	
Tal ...	49	...	3 0 0		10	...	0 12 0	
Tucr ...	184	364	9 11 0		216	428	11 4 8	
Sheria ...	112	56	4 8 8		76	36	3 0 4	
			37 13 0				30 7 0	

10. *Series IV.*—The object was to see the effects of deep and ordinary ploughing on the following rotation and compare it with others :—

1st year	...	...	Variáli.
2nd year	...	...	(a) Bájri. (b) Onions.
3rd year	...	...	Kodra and mixture.

The following table gives the details of plots and cultivation in this series :—

Plot.	Area.	Crop.	Tillage.	Manure.			In rotation or continuous.	Irrigated or not.
				Kind.	Quantity per acre.	Time of application.		
28	10	Variáli	Ordinary	F. Y. M.	12½ tons.	June.	In rotation.	Irrigated.
39	10	Do.	Deep	Do.	Do.	Do.	Do.	Do.
29	10	(a) Bájri	Ordinary	Nil.	Nil.	Nil.	Do.	Nil.
		(b) Onions	Do.	Castor-cake	800 lbs.	January	Do.	Irrigated.
40	10	Do.	Deep	Do.	Do.	Do.	Do.	Do.
30	10	Kodra mixture	Ordinary	Nil.	Nil.	Nil.	Do.	Nil.
41	10	Do.	Deep	Nil.	Nil.	Nil.	Do.	Nil.

Onions after Bájri in plots 29 and 40 were not planted owing to difficulty in irrigation.

The results for Variáli are as under :—

Crop.	Plot No. 28—Ordinarily ploughed.				Plot No. 39—Deeply ploughed.			
	Yield per acre.		Value of produce.	Cost of cultivation.	Yield per acre.		Value of produce.	Cost of cultivation.
	Seed.	Straw.			Grain.	Straw.		
	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.
Variáli ...	2,598	...	138 4 0	113 3 8	2,132	...	160 0 0	110 3 8

The results for Bájri are as under :—

Crop.	Plot No. 29—Ordinarily ploughed.				Plot No. 40—Deeply ploughed.			
	Yield per acre.		Value of produce.	Cost of cultivation.	Yield per acre.		Value of produce.	Cost of cultivation.
	Grain.	Straw.			Grain.	Straw.		
	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.
Bájri ...	592	1,784	28 6 4	12 10 4	512	1,452	24 11 0	11 8 4

The results for Kodra are as under :—

Crop.	Plot No. 30—Ordinarily ploughed.				Plot No. 41—Deeply ploughed.			
	Yield per acre.		Value of produce.	Cost of cultivation.	Yield per acre.		Value of produce.	Cost of cultivation.
	Grain.	Straw.			Grain.	Straw.		
	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.
Kodra ...	378	1,376	8 13 0	14 12 0	284	780	6 9 8	14 8 4
Guvár ...	332	416	8 15 4		284	360	7 10 8	
Tal ...	44	...	8 4 8		36	...	2 11 0	
Tuer ...	32	52	1 10 4		52	92	2 11 0	
Sheria ...	44	20	1 11 4		56	28	2 4 4	
			24 6 8				21 14 8	

In this series the shallow ploughed plots have produced a better yield.

11. *Series V.*—The object was to see the effects of deep and ordinary ploughing on the following rotation and to compare it with others :—

1st year	...	...	Bájri and mixture.
2nd year	...	...	Kodra and mixture.
3rd year	...	...	Bávto, Vál and castor.

The following table shows the details of plots and cultivation in this series :—

Plot.	Area.	Crop.	Tillage.	Manure.			In rotation or continuous.	Irrigated or not.
				Kind.	Quantity.	Time of application.		
31	Gunthas. 10	Bájri and mixture	Ordinary	F. Y. M.	5 tons.	June.	In rotation.	Nil.
42	10	Do.	Deep	Do.	Do.	Do.	Do.	Nil.
32	10	Kodra mixture	Ordinary	Nil.	Nil.	Nil.	Do.	Nil.
43	10	Do.	Deep	Nil.	Nil.	Nil.	Do.	Nil.
33	10	Bávto, castor, Vál	Ordinary	Nil.	Nil.	Nil.	Do.	Nil.
44	10	Do.	Deep	Nil.	Nil.	Nil.	Do.	Nil.

The results for Bájri mixture are as under :—

Crop.	Plot No. 31—Ordinarily ploughed.				Plot No. 42—Deeply ploughed.			
	Yield per acre.		Value of produce.	Cost of cultivation.	Yield per acre.		Value of produce.	Cost of cultivation.
	Grain.	Straw.			Grain.	Straw.		
	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.
Bájri ...	272	1,064	12 14 4	21 9 4	256	884	12 5 4	20 14 0
Math ...	12	160	0 15 0		16	220	1 4 4	
Chola ...	92	398	4 7 0		100	420	4 13 4	
Mag ...	28	364	2 6 8		92	412	2 11 8	
Tuer ...	20	28	1 0 8		32	52	1 10 4	
			21 11 8				22 13 4	

The results for Kodra mixture are as under :—

Crop.	Plot No. 32—Ordinarily ploughed.				Plot No. 43—Deeply ploughed.			
	Yield per acre.		Value of produce.	Cost of cultivation.	Yield per acre.		Value of produce.	Cost of cultivation.
	Grain.	Straw.			Grain.	Straw.		
	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.
Kodra ...	84	348	1 15 8	14 7 8	68	284	1 5 0	14 13 0
Guvár ...	500	624	13 8 4		368	464	9 15 4	
Tal ...	20	...	1 8 0		24	...	1 12 8	
Tuer ...	108	200	5 11 8		84	164	4 7 0	
Eheria ...	16	8	0 10 4		20	8	0 12 0	
			23 6 0				18 4 0	

The results of Bávto, castor and Vál are noted below :—

Crop.	Plot No. 33—Ordinarily ploughed.				Plot No. 44—Deeply ploughed.			
	Yield per acre.		Value of Produce.	Cost of Cultivation.	Yield per acre.		Value of Produce.	Cost of Cultivation.
	Grain.	Straw.			Grain.	Straw.		
Bávto ...	Lbs. 1,352	Lbs. 1,500	Rs. a. p. 49 5 8	Rs. a. p. 20 6 0	Lbs. 1,448	Lbs. 1,588	Rs. a. p. 52 12 8	} 19 7 0
Castors ...	136	...	6 12 8	}	84	...	4 3 0	
Vál (Green pods) ...	363	...	5 15 0		272	...	4 6 0	
			62 1 4				61 5 8	

Castors and Vál did not produce an average yield on account of failure of late rains.

12. *Series VI.*—The object was to see the effects of deep and ordinary ploughing on the following rotation and to compare it with others :—

First year Sugarcane.

Second year Chillis.

Third year Bájri.

The following statement shows the details of plots, crops, cultivation, etc., in this Series :—

Plot No.	Area in Gunthas.	Crop.	Tillage.	Manure.			In rotation or continuous.	Irrigated or not.
				Kind.	Quantity per acre.	Time of application.		
45	10	} Bájri	Ordinary	Nil	...	.....	In rotation	Nil.
46	10		Deep	.....	.....	.....
53	10		Deep		
54	10	} Chillies	Ordinary	Castor cake	1,000 lbs.	September	Do.	Irrigated.
47	10		Deep	Do.	Do.	Do.		
48	10		Deep	Do.	Do.	Do.		
55	10	} Chillies	Ordinary	F. Y. M. + Ammonia Sulphate.	20 tons + 400 lbs.	April + August.	Do.	Do.
56	10		Deep	Do.	Do.	Do.		
49A	5.9	Sugarcane	Ordinary	F. Y. M. + Ammonia Sulphate.	20 tons + 400 lbs.	April + August.	Do.	Do.
57A	5.9	Do.	Deep	Do.	.....	Do.	Do.	Do.
49B	4.2	Do.	Ordinary	F. Y. M.	20 tons	April	Do.	Do.
57E	4.2	Do.	Deep	Do.	Do.	Do.	Do.	Do.
50A	4.7	Do.	Ordinary	F. Y. M. + Nitre + Ammonia Sulphate.	12 tons + 300 lbs. + 200 lbs.	April + July + August.	Do.	Do.
56A	4.7	Do.	Deep	Do.	.....	Do.	Do.	Do.
50B	5.2	Do.	Ordinary	F. Y. M. + Nitre	12½ tons + 300 lbs.	April + July.	Do.	Do.
53B	5.2	Do.	Deep	Do.	.....	Do.	Do.	Do.

The results for Bájri are as under :—

Crop.	Plots Nos. 45, 46—Ordinarily ploughed.				Plots Nos. 53, 54—Deeply ploughed.			
	Yield per acre.		Value of produce.	Cost of cultivation.	Yield per acre.		Value of produce.	Cost of cultivation.
	Green.	Straw.			Grain.	Straw.		
Bájri ...	Lbs. 956	Lbs. 3,508	Rs. a. p. 44 12 8	Rs. a. p. 13 6 0	Lbs. 1,060	Lbs. 3,690	Rs. a. p. 49 11 0	Rs. a. p. 15 9 4

The actual yield is not very high but the value per acre is good owing to the high price of grain and fodder obtained. The deeply ploughed plots have given a greater yield.

The results of chillies are as under:—

Crop.	Plots Nos. 47, 48—Ordinarily ploughed.				Plots Nos. 55, 56—Deeply ploughed.			
	Yield per acre.		Value of produce.	Cost of cultivation.	Yield per acre.		Value of produce.	Cost of cultivation.
	Green chillies.	Straw.			Green chillies.	Straw.		
	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.
Chillies ...	3,888	...	68 7 0	128 9 4	5,936	...	120 3 0	133 11 0

White ants did great damage to this crop. Nearly half the plants were destroyed. Frost in the month of January did also some damage. The yield is poor.

The sugarcane crop progressed well till the middle of August when the Sugar borer attacked it. The affected canes were all destroyed and the attack was brought under control. The attack of white ants was so severe that more than one-fourth of the area produced nothing. A second attack of borer occurred in November. As the crop was taller the affected canes could not be cut down and destroyed. Nearly all the plants were found to be bored. Owing to the damage done by white ants and borers the crop proved to be a failure.

13. *Series VII.*—The object was to see the effects of deep and ordinary ploughing on the following rotation and to compare it with others:—

First year (a) Bajri.

(b) Wheat.

Second year Kodra and mixture.

The details of plots, crops, cultivation, etc., are as under:—

Plot.	Area in Gunthas.	Crop.	Tillage.	Manure.			In rotation or continuous.	Irrigated or not.	
				Kind.	Quantity per acre.	Time of application.			
51	10	Kodra and mixture.	Ordinary	...	Nil.	...	In rotation.	Nil.	
59	10	Do.	Deep	...	Nil.	...	Do.	Nil.	
52	10	(a) Bajri	Ordinary	...	F. Y. M.	10 tons	June	Do.	Nil.
		(b) Wheat	Do.	...	Nil.	Nil.	Nil.	Do.	Irrigated.
60	10	Do.	Deep	...	Do.	Do.	Do.	Do.	Do.

The results for Kodra are as under:—

Crops.	Plot No. 51—Ordinarily ploughed.				Plot No. 59—Deeply ploughed.			
	Yield per acre.		Value of produce.	Cost of cultivation.	Yield per acre.		Value of produce.	Cost of cultivation.
	Grain.	Straw.			Grain.	Straw.		
	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.
Kodra ...	312	1,188	7 5 0	17 8 8	736	2,748	17 4 4	19 4 8
Guvár ...	124	160	8 5 4		296	368	8 0 0	
Tal ...	86	...	2 11 0		40	...	3 0 0	
Tuer ...	148	292	7 14 0		84	164	4 7 0	
Sheria ...	44	20	1 11 4		76	86	3 0 4	
Total ...			22 14 8			85 11 8		

The results for Bájri are as under :—

Crop.	Plot No. 52—Ordinarily ploughed.				Plot No. 60—Deeply ploughed.			
	Yield per acre.		Value of produce.	Cost of cultivation.	Yield per acre.		Value of produce.	Cost of cultivation.
	Grain.	Straw.			Grain.	Straw.		
Bájri	Lbs. 760	Lbs. 3,800	Rs. a. p. 37 5 0	Rs. a. p. 33 8 0	Lbs. 784	Lbs. 3,272	Rs. a. p. 39 8 4	Rs. a. p. 35 9 8

The yield is below average though the Bájri was manured. The heavy rains at the beginning damaged the crop to a great extent. The results of wheat grown after Bájri are as under :—

Crop.	Plot No. 52—Ordinarily ploughed.				Plot No. 60—Deeply ploughed.			
	Yield per acre.		Value of produce.	Cost of cultivation.	Yield per acre.		Value of produce.	Cost of cultivation.
	Grain.	Straw.			Grain.	Straw.		
Wheat	Lbs. 1,008	Lbs. 1,608	Rs. a. p. 39 13 4	Rs. a. p. 79 13 0	Lbs. 1,220	Lbs. 1,688	Rs. a. p. 47 15 0	Rs. a. p. 81 2 0

The variety of wheat grown was "Popatia" spelt wheat. The yield is very poor on account of white ants.

14. *Series VIII.*—The object was to compare the effects of deep and ordinary ploughing on the following crops and rotations, and to compare Rozi cotton with Broach cotton :—

- A. First year Kodra and mixture.
Second year Bájri mixture.
Third year Broach cotton.
- B. First year Kodra mixture and Rozi cotton.
Second year Bájri mixture and Rozi cotton.

The details of plots, crops, cultivation, etc., are noted below :—

Plot.	Area in Gunthas.	Crop.	Tillage.	Manure.			In rotation or continuous.	Irrigated or not.
				Kind.	Quantity per acre.	Time of application.		
66	10	Kodra mixture ...	Ordinary ...	Nil ...	Nil ...	Nil ...	In rotation ...	Nil.
76	10	Do. ...	Deep ...	Do. ...	Do. ...	Do. ...	Do. ...	Nil.
67	10	Bájri and mixture ...	Ordinary ...	Do. ...	Do. ...	Do. ...	Do. ...	Nil.
77	10	Do. ...	Deep ...	Do. ...	Do. ...	Do. ...	Do. ...	Nil.
68	10	Cotton ...	Ordinary ...	F. Y. M.	5 tons ...	June ...	Do. ...	Nil.
78	10	Do. ...	Deep ...	Do. ...	Do. ...	Do. ...	Do. ...	Nil.
69	10	Kodra mixture and Rozi cotton.	Ordinary ...	Nil ...	Nil ...	Nil ...	Do. ...	Nil.
79	10	Do. ...	Deep ...	Do. ...	Do. ...	Do. ...	Do. ...	Nil.
70	10	Bájri mixture and Rozi cotton.	Ordinary ...	F. Y. M.	5 tons ...	June ...	Do. ...	Nil.
80	10	Do. ...	Deep ...	Do. ...	Do. ...	Do. ...	Do. ...	Nil.

The results for Kodra and mixture are as under :—

Crop.	Plot No 66—Ploughed ordinarily.				Plot No. 76—Ploughed deeply.			
	Yield per acre.		Value of produce.	Cost of cultivation.	Yield per acre.		Value of produce.	Cost of cultivation.
	Grain.	Straw.			Grain.	Straw.		
	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.
Kodra ...	792	3,148	18 12 4	16 11 8	728	2,736	17 1 4	18 4 8
Guvár ...	296	376	8 0 4		840	428	9 3 4	
Tal ...	36	...	2 11 0		24	...	1 12 8	
Tuer ...	20	24	1 0 4		24	56	1 4 4	
Sheria ...	60	Fibre. 28	2 6 0		100	Fibre. 48	4 0 0	
			32 14 0				33 5 8	

The results for Bájri and mixture are as under :—

Crop.	Plot No. 67—Ordinarily ploughed.				Plot No. 77—Deeply ploughed.			
	Yield per acre.		Value of produce.	Cost of cultivation.	Yield per acre.		Value of produce.	Cost of cultivation.
	Grain.	Straw.			Grain.	Straw.		
	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.
Bájri ...	843	4,864	42 9 8	22 6 4	640	3,056	31 13 4	23 5 0
Math ...	23	384	2 3 8		16	212	0 15 8	
Mag ...	8	92	0 10 0		36	464	3 2 4	
Chola ...	82	340	3 15 0		116	488	5 9 8	
Tuer ...	12	24	0 9 8		16	36	0 13 4	
			50 0 0				41 6 4	

The results for Broach cotton are as under :—

Plot.	Treatment.	Manure.	Yield per acre.	Value of produce.	Cost of cultivation.
68	Ordinary	...	Lbs. 382	Rs. a. p. 33 7 0	Rs. a. p. 23 7 8
78	Deep	...	Lbs. 496	Rs. a. p. 43 6 4	Rs. a. p. 25 1 8

The first sown seed of Broach cotton did not germinate owing to heavy rains. The second sown seed germinated well but the crop withered afterwards for want of late rains.

Rozi cotton sown with Kodra and mixture and Bájri and mixture was totally destroyed by heavy rains.

The results for Kodra mixture are as under :—

Crop.	Plot No. 69—Ordinarily ploughed.				Plot No. 79—Deeply ploughed.			
	Yield per acre.		Value of produce.	Cost of cultivation.	Yield per acre.		Value of produce.	Cost of cultivation.
	Grain.	Straw.			Grain.	Straw.		
	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.
Kodra ...	344	1,296	7 15 4	17 7 8	384	1,472	8 15 8	18 10 0
Guvár ...	416	524	11 4 4		216	272	5 13 4	
Tal ...	24	...	1 12 8		32	...	2 6 4	
Tuer ...	96	192	5 1 8		108	220	5 11 8	
Sheria ...	24	Fibre. 12	0 15 4		36	Fibre. 16	1 6 4	
			27 1 4				24 5 4	

The results for Bájri and mixture are as under :—

Crop.	Plot No. 70—ordinarily ploughed.				Plot No. 80—deeply ploughed.			
	Yield per acre.		Value of produce.	Cost of cultivation.	Yield per acre.		Value of produce.	Cost of cultivation.
	Grain.	Straw.			Grain.	Straw.		
	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.
Bájri	432	1,692	20 13 0	} 29 11 0	512	2,200	27 12 0	} 30 9 0
Math	20	280	1 13 4		24	336	2 0 0	
Mag	20	252	1 11 4		28	364	2 6 8	
Chola	88	372	4 4 0		104	452	5 1 0	
Tuer	28	44	1 7 4		40	68	2 1 0	
			30 1 0				30 4 8	

15. *Series IX.*—The object was to find out (1) which of the following crops, *viz.*, Tal, Tuer, and Tal and Tuer mixed, leaves a better residue or enriches the soil for the next crop and (2) whether Tal and Tuer grown mixed together are more profitable than grown separately.

Plot 82-A.—Area 10 gunthas; ordinarily ploughed; not manured; sown with Tal alone.

Plot 82-B.—Area 10 gunthas; ordinarily ploughed; not manured; sown with Tuer alone.

Plot 82-C. D.—Area 20 gunthas; ordinarily ploughed; not manured; sown with Tal and Tuer mixed together.

The results are noted below :—

Plot.	Area in Gunthas.	Tillage.	Crop.	Yield per acre.		Value of produce.	Cost of cultivation.
				Grain.	Straw.		
				Lbs.	Lbs.	Rs. a. p.	Rs. a. p.
82-A.	10	Ordinary.	Tal ...	336	...	25 3 0	8 4 0
82-B.	10	Do. ...	Tuer...	448	980	25 15 4	10 2 0
82-C. D.	20	Do. ...	Tal ...	126	...	9 7 2	} 8 6 0
			+ Tuer...	56	226	5 15 6	

Tal alone has given a better yield. The mixed crop of Tal and Tuer is poor in yield. What crop enriches the soil will be seen next year. This crop is to be Bájri sown every other year so as to make a set of continuous plots.

Experiments on crops grown continuously.

16. The object was (1) to see how long the following crops can be grown profitably without any manure on the same plots.

(2) To see the effects of deep and ordinary ploughing on Kodra mixture and on Bájri mixture grown continuously.

The following crops were grown continuously :—

- Bájri and mixture.
- Kodra and mixture.
- Bájri.
- Cotton (Broach).
- Tobacco (dry).

The Bájri and Kodra mixtures were grown on the following plots :—

Plot No. 118.—Area 5 gunthas; ordinarily ploughed; not manured; sown with Bájri and mixture.

Plot No. 120.—Area 5 gunthas; ordinarily ploughed; not manured; sown with Kodra mixture.

Plots Nos. 119, 121.—Area 5 gunthas each; deep ploughed; otherwise crops and treatment same as in plots 118 and 120.

The results of Bájri and mixture are as under :—

Crop.	Plot No. 118—ordinarily ploughed.				Plot No. 119—deeply ploughed.			
	Yield per acre.		Value of produce.	Cost of cultivation.	Yield per acre.		Value of produce.	Cost of cultivation.
	Grain.	Straw.			Grain.	Straw.		
	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.
Bájri	560	8,912	27 4 8	} 20 2 0	640	5,240	31 7 4	} 21 14 0
Math	40	576	3 1 4		48	680	3 14 0	
Mag	24	304	2 1 4		32	392	2 10 8	
Chola	208	1,004	10 2 0		168	704	8 1 4	
Tuer	56	88	2 14 8		32	72	1 10 8	
			45 8 0				47 12 0	

The results of Kodra and mixture are as under :—

Crop.	Plot No. 120—ordinarily ploughed.				Plot No. 121—deeply ploughed.			
	Yield per acre.		Value of produce.	Cost of cultivation.	Yield per acre.		Value of produce.	Cost of cultivation.
	Grain.	Straw.			Grain.	Straw.		
	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.
Kodra	464	1,960	10 14 8	} 17 6 0	216	936	5 2 0	} 18 0 0
Guvár	424	536	11 7 4		312	392	8 4 0	
Tal	20	...	1 8 0		32	...	2 6 0	
Tuer	88	166	4 10 0		136	240	7 2 8	
Sheria	24	Fibre. 8	0 13 4		16	Fibre. 8	0 10 0	
			29 5 4				23 8 8	

The cotton, Bájri and tobacco crops were grown on the following plots :—

Plot No. 92.—Area 6 gunthas ; ordinarily ploughed ; not manured ; sown with Broach cotton.

Plot No. 93.—Area 6 gunthas ; ordinarily ploughed ; not manured ; sown with Bájri.

Plot No. 96-B.—Area 4½ gunthas ; ordinarily ploughed ; not manured ; planted with tobacco ; not irrigated.

The results are as under :—

Plot.	Crop.	Outturn per acre.		Value of outturn.	Cost of cultivation.
		Grain.	Straw.		
		Lbs.	Lbs.	Rs. a. p.	Rs. a. p.
92	Cotton, Broach ..	233	...	20 6 8	10 11 4
93	Bájri	1,133	5,160	55 0 0	22 13 0
96-B.	Tobacco	551	...	49 7 1	27 7 1
		Cured leaves.			

Cultural Experiments.

17. *Series I.*—The object was (1) to compare Bájri and Bájro sown 1' apart with Bájri and Bájro sown 1½' apart.

(2) To compare the yield of Bájri with that of Bájro.

(3) To compare Broach cotton sown 1½' apart with cotton sown 2' apart.

Bájro and Bájri were grown on the following plots :—

Plot No. 97.—Area 10 gunthas ; not manured ; ordinarily ploughed ; sown with Bájri 1' apart.

Plot No. 98.—Area 10 gunthas ; ordinarily ploughed ; not manured ; sown with Bájro 1' apart.

Plot No. 101.—Area 10 gunthas ; ordinarily ploughed ; not manured ; sown with Bájri 1½' apart.

Plot No. 102.—Area 10 gunthas ; ordinarily ploughed ; not manured ; sown with Bájro 1½' apart.

The results of Bájri and Bájro are noted below :—

Plot.	Treatment.	Yield per acre.		Value of produce.	Cost of cultivation.
		Grain.	Straw.		
		Lbs.	Lbs.	Rs. a. p.	Rs. a. p.
97	... Sown 1' apart ...	824	3,984	41 5 0	15 14 0
101	... Sown 1½' apart ...	704	2,792	34 2 0	11 4 4
		Lbs.	Lbs.	Rs. a. p.	Rs. a. p.
98	... Sown 1' apart ...	588	2,672	28 12 0	9 10 8
102	... Sown 1½' apart ...	392	1,688	19 14 8	7 13 4

During the heavy rains the crop was much damaged. Bájri and Bájro sown wide apart gave less yield.

Cotton was sown under similar conditions in the following plots :—

Plots Nos. 99, 100.—Area 10 gunthas each ; not manured ; and sown with Broach cotton 1½' apart.

Plots Nos. 103, 104.—Area 10 gunthas each ; not manured ; sown with Broach cotton 2' apart.

The results are as under :—

Plot.	Treatment.	Yield per acre.	Value of produce.	Cost of cultivation.	
				Rs. a. p.	Rs. a. p.
		Lbs.	Rs. a. p.	Rs. a. p.	
99	... Sown 1½' apart ...	142	12 6 8	7 12 0	
100	... Do. ...	216	19 1 8	8 10 0	
103	... Sown 2' apart ...	174	15 6 4	7 14 0	
104	... Do. ...	272	23 6 4	7 13 4	

Cotton plants in Nos. 99 and 103 were much damaged by "wilt" disease. The yield is much below average.

18. *Series II.*—The object was to compare Bájri and Guvár sown as separate crops with Bájri and Guvár sown mixed together.

Plot No. 105-B.D.—Area 1 acre ; ordinarily ploughed ; not manured ; and sown with Bájri and Guvár mixed together.

Plot No. 105-A.C.—Area 1 acre ; ordinarily ploughed ; sown with Guvár ; no manure.

Plot No. 97.—Area 10 gunthas ; ordinarily ploughed ; sown with Bájri ; no manure.

No separate plot was sown with Bájri alone in this series.

The plot No. 97 which was very near to plots 105 B. D., A. C., is taken for comparison.

The results are as under :—

Plot.	Crop.	Yield per acre.		Value of produce.	Cost of cultivation.
		Grain.	Straw.		
		Lbs.	Lbs.	Rs. a. p.	Rs. a. p.
105-B. D.	... Bájri ...	624	2,645	} 39 2 1	10 13 7
	+ Guvár ...	336	421		
105-A. C.	... Guvár ...	822	997	22 3 4	7 15 11
97	... Bájri ...	824	3,984	41 5 0	15 14 0

The sowing of Guvár and Bájri mixed appears to be sound.

Trial of new Crops.

19. *Jowár*.—The object was (1) to introduce Perio and Chapti varieties of Jowár which are grown on the Surat side.

(2) To compare these varieties with local Sundhia varieties, *viz.*, Amario and Farfario.

Plot No. 108-A.—Area 20 gunthas; ordinarily ploughed; not manured; sown with Amario.

Plot No. 108-B.—Area 20 gunthas; ordinarily ploughed; not manured; sown with Farfario.

Plot No. 109-A.—Area 20 gunthas; ordinarily ploughed; not manured; sown with Chapti Jowár.

Plot No. 109-B.—Area 20 gunthas; ordinarily ploughed; not manured; and sown with Perio Jowár.

The results are as under :—

Plot.	Crop.	Yield per acre.		Value of produce.	Cost of cultivation.
		Graio.	Straw.		
		Lbs.	Lbs.	Rs. a. p.	Rs. a. p.
108-A.	Amario	572	3,194	43 7 4	14 12 0
108-B.	Farfario	600	3,676	44 5 4	15 0 0
109-A.	Chapti ... ..	...	8,688	18 1 6	12 0 0
109-B.	Perio ... ..	...	9,932	19 1 6	12 8 6

The local varieties have done well. Chapti and Perio did not produce grain on account of failure of late rains.

20. *Cotton*.—The object was to introduce Lálío and Wágad cottons which are extensively grown in the Ahmadabad district.

Plot No. 107-A.—Area 20 gunthas; ordinarily ploughed; not manured; sown with Lálío cotton.

Plot No. 107-B.—Area 20 gunthas; ordinarily ploughed; not manured; sown with Wágad cotton.

The results are as under :—

Plot.	Crop.	Produce per acre.	Value of produce.	Cost of cultivation.
		Lbs.	Rs. a. p.	Rs. a. p.
107-A.	Lálío	317	27 11 0	11 14 6
107-B.	Wágad	245	21 8 4	11 4 6

The crops are much below average owing to unfavourable season.

21. *American Cotton*.—The following varieties were grown :—

- (1) Chrystophor.
- (2) Texas big boll.
- (3) Sea Island.

The seed was sown in April. The plants grew luxuriantly. The bolls were badly attacked with boll worms and moreover did not open well.

22. *Egyptian Cotton*.—Two varieties of this cotton were sown in February. Germination was good, but afterwards several plants were destroyed by white ants during the hot weather. Fertilization was much hindered by rain. The bolls did not open well.

23. *Dhárwár-American*—A small plot was sown with this variety. Plants did not grow tall, but they were full of bolls. The bolls opened well. The cultivation was encouraging. A full trial will be given next season.

24. *Tobacco*.—The following statement gives the details of the several varieties of tobacco grown on this farm :—

Name of variety.	Height of plant.	Number of ripe leaves on the plant.	Measurement of large leaf	Measurement of top leaf.	Quality of cured leaf.
	Ft. ins.		Ins.	Ins.	
Spanish	3½ 0	17	15 × 10	10 × 6½	Thick and reddish brown.
Wlingi	3½ 0	17	15½ × 10	12 × 7	Thin and yellow.
Hybrid, Deshi and Sumatra.	2 9	15	21 × 15	7½ × 5½	Do.
Java P.	3 10	20	19 × 13½	10 × 6½	Do.
Havana	2 10	22	16½ × 10	8 × 10	Thick and reddish brown.
Java D.	3 1	19	17 × 10½	12 × 6½	Thin and greenish in colour.
Sumatra	4 2	18	21 × 13	11½ × 6	Thin and bright yellow.
Florida	3 4	19	15 × 11	9 × 6	Thin and yellow.
Taloan	3 7	24	19½ × 10	13 × 6½	Thicker than any other variety. Greenish yellow in colour.

Spanish, Havana, Sumatra and Taloan seem to be better. The comparative value of each variety cannot be ascertained until they are cured on scientific methods. These varieties produce the best wrappers. For this purpose a curing house is soon to be built.

25. *San*.—On this side San is not grown, the fibre being extracted from Sheria (Ambádi). San was sown in July. It grew very vigorously. Some of the plants were 9' high.

The results are as under :—

Plot.	Crop.	Yield per acre.		Value of produce per acre.	Cost of cultivation.
		Seeds.	Fibre.		
		Lbs.	Lbs.	Rs. a. p.	Rs. a. p.
91-B.D.	San	680	430	30 7 0	19 14 0

Extracting fibre by hired labour is costly.

26. *Kamod Rice*.—This variety is considered the best on this side. It is grown to a great extent in the Ahmadabad district in low-lying rice fields. It requires a good deal of water. The rice fields in sandy soil do not hold much water and therefore it is not cultivated on this side. A small plot was planted with this variety for trial.

Plot No. 87.—Area 7 gunthas; ordinarily ploughed; manured with farm-yard manure in June at the rate of 15 cart-loads per acre. It was watered six times.

The results are as under :—

Plot.	Manure.	Yield per acre.		Value of yield.	Cost of cultivation.
		Grain.	Straw.		
		Lbs.	Lbs.	Rs. a. p.	Rs. a. p.
87	Farm yard manure.	1,468	4,514	68 10 6	100 12 7

The yield is below average owing to the insufficient supply of water. By well irrigation the field could not be filled to the brim. Cost of cultivation is high owing to irrigation.

Pests.

27. *Brinjal borer* (*Leucinodes orbonalis*).—In the month of September borers were detected in the brinjal crop. As soon as the crop is attacked the growing shoot of the plant withers. If the withered shoot be cut the borer is found. All the affected plants were removed and burnt.

28. *Sugarcane borer* (*Chilo simplex*).—The attack of the borer was detected in the month of August when the sugarcane crop was very young. All the affected shoots were cut down and burnt. Maize was also sown to attract them. A second attack was detected in November when it was not possible to cut down all the affected plants. This attack was very severe.

29. *Red cotton bug* (*Dysdercus cingulatus*).—These insects were seen sucking the bolls of American and Egyptian cotton in August. They were picked and destroyed in kerosine oil.

30. *Wilt Disease*.—Several plants of cotton were attacked with this fungoid disease. Specimens were sent to Dr. Butler for identification. The affected plants were removed and burnt.

31. *Scale Insects*.—A few castor plants were attacked with scale insects in October. The affected leaves were plucked and burnt.

32. *White Ants*.—The greatest enemy of the valuable crops in these sandy soils is the white ant. During the last season great damage was done by this pest to sugarcane, chillies, tobacco, etc. Attacks are especially severe in years of light rainfall.

Cross Breeding.

33. During the year under report the following crosses of cotton were obtained. To see if there is a natural cross fertilization in cotton 50 flowers were emasculated and left uncovered. Not a single flower was found to be fertilized.

Broach + Broach.			Broach + Dhárwár-American.			Broach + Abassi.			Dhárwár-American + Broach.			Abassi + Broach.			Tree cotton + Broach.			Tree cotton + Sea Island.			Tree cotton + Texas big boll.		
No. of crossed flowers.	No. of bolls formed.	No. of bolls obtained.	No. of crossed flowers.	No. of bolls formed.	No. of bolls obtained.	No. of crossed flowers.	No. of bolls formed.	No. of bolls obtained.	No. of crossed flowers.	No. of bolls formed.	No. of bolls obtained.	No. of crossed flowers.	No. of bolls formed.	No. of bolls obtained.	No. of crossed flowers.	No. of bolls formed.	No. of bolls obtained.	No. of crossed flowers.	No. of bolls formed.	No. of bolls obtained.	No. of crossed flowers.	No. of bolls formed.	No. of bolls obtained.
192	127	73	242	140	13	216	98	11	289	100	7	207	108	8	138	94	78	234	142	101	321	231	207

Irrigational Experiments.

34. To find out what quantity of water is required by each irrigated crop, arrangements have been made to measure water at each irrigation. When the crop is watered by a Kos the number of Koses is noted and where it is irrigated by pump the water is passed through tanks each of one hundred cubic feet capacity.

The following table gives the details of quantity of water required per acre:—

Crop.		Quantity of water at the time of sowing.	Quantity of water at the 1st watering.	Quantity of water at the 2nd watering.	Total number of waterings.	Total quantity applied.
		Gallons.	Gallons.	Gallons.		Gallons.
Tobacco	... ..	45,833	31,250	37,500	7	282,916
Variáli	... ..	.....	55,000	50,000	10	559,980
Chillies	... ..	.....	45,000	40,000	21	911,852
Cabbages	... ..	60,000	31,312	104,500	12	495,812
Wheat	... ..	109,668	62,700	73,112	9	705,280
Rice	... ..	.....	125,000	100,000	4	316,666
Brinjals	... ..	.....	52,777	33,333	21	819,331

New Implements.

35. *Winnowing Fan*.—This consists of one pinion wheel, one driving wheel with handle, one axle and five wooden flies. They are adjusted as in the ordinary blowing fan. It is like the winnowing machine without the sieves. The grain is placed on the board on the top of the machine and pushed down slowly by hand into the current of the wind kept constant by driving the wheel. The chaff is blown off and the grain falls down on the ground. By this machine the grain can be winnowed independent of natural wind.

36. *Egyptian Plough*.—It differs from the "Charotar" plough in having the iron share broader and in having the beam fixed at a smaller angle. A thorough trial has not yet been made.

37. *Watt's Chain Plough*.—This has just been received from Cawnpore.

38. *Turn-wrest Plough, Nile Plough, etc.*, continue to give satisfaction.

Experiments made off the Station.

39. To convince the cultivators the value of the special fertilizers, sodium nitrate was distributed for trial on tobacco.

The fields were manured with farm-yard manure as usual. sodium nitrate was applied to half the field at the rate of 120 lbs. per acre as top dressing in October. The crop was irrigated as usual.

The results are as under :—

Field No.	Area.	Manure used.	Yield of cured leaves per acre.	Value of produce.	Increment of value due to Sodium Nitrate.	Remarks.
1	Gunthas. 17½	Farm-yard manure ...	lbs. 2,352	Rs. a. p. 196 0 0	Rs. a. p. 18 0 0	} Sold at 12 lbs. per rupee.
	17½	+ Sodium Nitrate. Farm-yard manure ...	2,132	178 0 0	...	
2	18	Farm-yard manure ...	1,760	126 0 0	13 0 0	} Sold at 14 lbs. per rupee.
	18	+ Sodium Nitrate. Farm-yard manure ...	1,588	113 0 0	...	

The cost of sodium nitrate was Rs. 12 per acre. The results are not as encouraging as last year, possibly owing to the abnormal season.

Oil Engine and Pump.

40. The engine was found not to be able to work continuously, and after much investigation it was decided to exchange the original 4" pump for one of 3". This has now been installed and the engine now works regularly 7 hours a day and could work longer if required. In this period (7 hours) it raises 7,350 cubic feet of water through a mean height of 57 feet and this will irrigate 48 gunthas of ordinary crop (=36 gunthas of sugarcane). To raise the same quantity of water by bullock power in a whole day would require 4½ pairs of bullocks and 9 men. If raised in this manner the water would irrigate only 36 gunthas of ordinary crop owing to the slowness with which it is applied.

There are then two ways of comparing the bullock "Kos" and the engine, viz.—

- (a) by quantity of water raised ;
- (b) by area irrigated.

By the former method the engine is equal to 4½ pairs of bullocks and 9 men and by the latter it is equal to 6 pairs of bullocks and 12 men.

The cost of running the engine is as follows :—

Cost of running the Engine for 7 hours.

Details.				Rs.	a.	p.
Starting the engine ($\frac{1}{2}$ lb. of kerosine)	...	...	...	0	0	6
Oil consumption in 7 hours (31 lbs.)	...	...	...	1	14	0
Lubricating oil	...	...	...	0	4	0
Engine boy (wages)	...	...	...	0	8	0
Extra man* (wages)	...	...	...	0	3	0
				2	13	6

* Required only on an experimental farm.

Deducting the wages of the extra man, the expense of irrigating an acre of ordinary crop is therefore Rs. 2-10-6, which is higher than the cost estimated before on the working of a larger pump for a short period only, but with a longer working day the cost per acre would be reduced.

Calculating on the basis of area irrigated the cost of irrigating an acre by engine and pump is only 6 annas more than the wages of the 12 men required to work the six "Kos" that would irrigate at the same rate. The cost of irrigating by engine may therefore be taken at about half the cost by bullock power. This statement is subject to the condition that the engine is kept in constant work and this presupposes a good source of water.

Ensilage.

41. To preserve succulent fodder for cattle during the hot weather a silo is constructed at a cost of Rs. 340. The silo is round 15 feet in diameter and 20 feet high, half below and half above the ground. Green Sundhia Jowár (30,198 lbs.) was filled in October to a height of 13 feet. It was then pressed down by a layer of earth $1\frac{1}{2}$ feet thick. The silo was opened after 6 months. The fodder which was 13 feet when filled in sunk to $6\frac{1}{2}$ feet. The colour of the silage is brown. The Jowár stalks are succulent and somewhat saccharine in taste. Cattle eat it willingly.

Distribution of Seeds, Manures and Implements.

42. The following statement shows the details of seeds, etc., distributed :—

Name of article.	Quantity in lbs.	Places where distributed.
Rice Kamod	22	Nuzvid Madras, Burdwan Farm.
Rice Sutarsál	453	Nadiád and roundabout.
Sundhia Jowár	3,027	Nadiád, Mirpurkhás, Dhárwár, Sángli, etc.
Bájri	355	Dhulia, Ahmadabad, Nadiád.
Peruvian cotton seed	10	Belgaum.
Lálio cotton seed	20	Baroda and Nadiád.
Wágad cotton seed	8	Gwalior, Surat, Nadiád.
Broach cotton seed	186	Nadiád, Thána, Karamsad.
Rozi cotton seed	8	Surat.
Kodra	5	} Ahmadabad Agricultural Farm.
Bávto	5	
Tal	2	
Guvár	360	
Tur	3	Nágpur, Dhulia, Nadiád, Poona, Surat, America.
Jiru	15	Nadiád and roundabout.
Castors	7	Poona Farm.
Raddish seed	50	Nadiád and roundabout.
Peelva seed	2	Poona.
Grass seed	15	} Pusa.
Tobacco seed	2 ozs.		Bengal.

Name of article.	Quantity in lbs.	Places where distributed.
<i>Manures.</i>		
Ammonium Sulphate	8	Ahmadabad.
Sodium Nitrate	204	Nadiád.
Ráyun Cake	400	Poona Farm.
<i>Implements.</i>		
Country seed drill	1	Pusa.

Visitors.

43. The Station was visited during the year by 568 persons.

They were as under—

Cultivators	352
Officials	29
Talátis	15
Students	153
Non-cultivators	19

Accounts.

44. The following statement shows the profit and loss account of the Station for the year 1905-06 :—

Date.	Losses.	Amount.	Date.	Profits.	Amount.
31st March 1906.	To Establishment account ..	Rs. a. p. 1,376 10 5	31st March 1906.	By Farm crops account ..	Rs. a. p. 1,858 9 8
	" Travelling Allowance account.	210 11 0		" Store account ...	20 14 3
	" Telegram and postage account.	47 1 0		" Contribution from the District Local Board account.	500 0 0
	" Office furniture account.	2 13 0		" Surat Station account for manure.	48 0 0
	" Work cattle account ...	593 4 10		" Dead Stock account...	45 14 1
	" Manure account ...	1 10 3		" Increment in valuation of stock.	1,451 3 5
	" Farm incidental account.	266 2 8			
	" Seed account ...	4 1 3			
	" Engine account ...	731 13 7			
	" Petty supplies account .	50 0 0			
	" Farm labour account ...	1,971 4 2			
	" Skilled labour account ..	12 0 0			
	" Petty construction account.	546 13 0			
	" Rent account ...	335 0 0			
	" Distribution account ...	47 9 11			
	Total ...	6,196 15 1		Total ...	3,924 9 5
				Net loss ...	2,272 5 8
				Total ...	6,196 15 1

III.—OPERATIONS ON THE DHARWAR AGRICULTURAL STATION.

Season.

The monthly rainfall was as follows :—

Month.		Rainfall in inches.		
		1904-05.	1905-06.	Average of last 21 years.
		In. c.	In. c.	In. c.
April	{ 1st Fortnight ...	1 2	.....	1 92
	{ 2nd " ...		0 28	
May	{ 1st " ...	6 19	0 88	3 59
	{ 2nd " ...		2 18	
June	{ 1st " ...	5 66	0 57	6 20
	{ 2nd " ...		0 39	
July	{ 1st " ...	3 17	1 17	3 54
	{ 2nd " ...		0 92	
August	{ 1st " ...	1 17	0 27	4 51
	{ 2nd " ...		0 33	
September	{ 1st " ...	3 12	0 50	5 54
	{ 2nd " ...		2 47	
October	{ 1st " ...	0 7	0 96	1 15
	{ 2nd " ...		.....
November	{ 1st " ...	...	0 24	0 69
	{ 2nd " ...		.....
December	{ 1st " ...	...	.....	0 6
	{ 2nd " ...		.....
January	{ 1st " ...	...	0 11	0 3
	{ 2nd " ...		.....
February	{ 1st " ...	0 13	.....	0 30
	{ 2nd " ...		.....
Total ...		26 98	12 57	32 68

From the statement given above it will be seen that the rainfall during the year under report was less than half the rainfall of the previous year and much less than half the average of the last 21 years. Further, the character of the distribution of the rain throughout the season was very capricious owing to the occurrence of local showers, as the result of which the crops in a few plots where the rain fell gave some outturn, while in others they totally failed.

Experiments.

2. On this Station a large series of permanent rotation experiments with the usual farm-yard manure have been initiated in duplicate plots to test the different practices of 2 and 3 year rotations with single and double crops in one year as practised in the district in general and round about Dhárwár. No foreign manures are used in these experiments. Green manuring with San and niger seed for wheat are also compared in these experiments.

The above experiments have occupied the major portion of the Station. In the remaining area various other experiments, such as manurial, cultural, varietal and crop breeding, etc., were conducted. Results are given below.

Rotation Experiments.

3. Permanent plots of 10 gunthas each.

The rotations now being compared are indicated in the following statement:—

Serial No. of		Area.	Kind of Rotation.	Crops in Rotation.	Method of sowing.	Manurial treatment.	Remarks.
Rotation.	Plots.						
		Gunthas			Inches.		
I	1	10	3 year Successive.	Broach cotton old seed	24	Farm yard manure, 5 tons.	
	2	10		Jowár Fulgar yellow	15	None.	
II	3	10	Do.	Broach cotton old seed	18	Farm yard manure, 5 tons per acre.	
	4	10		Jowár Fulgar yellow	12	None.	
III	5	10	Do.	Broach cotton new seed	18	Farm yard manure, 5 tons per acre.	
	6	10		Jowár Fulgar yellow	12	None.	
IV	7	10	2 year pound.	(1) Broach cotton new seed	18	Farm yard manure, 5 tons per acre.	
	8	10		(2) Sprinkling of Jowár. Jowár Fulgar yellow	12	None.	
V	9	10	2 year Successive.	Kumpta cotton	18	Farm yard manure, 5 tons per acre.	
	10	10		Jowár Fulgar yellow	12	None.	
VI	11	10	2 year pound.	Kumpta cotton	18	Do.	
	12	10		(1) Jowár Fulgar yellow (2) Tur and Mug + Math alternately in every 4th row along with Jowár.	12	Do.	
VII	13	10	Nil	Kumpta cotton	18	Farm yard manure, 5 tons per acre.	
VIII	14	10	Simultaneous	(1) Jowár Fulgar yellow (2) Pulses as in plot No. 12.	12	Do. do.	
IX	15	10	Nil	Kumpta cotton	18	None.	
X	16	10	Simultaneous	(1) Jowár Fulgar yellow (2) Pulses as in plot No. 12.	12	Do.	
XI	17	10	Nil	Kumpta cotton	18	Do.	Plot to be ploughed immediately after the crop is harvested.
XII	18	10	Simultaneous	(1) Jowár Fulgar yellow (2) Pulses as in plot No. 12.	12	Do.	Do. do.
XIII	19	10	2 year pound.	Kumpta cotton	24	Farm yard manure, 5 tons per acre.	
	20	10		(1) Jowár Fulgar yellow (2) Tur sprinkling.	15	Do. do.	
XIV	21	10	Do.	Kumpta cotton	24	None.	
	22	10		(1) Jowár Fulgar yellow (2) Tur sprinkling.	15	Do.	
XV	23	10	Nil	Kumpta cotton	24	Farm yard manure, 5 tons per acre.	
XVI	24	10	Simultaneous	(1) Jowár Fulgar yellow (2) Tur sprinkling.	15	Do. do.	
XVII	25	10	2 year Successive.	Jowár Fulgar yellow	12	Do. do.	
	26	10		(a) Rála (b) Gram	12	None.	
XVIII	27	10	Do.	Jowár Fulgar yellow	12	Farm yard manure, 5 tons per acre.	
	28	10		(a) Til (b) Gram	15	None.	
XIX	29	10	Do.	Kumpta cotton	18	Farm yard manure, 5 tons per acre.	
	30	10		(a) Rála (b) Gram	12	None.	
XX	31	10	Do.	Kumpta cotton	18	Farm yard manure, 5 tons per acre.	
	32	10		Rála (late)	12	None.	
XXI	33	10	3 year Compound Double Simultaneous.	Kumpta cotton	18	Farm yard manure, 5 tons per acre.	
	34	10		(1) Jowár Fulgar yellow (2) Pulses as in plot No. 12.	12	Nil.	
	35	10	(1) Wheat (2) Safflower, 8th row along with wheat.	12	Do.		
	36	10	Do.	Kumpta cotton	18	Farm yard manure, 5 tons per acre.	
	37	10		(1) Jowár Fulgar yellow (2) Pulses as in plot No. 12.	12	Nil.	
XXII	38	10	Do.	(a) Udidi (b) (1) Wheat (2) Safflower as in plot No. 35.	12	Do.	
	39	10		Kumpta cotton	12	.....
XXIII	40	10	Do.	Kumpta cotton	18	Farm yard manure, 5 tons per acre.	
	41	10		(1) Jowár Fulgar yellow (2) Pulses as in plot No. 12.	12	Nil.	
	42	10	(1) Wheat (2) Safflower as in plot No. 35.	12	San crop to be ploughed in as green manure.		
XXIV	43	10	Do.	Kumpta cotton	18	Farm yard manure, 5 tons per acre.	
	44	10		(1) Jowár Fulgar yellow (2) Pulses as in plot No. 12.	12	Nil.	
	45	10	(1) Wheat (2) Safflower as in plot No. 35.	12	Niger-seed crop to be ploughed in as green manure.		

Serial No. of		Area.	Kind of Rotation.	Crops in Rotation.	Method of sowing.	Manurial treatment.	Remarks.
Rotation.	Plots.						
XXV	45	Guntur	3 year Com- pound Double- Successive.	Kumpta cotton	Inches. 18	Farm yard manure, 5 tons per acre.	
	46			Gram	19	Nil.	
	47			(1) Jowár Fulgar yellow (2) Pulses as in plot No. 12.	12	Do.	
XXVI	48	Do.	Do.	Kumpta cotton	18	Farm yard manure, 5 tons per acre.	
	49			(1) Wheat (2) Safflower as in plot No. 35.	13	Nil.	
	50			(1) Jowár Fulgar yellow (2) Pulses as in plot No. 12.	12	Do.	
XXVII	51	Do.	Do.	Kumpta cotton	18	Do.	
	52			(1) Jowár Fulgar yellow (2) Pulses as in plot No. 12.	12	Farm yard manure, 5 tons per acre.	
	53			(1) Til (2) Gram	19 12	Nil.	
XXVIII	54	Do.	Do.	Kumpta cotton	18	Nil.	
	55			(1) Jowár Fulgar yellow (2) Pulses as in plot No. 12.	12	Farm yard manure, 5 tons per acre.	
	56			(a) Til (b) Linseed	18 12	Nil.	
XXIX	57	3 year Com- pound.	Com.	(1) Jowár Fulgar yellow (2) Pulses as in plot No. 12.	12	Nil	Deep ploughing by the T. W. plough.
	58			D. A. cotton	18	Farm yard manure, 5 tons per acre.	Do. do.
XXX	59	Do.	Do.	(1) Jowár Fulgar yellow (2) Pulses as in plot No. 12.	12	Nil	Ordinary ploughing with C. plough.
	60			D. A. cotton	18	Farm yard manure, 5 tons per acre.	Do. do.
XXXI	61	Do.	Do.	Do.	24	Do. do.	Deep ploughing with T. W. plough.
	62			(1) Jowár Fulgar yellow (2) Pulses as in plot No. 12.	15	Nil	Do. do.
XXXII	63	Do.	Do.	D. A. cotton	24	Farm yard manure, 5 tons per acre.	Ordinary ploughing with C. plough.
	64			(1) Jowár Fulgar yellow (2) Pulses as in Plot No. 12.	18	Nil	Do. do.

Notes.—When a plot is said to be manured, this means that every second crop of this variety on the same plot needs manure and not every crop.

4. The crops in the rotation experiments stated above totally failed owing to the very scanty rainfall and several of the plots had to be sown with wheat and gram in October, the original crops thereon being grubbed up. These crops also were exceedingly poor and the results are given below merely to record the yield of each plot. As the experiment is on rotations no conclusions can be drawn for some years. Plots 101 to 164 were similar to plots 1 to 64 except that the former were ploughed deep.

No. of Plot.	Names of Crops.	Area.	Drill used.	Manurial Treatment per acre.	Yield per Plot.			Yield per Acre.			Value per acre.
					Principal product in lbs.	Bye-products.		Principal product in lbs.	Bye-products.		
		Gs.			Lbs. oz.	Kadbi or Stalks in lbs.	Chaff in lbs.	Principal product in lbs.	Kadbi or Stalks in lbs.	Chaff in lbs.	Rs. a. p.
1	Cotton	10	24"	F. Y. M. 5 tons	12 0	35	...	48	140	...	4 12 8
101	Cotton	10	24"	F. Y. M. 5 tons	2 0	58	...	8	238	...	0 12 8
2	Jowár, F. Y.	10	12"	Nil	20 0	160	4	80	640	16	10 13 0
102	Jowár, F. Y.	10	12"	Nil	2 0	204	2½	8	1,016	20	13 1 0
3	Cotton	10	18"	F. Y. M. 5 tons	11 8	35	...	48	140	...	4 9 8
103	Cotton	10	18"	F. Y. M. 5 tons	2 8	87½	...	10	150	...	1 0 0
4	Jowár, F. Y.	10	15"	Nil	18 8	136	4	66	544	16	9 2 0
104	Jowár, F. Y.	10	15"	Nil	2 0	214	3	8	856	12	11 1 4
5	Cotton	10	18"	F. Y. M. 5 tons	13 8	36	...	54	144	...	5 6 4
105	Cotton	10	18"	F. Y. M. 5 tons	4 0	60	...	16	200	...	1 9 8
6	Jowár, F. Y.	10	12"	Nil	13 0	188	4	52	732	16	11 0 4
106	Jowár, F. Y.	10	12"	Nil	1 0	222	1	4	858	4	11 4 4
7	Cotton and sprinkling of Jowár.	10	18"	F. Y. M. 5 tons	6 cotton 15 Jowár	20	...	24	80	...	10 8 0
107	Cotton and sprinkling of Jowár.	10	18"	F. Y. M. 5 tons	0 8 cotton, 17 Jowár	15	...	2	60	...	10 2 8
8	Jowár, F. Y.	10	12"	Nil	10 0	150	3	40	636	12	9 6 4
108	Jowár, F. Y.	10	12"	Nil	10 0	150	3	40	636	12	9 6 4
9	Cotton	10	18"	F. Y. M. 5 tons	12 0	37	...	48	149	...	4 12 8
109	Cotton	10	18"	F. Y. M. 5 tons	5 0	43	...	20	172	...	2 0 0
10	Jowár, F. Y.	10	12"	Nil	16 0	218	4	64	872	16	13 2 8
110	Jowár, F. Y.	10	12"	Do.	1 0	206	1½	4	1,004	6	13 7 8
11	Cotton	10	14"	Do.	13 12	40	...	53	100	...	5 8 0
111	Cotton	10	18"	Do.	6 8	30	...	23	130	...	2 3 0
12	Jowár, F. Y.	10	12"	Do.	10 0	170	2	40	704	8	10 11 0
112	Jowár, F. Y.	10	12"	Do.	1 0	188	1	4	752	4	9 9 0

No. of Plot.	Names of Crops.	Area.	Drill used.	Manurial Treatment per acre.	Yield per Plot.			Yield per Acre.			Value per acre.
					Principal product in lbs.	Bye-products.		Principal product in lbs.	Bye-products.		
						Kadbi or Stalks in lbs.	Chaff in lbs.		Kadbi or Stalks in lbs.	Chaff in lbs.	
13	Cotton	10	15"	F. Y. M. 5 tons	5 10	37	...	22	143	...	Rs. a. p.
113	Cotton	10	15"	F. Y. M. 5 tons	3 8	45	...	17	154	...	3 4 0 1 6 4
14	Jowár, F. Y.	10	12"	F. Y. M. 5 tons	1 0	251	2	4	1,004	8	12 11 8
114	Jowár, F. Y.	10	12"	F. Y. M. 5 tons	1 8	239	...	6	1,156	2	14 10 8
15	Cotton	10	15"	Nil	6 14	55	...	27	220	...	2 12 0
115	Cotton	10	15"	Do.	4 8	33	...	15	153	...	1 12 8
16	Jowár, F. Y.	10	12"	Do.	0 8	153	...	2	612	...	7 11 4
116	Jowár, F. Y.	10	12"	Do.	1 0	195	...	4	790	...	9 14 4
17	Cotton	10	15"	Do.	5 8	41	...	22	164	...	2 3 0
117	Cotton	10	15"	Do.	3 0	42	...	13	168	...	1 3 4
18	Jowár, F. Y.	10	12"	Do.	1 0	116	1 1/2	4	584	6	7 7 8
118	Jowár, F. Y.	10	12"	Do.	1 0	200	1	4	800	4	10 3 4
19	Cotton	10	24"	F. Y. M. 5 tons	4 0	58	...	10	232	...	1 9 8
119	Cotton	10	24"	F. Y. M. 5 tons	5 8	46	...	23	184	...	2 3 0
20	Jowár, F. Y.	10	15"	F. Y. M. 5 tons	4 0	255	2	16	1,090	8	13 5 4
120	Jowár, F. Y.	10	15"	F. Y. M. 5 tons	2 0	326	3	8	1,354	12	17 10 8
21	Cotton	10	24"	Nil	3 4	43	...	13	172	...	1 4 8
121	Cotton	10	24"	Do.	6 0	34	...	20	136	...	2 0 0
22	Jowár, F. Y.	10	15"	Do.	2 0	223	2	8	892	8	11 7 4
122	Jowár, F. Y.	10	15"	Do.	1 0	253	1 1/2	4	1,012	6	12 13 4
23	Cotton	10	24"	Do.	4 6	46	...	17	184	...	1 12 0
123	Cotton	10	24"	Do.	2 12	41	...	11	164	...	1 1 8
24	Jowár, F. Y.	10	15"	Do.	1 0	223	2	4	892	8	11 5 4
124	Jowár, F. Y.	10	15"	Do.	0 8	263	1/2	2	1,052	2	13 3 8
25	Jowár, F. Y.	10	12"	F. Y. M. 5 tons	3 0	268	2	12	1,072	8	14 13 8
125	Jowár, F. Y.	10	12"	F. Y. M. 5 tons	1 0	323	1	4	1,412	4	17 13 0
26	Gram	10	12"	Nil	5 0	...	18	20	...	64	1 10 4
126	Gram	10	12"	Nil	2 0	...	20	8	...	80	1 3 0
27	Jowár, F. Y.	10	12"	F. Y. M. 5 tons	2 0	265	1 1/2	8	1,060	6	13 9 0
127	Jowár, F. Y.	10	12"	F. Y. M. 5 tons	0 8	321	1	2	1,354	4	17 2 4
28	Gram	10	12"	Nil	2 0	...	10	8	...	40	0 12 8
128	Do.	10	12"	Nil	3 0	...	23	18	...	92	1 3 4
29	Do.	10	12"	F. Y. M. 5 tons	5 0	...	25	20	...	100	2 0 0
129	Do.	10	12"	F. Y. M. 5 tons	4 0	...	20	16	...	80	1 9 4
30	Do.	10	12"	Nil	8 0	...	28	32	...	112	2 11 8
130	Do.	10	12"	Nil	8 0	...	28	32	...	112	2 11 8
31	Do.	10	12"	F. Y. M. 5 tons	3 0	...	23	12	...	92	1 8 4
131	Do.	10	12"	F. Y. M. 5 tons	4 0	...	20	16	...	80	1 9 4
32	Do.	10	12"	Nil	8 0	...	32	32	...	128	2 14 0
132	Do.	10	12"	Nil	8 0	...	27	32	...	108	2 11 0
33	Wheat	10	12"	F. Y. M. 5 tons	11 0	...	28	44	...	112	3 2 0
133	Do.	10	12"	F. Y. M. 5 tons	15 0	...	32	60	...	128	4 0 0
34	Do.	10	12"	Nil	7 0	...	18	28	...	72	1 15 8
134	Do.	10	12"	Do.	5 0	...	16	20	...	64	1 8 8
35	Do.	10	12"	Do.	13 0	...	28	52	...	112	3 7 8
135	Do.	10	12"	Do.	9 0	...	22	36	...	88	2 8 0
36	Do.	10	12"	F. Y. M. 5 tons	13 0	...	28	52	...	112	3 7 8
136	Do.	10	12"	F. Y. M. 5 tons	14 0	...	23	56	...	112	3 10 8
37	Do.	10	12"	Nil	7 0	...	18	28	...	72	1 15 8
137	Do.	10	12"	Do.	5 0	...	14	20	...	56	1 7 4
38	Do.	10	12"	Do.	12 0	...	26	49	...	104	3 3 4
138	Do.	10	12"	Do.	6 0	...	16	24	...	64	1 11 8
39	Do.	10	12"	F. Y. M. 5 tons	16 0	...	30	64	...	120	4 1 8
139	Do.	10	12"	F. Y. M. 5 tons	8 0	...	22	32	...	88	2 5 4
40	Do.	10	12"	Nil	7 0	...	18	28	...	72	1 15 8
140	Do.	10	12"	Nil	4 0	...	14	16	...	56	1 4 8
41	Do.	10	12"	San crop green manure.	2 0	...	8	8	...	32	0 10 8
141	Do.	10	12"	San crop green manure.	1 0	...	5	4	...	20	0 6 4
42	Do.	10	12"	F. Y. M. 5 tons	13 0	...	26	52	...	104	3 6 4
142	Do.	10	12"	F. Y. M. 5 tons	8 0	...	20	32	...	80	2 4 0
43	Do.	10	12"	Nil	7 0	...	17	28	...	68	1 15 4
143	Do.	10	12"	Nil	3 0	...	10	12	...	40	0 15 0
44	Do.	10	12"	Niger-seed crop green manure.	5 0	...	16	20	...	64	1 8 8
144	Do.	10	12"	Niger-seed crop green manure.	2 0	...	8	8	...	32	0 10 3
45	Do.	10	12"	F. Y. M. 5 tons	12 0	...	22	48	...	88	3 1 0
145	Do.	10	12"	F. Y. M. 5 tons	10 0	...	21	40	...	84	2 10 4
46	Do.	10	12"	Nil	11 0	...	23	44	...	88	2 14 4
146	Do.	10	12"	Do.	13 0	...	23	48	...	112	3 3 0
47	Do.	10	12"	Do.	4 0	...	14	16	...	56	1 4 8
147	Do.	10	12"	Do.	5 0	...	12	20	...	48	1 6 0
48	Do.	10	12"	F. Y. M. 5 tons	14 0	...	27	56	...	108	3 10 0
148	Do.	10	12"	F. Y. M. 5 tons	7 0	...	16	28	...	64	1 14 8
49	Do.	10	12"	Nil	11 0	...	20	44	...	80	2 12 8
149	Do.	10	12"	Do.	8 0	...	18	32	...	72	2 2 8
50	Do.	10	12"	Do.	3 0	...	12	12	...	48	1 0 4
150	Do.	10	12"	Do.	4 0	...	11	16	...	44	1 2 8
51	Do.	10	12"	Do.	9 0	...	22	36	...	88	2 9 4
151	Do.	10	12"	Do.	10 0	...	23	40	...	88	2 11 0

No. of Plot.	Names of Crops.	Area.	Drill used.	Manurial Treatment per acre.	Yield per Plot.			Yield per Acre.			Value per acre.
					Prin- cipal product in lbs.	Bye-products.		Prin- cipal products in lbs.	Bye-products.		
						Kadbi or Stalks in lbs.	Chaff in lbs.		Kadbi or Stalks in lbs.	Chaff in lbs.	
52	Wheat	10	12"	F. Y. M. 5 tons	6 0	...	16	24	...	64	Ra. a. p.
158	Do.	10	18"	F. Y. M. 5 tons	6 0	...	13	24	...	63	1 11 8
58	Do.	10	12"	Nil	18 0	...	28	52	...	112	8 7 8
153	Do.	10	18"	Do.	20 0	...	20	40	...	80	2 9 8
54	Do.	10	12"	Do.	6 0	...	23	24	...	88	1 16 8
154	Do.	10	18"	Do.	8 0	...	23	32	...	92	2 6 0
55	Do.	10	12"	F. Y. M. 5 tons	5 0	...	16	20	...	64	1 8 8
155	Do.	10	18"	F. Y. M. 5 tons	5 0	...	15	20	...	60	1 8 0
56	Do.	10	12"	Nil	11 0	...	22	44	...	88	2 14 4
156	Do.	10	18"	Do.	9 0	...	20	36	...	80	2 8 8
57	Do.	10	12"	Do.	6 0	...	14	24	...	56	1 10 4
157	Do.	10	18"	Do.	5 0	...	12	20	...	48	1 6 0
53	Do.	10	12"	Do.	15 0	...	27	60	...	108	8 13 0
158	Do.	10	18"	Do.	9 0	...	18	36	...	72	2 6 4
59	Do.	10	12"	Do.	5 0	...	13	20	...	48	1 6 0
159	Do.	10	18"	Do.	4 0	...	14	16	...	56	1 4 8
60	Do.	10	12"	Do.	10 0	...	22	40	...	88	2 11 0
160	Do.	10	18"	Do.	7 0	...	16	28	...	64	1 16 8
61	Russian Linseed	10	12"	Do.	...	...	...	...	...	...	.....
161	Local Linseed	10	18"	Do.	...	...	...	...	...	...	0 2 0
62	Jowár and Tur	10	12"	Do.	29 Jowár. 22 Tur.	135	7	112	540	28	15 10 0
162	Jowár and Tur	10	18"	Do.	10 Jowár. 11 Tur.	75	3	40	300	18	7 14 0
63	Russian Linseed	10	12"	Do.	...	...	...	...	...	...	.....
163	Local Linseed	10	18"	Do.	...	...	...	...	...	...	0 2 0
64	Jowár and Tur	10	12"	Do.	23 Jowár. 23 Tur.	160	5	92	640	20	16 9 8
164	Jowár and Tur	10	18"	Do.	9 Jowár. 9 Tur.	70	3	36	280	12	7 0 8

Manurial Experiments.

5. The scheme of experiments included comparative trials of ammonium sulphate with and without farmyard manure on the staple crops of the district, *viz.*, cotton and Jowár. But owing to the unfavourable season, the experiment on cotton had to be abandoned and the results obtained with Jowár are unreliable as the crop was a partial failure. The outturns per acre as obtained are shown below:—

Serial number of Plot.	Area in gunthas.	Crops.	Distance between drill.	PER ACRE.			Remarks.
				Manure.	Yield of		
					Grain.	Kadbi and Chaff.	
70 (a)	12½	(1) Jowár, Fulgar yellow ...	12"	None	Lbs. 115	Lbs. 995	The mixture of Tur was sprinkled with Jowár all over the field in the proportion of 6 Jowár to 1 Tur.
70 (b)	12½	(2) Tur, Local red ...	12"	.....	Nil.	Nil.
100 (a)	25	(1) Jowár, Fulgar yellow ...	12"	160 lbs. am- m o n i u m sulphate.	109	940	
100 (b)	25	(2) Tur, Local red ...	12"	.....	Nil.	Nil.
101 (a)	25	(1) Jowár, Fulgar white ...	15"	4½ tons F. Y. M.	120	1,879	
101 (b)	25	(2) Tur, Local red ...	15"	.....	Nil.	Nil.
102 (a)	25	(1) Jowár, Fulgar white ...	15"	4½ tons F. Y. M. + 200 lbs. am- m o n i u m sulphate.	46	1,554	
102 (b)	25	(2) Tur, Local red ...	15"	.....	Nil.	Nil.
103 (a)	25	(1) Jowár, Fulgar white ...	18"	4½ tons F. Y. M.	99	1,653	
103 (b)	25	(2) Tur, Local red ...	18"	.....	Nil.	Nil.
104 (a)	25	(1) Jowár, Fulgar white ...	18"	4½ tons F. Y. M. + 200 lbs. am- m o n i u m sulphate.	113	2,051	
104 (b)	25	(2) Tur, Local red ...	18"	.....	Nil.	Nil.

From comparison of the outturns per acre at first sight it seems that the plots manured with ammonium sulphate have yielded less. But from observations made from time to time, it can be said with confidence that, had the season been normal the outturn results would have been quite contrary. The crop in the plots manured with ammonium sulphate, being more vigorous, yielded to the drought earlier than plots without any manure or with farmyard manure alone and the majority of the stalks did not produce any earheads. The Tur crop was a total failure in either case.

Cultural Experiments.

6. To test the most suitable time for sowing cotton in the district, several plots were sown with different varieties of cottons, *viz.*—(1) Kumpta, (2) Dhárwár saw-ginned, and (3) Broach, at different times. But owing to the capricious character of the rainfall, almost all the plots failed and they had to be grubbed up except the one in which the Broach and Kumpta were sown in low-lying fields in the 3rd week of July (a month earlier than the local time of sowing cotton). The following tabular statement shows the experiments as planned:—

Number of Plot.	Area.	Crops.	Time of sowing.	Result.
72	A. g. 0 5	D. A. Cotton ...	} 1st week of July ...	Grubbed up.
73 (a)	0 17½	Kumpta Cotton...		
73 (b)	0 17½	Broach Cotton ...		
82 (a)	0 22	Kumpta Cotton...	} 3rd week of July ...	Do.
83 (a)	0 35	Broach Cotton ...		
83 (b)	0 35	D. A. Cotton ...		

Serial number of Plot.	Crop.	Area.	Distance of Drill.	Time of sowing.	Yield of seed-cotton per acre in lbs.	Percentage of lint to seed-cotton.	
						1905-06.	1904-05.
89 (a)	Broach Cotton ...	A. g. 0 20	24"	3rd week of July.	346	30.06	32.3
89 (b)	Kumpta ...	0 20	24"	Do. ...	356	25.10	26.0

In addition to the above plan, three plots were intended to be sown in the middle of August. But the rains then being unfavourable for sowing, the plan was abandoned.

The difference in the percentage of lint to seed-cotton in the year under report and that of last year is due to the short rainfall.

The yield per acre of seed-cotton of the Broach variety is this year much less than that of last year owing partly to short rainfall and partly to late sowing. Even taking the yields of both the varieties, Broach and Kumtha, to be equal, there is a clear gain to cultivators indicated both this year and last in the substitution of the former variety for the latter, in the percentage of lint to seed-cotton and the quality of fibre. In view of this about a thousand pounds of Broach cotton-seed has been imported from Surat and arrangements are being made for distribution of the same among cultivators at different places with instructions regarding the time and method of sowing, etc., during the coming season, provided the monsoon is normal. The results of these experiments at various places will prove whether the importation on a large scale of the seed of this variety for general distribution in the Karnátak is justifiable or not.

7. The experiment with the Dhárwár-American (saw-ginned) cotton with grey and green fuzz on the seed was repeated during the year and the

results though not conclusive owing to scanty rains, are given in the following statement:—

Serial No. of plots.	Area in gunthas.	Crop.	Time of sowing.	Distance in drill.	Yield of seed cotton per acre.	Percentage of lint to seed cotton.	Remarks.
65	5	Dhárwár-American (white seeded) ...	End of August.	18"	Lbs. 86	32.31	} See para. 65 of last year's report.
85	5	Dhárwár-American (green seeded) ...	Do. ...	18"	92	31.94	

Varietal Experiments.

8. The local varieties of Jowárs, Nandyál and Fulgar yellow, were again compared with the Gujarát varieties—Perio and Chapti. The plot with Nandyál totally failed and the results of the rest are as under:—

Serial No. of plot.	Area in gunthas.	Name of Variety.	Drill used.	Yield of plot per acre.			Remarks.
				Grain.	Kadbi.	Chaff.	
102	22½	Fulgar yellow ...	18"	Lbs. 233	Lbs. 1,931	Lbs. 76	Tur was sprinkled in all these plots in the same proportion as Jowár but the crop failed all through.
106 (a)	20	Chapti Jowár ...	18"	446	954	142	
106 (b)	20	Perio Jowár ...	18"	316	980	126	

This justifies a further trial of Perio and Chapti Jowárs in comparison with the local varieties, *viz.*, Fulgar yellow and Nandyál, with regard to the yield. But there is some prejudice against the Chapti Jowár in taste and color of bread made from that Jowár. It is stated that breads made of Chapti Jowár turn out a little reddish though the Jowár grains are perfectly white. People of this side are accustomed to the yellow grains of Fulgar Jowár and do not like reddish breads. But this is not important as it can easily be overcome when they become accustomed to the Jowár.

Another objection to Chapti Jowár is its lightness. They consider that Chapti is lighter in weight than the local Jowár and consequently require more for individual consumption. To test this two equal measures of Jowárs of Chapti and Fulgar yellow were weighed and the results are given below:—

Serial No.	Name of Variety of Jowár.	Quantity measured.	Weight in Lbs. and Tolas.
1	Fulgar yellow	One local seer	Lbs. tolas. 3 32
2	Chapti	Do. ...	3 29½

9. In addition to the varieties mentioned above, 271 varieties of Jowárs collected by the Deputy Director of Agriculture some time ago from all parts of India were tried in two rows of each variety for botanical identification. But the season being unfavourable, an average crop of these varieties was not obtained for the intended identification. A few varieties totally failed and the rest produced a few earheads which are preserved for sowing in the coming season. Certain of them ripen very early and are most suitable for districts of short rainfall or which are liable to partial failures of late rains.

10. Experiments with local and non-local varieties of wheat and linseed were tried but no results of value were obtained on account of failure of rains. From the habit of growth of the foreign variety of linseed (Russian) it is apparent that the variety is more suitable for fibre, as it has a tendency to grow tall without branches.

New crops.

11. *Potatoes*.—As stated in the last year's report various varieties of foreign potatoes were obtained from Scotland and France and are being given a comparative trial to see which will suit the local conditions. All these varieties were received very late and are planted under irrigation in the adjoining village. The results will be published in next year's report. The details of yield of one variety, *viz.*, Eldorado which was grown at Hebli in the winter are given below:—

No. of plot.	Name of Variety of Potatoes.	Manure applied.	Details of sets planted.	Yield in	Details of yield according to size.				Yields compared; plot No. 9=100.
					Big number.	Medium number.	Small number.	Very small number.	
1	Eldorado from Scotland.	F. Y. M. + kainit $\frac{1}{2}$ lb.	20 cut sets...	Lbs. oz. 4 2	2	20	57	18	110
2	Do.	Do.	28 uncut 1" diameter.	5 0	6	37	38	16	95
3	Do.	F. Y. M. + safflower 1 lb.	20 cut sets...	5 4	4	42	48	22	140
4	Do.	Do.	28 uncut 1" diameter.	6 6	26	47	21	12	121
5	Do.	F. Y. M. alone	20 cut sets...	5 6	10	32	33	29	143
6	Do.	Do.	20 uncut $\frac{1}{2}$ " diameter	2 10	1	14	34	9	70
7	Do.	F. Y. M. + Am-sulphate $\frac{1}{2}$ lb.	20 cut sets...	5 8	7	33	42	24	147
8	Do.	Do.	20 uncut $\frac{1}{2}$ " diameter	1 6	...	5	25	4	37
9	Bazár seed	F. Y. M. alone	140 cut sets	26 4	Not counted.				100
10	Do.	F. Y. M. + 3 $\frac{1}{2}$ lbs. kainit and 3 $\frac{1}{2}$ lbs. Am-sulphate.	Do.	21 12	Not counted.				88

The results above given show that the use of kainit and indeed any manure should not be recommended to cultivators without previous trial accompanied by analysis. The application of kainit on potatoes in the above experiments has diminished the yield in every case. The plots treated with farm yard manure alone or with safflower or ammonium sulphate have given better results.

The other result arrived at in this experiment is that planting cut sets of potatoes of about 2 inches in diameter pays better than to plant whole potatoes of one inch diameter. The experiment will have to be continued for conclusive results using whole and cut sets of 2" and 1" diameter. The variety of potato "Eldorado" keeps longer after it is dug out from the ground than the local sort. The local variety which was similarly treated and dug out on the same day with the Eldorado, began to rot after three weeks, while the Eldorado is still (3 months after digging) perfectly sound. The seed of this variety is carefully preserved and will be planted on the Station during the coming season for distribution of seed.

12. *Peruvian (rough) cotton*.—This is a new variety of cotton lately introduced by the Station into the district. A few plants were planted in the rains in the odd, irregular plots of the Station. The plants came up very well. But the failure of rains checked their growth and several of the plants died for want of moisture. The Station having no well, these plants could not be saved. A few plants however survived, grew to a height of 4 feet and bore bolls in some quantity. The experiment though a failure this year owing to very scanty rainfall has indicated the possibility of its successful cultivation on extended areas in ordinary rainfall years.

At the suggestion and advice of the Department, the Jághirdár of Hebli planted in the month of July on a very inferior stony land about 200 cotton plants of this variety. The area occupied was 5 gunthas; the plants germinated and thrived well in the beginning; but owing to the absence of late rain they showed signs of withering. The Jághirdár was advised to give occasional waterings from the well which was close by. The plants then thrived better and reached a height of about 5 feet and bore numerous bolls, some of which

opened freely and others did not. The total weight of seed-cotton collected from an area of 5 gunthas amounted to 30 lbs. which, considering the soil and season, is very promising. The plants are now pruned and it is hoped that they will give better results next year, when better established and receiving a better rainfall.

13. *Groundnut*.—This is another crop newly introduced into the district. Some 2 or 3 years ago the cultivation of this crop was quite unknown in the district. But of late a few fields are seen here and there under this crop without irrigation. The soil and rainfall round about Dhárwár appear to be suitable for dry-crop cultivation of the groundnut. A small plot of one acre was sown with the Surat Deshi variety but the scarcity of late rains checked the growth of the creepers and consequently the outturn was negligible:—

Serial No. of plot.	Area.	Name of Variety.	Seed rate per acre.	Outturn per acre.	Remarks.
105	Acres. 1	Groundnut (Surat Deshi.)	Lbs. 40 clean seed.	Lbs. 75	Several of the creepers had withered for want of rain.

Cotton-Breeding.

14. The several methods of improvements of cotton, *viz.*:—

- (a) Selection in indigenous varieties,
- (b) Acclimatization of exotic varieties,
- (c) Cross-fertilization between inferior and superior varieties,

of both indigenous and exotics are continued on the Station.

The selection of cotton for seed in the Kumpta variety after plant to plant inspection in the year 1904-05 is distinctly encouraging. The superiority of the crop raised from such seed was distinctly noticeable in spite of the unfavourable season. It is hoped that from the continued method of selection of seed from the most vigorous plants the local Kumpta can be brought much nearer to the level of Broach in respect of prolificness in yield.

Among the newly introduced varieties from America 17 E. (King) and 20 E. (Culpepper) appear to suit the conditions of the district. Both are late varieties as grown here, and, though sown in July, did not ripen till spring and the bolls then opened very freely. The Sea-island variety was a failure.

15. Numerous crosses between the acclimatized Dhárwár-American and several other indigenous varieties were grown with fair success although the season was unfavourable, and further sub-divisions were made in the varieties according to prolificness of the plants or the time of harvest.

The various varieties of cotton enumerated above are reserved for next year's sowing and their names with the percentages of lint to seed cotton are given below:—

No. of Variety.	Name of Variety.	Sub-divisions.	Picking season.	Remarks on Fibre.	Percentage of Fibre to seed cotton.
1245 (a) ...	D. A. + Christopher ...	Extra fine early ...	Autumn ...	Much longer than D. A.; leaves seed easily.	32.0
1246 (b) ...	Khákhi Lylpur + Abassi white.	White colored ...	Do. ..	Fine and good ...	32.66
1247 (a 1) ...	Khákhi Lylpur + Abassi khákhi.	Pure white ...	Do. ...	Do. ...	27.32
1247 (a 2) ...	Do. ...	Do. ...	Spring ...	Shorter and weaker than No. (a 1).	29.27
1250 (a 1) ...	D. A. + Varádi ...	Extra fine early ...	Autumn ...	Very weak ...	30.21
1250 (c 1) ...	Do. ...	Extra prolific early ...	Do. ...	Very short ...	28.69
1257 (a 1) ...	D. A. + Kumpta Prolific ...	Extra fine early ...	Do. ...	.....	33.24
1257 (a 2) ...	Do. ...	Do. ...	Spring ...	.....	31.02
1257 (b 1) ...	Do. ...	Fine late ...	Autumn ...	Longer and stronger than D. A.	33.15

No. of Variety.	Name of Variety.	Sub-divisions.	Picking seasons.	Remarks on Fibre.	Percentage of Fibre to seed cotton.
1257 (b 2) ...	D. A. + Kumpta Prolific	Fine late	Spring	Not so good as (b 1)...	32.62
1257 (b 3) ...	Do.	Do.	Spring alone	Very weak	32.65
1257 (c 1) ...	Do.	Prolific late	Autumn	Almost as good as (b 1).	31.51
1257 (c 2) ...	Do.	Do.	Spring	Fairly long and strong for spring picking.	33.51
1257 (c 3) ...	Do.	Do.	Spring alone	Very weak	33.19
38 E (a 1) ...	New Orleans	Extra fine early	Autumn	Long but rather weak.	35.55
38 E (a 2) ...	Do.	Do.	Spring	Weaker than (a 1) ...	29.56
38 E (b 1) ...	Do.	Fine early	Autumn	Do.	29.25
38 E (b 2) ...	Do.	Do.	Spring	Do.	30.04
1249 (a 1) ...	D. A. + Kumpta	Extra fine early	Autumn	Very weak	29.66
1249 (a 2) ...	Do.	Do.	Spring	Do.	33.54
1249 (b 1) ...	Do.	Fine early	Autumn	Strong but not very long.	30.65
1249 (b 2) ...	Do.	Do.	Spring	Do.	31.17
1249 (c 1) ...	Do.	Extra prolific early.	Autumn	Do.	27.63
1249 (c 2) ...	Do.	Do.	Spring	Do.	31.53
1249 (d 1) ...	Do.	Fine late	Autumn	Very short; little better than D. A.	28.06
1249 (d 2) ...	Do.	Do.	Spring	Do.	32.22
1249 (d 3) ...	Do.	Do.	Spring alone	Do.	32.08
1249 (e 1) ...	Do.	Prolific late	Autumn	Very short and coarse.	27.10
1249 (e 2) ...	Do.	Do.	Spring	Better than (e 1) ...	31.22
1249 (e 3) ...	Do.	Do.	Spring alone	Do.	29.20
1252 (a 1) ...	D. A. + D. A. Fine lint	Extra fine early	Autumn	About the same as D. A.	29.85
1252 (a 2) ...	Do.	Do.	Spring	Do.	35.0
1252 (b 1) ...	Do.	Fine early	Autumn	Do.	29.73
1252 (b 2) ...	Do.	Do.	Spring	Do.	34.01
1252 (c 1) ...	Do.	Fine late	Autumn	Better than D. A.	33.03
1252 (c 2) ...	Do.	Do.	Spring	Do.	34.19
1252 (c 3) ...	Do.	Do.	Spring alone	Do.	32.68
1252 (d 1) ...	Do.	Prolific late	Autumn	Coarse	31.20
1252 (d 2) ...	Do.	Do.	Spring	Very short and coarse.	31.51
1252 (d 3) ...	Do.	Do.	Spring alone	Do.	31.58
1253 (a 1) ...	D. A. + D. A. Prolific	Extra prolific early.	Autumn	Coarse	28.57
1253 (a 2) ...	Do.	Do.	Spring	Do.	29.74
1253 (b 1) ...	Do.	Fine early	Autumn	Very short and poor.	34.48
1253 (b 2) ...	Do.	Do.	Spring	Better than (b 1) ...	32.20
1253 (c 1) ...	Do.	Fine late	Autumn	Very short	37.5
1253 (c 2) ...	Do.	Do.	Spring	Slightly better than (c 1).	30.84
1253 (c 3) ...	Do.	Do.	Spring alone	Do.	31.13
1253 (d 1) ...	Do.	Prolific late	Autumn	Very short and coarse.	34.48
1253 (d 2) ...	Do.	Do.	Spring	Do.	31.90
1253 (d 3) ...	Do.	Do.	Spring alone	Better than (d 1) and (d 2).	31.63
1254 (a 1) ...	D. A. + Ghoghári fine lint	Fine early	Autumn	Fairly long and strong.	31.14
1254 (a 2) ...	Do.	Do.	Spring	Do.	30.56
1255 (a 1) ...	D. A. + Ghoghári Prolific	Prolific early	Autumn	Long and strong and promising.	33.39
1255 (a 2) ...	Do.	Do.	Spring	Do.	31.28
1256 (a 1) ...	D. A. + Kumpta. Fine lint	Extra fine early	Autumn	Very long but rather weak; promising.	25.24
1256 (a 2) ...	Do.	Do.	Spring	Do.	24.01
1256 (a 3) ...	Do.	Do.	Spring alone	Do.	28.81
1256 (b 1) ...	Do.	Fine early	Autumn	Do.	28.33
1256 (b 2) ...	Do.	Do.	Spring	Do.	30.46
1256 (c 1) ...	Do.	Fine late	Autumn	Do.	31.51
1256 (c 2) ...	Do.	Do.	Spring	Do.	28.99
1256 (c 3) ...	Do.	Do.	Spring alone	Rather shorter than above (a 1).	26.60
1256 (d 1) ...	Do.	Prolific late	Autumn	Do.	31.14
1256 (d 2) ...	Do.	Do.	Spring	Do.	33.89
1256 (d 3) ...	Do.	Do.	Spring alone	Do.	25.12
	D. A. Green	Early	Autumn	One inch long and good.	29.17
	Do.	Do.	Spring	Do.	31.19
	Do.	Late	Do.	Do.	31.94
	D. A. White	Early	Autumn	3/4th of an inch long; good.	31.65
	Do.	Do.	Spring	1 inch long; good	31.47
	Do.	Late	Do.	3/4th inch long; good.	32.31
	Fruit from old plants	Extra fine late	Do.	Do.	31.32
	Fruit from new plants	Do.	Do.	Do.	31.40
	Texas Bur. old plants	Do.	Do.	Do.	40.49
	Kings improved	Do.	Do.	Do.	34.55
	Kemper, County, old plants	Do.	Do.	Do.	31.66
16 E (a) ...	Christopher	Do.	Do.	Lint. fairly good. Trials to be continued.	31.92
16 E (b) ...	Do.	Fine late	Do.		34.55
16 E (c) ...	Do.	Prolific late	Do.		31.60

Number of Variety.	Name of Variety.	Sub-divisions.	Picking Season.	Remarks on Fibre.	Percentage of fibre to seed cotton.
16 E (d)	Christopher	Fine late	Spring		32.23
17 E (a 1)	King	Fine early	Autumn		35.18
17 E (a 2)	Do.	Do.	Spring		30.86
17 E (a 3)	Do.	Do.	Spring alone		34.69
17 E (b 1)	Do.	Prolific late	Autumn		35.0
17 E (b 2)	Do.	Do.	Spring		55.89
17 E (b 3)	Do.	Do.	Spring alone		35.29
17 E (c 1)	Do.	Fine late	Autumn		35.59
17 E (c 2)	Do.	Do.	Spring		36.50
17 E (c 3)	Do.	Do.	Spring alone		33.07
18 E (a 1)	Excelsior	Extra fine early	Autumn		32.53
18 E (a 2)	Do.	Do.	Spring		32.05
18 E (b 1)	Do.	Fine early	Autumn		34.13
18 E (b 2)	Do.	Do.	Spring		33.07
18 E (c 1)	Do.	Black seeded	Autumn		29.41
18 E (c 2)	Do.	Do.	Spring		29.49
18 E (d 1)	Do.	Fine late	Autumn		36.12
18 E (d 2)	Do.	Do.	Spring		33.63
18 E (e 1)	Do.	Prolific late	Autumn		35.48
18 E (e 2)	Do.	Do.	Spring		34.49
19 E (a 1)	Sea-Brook	Prolific early.	Black seed. Autumn		29.23
19 E (a 2)	Do.	Do.	do. Spring	Lint fairly good. Trials to be continued.	28.33
19 E (a 3)	Do.	Do.	Green Autumn		25.0
20 E (a 1)	Culpepper	Fine early	do. Do.		31.42
20 E (a 2)	Do.	Do.	Spring		32.22
20 E (b 1)	Do.	Prolific late	Autumn		32.0
20 E (b 2)	Do.	Do.	Spring		33.82
20 E (b 3)	Do.	Do.	Spring alone		33.14
20 E (c 1)	Do.	Fine late	Autumn		33.59
20 E (c 2)	Do.	Do.	Spring		31.05
26 E (a 1)	Sea Island	Prolific early.	Black seed. Autumn		29.29
26 E (a 2)	Do.	Do.	Spring		33.33
26 E (a 3)	Do.	Do.	Green Autumn		31.22
26 E (a 4)	Do.	Do.	Spring		29.16
	Egyptian Abassi	.....	Do.		32.37
	Ghoghari 05 V	.....	Do.		33.88
	Kumpta 04 Q	Fine fibre	Do.		22.78
	Do.	Long fibre	Do.		24.37
	Do.	Fine and long fibre	Do.		22.67
	Broach 04 V	.....	Do.		30.06
	Kumpta 04 V	.....	Do.		25.10

The quality of the cotton as between autumn and spring harvests from the same plants show marked differences which are in general perhaps in favour of the autumn picking. The whole question however requires investigation on a much larger scale than has yet been possible and this will be done.

Insect-pests.

16. Attention is paid to the damage caused by insects to the crops on the Station and the remedies suggested by the Entomologist are carefully tried. The pest of red cotton bug (*Dysdercus singularatus*) in the hybrid varieties of cottons was diminished to a very considerable extent by collecting the bugs and destroying the same.

Several specimens of insects were sent to the Entomologist to the Government of India for identification with details of the crops attacked by such insects, and their names, as identified by the Entomologist, with his remarks are given below:—

Serial No.	Insects found attacking.	English Name.	Scientific Name.	Remarks by the Entomologist.
1	Jowar heads	Red Pumpkin Beetle.	Anlaoptora-favicolis Kust.	The record of this insect in Jowar head is very unusual; the beetle usually feeding on cucurbitaceous plants. The only method of stopping the damage is to shake the heads over a pot of kerosine and water shaking the beetles into the pot.
2	Cotton Bolls	Spotted Boll-worm No. 73.	Earias Forbia Stoll	The moths fly at night and can be caught in the evening.
3	Cotton leaves	Cotton leaf hopper	.....	The specimen sent is a new species of cotton leaf hopper and not the usual species.
4	Cotton Crop	Common Bug	Antilochus coqueberti.	It is not recorded as being injurious in any way to crop.
5	Brinjal leaves	Lace wing bugs	Urentinsechinus	I have seen the insect often in brinjal in Surat. There is no remedy but spraying the plants with a contact poison such as kerosine emulsion.

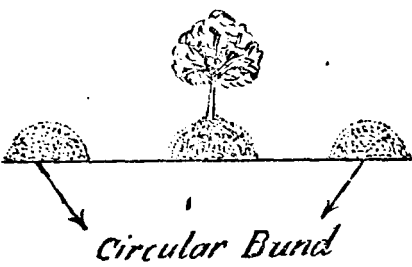
New Implements.

17. During the year under report a new plough of the Egyptian pattern was received at the Station. The plough is a very light one with a broad shovel-like iron share. It is not suitable for work in the hot weather, when the soil gets extremely hard. Further trials of the plough are to be given after the anti-monsoon.

Manurial Experiments at Sirsi.

18. A small experiment has been commenced at Alesar, a village near Sirsi (Kánara), to find out a suitable artificial manure as a substitute for the leaf-mould, now so largely used by the Havik gardeners of Kánara. To this end a small area containing 40 betel-trees was leased by the Department in the beginning of the year under report and a permanent scheme of treatment to the trees was drawn up after personal inspection of the gardens. The area is rented for the present for 5 years.

The scheme of experiments is as below :—

Number of trees.	Treatment per tree.
1, 3, 5, 7, 9, 11 ...	To receive about a gallon of water after every 10 days after the monsoon. The earth to be heaped up round each tree as indicated in the sketch :—
 <p><i>Circular Bund</i></p>	
2, 4, 6 ...	To receive 10 lbs. of Karanj cake (<i>Pongemia glabra</i>).
8, 10, 12 ...	To receive 10 lbs. of cotton seed soaked for 24 hours and then crushed (cake not being available).
13, 15, 17 ...	To be untreated.
14, 16, 18, 20 and 22.	To receive leaf-mould in the ordinary way (35 lbs.).
19, 21, 23 ...	To receive 10 lbs. of safflower cake.
24, 26, 28, 30 ...	To receive ordinary farm yard manure (20 lbs.).
25, 27, 29, 31 ...	To receive a mixture of 5 lbs. bone meal with twice the quantity of earth.
32, 34, 36 ...	To receive a mixture of 5 lbs. bone meal with twice the quantity of farm yard manure.
33, 35 ...	To receive 5 lbs. of dissolved bones with twice the quantity of earth.
37, 38, 39, 40 ...	To receive (after rains) $\frac{1}{2}$ lb. of nitre with 5 lbs. of soil.

Several of the betel-palms had a pepper vine in their basins and trailing on the stems. The manure on the betel-palm was also of necessity a trial on pepper vine.

The produce of each betel-tree and pepper vine was separately weighed and the number of betel-nuts of each tree separately counted for comparison of the produce in future years to judge the effect of different manures proposed in the experiments. No interest will attach to the yields of the 1st year and these are therefore not reported.

19. The details of cost of the Sirsi experiment are given below :—

Receipts.	Amount.	Expenditure.	Amount.
	Rs. a. p.		Rs. a. p.
To Sale of Betel-nuts ...	28 1 9	By Purchase of manure ...	10 4 0
„ Cardamoms ...	0 15 0	„ Carriage charges on manure to Sirsi ...	8 8 0
		„ Rent of land ...	15 0 0
		„ Wages of a permanent man for 7 months at Rs. 3 per month ...	21 0 0
		„ Wages for making new Bha-rana ...	10 4 0
		„ Wages for coolies employed in tying hoods, manuring and harvesting nuts, etc. .	20 9 0
Total ...	29 0 9	Railway fare of servant from Dhárwár to Háveri and back...	1 3 6
Net cost ...	57 11 9		
Total ...	86 12 6	Total ...	86 12 6

Distribution of Seed.

20. The cotton-seed distributed from the Station is of the acclimatized Dhárwár American and the local Kumpta cotton.

The Inspector-General of Agriculture in India, the Director of Research Institute, Pusa, and the Directors of Agriculture of Punjáb and Bengal were supplied during the year to the extent of 11,000 lbs. of cotton-seed. The Dewán Sáheb of Tanjore and the Director of Agriculture, Baroda, also obtained seeds from the Station. Besides these, numerous applications from other Provinces, from Zamindárs and from cultivators were received for cotton-seed, which were all complied with.

In addition to the seed supplied to other provinces the Station has distributed large quantities of cotton and Jowár seeds to the local cultivators and other Agricultural Stations of the Department in the Presidency.

21. The following statement shows the amount of different seeds distributed in the Presidency :—

Serial Number.	Names to whom the seed was distributed.	Cotton-seed Kumpta and Dhárwár American.	Jowár seed.	Tur.	San.	Wheat.	Castor seed.	Guvár seed.	Peruvian cotton-seed.
		Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
1	Cultivators and land holders.	119,200	191	20	20	...	...	...	5
2	College Farm, Dhárwár ...	20	8	...	20	...	...	...	...
3	Dhárwár Prison ...	...	200	...	...	...	...	...	...
4	Dhulia Station ...	5	...	...	...	5	4	...	...
5	Poona Station ...	60	...	...	...	...	...	...	...
6	Nadiád Station ...	...	...	...	...	...	...	2	...
7	Mánjri Station ...	20	...	...	...	...	...	...	...
	Total ...	119,305	399	20	40	5	4	2	5½

Distribution of Implements.

22. The demand for English Turn-wrest ploughs is increasing day by day. Twenty-four new ploughs were sent out on cash terms from the Station to cultivators of Dhárwár, Belgaum and Bijápur districts. The work of a small chaff-cutter was demonstrated to all visitors that came to the Station. Several of these machines are now used by cultivators, either bought through the Station or ordered direct from Bombay.

Chaff-cutters are now locally made at Belgaum by Messrs. Kirlosker Brothers. The machine is a fairly good one and deserves encouragement.

Visitors.

23. The distribution of selected cotton-seed and the improved English ploughs have made the Station very popular throughout Karnatak and many cultivators visited the Station to see the crops and operations thereon. A record of important visitors, that came to the Station during the year is kept and their number is as under :—

30 European officers.
25 Native officers.
103 Cultivators.

Besides the above, use is made of the Station by the Agricultural teacher at the Training College. He brings his students often in the season to show them the different methods of cultivation and the various crops grown on the Station.

Accounts.

24. The Station has worked at a net cost of Rs. 6,757-8-3 against Rs. 3,741-8-8 in the previous year. The heavy loss is due to unfavourable season and several permanent improvements such as bunding, digging, etc., to bring the area into proper condition for experimental purpose.

The following is the account of profit and loss of the station for the year 1905-1906 :—

Date.	Losses.	Amount.	Date.	Profits.	Amount.
31st March 1906.	To Establishment account ...	Rs. a. p. 1,847 10 8	31st March 1906.	By Farm crops account ...	Rs. a. p. 417 3 5
"	" Travelling Allowance account.	425 0 0	"	" Dead stock account foreign and local agricultural implements.	177 13 2
"	" Telegram and Service Stamps account.	91 15 0	"	" Fodder and Grass account.	173 15 9
"	" Labour account ...	1,189 8 3			
"	" Incidental account ...	498 10 1			
"	" Furniture account ...	11 0 0			
"	" Petty Supplies account .	74 0 0			
"	" Petty construction account.	299 13 11			
"	" Cattle account for up-keep.	904 11 11		Total ...	769 0 4
"	" Farm yard manure account.	6 0 10			
"	" Artificial manure account	730 0 0			
"	" Valuation account ...	367 13 9			
"	" Rent account ...	981 4 0		Net cost to Government ...	6,757 8 3
"	" Store account ...	99 0 2			
	Total ...	7,526 8 7		Total ...	7,526 8 7

IV.—OPERATIONS ON THE DHULIA AGRICULTURAL STATION.

Season.

It was much shorter than the normal. Rains held off in September and Jowár and cotton crops suffered considerably, Tur failed altogether and the sowings of rabi wheat diminished. The rainfall was 71 per cent. of normal :—

Fortnightly period.		Fall in 1905-06.		Average.	
		In.	cts.	In.	cts.
June	... { 1st fortnight	0	7	}	3 90
	... { 2nd do.	3	46		
July	... { 1st do.	2	65	}	5 77
	... { 2nd do.	6	57		
August	... { 1st do.	0	34	}	3 97
	... { 2nd do.	2	37		
September	... { 1st do.	2	46	}	6 28
	... { 2nd do.	.....		
October to May	... ..	.....			2 48
Total		17	92		22 40

Manurial Experiments.

2. Ammonium sulphate and Mowra flower (*Bassia latifolia*) refuse from a distillery were tried on cotton and wheat in comparison with farm-yard manure and no manure. Ammonium sulphate was given as a top-dressing. The rainfall after its application was short and the manure was not completely effective.

The low lying plots received more moisture and some of them, though unmanured, yielded more than their corresponding manured halves. The table following shows the results of this manure on different plots of cotton :—

Serial No. of cotton plots.	Area.	Variety of cotton.	Drill used.	Average per acre.				
				Manure applied.	Yield of seed-cotton.	Value of produce.	Cost of cultivation.	Net profit.
					Lbs.	Rs. a. p.	Rs. a. p.	Rs. a. p.
1 {	20 20	Khasioteah cotton.	18"	Am. Sulph. 1 cwt. ...	510	48 5 10	29 5 10	17 0 0
			18"	Nil	652	59 4 4	12 11 1	46 9 3
2 {	20 20		18"	Am. Sulph. 1 cwt. ...	566	51 7 4	30 5 10	21 1 6
			18"	Nil	450	40 14 6	12 11 1	28 3 5
3 {	10 10		18"	Am. Sulph. 1 cwt. ...	624	56 11 8	25 5 9	31 5 11
			18"	Nil	452	41 1 4	10 11 0	30 6 4
4 {	10 10		24"	Am. Sulph. 1 cwt. ...	496	45 1 4	25 5 10	19 11 6
			24"	Nil	512	46 8 8	12 11 1	33 13 7
5 {	10 10		24"	Am. Sulph. 1 cwt. ...	496	45 1 4	25 5 10	19 11 6
			24"	Nil	484	44 0 0	12 11 1	31 4 11
6 {	14 14	18"	Am. Sulph. 1 cwt. ...	694	63 1 5	26 4 0	36 13 5	
		18"	Nil	837	76 1 5	13 10 5	62 6 11	
7 {	20 20	18"	Am. Sulph. 1 cwt. ...	700	63 10 2	25 7 3	37 2 11	
		18"	Nil	663	60 2 10	13 12 4	46 6 6	
8 {	10-25 10-25	18"	Am. Sulph. 1 cwt. ...	706	64 3 4	26 10 7	37 8 9	
		18"	Nil	698	63 8 0	13 15 9	49 5 3	
9 {	10 10	Comilla ...	24"	Am. Sulph. 1 cwt. ...	564	78 5 4	23 7 3	51 14 1
		Do. ...	24"	Nil	392	54 7 0	18 12 6	40 10 6

3. The following table shows results of different manures on irrigated wheat :—

Crop.	Yield per acre in lbs. from plots manured with									
	No manure.		Farm yard manure 10 cart-loads per acre.		Farm yard manure 10 cart-loads + 1 cwt. of Ammonium Sulphate.		Ammonium Sulphate 1 cwt.		Mowra refuse 8 cart-loads.	
	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.	Grain.	Straw.
Wheat Moondie ...	Lbs. 1,648	Lbs. 1,680	Lbs. 1,584	Lbs. 1,680	Lbs. 1,376	Lbs. 1,560	Lbs. 1,440	Lbs. 1,720	Lbs. 1,520	Lbs. 2,000

Note.—The area of each plot was 5 gunthas.

Cultural Experiments.

4. The effect of wide drilling in the case of Bani cotton was contrary to that obtained with the local variety.

Crop.	Drill.	Yield of seed-cotton in lbs. per acre.	Value of produce per acre.
Bani cotton ...	24"	670	Rs. a. p. 60 14 6
	18"	632	57 7 3

The result supports the statement made in paragraph 38 of report for 1903-04.

Varietal Experiments.

5. *Cotton*.—Bani, Comilla, Broach and Kumpta cottons were grown for comparison with the Khándesh variety. Bani and Comilla cropped successfully and came to picking in 3½ months. The bolls of the last two varieties (Broach and Kumpta) did not develop or open properly.

Table of results:—

Serial No.	Area in Gunthas.	Crop.	Drill.	Yield of seed-cotton per acre.	Remarks.
1	20	Bani Cotton ...	24"	Lbs. 670	These plots received no manure.
2	10	Comilla Cotton ...	24"	392	
3	3	Broach do. ...	24"	114	
4	3·6	Kumpta do. ...	18"	234	
5	10·25	Khándesh ...	18"	698	

Percentage of lint to seed-cotton:—

Variety of cotton.		Percentage of lint to seed-cotton.	Remarks.
Local name.	Commercial name.		
Bani	... Hinganghát ...	25·5	All will give higher percentage in better season.
Varádi	... Khándesh ...	30·5	
Comilla	... Bengal ...	45·5	

6. The following table shows the results of Jowár, Bájri, and Til of different varieties grown:—

Serial No.	Crop.		Drill.	Average yield per acre.			Value of outturn per acre.
	Name.	Variety.		Grain.	Stalks.	Chaff.	
1	Jowár	Mothi local	18"	Lbs. 850	Lbs. 2,310	Lbs. 315	Rs. 35 12 10
2		Gudghi	12"	853	2,706	324	37 8 6
3		Chapti	18"	21	5,091	51	21 3 3
4		Perio	18"	80	4,560	53	19 6 3
5	Bájri	Nadiád	12"	1,040	1,455	...	45 13 0
6		Local	12"	897	1,344	...	39 14 0
7	Til	Kátháli	12"	1,027	...	...	65 13 0
8		Havri	12"	842	...	...	55 9 4

7. *Wheat*.—Of the seven varieties grown, four are botanically different. They were grown under irrigation in a few lines on very small irregular plots. Next year the more successful of these varieties will be grown on large areas for comparison of yields.

Observations made regarding these are given in the following table:—

Local name of the variety.	Diagnostic character.	Period of ripening.	Remarks.
Bansi	White awned	3½ months	First three varieties thrive very well. Bansi is largely exported from Khándesh and Moondi from Central Provinces. Khapli is a hardier variety.
Kálakusal or Bakshi	Black awned	4¼ months	
Moondi	Awnless	4 months	
Khapli	Spelt wheat	4¼ months	

Experiments with new Crops.

8. *Cotton*.—Comilla and Bani are the new cotton varieties which met with some success. The higher proportion and pure white colour of lint and the clean boll of the Comilla cotton attracted a very great demand for its seed. The price offered for its seed-cotton was 50 per cent. higher than that for the local variety.

9. *Saidi beans*.—These beans gave the following result:—

Area sown.	Drill.	Time of sowing.	Yield per acre.		Remarks.
			Grain.	Chaff.	
Gunthas. 10	18"	25th November 1905.	Lbs. 104	Lbs. 168	The crop got rusted in its ripening period.

It requires further trial.

10. *Oats*.—Only a few rows were grown. The plants tillered freely and grew luxuriantly; but the grain obtained was not quite full. It requires 5 months, *i. e.*, 1½ months more for ripening than local wheat:—

Area.	Drill.	Time of sowing.	Average yield per acre.		Remarks.
			Grain.	Chaff.	
Gunthas. ½	18"	8th November 1905.	Lbs. 80	Lbs. 240	Next year's trial would give more definite results.

Cross-breeding Experiments.

11. To prevent the cotton-hybrids from being seriously damaged by the failure of rains, it was necessary to irrigate them when there was no hope of rain. Notwithstanding the abnormal seasonal conditions the following crosses produced fairly good cotton:—

No. of Hybrid.	Amount of selected seed obtained.	No. of Hybrid.	Amount of selected seed obtained.	No. of Hybrid.	Amount of selected seed obtained.
1074	1 oz.	1140	$\frac{1}{2}$ oz.	1157	3 ozs
1077	$\frac{1}{2}$ oz.	1143	3 $\frac{1}{2}$ ozs.	1158	1 $\frac{1}{2}$ ozs
1089	1 $\frac{1}{2}$ ozs.	1146	$\frac{1}{2}$ oz.	1166	$\frac{1}{4}$ oz.
1101	$\frac{1}{4}$ oz.	1147	2 ozs.	1199	2 ozs.
1113	$\frac{1}{4}$ oz.	1149	1 oz.	1200	3 ozs.
1123	$\frac{1}{2}$ oz.	1150	2 ozs.	1201	3 ozs.
1125	6 ozs.	1152	1 oz.	1202	1 oz.
1130	$\frac{1}{4}$ oz.	1153	$\frac{1}{4}$ oz.	1205	2 ozs.

Pests.

12. Cotton plants in fields, which had borne the same crop in the last two years, suffered much from cotton wilt.

Irrigational Experiments.

13. Wheat was grown under well irrigation as a second crop after Til and as a first (rabi) crop after kharif fallow. The quantity of water absorbed by the crop after Til was 8,100 cubic feet more per acre than that done by the crop after fallow (*vide* table given below).

Method of measuring water.—The cubic contents of one water lift filled with water were determined on average and the number of Kos emptied for irrigating a particular plot was counted. From this the quantity of water for the plot was found. The result goes to support the statement made in paragraph 23 of the report for 1904 that “the effect of fallowing is merely to store up water in the soil for the next season’s crop.”

Serial No.	Crop.	Crop in previous season.	Manure applied.	Quantity of water given per acre.	Yield of grain in lbs. per acre.	Remarks.
				Cubic feet.		
1	Wheat	Til	No manure	80,100	1,120	Wheat after Til ripened three weeks before the other plots. This must be due partly to the insufficient supply of water.
2	Do.	Do.	6 cart-loads F. Y. M.	80,100	1,268	
3	Do.	Fallow	No manure	72,000	1,643	
4	Do.	Do.	10 cart-loads F. Y. M.	72,000	1,534	
5	Do.	Do.	10 cart-loads F. Y. M. + 1 cwt. Amn. Sulphate	72,000	1,376	
6	Do.	Do.	1 cwt. of Amn. Sulphate.	72,000	1,440	
7	Do.	Do.	Mowra refuse 8 cart-loads.	45,030	1,520	

Implements.

14. The new implement tried was the Egyptian plough. Some of the merits of the English turn wrest plough and the Indian plough are to a certain extent combined in this Egyptian pattern. It cuts rectangular furrows and leaves no blanks if worked close. It is cheap and can be made and mended by country carpenters. The following table will show its work in comparison with that of the local plough:—

Name of Flough.	Cost.	No. of Bullocks required.	Area ploughed in a day.	Nature of work done.
Khândesh ...	Rs. 8 to 10	2	Gunthas. 20 to 30	Section of furrow is triangular and its area is $\frac{1}{2}$ square foot.
Egyptian ...	7 to 9	4	15 to 20	Section of furrow is rectangular and its area is $\frac{1}{2}$ square foot.

Experiments made off the Station.

15. These were of Ammonium Sulphate on sugarcane crop at Chitegaon near Chálisgaon. The soil is medium black and $2\frac{1}{2}$ to 3 feet deep. The water is sweet and stands about 35 feet below the surface of the ground.

The results are tabulated below :—

Crop.	Quantity of manure applied per acre.	Nitrogen supplied by manure.	Yield of Gul per acre.	Value of Produce per acre.	Remarks.
		Lbs.	Lbs.	Rs. a. p.	
Sugarcane	20 Tons F. Y. M. x 200 Lbs. Ammonium Sulphate.	310	4,714	432 2 0	The quality of Gul from first plot was much superior to that from the other in point of grain, color and sweetness.
Do.	20 Tons of F. Y. M. only	270	4,590	382 8 0	

The manure (Ammonium Sulphate) turned out to be apparently a preventive against white ants. The Gul from plot No. 1 was valued at Rs. 2 more per Palla of 240 lbs. These experiments were done in the fields of Mr. S. D. Garud, B.A. The extra cost required for experiments of this year was kindly borne by him for which thanks are due.

Distribution of Seeds and Implements.

16. The following table gives the details of seeds and implements distributed from this Station :—

Kind of Seed or Implement.	Quantity or number.	Place to which distributed.	Remarks as to the result of crops or trials of implements.
Chapti Jowár	8 lbs.	Dhulia	Crop failed.
Khándesh Cotton-seed	40 "	Mhasrul, Násik	The seed was sown late and the crops failed through insufficient rains.
Jari yellow flowered	40 "		
Bani do.	40 "		
Khándesh Cotton	40 "	Calcutta	For next season.
Wheat Seed	2 "	Morane near Dhulia	The crop was successful.
Do.	8 "	Economic Botanist, Pusa...	Result not known.
Do.	2 ozs.	Inspector-General of Agriculture.	For trial in next season.
Guvár Seeds	1½ lbs.	Nadiád Station for sending to America.	Do.
Egyptian Plough	1	Bhor State	The plough was purchased from Surat Station.
Chaff Cutter	1	Dhulia	

There was no distribution of manures from this Station.

Visitors.

17. The following is an abstract showing the classification of persons who visited Dhulia Station in the year 1905-06 :—

Quarter in which visitors came.	Culti-vators.	Non-culti-vators including land-lords, pleaders, merchants, etc.	Government officers.	Total.	Remarks.
1st quarter	2	...	2	4	Among the distinguished visitors were the Collector and Assistant Collectors, Khándesh, Ráo Bahádur Bhángáonker, Ráo Bahádur Actyut Bháskar Desái, late Administrator, Sánzli, and Ráo Bahádur Kunte, Diwán of Dewás.
2nd do.	11	37	8	56	
3rd do.	33	18	7	58	
4th do.	41	181	2	224	
Total	87	236	19	342	

From the above it will be seen that the number of visitors is gradually increasing. The following table gives the distribution of places from which visitors came :—

No. of places from which visitors came.	District or State.	No. of places from which visitors came.	District or State.	No. of places from which visitors came.	District or State.
25	Khándesh ...	1	Sangli ...	1	Bombay.
1	Sátára ...	3	Násik ...	1	Nágpur.
1	Dewas ...	2	Poona ...	2	Berars.
				Total ...	35 places.

Accounts.

18. The following table gives the receipts and expenditure of the Station during 1905-06 :—

Receipts.	Amount.	Expenditure.	Amount.
	Rs. a. p.		Rs. a. p.
To Sale of Station produce such as Cotton, Jowár, Bájri, Til, Wheat, etc.	868 4 11	By Establishment charges ...	918 9 6
„ Value of fodder, seeds, etc., in hand.	160 11 5	Pay Rs. 764 0 0	
„ Value of manure in stock .	180 0 0	Trav. allonce. „ 154 9 6	
„ Value of Live stock ...	88 0 0	„ Labour ...	571 11 9
„ Value of Dead stock ...	1,118 5 0	„ Manure ...	263 8 0
„ Value of seeds supplied gratis.	1 4 0	„ Seed ...	39 6 7
	2,416 9 4	„ Up-keep of Bullocks ...	167 0 3
Net cost to Government ...	1,152 10 0	„ Value of Live and Dead stock on hand on 1st April 1906.	153 6 0
	3,569 3 4	„ Implements ...	30 1 3
		„ Furniture ...	175 0 0
		„ Petty construction * ...	32 5 6
		„ Petty supplies and stationery.	100 0 0
		„ Postage and Telegram charges.	68 11 0
		„ Wire fencing ...	765 0 0
		„ Railway freight ...	50 10 0
		„ Miscellaneous expenses ...	235 13 6
Total ...	3,569 3 4	Total ...	3,569 3 4

V.—OPERATIONS ON THE MIRPURKHAS AGRICULTURAL STATION.

History.

The Station was started in October 1904, a site being selected that was typical of much of the soil on the Jamrao canal that has been irrigated for a few years; that is, the soil gets very hard after irrigation and in consequence produces very poor crops. The cause of this it is impossible to discover without a considerable amount of chemical analysis performed in conjunction with field experiments. The object of the Station is to provide opportunity for these experiments, and it is hoped that before long it will be possible to commence the necessary analytical work.

In its present condition the soil will produce only very poor crops of cotton, but wheat thrives much better under the adverse conditions.

Further the Station being all under irrigation much levelling was necessary to make it suitable for experiment and this is not yet complete.

It will be obvious therefore that this the first year's results can indicate little except lack of condition in the soil. This is well shown in the yields of cotton as compared with those obtained in the previous season at Dhoronáro. It should be stated, however, that the season under report was exceptionally disastrous to cotton both in Sind and in the Punjáb. Some of the wheat plots yielded excellently, especially considering the nature of the soil. This is due to good cultivation, no manure being applied.

Season.

2. The rainfall in the year under report is compared with the average in the following table —

Months.		1903-04.	1904-05.	1905-06.	Average of 20 years.
		In. cts.	In. cts.	In. cts.	In. cts.
April	1st Fortnight	.....	.....	.....	0 1
"	2nd "	.....	.....	.....	0 1
May	1st "	.....	.....	.....	0 7
"	2nd "	.....	.....	.....	0 1
June	1st "	.....	.....	.....	0 8
"	2nd "	.....	.....	.....	0 53
July	1st "	.....	0 3	.....	0 94
"	2nd "	7 33	.....	0 39	1 21
August	1st "	0 1	.....	.....	1 19
"	2nd "	.....	.....	.....	0 87
September	1st "	.....	0 55	.....	0 2
"	2nd "	1 17	.....	.....	0 12
October	1st "	.....	.....	.....	0 ½
"	2nd "	.....	.....	.....	0 1
November	1st "	.....	.....	.....	.....
"	2nd "	.....	.....	.....	0 10
December	1st "	.....	.....	.....	0 1
"	2nd "	.....	.....	0 10	0 10
January	1st "	0 17	.....	.....	0 4
"	2nd "	.....	0 36	.....	0 21
February	1st "	.....	0 15	1 87	0 10
"	2nd "	0 42	0 54	0 99	0 13
March	1st "	1 16	.....	.....	0 14
"	2nd "	.....	.....	0 4	0 ½
Total		10 26	1 63	3 39	5 91

Experiments with different crops.

3. Egyptian Cotton.—The yields of the cotton plots are as follows :—

No. of Plot.	Area.	Variety of Cotton.	Time of sowing.	Manure per plot.	No. of Water-ings.	Yield of Seed Cotton.					Yield of seed-cotton per acre.	Remarks.
						Per plot.						
						Pickings.				Total.		
						1st	2nd.	3rd.	4th.			
4	A. G. 0 22	Abassi Cotton ...	March	{ 200 lbs. Cotton seed. 200 „ Gypsum ... }	14	61	52	29	0	142	269	
5	0 24	Do. ...	Do. ...	200 „ Cotton seed ...	16	50	77	24	12	193	322	
10	1 0	Do. ...	Do. ...	400 „ Gypsum ...	17	198	124	82	53	462	462	
20	1 0	Do. ...	Do. ...	No manure ...	17	72	45	33	...	155	155	
21	1 0	Do. ...	Do. ...	400 lbs. Cotton seed ...	15	83	60	40	10	193	193	
23	1 0	Do. ...	Do. ...	{ Do. ... 400 „ Gypsum ... }	15	33	31	...	...	69	69	The cotton plants did not flower in 25 Gunthas.
23	0 35	Do. ...	Do. ...	350 „ Cotton seed ...	15	99	46	...	...	145	168	
25*	0 33	Do. ...	End of April ...	330 „ do. ...	12	65	25	12	...	102	124	
29	0 33	Do. ...	March	330 „ do. ...	14	116	91	69	8	304	366	
30	0 33	Do. ...	Do. ...	{ 330 „ do. ... 330 „ Gypsum ... }	14	75	56	25	...	156	169	
31	0 33	Do. ...	Do. ...	330 „ do. ...	14	26	83	23	...	137	166	
32	1 0	Do. ...	Do. ...	No manure ...	14	111	24	18	...	153	153	
33	1 0	Do. ...	Do. ...	800 lbs. Cotton seed ...	14	40	31	12	...	83	83	Plants did not flower in 30 Gunthas.
34	1 0	Do. ...	Do. ...	Do. ...	15	41	76	26	...	143	143	
35	1 0	Do. ...	Do. ...	500 „ Gypsum ...	16	62	40	17	...	139	139	
36	1 0	Metafifi Cotton...	Do. ...	400 „ Cotton seed ...	14	131	124	69	7	321	321	
37	1 0	Do. ...	Do. ...	800 „ do. ...	14	114	121	51	23	309	309	
38	1 0	Abassi Cotton ...	April	{ Do. ... 800 „ Gypsum ... }	12	194	171	86	33	484	484	
40	0 13	Do. ...	Do. ...	No manure ...	8	41	18	16	3	78	240	Nos. 40 to 43 being situated near the water-course and the Karla here being newly constructed water from it percolated and hence less watering.
41	0 35	Do. ...	Do. ...	350 lbs. Cotton seed ...	9	44	85	33	35	202	230	
42	1 0	Do. ...	Do. ...	{ 400 „ do. ... 400 „ Gypsum ... }	10	126	107	42	17	286	356	
43	1 0	Do. ...	Do. ...	400 „ Cotton seed ...	9	174	129	94	13	410	410	
										4,672		

* The seed for all plots except 23 was that grown at Dhoronáro the previous year. Plot 23 was sown with seed imported direct from Egypt.

The differences in yields are due, not to the manurial treatment but partly to some of the plots containing very bad patches and partly to the nearness to the water-course from which, owing to leakage, some of the plots received more water than others. Further, the water-supply on the Station is bad, and enough water lifts were not available during the year under report with the result that it was impossible to water the plots often enough or at the proper times.

Small plots of Sindhi cotton yielded at the average rate of 295 lbs. of seed cotton per acre, so that the results in the table do not indicate that the conditions are specially adverse to Egyptian cotton. Comilla cotton did badly, averaging only 113 lbs. per acre.

4. *Wheat*.—Experiments on a number of Punjáb and Sind varieties were made and the water applied measured. The numerical results are given in the following statement :—

No. of plot.	Variety of wheat.	Date of sowing.	Seed rate in lbs. per acre.	Date of waterings.			PER ACRE.				Mr. Robson's valuation (per 2½ lbs.) and opinion.	Mr. Kenyon's opinion.				
				1st.	2nd.	3rd.	Quantity of water applied in cubic feet.			Yield of the crop.						
							Waterings.			Total.			Grain.	Straw.		
							1st.	2nd.	3rd.						+	
7a	Delhi white	1st week of November.	80	Jan- uary 1	Jan- uary 31	6	4,592	4,401	4,401	13,394	560	1,065	8 8 6 (hard and shrivelled).	Much deteriorated.		
13a	Do.		80	6-7	Feb- ruary 2-3	8	994	996			8 8 0 (better than Sindhi red).	Much like ordinary Punjab red (mixed hard and soft).
14a	Do.		80	8	5	9	...	...	...	...	1,320	1,786
13b	Punjab red		80	9	2-3	8	...	...	...	...	812	1,648
13c	Do.	80	11	4	9	1,208	3,082	8 9 6 (shrivelled and uneven).	Ordinary value.			
40	Do.	4th December	80	23	March 7	...	5,450	4,912	...	10,368	1,443			2,650		
44	Nandero	2nd week of November.	80	11-12	February 12	7	4,022	4,645	4,645	13,312	656	812	8 14 0 (by far the best white wheat).	Best Sind grown wheat he has ever seen.		
45	Do.		120	14	March 9	...	5,040	4,820	...	9,860	903	1,262				
*46	Bubak		120	18	10	...	4,592	4,528	...	9,120	1,412	2,053				
47	Do.	Last week of November.	120	19	5	13	5,380	5,088	5,088	15,536	1,271	2,336	8 11 0 (shrivelled and uneven).		
*48a	Do.		120	21	6	14	5,450	5,068	5,068	15,632	1,412	2,970				
50	Sindhi white	Last week of November.	80	26	March 13	...	5,040	4,825	...	9,865	1,919	2,589	8 13 0 (almost as good as plot 45).	Some red grains. Mixed hard and soft.		
51	Do. red		80	27	15	...	5,040	4,825	...	9,865	1,547	2,018				
48b	Kahno		120	21	February 7	14	...	...	...	...	1,344	2,244
43	Do.	6th January	80	March 9	March 23	...	5,035	5,035	...	10,070	100	185	Not valued		

* These samples appear to have been wrongly labelled by the Station and a further valuation is awaited.

† 2.88 inches of rain fell in February and 4 cents in March.

Note.—(1) Plots 43 and 44 are very uneven and the crop did not germinate on some portions.

(2) No manure was applied to any of the plots. Plots 45 to 51 had to be hand dug to a depth of 1 foot.

If sown early in November the crop flowers at the beginning of February and ripens in the middle of April.

Little can be said about these experiments as yet since the land is very uneven. They, however, confirm the opinion expressed in paragraph 94 of the last year's annual report that three or four waterings are sufficient for wheat, and this is true even for soil which like that of the Station is in poor condition. The estimate of 4,000 cubic feet as the water applied at each application has however turned out too low.

The valuations were very kindly made by Mr. H. F. Robson of Messrs. Clements, Robson and Co. and Mr. J. Kenyon of Messrs. Sanday, Patrick and Co. These taken in conjunction with the yields appear to indicate that Sindhi white wheat, if properly selected, will be as paying as any, while Nandero and Bubak, as in last season, are promising.

5. *Egyptian clover*.—This crop again gave good results though sown very late owing to the difficulty of obtaining water.

The results are given below :—

No. of plot.	Area.	Variety of Berseem.	Date of sowing.	Outturn per acre in lbs.			Remarks.
				Green.	Hay.	Seed.	
4	A. g. 0 22	Miscow	14th December	6,469	564	80	Cut once and then left for seed.
5	0 22		1905.	5,769	409	42	Do. do.
6	0 4		Do. ...	19,980	1,460	70	Do. do.
10	1 0		22nd October ...	15,015	...	...	Cut twice and then ploughed.
16	1 0		21st do. ...	9,667	97	5	Do. left for seed.
19	1 0		14th November...	3,988	202	9	Cut once and then left for seed.
36	1 0		27th December ...	8,513	...	...	Cut twice and then ploughed.
22	1 0		19th do. ...	2,841	...	...	Cut once and then ploughed.
38	1 0		2nd January	1906.	3,197	251	35	Do. and then left for seed.
	7 8		1st January ...				
9	1 0	Fahli	... 10th October ...	...	724	60	Left for seed.

The correct time for sowing this crop is September and it will be noticed that, except in plots 4, 5 and 6, the yield decreases as the sowing becomes later. The excellent yield of plot 6 which though sown late, gave one cutting of about 20,000 lbs. per acre in addition to 1,460 lbs. of hay which is equivalent to about 10,000 lbs. green, is due to its nearness to the water channel. It should be mentioned that this plot was inoculated with bacteria but the yield is not due to this fact. This crop should prove extremely valuable in perennially irrigated tracts not only in supplying fodder but also in taking the place of the equally necessary and even more scant manure supply.

6. *Maize*.—This crop was tried on 3 acres with the following result :—

No. of Plot.	Area in acres.	Manure applied.	Yield per acre in lbs.		Value of produce.
			Grain.	Fodder.	
8	1	<i>Nil</i>	489	1,035	Rs. a. p. 15 13 11
9	1	20 cart-loads F. Y. manure ...	551	1,190	18 2 7
10	1	2,240 lbs. Gypsum + 240 lbs. Jámbo cake. } ...	494	1,107	16 5 6

This result like all others merely emphasizes the very poor condition into which the soil has got. Even a heavy dressing (20 loads per acre) of farm yard manure had very little effect.

Juanpur maize yielded 754 lbs. of grain and 1,754 lbs. of fodder per acre and appears to be better than the local variety.

7. *Sugar-cane*.—This crop was tried on a small scale, but, owing partly to white ants and largely to the poor soil, was a total failure.

8. *Senji (Melilotus Indicus)*.—This yielded at the rate of 6,933 lbs. of green fodder per acre in one cutting after which the roots died. It cannot compare with Egyptian clover.

9. *Jowár*.—Chapti Jowár from Gujarát was tried and yielded as well as could be expected in view of the poor soil. It gave 1,017 lbs. of grain and 6,180 lbs. of fodder per acre.

A number of Zamindárs have asked for, and been supplied with seed of this variety.

10. *Groundnut*.—The soil on the Station gets too hard to be favourable to this crop. The following results were obtained and indicate that on suitable sandy land this crop would give good yields :—

Area of Plot.	Name of Variety.	Yield per acre in lbs.
Gunthas.		
14	Spanish pea-nut ...	703
8	Japanese small ...	360
9	Do. big ...	1,186
3	Pondicherry ...	1,200
8	Virginia ...	725
7	Surat Deshi ...	840

The crop appears to do excellently when sown under suitable conditions by cultivators. Four tons of seed have been obtained for the Vazir of Khairpur State for sowing this year.

11. *American cotton*.—A large number of varieties were tried but produced a much deteriorated quality of fibre.

12. *Russian wheat*.—A small plot was sown but grew with the habit of a grass and produced nothing.

13. *Russian linseed*.—A small plot grew well and further trial will be given.

14. *Til and gram.*—Small plots were sown but failed. These crops, according to the experience of cultivators, will not succeed in Central Sind. The cause, judging only from the year's results on the Station, is insect pests. These will be further investigated.

Crop-breeding.

15. Breeding operations in cotton and wheat have been commenced on a small scale. The Station establishment is, however, not sufficiently trained to push on this work, while the field men in the Deputy Director's office have been fully occupied for the most part with work in the Presidency. If the posts already proposed for strengthening this branch are sanctioned, the important work of improving Egyptian cotton and wheat in Sind can proceed though the circumstances of soil at Mirpur Khás are not very favourable for this purpose.

Water requirements of crops.

16. Owing to the lack of water-lifting implements it has been impossible to do much in this respect during the year under report. An example, however, of what is being done is given above in the report on the wheat experiments. Two tanks for measuring water have been made but are not yet in good working order. It is hoped, however, that before long it will be possible to work out the question of water requirements of the common crops of Sind in some detail.

New implements.

17. There appears to be a need in the preennially irrigated parts of Sind for a good native bullock-hoe and about 20 of the Gujarát type of this implement have been distributed. This implement should have a good effect in helping cultivators to keep their fields clean; at present they are on the whole more full of weeds (chiefly grass) than in any other part of the Presidency.

Distribution of seed.

18. *Egyptian cotton seed.*—Besides 10 tons of Egyptian cotton seed received from Egypt for distribution in Sind, 5,520 lbs. of seed were distributed after 1st of April 1905 from the last cotton season as shown below:—

Names of persons to whom distributed.	Description of seed.	Quantity of seed distributed in lbs.	Remarks.
In Sind through Mukhtyárkars ...	Egyptian cotton seed.	3,348	Metaffi and Abassi varieties distributed.
To private persons and Zamindárs ...	Do. ...	787	
In the Presidency ...	Do. ...	1,162	
Outside the Presidency ...	Do. ...	223	
	Total ...	5,520	

The 50 tons of the Abassi variety obtained from Egypt were distributed as below:—

Name of place where distributed.	Whether gratis or on sale.	Quantity of seed supplied in lbs.	Total.
		Lbs. oz.	Lbs. oz.
Presidency Proper ...	Gratis ...	52 0	52 0
Do. ...	On sale ...	240 0	240 0
Outside the Presidency ...	Gratis ...	51 8	51 8
Do. ...	On sale ...	1,082 0	1,082 0
In Sind ...	Gratis ...	0 1	0 1
Do. ...	On sale ...	4,497 0	4,497 0
Through the Mukhtyárkars, Mirpur Khás.	.....	38,480 0	= 103,440 0
Do. do. Jamesabad ...	.....	50,000 0	
Do. do. Umakote ...	.....	800 0	
Do. do. Khipro ...	.....	560 0	
Do. do. Digri ...	.....	13,280 0	
Do. do. Pithoro ...	.....	240 0	
Do. do. Tando Mahomedkhán.	.....	80 0	
	Total ...	.....	109,362 9

19. *Groundnut seed*.—2,194 lbs. of groundnut of different varieties were distributed during the year under report. Details of distribution are given below :—

Name of Person and Village.	Description of seed.	Quantity in lbs.
Mukhtyárkar, Mirpur Khás	Groundnut ...	135
Do. Sákrand	Do. ...	450
Do. Sanjhoró	Do. ...	150
Sirdár Mahomed Yákubkhán	Do. ...	1,155
Lál Mahomed, Jamesabad	Do. ...	50
Collector, Lárkhána	Do. ...	80
Do. Sakkar	Do. ...	20
Ganumal, Mirpur Khás	Do. ...	10
Mukhtyárkars, Diplo and Mithi	Do. ...	144

20. *Egyptian clover*.—5,432 lbs. of clover seed were distributed in Sind and outside. The statement showing the distribution is given below :—

Name of person.	Whether gratis or on sale.	Quantity of seed supplied in lbs.	Remarks.
<i>Presidency Proper.</i>			
Miss S. Trott, Girgaon, Bombay	60	
<i>Outside the Presidency.</i>			
Director, L. R. and Agriculture, Lahore... ..	On sale ...	340	
Durgáshankar Motirám, Mámlatdár, Káthiáwár	Do. ...	40	
E. E. Baird, Esqr. Bundelkhand	200	
Total	580	
<i>Sind.</i>			
Mr. K. S. Fazal Ahmed, Village No. 22 and 24	On sale ...	100	40 lbs. from Station produce.
Deputy Commissioner, Upper Sind Frontier, Jacobabad	400	
Collector, Sukkur	400	
Mukhtyárkar, Shahdádpur	200	
Do. Labdarya	160	
Do. Lárkhána	80	
Do. Kambar	160	
Do. Ráto-dero	160	
Do. Mehar	80	
Do. Umarkot	100	
Mr. Udhárám, C/o. Mukhtyárkar, Tando Muhamad Khán	On sale ...	10	
Mukhtyárkar, Hyderabad	225	
Do. Jati	100	
Do. Tándo Bágó	60	
Do. Badin	100	
Do. Hala	100	
Do. Tatta	100	
Deputy Collector, Kotri	100	
Himatsing Khemsing, C/o. Mukhtyárkar, Badin	150	
Mukhtyárkar, Mirpur Khás...	300	
Do. Pithoro	} C/o. Mukhtyárkar, Mirpur Khás.	100	
Do. Khipro		100	
Do. Sanghar		100	
Ramditta Zamindar, Deh 72	60	
Mukhtyárkar, Mirpur Khás for Colonization Officer...	1,277	
Sábebsing Chandásing, Esq., Jamesabad...	600	
Executive Engineer, Jámrao District	120	
Total	4,842	
Grand Total	5,432	

Distribution of Implements.

21. Since the opening of the Station in October 1904 the following implements were distributed:—

Name of the Person and Village to whom distributed.	Description of Implement.	Number.
Mr. Gulám Ghosh, Canal Assistant, Mirpur Khás...	English T. W. Plough ...	1
Deputy Commissioner, Thar and Párkar ...	Country plough Surti ...	1
Do. do. ...	Karab ...	1
Do. do. ...	Leveller (chen) ...	1
Mr. Sáhebsing, Chandápúr State ...	Karabdi ...	2
Do. ...	Karab ...	1
Mukhtyárkar, Jamesabad ...	Do. ...	1

22. No manure was distributed to cultivators or Zamindárs for experimental trial during the year under report.

Visitors.

23. Mr. W. T. Morrison, the Commissioner and the Officiating Inspector-General of Agriculture accompanied by the Director of Agriculture, paid visits to the Station. In addition the following visited the Station:—

- 16 European Officers.
- 25 Native Officers.
- 47 Zamindárs.
- 9 Cultivators.

The total number of visitors during the year was 100.

Accounts.

24. The following statement shows the profit and loss account of the Station during the year 1905-06:—

Date.	Loss.	Amount.	Date.	Profit.	Amount.
31st March 1906.	To Hyderabad Egyptian Cotton Plot Account	Rs. a. p. 282 1 10	31st March 1906.	By Miscellaneous Recoveries Account	Rs. a. p. 20 13 0
	„ Egyptian Cotton Seed Account	63 14 8		„ Store Account	45 13 11
	„ Dead Stock Account	106 8 0		„ Stationery Account	1,002 8 11
	„ Artificial Manure Account	119 9 0		„ Packing Account... ..	5 1
	„ Distribution of Seed Account	160 10 10		„ Increase in Valuation Account (Standing crops Account)	1,769 12 5
	„ Petty Construction Account	731 3 0			
	„ Purchase and Transport of Seed Account	645 0 0			
	„ Implements and Water-lift Account	392 9 7			
	„ Cleaning Site and making Water Channel Account	481 6 6			
	„ Wire Fencing Account... ..	208 0 0			
	„ Office Furniture Account	29 0 0			
	„ Seed Account	72 7 7			
	„ Petty Supplies Account	125 0 0			
	„ Farm Incidental Account	484 9 8			
	„ Station Labour Account	3,038 11 3			
	„ Work Cattle Account	1,156 1 6			
	„ Telegram and Service Stamps Account	98 10 0			
	„ Establishment Account	3,005 2 8			
	„ Travelling Allowance Account	168 2 0			
	Total	11,337 6 8		Total	2,923 11 3
				Net cost to Government	8,413 11 5
				Grand Total	11,337 6 8

APPENDIX.

Analysis of Manures used on the various Stations under the Deputy Director of Agriculture during 1905-06.

Name of Manure.	Constituents.	Name of Station.				
		Surat.	Nadiad.	Dhárwar.	Dhulia.	Mirpurkhás.
Farm yard manure ...	Moisture ...	22.63	6.80	9.83	5.43	4.16
	* Organic matter ...	38.83	12.90	17.06	15.12	18.39
	† Soluble Ash ...	13.94	11.04	28.85	30.08	19.59
	Sand ...	26.60	69.26	44.26	49.37	57.86
		100.00	100.00	100.00	100.00	100.00
	* Containing Nitrogen ...	1.06	0.67	0.42	0.60	0.36
	† Do. Phosphoric Acid ...	0.55	0.65	0.25	0.53	0.25
	Do. Potash ...	0.75	1.20	0.66	1.08	1.16
						<i>Jambho cake.</i>
	Castor cake ...	Moisture ...	10.22	8.17			10.20
* Organic matter ...		82.49	78.49			78.01
† Soluble Ash ...		5.66	6.51			6.72
Sand ...		1.63	6.83			5.07
		100.00	100.00	Not used at these Stations.		100.00
* Containing Nitrogen ...		4.47	3.48			4.63
† Do. Phosphoric Acid ...		2.03	1.53			1.60
Do. Potash ...		.67	0.59			1.15
Ammonium Sulphate...		* Ammonium Sulphate ...	91.30	95.31	96.38	97.75	97.63
	Moisture ...	3.01	} 4.69	} 3.62	{ 1.37	{ 2.37
	Sand, etc. ...	5.69				
		100.00	100.00	100.00	100.00	100.00
	* Containing Nitrogen ...	19.36	...	19.91	20.56	...
Nitre ...	Moisture ...	5.80	4.33			
	* Potassium Nitrate ...	65.24	91.19			
	Do. Chloride ...	5.49	...			
	Sodium Nitrate ...	...	3.54			
	Do. Chloride ...	14.21	0.61			
	Do. Sulphate ...	1.90	...			
	Calcium do. ...	2.83	...			
	Sand, organic matter, etc....	4.53	0.33	Not used at these Stations.		
		100.00	100.00			
	* Containing Nitrogen ...	9.05	13.21			
Sodium Nitrate ...	Moisture ...	5.97				
	Potassium Nitrate ...	1.53				
	* Sodium Nitrate ...	62.38				
	Do. Chloride ...	0.43				
	Do. Sulphate ...	0.61				
	Organic matter, sand, etc. ...	29.08		Not used at these Stations.		
		100.00				
* Containing Nitrogen ...	10.51					

Name of Manure.	Constituents.	Name of Station.					
		Surat.	Nadiád.	Dhárwár.	Dhulia.	Mirpurkhás.	
Superphosphate ...	Moisture and organic matter. ...	29·31	} Not used at these Stations.				
	* Soluble Phosphate of lime ...	30·92					
	† Insoluble Phosphate of lime ...	7·81					
	Calcium Sulphate, etc. ...	29·61					
	Sand ...	2·35					
		100·00					
	* Containing Soluble Phosphoric Acid. ...	14·15					
† Do. Insoluble do. ...	3·57						
Do. Nitrogen ...	Nil.						
Gypsum ...	Gypsum ...	61·43	} Not used at these Stations.			65·84	
	Sand ...	31·48					
	Calcium Carbonate, etc. ...	7·09					
		100·00					
Town sweepings ...	Moisture ...	} Not used at these Stations.	100·00	} Not used at these Stations.			
	* Organic matter ...						6·10
	Sand ...						6·59
	† Soluble Mineral ...						57·29
							30·02
	* Containing Nitrogen ...						0·22
	† Do. Phosphoric Acid ...						0·63
Do. Potash ...	1·06						
Bone meal ...	Moisture ...	} Not used at these Stations.	100·00	} Not used at these Stations.			
	* Organic matter ...						7·52
	† Calcium Phosphate ...						27·72
	Calcium Carbonate ...						53·52
	Sand ...						9·96
							1·28
	* Containing Nitrogen ...						3·70
† Do. Phosphoric Acid ...	24·24						
Cotton seed (Sindhi) ...	Moisture ...	} Not used at these Stations.				9·06	
	* Organic matter ...						100·00
	† Soluble Ash ...						
	Sand ...						
* Containing Nitrogen ...	} Not used at these Stations.				100·00		
† Do. Phosphoric Acid ...							
Do. Potash ...							
	2·51						
	1·20						
	0·91						

Name of Manure.	Constituents.	Name of Station.				
		Surat.	Nadiád.	Dhárwár.	Dhulia.	Mirpurkhás.
Kunit	Moisture ... Magnesium Chloride ... Sodium do. ... Calcium Sulphate ... Magnesium Sulphate ... Potassium do. ...	Not used at these Stations.		15.74	Not used at these Stations.	
				11.93		
				48.62		
				1.79		
				13.61		
				18.31		
				100.00		
Muriato of Potash	Moisture and sand ... Potassium Chloride ... Sodium do. ... Do. Sulphate ... Calcium do. ...	Not used at these Stations.		0.72	Not used at these Stations.	
				71.95		
				26.60		
				0.40		
				0.33		
				100.00		
Safflower	Moisture and sand ... * Organic matter ... † Soluble Mineral matter...	Not used at these Stations.		11.07	Not used at these Stations.	
				83.09		
				5.84		
				100.00		
	* Containing Nitrogen ...			7.24		
	† Do. Phosphoric Acid ...			1.87		
	Do. Potash ...			0.76		
Mowhra Flower Refuse.	Moisture ... * Organic matter ... † Soluble Mineral matter... Sand ...	Not used at these Stations.		9.97	Not used at this Station.	
				46.21		
				15.56		
				28.26		
				100.00		
	* Containing Nitrogen ...			2.10		
	† Do. Phosphoric Acid ...			0.43		
	Do. Potash ...			1.70		

Glossary of crops referred to in the Poona and Mánjri Station Reports.

No.	English name.	Vernacular name.	Latin name.
	Barley	Jav	Hordeum vulgare.
	Beet root	Bit	Beta vulgaris.
	Black gram	Udid	Phaseolus mungo var. radiatus.
	Brinjals	Vángo	Solanum Melongena.
	Broom corn	(Exotic)	Sorghum.
	Cassava	Do.	Manihot Utilissimum.
	Chillies	Mirchi	Capsicum frutescens.
	Clover	(Exotic)	Trifolium.
	Cotton	Kápus	Gossypium.
	Cow-pea	Chavli	Dolichos catiang.
	Field beans	Shrávan ghevda	Phaseolus vulgaris.
	Gram	Harbbara	Cicer arietinum.
	Great millet	Jowár	Andropogon Sorghum var. vulgare.
	Do.	Hundi (Hot weather Jowári).	Do.
	Do.	Nilwa	Do.
	Do.	Sundhia	Do. var. cernuus.
	Do.	Utávli	Do.
	Green gram	Mug	Phaseolus mungo.
	Groundnut	Bhuimug	Arachis hypogea.
	Guinea grass	(Exotic)	Panicum jumentorum.
	Horse gram	Kulthi	Dolichos biflorus.
	Indian bean	Vál	Do. lablab.
	Lima beans	(Exotic)	Phaseolus lunatus.
	Linseed	Javas	Linum usitatissimum.
	Lucerne	(Exotic) ; Lasun ghás	Medicago sativa.
	Maize	Maka	Zea Mays.
	Mulberry	Tut	Morus indica.
	Oats	Vat	Avena sativa.
	Peas	Vátána	Pisum sativum.
	Pigeon-pea	Tur	Cajanus indicus.
	Plantain	Kel	Musa sapientum.
	Potatoes	Batáta	Solanum tuberosum.
	Rapeseed	Shiras	Brassica campestris var. Napus.
	Rice	Bhát	Oryza sativa.
	Rangoon beans	.....	.....
	San	Tág	Crotolaria juncea.
	Sorghum amber	(Exotic)	Sorghum sachharatum.
	Do. collier	Do.	Do.
	Soy bean	Do.	Glycine hispida.
	Spelt	Khapli	Triticum sativum var. Spelta.
	Spiked millet	Bájri	Pennisetum typhoideum.
	Sugarcane	Us	Sacharum officinarum.
	Sweet-potato	Ratálu	Ipomoea batatas.
	Tobacco	Tamáku	Nicotiana tabacum.
	Velvet beans	(Exotic)	.....
	Water grass	Do.	Panicum muticum.
	Wheat	Gahú	Triticum sativum.

No. 1009 OF 1906.

From

J. B. KNIGHT, Esq., M.Sc.,
Professor of Agriculture, Poona;

To

THE DIRECTOR OF AGRICULTURE,
Bombay, Poona.

Poona, 13th August 1906.

Sir,

I have the honour to forward herewith the Annual Reports of the Agricultural Stations, the Kirkee Dairy and the Rice Experiments at Lanowli and other places under my charge. The extreme unfavourable season has to a very large extent reduced the value of the experiments of the year.

I have the honour to be,

Sir,

Your most obedient Servant,

J. B. KNIGHT,
Professor of Agriculture.

VI.—OPERATIONS ON THE POONA AGRICULTURAL STATION.

I.—History and aim of the Station.

The Poona Station had its origin in a small piece of land taken for the agricultural class at the College of Science, which was opened in 1879. In 1882 this area was extended to 66 acres. Up to 1888 it was in charge of the Lecturer in Botany and Agriculture at the College. But in that year it was handed over to the Agricultural Department where it has remained ever since. Primarily the Station was for demonstration in agriculture to the students.

Upon other agricultural problems arising the Station was used for experimental purposes.

On account of its convenient location for observation and inspection a considerable area has for the last three years been devoted to raising varieties and hybrids of cotton, wheat and Jowári, for Professor Gammie's studies.

II.—Area, character of Soil and Irrigation.

2. Poona Station consists of Survey Nos. 57-59 and 60 of Bopudi situated about 2 miles from Poona. Of this area about 35 acres are arable while the rest is used for building and pasturage; 26 acres and 19 gunthas are medium black soil and 8 acres and 3 gunthas light soil. Survey Nos. 57-59 and 60 are irrigable from the Mutha Left Bank Canal. Survey Nos. 16, 17, 19 and 57, which are occupied by the pasturage and most of the buildings, may be considered as belonging to the Dairy.

III.—Lines of work for the year.

3. The principal work is noted below :—

(1) *Forage crops.*—A large part of the Station was devoted to growing fodder for the Dairy.

(2) *Variety tests.*—A very complete set of varieties of Bombay crops was grown in the Object Lesson plots.

(3) *New crops.*—Also in Object Lesson plots.

(4) *Plant Diseases and insect pests.*—The work with 'Tika' disease of groundnut and the 'Wilt' disease of Tur was continued.

(5) *Educational.*—The Station serves the purpose of demonstration in teaching to

(i) Students of the College of Science.

(ii) Probationers from this Presidency and other Provinces.

(iii) Junior Civilians who are sent to be instructed in agriculture (*vide* Government Resolution, Revenue Department, No. 4155, dated 25th June 1903).

(iv) Visitors, agriculturists, etc.

For these purposes there is a growing collection of soils, manures, seeds, fibres, botanical specimens of different varieties of cotton, rice, etc., indigenous implements of the Presidency and the imported implements. Yearly a portion of land is reserved for the growing of small plots of all the important varieties of the typical crops of the Presidency.

(6) Plant breeding is also carried on largely for demonstration for probationers and others.

(7) *Distribution of seed.*—Seeds of all kinds have been distributed as far as the supply would admit.

IV.—Meteorology.

4. The rain at Poona was nearly 10 inches below the normal and was not well distributed.

The statement below of the year under report compares the rainfall with that of the last year and with average for the last 10 years:—

Month.		1904.		1905.		Average for the last 10 years.
		No. of rainy days.	Rainfall in inches.	No. of rainy days.	Rain fall in inches.	
1		2	3	4	5	6
			In. cts.		In. cts.	In. cts.
May,	1st fortnight	...	...	2	1 25	} 0 94
Do.	2nd do.	...	...	2	1 21	
June,	1st do.	...	1 0 24	2	1 88	} 4 67
Do.	2nd do.	...	3 0 54	2	0 24	
July,	1st do.	...	7 2 51	10	4 80	} 9 90
Do.	2nd do.	...	3 0 72	12	5 16	
August,	1st do.	...	2 0 54	13	0 80	} 4 55
Do.	2nd do.	...	1 0 16	8	0 75	
September,	1st do.	...	5 3 32	5	0 21	} 4 33
Do.	2nd do.	...	3 0 61	...	...
October,	1st do.	...	4 1 81	2	0 62	} 3 97
Do.	2nd do.	...	3 4 85	6	3 65	
November,	1st do.	...	...	...	...	} 0 38
Do.	2nd do.	...	...	2	0 40	
December,	1st do.	...	...	...	...	} 0 32
Do.	2nd do.	...	...	...	...
Total		...	32 15 30	66	20 97	29 6

The season was an unfavourable one. The rainfall in the months of May and June was 4 inches and 58 cents., which facilitated the preliminary operations of preparing the land. In July it rained heavily on the 6th and produced sufficient moisture for sowing. The sowing went on from 6th till the 15th of July. The rainfall during the second fortnight of July helped the germination and growth of the crops. During long breaks in the rain the crops were irrigated. In August it rained in drizzles but the total rainfall was not sufficient for the standing crops. In September there was only 21 cents of rain. The fodder crops came into flower one after another and the cutting of green fodder was carried on in September.

During the month of October it rained on the 14th, 15th, 18th and 19th. This rainfall was quite opportune for the rabi sowing. The months of November and December were nearly dry.

V.—Area planted to different crops.

5. 18 acres and 8 gunthas were under kharif crops, 6 acres 12½ gunthas under rabi crops (cropped second time) and 6 acres and 38 gunthas were under guinea-grass, water grass, plantains, mulberry and perennial cottons.

The statement below shows the area cropped and the purpose of each crop:—

Field No.	Kharif Crop.	Area.	Purpose.	Rabi Crop.	Area.	Purpose.	Perennial Crop.	Area.	Purpose.
1	2	3	4	5	6	7	8	9	10
6	Choll ... Maize ... Soybeans ... Tur ...	A. g. 0 30 1 13 1 13 0 20	Fodder ... Do. ... Do. ... To study wilt disease of Tur.		A. g.			A. g.	
7	Cotton	0 18	For seed		...		Cotton	0 33	Botanical study.
8	Ground-nut	1 0	To study Tika disease.	Gram	0 5	Crop			
...	Utavall	0 4	Fodder	Maize*	1 0	Fodder	Water grass	0 2	Green fodder for dairy.

* Cultivated by dairy.

Field No.	Kharif Crop.	Area.	Purpose.	Rabi Crop	Area.	Purpose.	Perennial Crop.	Area.	Purpose.
1	2	3	4	5	6	7	8	9	10
...	.....	A. g.	.....	.....	A. g.	.....	Plantains	A. g.	Crop. Green fodder for dairy.
...	.....	...	.....	.....	.....	.....	Guinea-grass	0 36	
9	Object lesson plots.	1 37	Object lesson for students.	Rabi crop	1 37	Object lesson for students.			
...	Utavall	0 23	Fodder						
10	Object lesson plots.	0 36	Object lesson for students.	Shalu varieties.	0 10	Object lesson...			
...	.....	...	.....	.....	...	.....	Cotton	0 3	Botanical study.
11	Object lesson plots.	1 20	Object lesson for students.	Maize	1 20	Fodder	Guinea-grass	8 8	Green fodder for dairy.
...	Nilva	0 8	Fodder						
12	Object lesson plots.	0 53	Object lesson for students.						
...	.....	...	.....	.....	...	.....	Guinea-grass	0 34	Green fodder for dairy.
14	Mulberry	0 31	To start a plantation.						
...	Seed beds	0 13	.....					
15	Student's plots	1 20	Practical work						
...	Nilva	1 23	Fodder						
...	.....	...	.....	.....	...	.....	Guinea-grass	0 9	Green fodder for dairy.
16	Student's plots	1 16	Practical work	Maize *	1 20	Fodder			
...	Nilva	0 10	.....					

* Cultivated by dairy.

VI.—Crop diseases and Insect pests.

6. The cucurbits were attacked by aphides, the Jowár by the sugar-borer, Choli and safflower by aphides. Attempts were made to check this pest by removing and destroying them in the case of borer and by the use of kerosine emulsion on aphides.

VII.—Forage crops.

7. On account of the scarcity of fodder all available area was put down to forage crops for the dairy animals. Five acres and seven gunthas were down to guinea-grass and gave an average outturn of 9,671 lbs.

Maize was grown for fodder in field No. 6. Irrigation had never been available to this field till this year; a pipe having been laid under the street enables us to get canal water.

Choli and three leafy varieties of soybeans were also sown in the field for fodder. The soybeans yielded poorly.

The statement below shows the outturn of the varieties of the various green fodder crops :—

Field No.	Name of crop.	Results per acre.		
		Outturn.	Value of outturn.	Cost of cultivation.
1	2	3	4	5
8	Guinea grass	Lbs. 6,822	Rs. a. p. 45 6 7	Rs. a. p. 68 7 10
10	Do.	12,205	81 5 10	40 2 8
13	Do.	10,658	71 0 10	61 9 8
15	Do.	9,000	60 0 0	46 7 4
	Average	9,671	64 4 1	54 2 4
6	Maize	3,037	15 3 0	22 3 11
6	Choli	6,981	34 14 6	39 9 10
6	Soybean No. 6	502	.....	.....
	Do. No. 13	196	.....	.....
	Do. No. 16	295	.....	.....
	Average	331	.....	.....

VIII.—Botanical Experiments.

8. *Jowár*.—280 varieties of Jowár classified last year by Professor Gammie were grown again this year under irrigation for further classification and identification. The varieties were vigorous in growth.

9. *Rice*.—266 varieties of rice from Bengal and other places collected in the Bombay Exhibition were sown for classification and identification by Professor Gammie.

10. *Cotton*.—The perennial cottons sown for botanical experiments last year were kept on this year and seed was collected from all.

IX.—Trial of new crops.

11. *Rheana luxurians* which is said to yield a good fodder was sown this year in small plots to get sufficient seed for sowing next year on a larger area.

12. Seven varieties of *American maize* were also sown for seed.

X.—Seed selection.

13. Small plots were sown with Chapti Jowár, Málbandro Bájri and Broach cotton for seed selection in field No 9.

XI.—Trial of new methods of cultivation and care of crops.

14. *Tika disease*.—The plot that has been affected with this disease for years and cropped continuously was again treated as last year.

Seven varieties of groundnut, *viz.*, Spanish pea-nut, Small Japanese, Big Japanese, Virginia, Tata's, Pondicherry and Poona local were sown on the 9th of July. The field was divided into seven sections and each section was sown with a variety, half of each section being sown with seeds steeped in one per cent. copper sulphate solution and the other half with unsteeped seeds. Each section was divided transversely into eight plots, there being 4 plots in the portion with steeped seeds and four in the portion with unsteeped seeds.

The corresponding plots of both halves in each section received the same treatment as to spraying which was as follows:—

Plot 1, Bordeaux mixture, 50 gallons per acre ... 15th Aug., 6th Sept.,
29th Sept.

Plot 2 " " " ... 15th Aug., 6th Sept.

Plot 3 " " " ... 15th Aug.

Plot 4, *Nil*.

About the beginning of August the upper leaves of some plants in each variety began to turn yellow. Gradually the leaves became full with brownish patches. The two varieties, Spanish pea-nut and Small Japanese, suffered the most.

The details of the experiment are given in statement below:—

Results per acre.

Variety.	Seeds steeped in one per cent. of copper sulphate solution.									
	Sprayed 3 times 50 gallons per acre (1) 15th August, (2) 6th September, (3) 29th September.		Sprayed twice 50 gallons of Bordeaux mixture (1) 15th August, (2) 6th September.		Sprayed once 50 gallons of Bordeaux mixture 15th August.		Unsprayed.		Average and steeped seed.	
	1903-04.	1904-05.	1903-04.	1904-05.	1903-04.	1904-05.	1903-04.	1904-05.	1903-04.	1904-05.
1	2	3	4	5	6	7	8	9	10	11
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
1. Spanish pea-nuts	256	192	302	176	142	192	65	187	191
2. Small Japanese	298	352	467	288	353	160	221	267	383
3. Big Japanese	1,094	944	1,303	896	1,152	928	1,042	928	1,162
4. Virginia	812	608	1,040	786	1,001	632	928	658	945
5. Tata's	1,125	612	1,454	704	1,517	768	1,523	681	1,405
6. Pondicherry	1,079	1,408	1,509	1,664	1,444	684	1,509	1,252	1,385
7. Poona (Local)	686	...	749	...	833	...	770	...	759
Average	763	669	953	744	920	561	865	661	853

Results per acre—*contd.*

Variety.	Seeds unsteeped.										Average.	
	Unsprayed.		Sprayed once 50 gallons Bordeaux mixture 15th August.		Sprayed twice 50 gallons Bordeaux mixture (1) 15th August, (2) 6th September.		Sprayed 3 times 50 gallons Bordeaux mixture (1) 15th August, (2) 6th September, (3) 29th September.		Average of unsteeped seed.			
	1903-04.	1904-05.	1903-04.	1904-05.	1903-04.	1904-05.	1903-04.	1904-05.	1903-04.	1904-05.	1903-04.	1904-05.
1	12	13	14	15	16	17	18	19	20	21	22	23
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
1. Spanish pea-nuts ...	192	125	...	158	112	240	512	221	272	186	228	190
2. Small Japanese ...	96	438	...	392	96	479	368	231	186	385	228	359
3. Big Japanese ...	890	877	...	1,029	832	1,008	560	866	757	748	896	1,163
4. Virginia ...	480	813	...	846	480	812	576	800	512	818	1,137	973½
5. Tata's ...	896	1,188	...	1,829	1,088	1,154	1,152	756	1,045	1,231	607	1,405
6. Pondicherry ...	576	1,079	...	990	768	936	960	501	768	876	853	1,131
7. Poona (Local) ...	...	749	...	504	...	682	...	385	...	555	...	651
Average ...	520	753	...	821	563	744	701	536	590	713	...	...

The following statement shows the results of different treatments compared with the results of the previous year :—

	1903-04.	1904-05.
	Lbs.	Lbs.
Average of once sprayed ...	744	836½
Do. of twice sprayed ...	616	863½
Do. of thrice sprayed ...	701	649½
Do. of all sprayed plots ...	669	795
Do. of steeped ...	658	883
Do. of unsteeped ...	594	713
Do. of unsprayed ...	540	809
Do. of combined treatment ...	805	647
Percentage gain or loss from steeping ...	7.5 gain	14.9 gain
Do. from spraying ...	27.6 gain	1.8 loss
Do. of Tata's over Spanish pea nuts ...	.....	639.5 gain
Do. of Virginia over small Japanese ...	403.1 gain	.....
Do. of combined treatment ...	24.4	6.9 gain

15. *Wilt Disease of Tur.*—16 varieties of Tur were sown on the 7th of July on the same field as last year. The seed was dibbled in by hand 3½ feet apart. The germination was fair. Irrigation was given during breaks in the rain. The crop at first showed no signs of disease, the growth being vigorous. But the disease first made its appearance in August, when the plants began to wither one by one in all varieties. From the first appearance of the disease till October the healthy plants were counted every week. Afterwards they were counted monthly. Only 9 varieties were able to produce seed. The variety Sambalpur No. 9 resisted the disease most of any, and Biláspur No. 1 showed over 50 per cent. resistance.

The statement below shows counts at different dates, percentage of resistance and yield per plant.

Next year only the 9 varieties which produced seed will be sown with the seed from the plants that have survived. It is hoped by thus selecting that a resistant variety will be evolved.

No.	Name.	No. of lines sown.	Total No. of plants at the beginning.	1st observation 23-3-05.	2nd 27-3-05.	3rd 3-9-05.	4th 17-9-05.	5th 24-9-05.	6th 30-9-05.	7th 9-10-05.	8th 13-10-05.	9th 1-11-05.	10th 1-12-05.	Height on 13-11-05.	11th 1-1-06.	12th 1-2-06.	13th 1-3-06.	14th 1-4-06.	Per centage of resistance in plants
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1	Bilaspur No. 1 ...	6	250	232	224	218	211	186	187	184	181	179	179	3' 8"	170	168	143	129	51.6
2	" No. 2 ...	6	276	260	220	189	158	112	103	96	85	68	60	3' 5"	43	34	21	19	3.0
3	" No. 3 ...	6	304	294	263	250	221	183	187	181	180	167	140	4' 4"	109	106	83	34	11.1
4	Sambalpur No. 8 ...	6	292	274	254	221	167	167	165	157	153	145	135	4' 1"	108	105	81	60	20.5
5	" No. 4 ...	1	37	35	23	18	16	7	7	7	7	7	7	2' 7"	5	4	3	3	8.1
6	" No. 6 ...	11	442	429	407	366	347	299	272	276	274	263	243	4' 4"	192	156	109	72	16.2
7	" No. 9 ...	6	311	304	286	271	271	265	265	262	260	259	238	3' 10"	250	248	240	243	77.8
8	" No. 10 ...	6	270	259	232	186	175	138	138	120	113	108	101	3' 6"	88	74	58	49	17.1
9	Red Tur Bangalore No. 13.	10	264	246	227	201	164	135	110	101	88	...	...	4' 2"	...	...	...	...	...
10	Red Tur Bellary No. 40.	2	54	47	47	25	19	14	14	9	7	5	2	2' 4"	1	1	...	...	...
11	Variegated Bangalore No. 20.	10	293	280	266	216	218	203	202	192	183	188	188	4' 4 1/2"	176	155	112	65	22.1
12	Red Tur Bellary No. 35.	2	74	68	68	44	28	18	11	8	9	5	1	3' 3 1/2"	1	...	...	...	...
13	White Tur found in Red Tur Bellary No. 46.	16	101	101	95	89	82	68	63	62	62	47	37	2' 3"	6	5	...	...	...
14	White Tur Nadiad ...	6	127	117	110	96	88	74	66	60	57	37	13	3' 3 1/2"	...	...	...	...	...
15	Arhar ...	6	208	132	156	124	98	68	67	50	44	26	5	2' 6 1/2"	...	...	...	...	...
16	Red Tur Nadiad ...	6	198	150	123	88	66	60	38	32	26	18	5	2' 6 1/2"	...	...	...	...	...

16. *Gram Disease*.—Four varieties of gram followed the groundnut crop in field No. 8 during the rabi season. The gram was badly diseased.

XIII.—Miscellaneous Crops.

17. *Wheat*.—Wheat varieties and crosses from last year's selected heads were sown this year on a large area. The germination of all was even and the growth vigorous. They were irrigated regularly till they began to ripen. Rust appeared on all the crosses and varieties, except a few crosses of Khapli and Kala Kusal, and Khapli and Popatia. As the rust appeared late much damage was not done. The grain of a few varieties that were badly affected were somewhat shrivelled. A variety of wheat found at the last Agricultural Exhibition at Nagar, the wheat of which is very heavy, was sown here for seed. The outturn per acre was 1,457 lbs.

Samples of all varieties and crosses will be sent for valuation and opinion to the Chamber of Commerce. The statement below shows the outturn of each variety grown on one guntha plots:—

No. of field.	Name of variety.	Area.	Outturn actual.	Outturn per acre.	
1	2	3	4	5	
		Gts.	Lbs. oz.	Lbs.	
1	15 Pivla Pota, Málegaon	...	1	16 0	640
2	26 Rangrif of Kangra	...	1	16 0	640
3	39 Koni of Jhelam	...	1	21 0	840
4	5 Pivla Botka, Bágán	...	1	12 0	480
5	33 Safed of Hoshiarpur	...	1	12 0	480
6	30 Ghoni of Silhat	...	1	13 0	520
7	Australian	3 19	1	20 0	800
8	Do.	2 10	1	22 8	900
9	Do.	2 13	1	21 8	860
10	Do.	2 22	1	22 0	880
11	Do.	2 23	1	17 0	780
12	Do.	...	1	15 0	600
13	Do.	...	1	17 0	680
14	Do.	...	1	15 0	600
15	Do.	...	1	19 8	780
16	Do.	...	1/2	4 0	320
17	Do.	...	1	13 0	820
18	17 Jonoria Damoh	...	1	15 0	600
19	20 Dodi of Muzafargarh	...	1	15 0	600
20	21 Dandan of Maltan	...	1	17 0	680
21	Kopergaon wheat	...	1/2	10 0	800

No. of field.	Name of variety.	Area.	Outturn actual.	Outturn per acre.
1	2	3	4	5
		Gts.	Lbs. oz.	Lbs.
22	Black awned Athni	1	26 8	1,060
23	Chavalkatha Bhandára	1	23 0	920
24	Daudakháni Dámoh	1	23 0	920
25	Maliya Belgaum	1	47 0	1,880
26	20 Daudakháni (c)	1	14 0	560
27	18 Deshi Athni, Belgaum... ..	1	28 0	1,120
28	6 Hansia, Broach	1	32 0	1,280
29	1 Mundi of Ludhiána	1	31 8	1,260
30	(10) Safed of Amritsar	1	29 0	1,160
31	(7) Daudakháni A	1	24 8	980
32	Kála Kusal wheat	1	25 0	1,000
33	14 Paman of Sirsa	1	26 0	1,040
34	22 Potia, Nadiad	1	47 0	1,880
35	38 Red Deshi of Oudh	1	36 0	1,440
36	4 Budhe wheat	1	31 0	1,240
37	7 Vadnak Amritsar	3 lines.	0 4	...
38	Bangashia Damoh	1 line.	2 0	...
39	Bansi Báleghát	4 lines.	2 8	...
40	Lál of Batála	1	23 0	920

18. *Cucurbitaceæ*.—Fifty-three kinds of cucurbits were planted for botanical study both foreign and indigenous. The American cucurbits did not produce any seed. The indigenous were very poor in growth. They only yielded a few fruits poor in quality. Many of the creepers being attacked by caterpillars died early. From many of the cucurbits no seed was obtained.

19. Brinjals, chillies and sweet potato varieties were grown in small plots. The brinjals and chillies were top-dressed with sulphate of potash. They did very well.

XIV.—*Demonstration and Training.*

20. As in previous years the object lesson plots were sown in field Nos. 9, 10 and 12 with all the varieties of cereals, pulses, oil-seeds, fibre plants, narcotics, dye-plants, millets, several varieties of chillies, brinjals, tomato, sweet potato, indigo, cucurbits and other garden crops such as sugarcane, yam, Suran, Alu, etc., with the object of enabling the students to study the crops of the Presidency. In field No. 9 representative mixtures in common use in the Bombay Presidency were also sown for the demonstration to the students and for the Junior Civilians' class. In field No. 10 one plot with each of the representative variety of a class of cotton newly classified by Professor Gammie was sown for demonstration to students.

In the rabi season almost all the rabi crops such as Shálu (rabi Jowár), wheat, oats, rabi pulses, safflower, gram, mustard, and linseed were sown on small plots.

Practical work.—Portions of field No. 15 and 16 were reserved as students' plots. The students of the second and third year's course were given each four and 10½ gunthas respectively for practical work.

The second year students were only given one crop, while third year students two crops.

XV.—*Farm Implements.*

21. During the year under report 48 heavy Arlington Turn-Wrest ploughs were received from America in two consignments.

Almost all the ploughs were sold during the year and a fresh consignment has been ordered from America.

The demand for reversible ploughs has been greatly increased.

During the months of February and March the demand was large and in many cases the money deposited or advanced had to be refused. Besides the Arlington ploughs, country drills and harrows were supplied to out-stations.

XVI.—Seed Distribution.

22. Varieties of tobacco, cotton and chillies were grown to raise seed for distribution. The demand for good seed is largely increasing from out-stations.

XVI.—Visitors.

23. In all 17 parties visited this Station during the year under report. Out of the above number 11 were land-holders and other private gentlemen from Poona, Sholapur, Belgaum, Kolhapur, Baroda and Aurangabad. The other six were Government officers of this as well as other provinces.

XVII.—Accounts.

24. The net cost for the year is Rs. 4,729-3-1 as compared with that of the last year Rs. 5,138-3-5. Of the fodder shown as sold to the Dairy Rs. 346 is balanced by upkeep of bullocks and Rs. 181-8-0 by manure used for the experimental Station and the balance Rs. 145-8-2 is due to Poona Station.

The balance sheet is given below :—

Receipts.	Amount.	Total.	Expenditure.	Amount.	Total.
1	2	3	4	5	6
To Sale of farm produce for 1904-05—			By Cost of Establishment ...	Rs. a. p.	Rs. a. p.
Oil-seeds ...	15 8 10	.....	„ Travelling Allowance to Es-	.....	1,858 15 6
Garden crops ...	27 3 7	.....	tablishment ...	.....	220 3 0
Grain ...	33 4 6	76 0 11	„ Telegram and Service	.....	95 6 0
„ Sale of farm produce for 1905-06—			Stamps ...	.....	144 0 0
Oil-seeds ...	34 12 3	.....	„ Rent of land ...	.....	.....
Grain ...	47 8 0	.....	„ Irrigation charges ...	223 6 3	.....
Fooder-seeds ...	3 9 0	.....	„ Petty improvements ...	297 7 3	.....
Garden crops ...	83 9 11	.....	„ Labour ...	1,066 10 9	.....
Vegetables ...	18 4 7	.....	„ Upkeep of bullocks ...	395 7 0	.....
Fruits ...	5 0 0	.....	„ Purchase of seed for sowing.	40 8 6	.....
Live-stock ...	35 8 0	.....	„ „ implements ...	186 10 9	.....
Miscellaneous ...	37 9 0	265 12 9	„ „ petty supplies .	46 15 6	.....
„ Sale of green and dry	.....	673 4 2	„ „ furniture ...	50 0 0	.....
fodder to Dairy Cattle...	.....	.....	„ „ books ...	4 7 0	.....
„ Seeds unsold on 31st	.....	305 11 7	„ „ manures ...	183 13 0	.....
March 1909 and on hand.	.....	.....	„ „ live-stock ...	132 3 6	.....
„ Increase in valuation of—			„ Printing charges ...	93 12 9	.....
Farm implements ...	191 8 0	.....	„ Miscellaneous expenses ...	663 9 9	3,985 0 0
Live-stock ...	62 0 0	253 8 0			
Total ...	.....	1,574 5 5			
By net cost ..	.....	4,729 3 1			
Total ...	.....	6,303 8 6	Total ...	.....	6,303 8 6

VII.—OPERATIONS ON THE KIRKEE DAIRY AND AGRICULTURAL STATION.

I.—Purpose.

The objects aimed at in the Dairy may be recapitulated as follows:—

1. To afford instruction for the students of the College of Science.
2. To serve as a model dairy to the public.
3. To give opportunity for experiments in feeding and dairying.
4. To improve dairy breeds.
5. To supply pure milk to the invalids and children of Poona.
6. To allow owners of milch cattle the free service of the good bulls bred from milking animals.

II.—Health of the Animals.

2. This year like last the health of the animals was affected by the climatic condition. Foot and mouth disease broke out but timely measures suppressed it with a loss of only one animal. The animals that suffered and were apparently cured of the disease in 1904 could not withstand the peculiar dry season and four died during the year under report. An epidemic of diarrhoea broke out among the small calves in November and December, killing nineteen. Six buffaloes died of liver-flukes this year, causing a serious loss to the dairy.

III.—Milk Supply.

3. The almost famine conditions prevailing affected the milk yield even more than last year; still, thanks to more careful attention in feeding, several animals have produced very large yields.

214,615 lbs. of milk were produced. This year the military hospitals were supplied by the military dairy and the civil dairy has been entirely dependent on the patronage of the private customers. Poona is a difficult place for dairying in that the demand varies so much that we could not produce sufficient milk in the rains, while in the cold season we could not dispose of a large part of the produce and had to turn it into ghee at a great financial loss. A branch dairy was opened at Maháleshwar during the hot season but it was not paying.

IV.—Yield.

4. The largest yields for the year under report are as follows. Among cows the first in yield is Harris (cross-bred English-Aden) 4,790 lbs., second Zankar (Sindhi) 4,545 lbs., third Pitámbari (Sindhi) 4,494 lbs., fourth Mekini (breed unknown) 4,465 lbs., fifth Piri (Sindhi) 4,123 lbs.; sixth Nari (Aden) 3,935 lbs. Among buffaloes—Ranga (Surti) 4,296 lbs. and Saradári (Jaffarábádi) 4,225 lbs.

The usual statements of milk record are given below. The following notes will explain how the figures in the several columns have been worked out:—

Column 7.—The maximum day's yield of the year is always quoted at a sale as an indication of an animal's productiveness and the average of these record yields for the whole period of observation is here given as affording a fair basis for comparison between the various animals when in milk.

Column 8 gives the average for the whole period inclusive of days dry.

Column 11.—The price of milk has varied for customers from 10 to 14 lbs. per rupee but an attempt has been made to fix a slightly higher arbitrary figure to cover cost of distribution. It must, however, be remembered that these statements are only intended to afford a basis for comparison between animals and the figures do not give an accurate indication of the total profit or loss. Sales of dairy produce in the shape of ghee and sometimes butter when the demand for milk is small are generally unprofitable, and in such cases the price estimated for milk is not realized in practice. Charges for supervision, etc., are also not taken into account in estimating these comparative net profits per animal.

Column 12.—These figures are actuals. It may be noted that cost of feeding and attendance varies with different animals according to period of lactation, size, yield of milk and individual idiosyncracies.

Column 13.—These figures are actuals for the last two years and approximate estimates for preceding years.

I.—Cows.

No.	Name.	Age.	Total Number of years under observation	Results during the period shown in column 4.					Yield of milk during 1905-06.	Financial results for total period shown in column 4.				
				Total number of days in milk.	Total days dry.	Average of maximum daily yields.	Average daily yield.	Yearly average out-put.		Value of milk.	Cost of feeding.	Cost of attendance.	Net profit.	Average net profit per year.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
<i>Aden.</i>														
		Y. m. d.				Lbs. oz.	Lbs. oz.	Lbs.	Lbs.	Rs.	Rs.	Rs.	Rs.	Rs.
1	Bakul	7 1 10	2½	799	212	16 12	8 5	2,544	2,083	448	236	32	180	66
2	Bhari	Medium	7	1,931	615	15 1	12 8	2,630	3,444	1,740	628	280	834	119
3	Gulabi	3 8 29	...	81	...	9 12	7 6	...	376	31	9	3	...	...
4	Madi	6 0 8	2½	683	25	9 0	7 2	2,290	2,582	435	193	33	219	86
5	Nari	9 9 11	6	1,628	664	14 6	11 6	2,573	3,935	1,397	608	231	658	103
6	Harris (cross)	Medium	4	950	497	26 12	16 5	3,707	4,790	1,342	472	127	743	186
<i>Sindh.</i>														
1	Ambi	5 4 20	...	93	...	15 0	12 1	...	1,124	93	24	4	65	...
2	Anupurna	6 3 25	2	499	291	8 12	6 15	1,373	2,220	229	119	24	86	43
3	Bhasul	9 11 22	6	1,437	763	14 6	13 0	2,073	1,419	1,129	220	223	677	113
4	Bulki	2 9 16	...	80	...	17 4	13 0	...	1,044	87	21	3	63	...
5	Dabi	6 4 7	2	279	451	10 6	5 14	853	683	142	58	11	73	36
6	Giti	2 3 19	...	41	...	13 4	10 10	...	435	86	12	2	22	...
7	Hira	Medium	4	1,087	373	13 1	8 4	2,160	2,955	798	417	131	250	62
8	Houshi	Do.	4	1,396	64	14 6	10 9	3,463	3,185	1,291	362	129	500	200
9	Kanai	Do.	4	1,120	340	13 4	7 6	2,447	1,928	903	345	127	436	109
10	Kaisar	Young	2½	535	285	11 5	8 4	1,465	1,916	331	175	22	134	50
11	Khilgri	3 4 4	...	98	...	15 8	11 2	...	1,072	99	24	4	62	...
12	Lahori	Young	4	1,069	371	15 1	4 8	1,930	1,908	702	188	127	389	97
13	Makhmal	Do.	4	1,084	396	11 7	6 8	1,910	1,903	703	273	127	318	75
14	Mhatari	Aged	4	1,178	284	13 11	8 14	2,259	2,617	830	242	127	441	115
15	Mori	Young	4	1,284	178	14 5	8 5	2,554	2,886	832	359	131	442	110
16	Mutri	5 8 18	1½	629	95	11 6	4 11	2,245	1,259	307	89	21	193	113
17	Pari	Medium	6	1,543	643	14 12	7 6	2,369	1,775	1,291	448	226	617	103
18	Piri	10 2 29	7	1,908	647	19 12	15 0	2,433	4,123	1,669	540	277	752	107
19	Pitambari	10 7 18	7	2,193	362	16 4	12 5	3,147	4,494	1,928	638	281	1,007	144
20	Polari	Medium	6	1,404	786	16 15	9 15	2,159	2,762	1,151	449	227	475	79
21	Putali	Do.	4	1,361	825	14 8	6 3	1,901	951	1,012	428	218	366	61
22	Rudhi	Do.	4	1,131	325	13 5	9 3	2,580	1,934	951	317	126	508	127
23	Sabani	Do.	4	1,690	865	15 2	7 2	2,259	1,654	1,385	624	276	409	57
24	Samarthi	13 0 0	7	1,848	707	11 7	7 5	1,893	2,221	1,155	534	279	342	40
25	Soni	3 2 22	...	93	...	15 8	11 6	...	1,658	88	24	4	60	...
26	Sukhi	6 10 4	2½	816	219	12 1	7 11	2,106	2,090	500	145	39	316	111
27	Tambhori	4	...	1,131	326	12 8	8 15	2,293	2,666	838	326	129	383	86
28	Tuphari	Medium	4	682	778	14 5	9 7	1,741	708	643	212	117	314	73
29	Zanar	Do.	4	1,191	269	16 12	13 4	3,580	4,545	1,294	405	130	759	190
<i>Sindh (cross).</i>														
1	Kara	8 8 10	5	1,145	680	14 8	5 9	2,178	2,119	991	452	175	364	73
2	Mekini	Medium	7	1,957	593	16 4	14 6	3,020	4,465	1,539	668	275	593	128
3	Mungli	4 2 3	...	79	...	15 8	11 14	...	939	78	22	13	63	...
4	Saraji	13 9 10	7	2,180	375	14 2	6 9	2,310	2,305	1,415	497	291	637	91
5	Sarangri	7 5 20	2½	821	214	13 1	6 10	1,737	2,095	459	212	41	206	43
6	Shendri	5 3 19	...	112	...	16 12	13 14	...	1,557	130	20	4	108	...
7	Tiki	Young	4	1,265	192	13 10	7 4	2,489	2,597	905	297	131	477	119
8	Yeshi	Do.	1½	670	30	16 10	9 5	3,194	3,290	640	160	30	350	182
<i>Gir.</i>														
1	Bhavali	Young	1½	190	266	18 12	14 7	2,169	1,429	226	58	7	171	137
2	Budhi	Do.	1½	180	272	12 4	14 7	1,330	1,342	139	63	7	69	55
3	Godi	Medium	2½	745	45	15 4	9 9	3,062	3,492	611	192	33	8-6	173
4	Kabari	Young	1½	219	242	12 4	9 4	1,261	1,141	331	71	8	52	41
5	Kanail	Do.	1½	413	114	12 8	8 9	2,250	2,162	265	103	18	139	98
6	Lalari	Do.	1½	527	...	16 6	8 12	3,551	3,205	420	131	23	268	188
7	Lingadi	Medium	1½	208	321	4 12	3 1	489	91	56	43	8	5	3
8	Mukhran	Do.	1½	264	136	20 10	9 6	2,351	2,145	212	61	13	133	127
9	Nabadi	Do.	1½	171	305	13 14	12 0	958	719	101	49	8	44	33
10	Pavali	Do.	1½	258	272	14 12	13 2	1,414	1,219	170	66	10	94	69
11	Sugran	Young	1½	287	209	12 4	6 7	1,199	1,009	133	81	12	40	30
12	Tapu	Do.	1½	190	285	10 8	5 8	729	416	72	56	8	6	6
13	Umbari	Aged	1½	118	267	13 2	14 11	1,374	1,439	124	47	6	72	66
<i>Gir (cross).</i>														
1	Bigul	Medium	7	1,977	574	13 0	7 3	2,289	2,289	1,384	517	279	588	84
2	Pandhari	Do.	1½	229	160	3 4	4 6	869	596	82	34	12	86	33

Note.—The Average yearly yield per cow comes to 2,038 lbs.; the average daily yield 9 lbs. 5 oz.; the average cost of feeding the cow Rs. 75-7-0; and the average net profit per cow Rs. 99-3-0.

II.—Buffaloes.

No.	Name.	Age.	Total number of years under observation.	Results during the period shown in column 4.					Yield of milk during 1905-06.	Financial results for total period shown in column 4.				
				Total number of days in milk.	Total days dry.	Average of Maximum daily yields.	Average daily yield.	Yearly average out-put.		Value of milk.	Cost of feeding.	Cost of attendance.	Net profit.	Average net profit per year.
1	2	2	4	5	6	7	8	9	10	11	12	13	14	15
<i>Jafrabadi.</i>										Rs.	Rs.	Rs.	Rs.	Rs.
1	Kndal ...	Medium ...	3	694	401	17 12	12 10	2,553	2,568	621	250	76	295	98
2	Makna ...	Do. ...	1½	304	150	14 0	8 14	2,116	1,914	221	288	14	-81	-64
3	Ratan ...	Do. ...	3	814	277	22 6	11 1	3,484	3,251	888	180	78	621	297
4	Saradári ...	Do. ...	1½	495	31	21 14	12 10	5,378	4,220	635	108	23	507	353
<i>Delhi.</i>														
5	Mañlan ...	Aged ...	7	1,600	895	26 9	25 8	3,778	2,375	2,045	800	268	977	139
6	Rambha ...	12-11-19	7	1,653	890	13 10	6 6	3,180	1,750	1,176	623	276	277	39
7	Salu ...	Medium ...	1½	325	155	18 0	12 15	3,491	2,724	378	91	16	271	203
8	Savali ...	Do. ...	1½	469	121	10 14	3 5	1,433	604	190	100	20	70	44
<i>Surti.</i>														
9	Aditwári ...	Medium ...	1½	563	23	18 0	6 1	3,072	2,075	405	136	24	245	155
10	Báshí ...	Do. ...	3	785	310	16 12	8 6	2,849	3,086	695	250	76	363	121
11	Báwaja ...	14-6-24	7	1,700	855	14 7	11 10	2,289	781	1,240	650	267	323	46
12	Bhandári ...	Aged ...	3	863	242	17 9	6 13	2,405	2,491	577	235	81	261	87
13	Bhavari ...	Medium ...	1½	447	143	13 0	7 10	3,617	1,642	345	117	29	208	131
14	Bhori ...	Aged ...	7	2,001	554	16 4	8 5	3,239	2,210	1,748	793	277	678	97
15	Chavell ...	13-9-11	7	1,924	681	17 5	14 11	3,394	3,437	1,880	769	277	844	121
16	Chandani ...	Aged ...	3	616	479	14 7	5 10	1,496	1,064	385	184	73	108	36
17	Dalbhari ...	13-6-9	7	1,843	712	14 15	9 0	2,728	2,544	1,479	657	277	545	78
18	Durga ...	Young ...	3	722	373	14 11	7 6	2,121	1,736	513	247	76	190	63
19	Gahina ...	Medium ...	1½	400	5	15 14	9 10	3,759	3,507	339	114	18	207	191
20	Gajari ...	Aged ...	7½	1,856	695	17 8	10 12	2,833	3,885	1,545	712	281	552	79
21	Ganga ...	Do. ...	7	1,784	771	17 13	12 5	3,354	3,219	1,331	757	277	797	114
22	Ghari ...	Medium ...	7	1,825	726	17 5	10 10	3,205	3,333	1,746	735	281	730	104
23	Ghosáli ...	Young ...	1½	484	106	13 0	10 3	2,979	2,641	393	127	21	245	155
24	Chumbari ...	Medium ...	1½	473	112	14 14	7 2	2,902	1,810	383	173	21	169	119
25	Giraji ...	Do. ...	1½	424	156	16 6	11 2	2,678	2,331	353	125	19	209	132
26	Gujar ...	Aged ...	7	1,906	745	13 12	6 4	2,163	2,099	1,172	633	280	259	37
27	Jamádár ...	13-3-27	7	1,758	793	15 6	7 7	2,496	2,593	1,364	659	280	425	61
28	Káveri ...	13-3-17	7	1,897	654	18 8	14 4	3,308	3,989	1,804	769	277	788	103
29	Maini ...	Young ...	6½	173	...	11 12	8 13	...	1,349	112	41	7	64	153
30	Mangl ...	12-3-18	6	1,205	785	12 10	9 0	1,807	1,242	863	493	229	171	25
31	Mori ...	Medium ...	1½	461	95	15 4	6 10	3,119	1,793	411	153	21	277	163
32	Parali ...	Do. ...	7	1,718	827	14 11	7 5	2,173	1,773	1,183	610	276	302	43
33	Patangi ...	Young ...	1½	423	157	18 14	15 7	3,823	3,208	502	182	19	351	229
34	Putali ...	Aged ...	4	1,408	690	12 14	8 14	2,446	3,198	1,154	563	231	357	59
35	Runga ...	Medium ...	4	905	551	17 0	11 15	2,591	4,296	836	395	131	310	77
36	Rupi ...	Young ...	1½	474	256	13 14	6 11	2,702	1,671	357	102	20	235	146
37	Shevari ...	Medium ...	8	694	401	16 15	9 4	2,064	2,549	496	212	77	207	69
38	Tavali ...	Young ...	1½	504	133	17 4	14 4	3,501	3,302	510	136	22	352	201

Note.—The average yearly yield per buffalo comes to lbs. 3,484; the average daily yield 11 lbs. 10 oz.; the average cost of feeding the buffalo Rs. 94-4-0; and the average net profit per buffalo Rs. 91-8-0.

V.—Strength of the Herd.

5. The total number, which is 231, shows an increase of 42 animals. Many of the animals were not disposed of on account of the low prices which were offered.

There is decrease of valuation of Rs. 180, which is due to—(1) loss of animals by liver-flukes and the after-effects of foot and mouth disease; (2) general loss of health due to the season, increasing age, animal not covered, etc.

The statement is given below:—

Description.	Strength on 1st April 1905.	Increase.			Decrease.				Strength on 1st April 1906.	Valuation.		Increase or Decrease during year.
		Purchased or Transferred.	Born.	Total.	Sold.	Died.	Transferred.	Total.		1905.	1906.	
<i>Cows.</i>												
Stud-bulls ...	12	...	...	...	...	1	...	1	11	604	660	+56
Cows ...	55	9	...	9	3	1	...	4	60	3,201	3,305	+104
Heifers ...	13	...	...	...	...	1	9	10	3	214	55	-159
Cow-calves ...	16	1	25	26	1	9	...	10	32	66	295	+229
Bull-calves ...	10	...	31	31	1	6	...	7	34	58	211	+152
Total ...	106	10	66	66	5	18	9	32	140	4,144	4,626	+482
<i>Buffaloes.</i>												
Buffalo-bulls ...	5	...	...	...	...	...	...	...	5	240	260	+20
She-buffaloes ...	40	1	...	1	1	8	...	9	38	4,100	2,875	-1,225
Heifers ...	6	...	...	...	...	...	1	1	5	165	165	+10
She-buffalo calves ...	15	...	12	12	...	1	...	1	26	46	128	+80
Bull-calves ...	11	...	11	11	2	3	...	5	17	84	37	-47
Total ...	83	1	23	24	3	12	1	16	91	4,625	3,463	-1,163
Dairy cart-horses ...	2	...	...	...	...	...	...	...	2	830	800	-30

VI.—Breeds kept.

6. There are three milking breeds of cows kept on the Station, *viz.*, Aden, Sindhi and Girs; and three breeds of buffaloes, *viz.*, Surti, Delhi and Jaffarabadi.

The breeding of cows has been carried on here for 10 years and 9 heifers (farm-bred) have come into milk during the year under report, making a total of 34 farm-bred cows.

The Aden herd is small but contains some good typical animals. This year there has been an addition of one to that breed.

The Gir herd is now well established and contains some animals of great promise as milkers.

VII.—Services of Bulls.

7. Free service of bulls is given to the public. 9 cows and 7 buffaloes were covered for private owners. Of these 6 were by Sindhi, 3 by Girs, 2 by Jaffarabadi and 5 by Surati.

VIII.—Farm.

8. In the rented area and that made over from the Poona Station 24 acres and $12\frac{1}{2}$ gunthas were for kharif, 10 acres and 8 gunthas for rabi* and 2 acres $9\frac{1}{2}$ gunthas for guinea-grass and lucerne. In addition 8 acres and 27 gunthas of guinea-grass and other fodders were grown on the experimental area of the Poona Station.

*Cropped second time.

The statement below shows the area cropped:—

Field No.	Kharif crop.	Area.	Purpose.	Rabi.		Purpose.	Perennial crop.	Area.	Purpose.
					A. g.				
1	Sundhia	1 15	Fodder	{ 2nd crop Maize	0 30	Fodder	.....	...	.....
..	.....	...	.....	Do.	0 30	Do.	.....	...	.....
2	Velvet beans	0 25	Fodder	†Wheat	0 25	Wheat Im- provement.	Do.	0 10	Green fodder for Dairy. Do.
	Bajri and Choli.	1 0	Do.	Peas and oats	1 0	Fodder	.....	...	.....
	Nilva	1 14	Do.	{ 2nd crop Maize	1 14	Do.	.....	...	.....
4	Sorghum Collier and Amber.	0 28	Do.	Maize	0 20	Do.	.....	...	.....
	Utavali	0 20	Do.	†Wheat	1 10	Wheat Im- provement.	.....	...	.....
	Maize	0 15	Do.	Do.	0 20	Fodder	.....	...	.....
	Do.	0 15	Do.	Maize	0 20	Do.	.....	...	.....
	Do.	0 20	Do.	Do.	0 20	Do.	.....	...	.....
	Do.	0 20	Do.	Do.	0 20	Do.	Guinea-grass	0 33	Green fodder for Dairy.
8	Yellow Cholam.	0 8½	Do.	Yellow Cholam.	0 8½	Fodder	.....	...	.....
	.....	.....	.....	.....	.....	.....	Lucerne	0 22	Green fodder for Dairy. Do.
	.....	.....	.....	.....	.....	.....	Guinea-grass	0 4½	.....
	Parti	0 4½	.....	.....	.....	.....	.....	.....	.....
	Raja	0 14	.....	.....	.....	.....	.....	.....	.....
13	Nilva	1 24	.....	.....	.....	.....	.....	.....	.....
14A	Do.	1 0	.....	.....	.....	.....	.....	.....	.....
14B	Hundi	1 15	.....	.....	.....	.....	.....	.....	.....
14C	Utavali	2 16	For fodder	.....	.....	.....	.....	.....	.....
15	Hundi	0 23	.....	.....	.....	.....	.....	.....	.....
16	Do.	0 31	.....	.....	.....	.....	.....	.....	.....
17	Nilva	1 4	.....	.....	.....	.....	.....	.....	.....
18	Maize	0 6	.....	Utavali	0 6	.....	.....	.....	.....
19	Do.	0 23	.....	Do.	0 23	For fodder	.....	.....	.....
20	Do.	1 8	.....	Do.	1 9	.....	.....	.....	.....
21 & 21	Rice	0 8	To raise seed- lines.	Rice varieties	0 10	For botanical study.	.....	.....	.....
21	Maize	1 21	Fodder	Utavali	1 21	For fodder	.....	.....	.....
22	Utavali	2 11	Do.	.....	.....	.....	.....	.....	.....
23	Do.	1 23	Do.	.....	.....	.....	.....	.....	.....

† Cultivated by Poona Station.

IX.—Forage crops.

9. During the year under report several varieties of green fodder, such as Sundhia, velvet beans, Choli mixed with Bajri, Nilva, Utavali, sorghums and maize were grown in the kharif season for the dairy cattle. Throughout the year green fodder was supplied to the dairy cattle to keep up the flow of milk. Maize plots were sown at an interval of a fortnight so that there should be no break in the supply.

After Bájri and Choli peas and oats were taken as a rabi fodder crop and the fodder was fed to a certain number of animals for a certain period to test the feeding value of this mixed crop.

10. *Field No. 1.*—This field which is occupied by mango trees was sown with Sundhia on the 8th July and the blanks resown on the 4th of August. The crop was cut in September. The field was given 40 loads of manure per acre and sown with maize on 22nd September, the space between the mango-trees being planted with guinea-grass. The crop was irrigated; it came into flower in November when the cutting commenced.

The field was again manured heavily at the rate of 60 loads per acre and sown on 29th of December with maize.

11. *Field No. 2.*—The soil of this field is black and friable; Velvet beans were dibbled in by hand 5 feet apart on the 11th of July. They were cut by the end of September, the outturn being 4,136 lbs. per acre.

Bájri and Choli.—The remaining portion of this field was sown with Bájri and Choli to further test the value of this mixed fodder crop on the milk yield of cattle. The seed was dibbled in furrows $1\frac{1}{2}$ feet apart; the crop was intercultured after it grew to a height of 10 inches. It came into flower in September when it was cut. The mixed fodder was relished by the animals.

12. *Field No. 3.*— $8\frac{1}{2}$ gunthas of this field were sown with yellow Cholum for fodder as it is said that this kind of Madras Jowár gives 6 cuttings in a year. The seed was sown on the 30th of July; the crop grew well; it was irrigated regularly; the first cutting was taken in October; afterwards the crop was hand-weeded. The ratoon crop was very poor, the height being $1\frac{1}{2}$ to 2 feet, all the plants appearing sickly. The second cutting was taken on the 4th of December and was very poor. The crop was weeded once more; the third cutting was better than the second; still the crop in some cases was very poor. After the third cutting the crop did not thrive well and was removed. The portion of the field on which this crop was sown is a light one. The crop will be tried next year on a larger area and on a better kind of soil.

Lucerne.—22 gunthas of this field were sown with lucerne to test the comparative value of the *ridge* and *bed* system, 11 gunthas being sown with each. The germination was even and the crop healthy. The first cutting on ridges was less than that on beds owing to the greater amount of space occupied by the plants. But the next cuttings on the ridges exceeded the corresponding cuttings in beds which manifested the advantage of sowing lucerne on ridges. In ridge system the plants get better drainage which is essential to this crop. Besides it can be intercultured easily; while in the bed-system the roots of the plants come directly in contact with water, the plants become stunted in growth, the leaves become yellow and drop off. Eight cuttings were taken from August to March.

The statement below shows comparison of different methods of planting:—

No. of cutting.					Results per acre.	
					Ridge System.	Bed System.
					Lbs.	Lbs.
1st	...	...	...	...	3,509	6,127
2nd	...	...	...	...	4,236	3,436
3rd	...	...	...	...	4,891	2,055
4th	...	...	...	..	2,891	1,673
5th	...	...	...	...	3,327	1,400
6th	...	...	...	...	3,364	1,182
7th	...	...	...	...	3,545	909
8th	...	...	...	...	2,909	1,545
Total					28,672	18,327

13. *Field No. 4* was occupied by four maize plots and one plot each of Sorghums and Utávali. The Sorghums and Utávali were made into dry fodder. Two 20-guntha plots, one treated with 60 loads of manure per acre and the other without manure and two 15-guntha plots, one with 60 loads of manure per acre and the other without manure were sown with maize for testing the liberal use of manure on the outturn of maize for fodder.

Maize to grow well requires liberal treatment. This is brought out in the results detailed below :—

Plot No.	Area.	Per acre.			
		Plot manured with 60 loads per acre.	Plot unmanured.	Increase.	Value of increase.
	Gunthas.	Lbs.	Lbs.	Lbs.	Rs. a. p.
I	20	11,000	.....	} 3,350	16 12 0
II	20	...	7,650		
III	15	...	7,560	} 2,360	11 13 0
IV	15	9,920	.....	

14. The statement below shows outturn, cost of cultivation, etc., of the several fodder crops grown :—

Name of crop.	Area.	Per acre.		Cost of 100 lbs. of fodder green.	Date of sowing.	Date of Flowering.
		Outturn green.	Cost of cultivation.			
	A. g.	Lbs.	Rs. a. p.	Rs. a. p.		
Sundhia	1 15	7,143	20 0 9	0 3 11	8th July 1905 ...	1st September 1905.
Velvet beans	0 25	4,136	23 10 9	0 9 2	11th July 1905 ...	1st October 1905.
Chavli and Bájri	1 0	13,845	22 0 3	0 2 3	Do. ...	5th September 1905.
Peas and Oats	1 0	13,170	33 11 0	0 3 10	22nd October 1905	9th January 1906.
Hundi	3 34	11,957	54 9 5	0 7 4	1st March 1906 ...	10th July 1906.
Maize	12 3	9,689	45 6 10	0 10 1	Successive Maize	crops were taken.
DRY FODDERS.						
Utávali	10 9	4,935	21 12 4	0 9 9	8th July 1905 ...	23rd October 1905.
Sorghum	0 26	6,161	34 4 0	0 8 10	9th July 1905 ...	10th October 1905.
Nilva	5 2	3,970	23 11 2	1 8 7	11th July 1905 ...	20th October 1905.

Name of the crop.	Results per acre.		Cost of Cultivation.	Remarks.
	Outturn.	Value of Outturn.		
	Lbs.	Rs. a. p.	Rs. a. p.	
Yellow Cholum, 3 cuttings	18,447	73 12 7	83 6 10	
Lucerne	28,672	191 2 4	94 8 8	Sown on ridges.
Do.	18,327	122 2 10	94 8 8	Sown in beds.

X.—Feeding Experiments.

15. *Chavli and Bájri.*—Chavli and Bájri was experimented upon, but the quantity was too little to arrive at definite results.

The statement shows details:—

No.	Names.	Date of calving.	Average of 5 days before experiments (19th to 23rd September.)	Average of		Average of 5 days after experiments (3rd to 7th October).
				1st period of 5 days.	2nd period of 4 days.	
	Cows.					
	<i>Sindhi.</i>					
1	Polári	27th June 1905 ...	Lbs. oz. 17 13	Lbs. oz. 13 10	Lbs. oz. 11 8	Lbs. oz. 11 15
2	Piri	30th June 1905 ...	17 3	17 2	17 0	16 0
		Total ...	35 0	30 12	28 8	27 15
	BUFFALOES.					
	<i>Surti.</i>					
1	Chameli	3rd July 1905 ...	18 0	18 6	18 9	16 4
2	Ganga	12th July 1905 ...	14 14	13 11	13 4	13 7
		Total ..	32 14	32 1	31 13	29 11

Peas and Oats.—The experiment was begun from the 12th January 1906 and lasted for 23 days. The cows were given 45 lbs. of peas and oats daily and the buffalo 55 lbs. each, the dry grass being substituted gradually. All the animals relished the fodder very much and there was an appreciable increase in their milk yield.

No.	Names.	Live weights.	Date of calving.	Average of 5 days before experiment (7th—11th January.)	Average of					Average of 5 days after experiment (4th—8th February 1906.)
					1st period of 5 days.	2nd period of 5 days.	3rd period of 5 days.	4th period of 5 days.	5th period of 3 days.	
	Cows.									
	<i>Sindhi.</i>									
1	Pitámbari ...	801	8th December 1905.	Lbs. oz. 22 8	Lbs. oz. 24 10	Lbs. oz. 27 2	Lbs. oz. 24 14	Lbs. oz. 24 15	Lbs. oz. 24 3	Lbs. oz. 22 3
2	Sábani ...	658	15th November 1905.	9 11	8 7	8 10	7 12	6 12	6 9	6 12
	<i>Gir.</i>									
3	Kábari ...	726	28th November 1905.	12 12	14 5	14 4	11 14	10 0	8 13	8 8
4	Umbari ...	736	23rd December 1905.	17 12	17 10	19 0	16 10	16 2	15 9	16 4
			Total ...	62 11	65 0	69 0	61 2	57 12	55 2	53 11
	BUFFALOES.									
	<i>Surti.</i>									
5	Dalbhari ...	1,043	20th September 1905.	11 6	11 3	12 6	11 14	12 10	11 10	11 0
6	Ghosáli ...	...	29th September 1905.	11 12	11 15	13 7	13 0	13 0	13 4	13 4
7	Ghumbhari ...	937	6th December 1905.	11 12	10 6	12 12	12 4	9 10	7 15	8 4
8	Patangi ...	921	4th September 1905.	14 3	16 11	17 15	18 2	17 14	16 1	16 8
			Total ...	49. 1	50 3	56 8	55 4	53 2	48 14	49 0

VIII.—OPERATIONS ON THE MA'NJRI AGRICULTURAL STATION.

I.—History and Aim of the Station.

Up to 1894 sugarcane experiments were carried out at Poona. When it became necessary for sanitary reasons to discontinue them there, a tract of 9 acres was leased at Mánjri in the heart of sugarcane district.

The following lines of experiments were suggested:—

- (1) To study the more economic system of manuring cane.
- (2) To ascertain the most profitable way in which bone-manure can be used.
- (3) To test various methods of cultivation.
- (4) To acclimatize newly imported varieties of sugarcane from Mauritius.
- (5) To compare sugar sorghums with cane as sugar producers.

Questions 2 and 5 have been quite thoroughly settled. Question 4 has been carried on for 12 years. During the year under report attention was mainly given to Question No. 1.

In 1895, 13 acres were purchased including the 9 acres already leased. In 1902, 31 acres adjoining were purchased. In 1905 an additional area of 17 acres was purchased.

II.—Area and Character of the Soil.

2. Mánjri Station consists 4 survey Nos. 61 to 64 inclusive, a total area of 62 acres 10 gunthas situated 8 miles from Poona. Of this area 21 acres 38 gunthas are deep black soil, 6 acres light soil and 1 acre 31 gunthas rock or murmád soil. The new and the old buildings and the *ndla* occupy about 8 acres. The entire tract is commanded by the Mutha Right Bank Canal, so that irrigation is always possible.

III.—New Buildings.

3. As this Station was originally only for sugarcane cultivation only a few buildings were erected. But as the Station increased in area and other lines of work were taken up, the need for larger and better accommodation began to be seriously felt. In 1905 plans for a complete set of buildings were drawn up and sanctioned and the work of constructing commenced. The buildings were ready and given into the charge of the Superintendent on the 15th of March 1906. They consist of office, Superintendent's quarters, clerk's quarters, fieldman's quarters, probationer's quarters, additional labourer's quarters, vegetable barn, implement shed, cattle byre, and visitors' quarters. The old buildings are used for seed barn and storage room for special manures. Most of the new buildings are located on the new area. A permanent Gurál (sugar boiling furnace and shed) and power crusher are necessary to give greater accuracy to the experiments with cane. A well has been dug near the new quarters to give a pure water-supply for the employés.

IV.—Lines of Work.

4. Manure experiments to test potash and phosphoric acid requirements of sugarcane at Mánjri, and the trial of mineral manures compared with cake and poudrette as to top-dressing, water demonstration plots and varieties for distribution constitute the work with sugarcane for the year.

The last year's sugarcane field was sown with cotton, San, Jowár, ground-nut, sweet potato, maize and Tur to see which is the most profitable crop to follow cane.

Varieties of maize, Bájri, Jowár and sweet potato were grown for testing, selection and distribution.

Growing of irrigated cotton was continued.

Various crops were grown for study of their cultivation as flax, barley, oats, Khapli, Jire, gram, Masur, paddy, Rála, Sáva, Lang, peas, Vari, Nágli and Guvár.

Water experiments were made with Khapli wheat.

V.—Meteorology.

5. The season was a very unfavourable one. There were anti-monsoon showers during the middle of May, giving 4.43 inches of rainfall, which facilitated the preparation of the field for sowing. In the second week of June .70 inches fell, but there was not sufficient rain to commence the sowing operations till July 7th. Sowing extended from 7th of July to 24th; the continuous rainy weather in July and fore part of August caused the crops to turn yellow. The last half of August, the whole of September and first half of October were very short of rainfall. Nearly an inch and a half in the last half of October was insufficient for the rabi sowing, and there were scarcely any late rains. Although the total amount of rainfall during the year was more than that of the previous year and equal to 1903, still it was so poorly distributed that without irrigation there would have been very poor crops. The Kuran (grass pasture) gave only $\frac{1}{4}$ th the normal supply of grass.

The statement below gives the rainfall of the last three years:—

Month.			1903.		1904.		1905.	
			Rainy days.	Rainfall in inches.	Rainy days.	Rainfall in inches.	Rainy days.	Rainfall in inches.
May,	1st fortnight	...	...	In. cts.	...	...	1	In. cts.
Do.	2nd do.	...	4	1 89	...	...	2	2 86
June,	1st do.	...	4	3 45	1	0 49	1	0 70
Do.	2nd do.	...	...	...	1	0 7	...	0 6
July,	1st do.	...	6	3 86	9	1 88	3	2 20
Do.	2nd do.	...	3	2 42	8	0 53	3	3 17
August,	1st do.	...	1	0 78	8	0 38	1	0 92
Do.	2nd do.	...	2	1 42	3	0 18	2	0 81
September,	1st do.	...	...	0 10	5	1 99	...	0 16
Do.	2nd do.	...	2	2 55	4	0 94	1	0 47
October,	1st do.	...	2	3 9	5	3 35	1	0 54
Do.	2nd do.	...	1	0 32	3	2 10	3	1 41
November,	1st do.	...	...	...	...	...	...	...
Do.	2nd do.	...	...	...	...	...	1	0 34
December,	1st do.	...	...	...	...	...	...	...
Do.	2nd do.	...	...	...	...	...	...	...
Total ..			25	19 83	47	11 91	19	15 21

VI.—Area planted to different crops.

6. The statement below shows the area cropped and the purpose of each crop:—

Field No.	Kharif crop.	Area.	Purpose.	Rabi crop.	Area.	Purpose.	Remarks.		
								A. g.	A. g.
1	Soy beans ...	1 24	Further study of their usefulness in India.	Flax white and blue flowered.	0 16	For fibre ...	Fibre was not extracted.		
2	Bajri ...	1 20			1 8	Do.			
2	Tur ...	0 21	For identification ...	Wheat, barley, oats and Khapli.	1 10	Study of the capabilities of light shallow land under irrigation.	...		
2	Tapioca ...	0 9			
2	Maize ...	0 3	For fodder	Jira (cumin seed).	0 3	New crop.	...		
3 & 4	Cotton ...	1 0			To find the best crop to follow and rotate with sugarcane.			Sweet potato ...	0 20	To keep the seed for next planting.	...
	San ...	0 20							
	Jowar ...	0 20							
	Groundnut ...	1 20							
	Sweet potatoes ...	0 20							
	Maize ...	0 20							
	Tur ...	0 20	Further test	Khapli ...	4 0	Irrigation experiments.	...		
	Soy beans ...	0 16							
6 & 7	Maize ...	3 0	For variety test	Linseed ...	1 0	Fibre.	...		
	Jowar ...	3 0	For fodder	Safflower ...	1 0	Study of crop.			
8	Jowar ...	2 20	For seed selection and variety test.	Gram ...	0 10	Rotation crop.	...		
	Maize ...	2 15	Do.	Masur ...	0 20	Do.			
				Lang ...	0 10	Rotation.	...		
				Peas ...	0 30	Do.			
				Do. ...	1 5	New crop.	...		
				Do. and oats ...	2 0	For fodder.			
9	Paddy ...	0 34	Manurial experiments...	Vál ...	...	Rotation.	Perennial. Do. Do.	
				Paddy ratoon ...	...	Crop.		
				Potatoes ...	...	System of planting.		
				Barley ...	0 8	For seed.			
				Peas and oats ...	0 16	For fodder.			
				Barley ...	1 0	For seed.			
10	Field beans ...	0 8		Variety test and selection of seed.
	Kulthi ...	0 8							
	Math ...	0 8							
	Mug ...	0 8							
	Udid ...	0 8							
	Guvár ...	0 8							
	Til ...	0 8							
	San ...	0 8							
	Tapioca ...	0 8							
	Bajri ...	0 20	Tillage experiments		
11	Rála ...	0 5		Study of crop ...	...	...	...
	Sava ...	0 10		Do ...	...	...	...
	Maize ...	0 20		Tillage experiments ...	...	...	...
	Vari ...	0 5		For study of crop ...	...	...	...
	Naghl ...	0 5		...	...	...	...
	Jewarr ...	0 20		Tillage experiments ...	...	...	...
	Maize ...	0 4		For fodder ...	...	...	...
12, 13 & 14	Sugarcane ...	4 0		Manurial experiments ...	...	...	...
	Do. ...	1 0		Water experiments ...	...	...	...
15	Cotton ...	0 25	For distribution ...	...	...	...
	Do. ...	0 30	Methods of cultivation ...	...	...	...
	Do. ...	0 1	Acclimatization of varieties.	...	...	...
	Sugarcane ...	0 6	Sugar borer experiments.	...	...	...
	Do. ...	0 36	For fodder ...	...	...	...
	Do. ratoon ...	1 20	...	...	...	...
	Do. ...	0 3	To test its growth in wet land.	...	...	...
16	Nilva ...	2 0	Tillage experiments ...	Wheat ...	1 30	Water experiments.	...		
New area.	Do. ...	9 31	For fodder ...	...	...	...

VII.—Experiments in care and Cultivation of crops.

A.—Manure experiments.

7. Potash requirements for sugarcane.—In order to determine the amount of potash required for sugarcane 4 plots were manured with potash at the rate of 50 lbs., 100 lbs., 150 lbs. and 200 lbs. per acre in the form of Sulphate of Potash in addition to 350 lbs. of nitrogen in the safflower cake. Plot 1 should not be compared with the rest of the series as it received leakage water from the main irrigation distributary along its eastern side. The results are tabulated below:—

No. of Experiment.	Manurial treatment per acre.					Results per acre.											
	Kind of manure.	Quantity.	Containing			Cost of manure.	No. of canes.	Weight of canes stripped and topped.	Weight of tops.	Weight of juice obtained.	Percentage of cane to juice.	Weight of Gul.	Percentage of Gul to juice.	Percentage of Gul to cane.	Cost of cultivation.	Value of outturn.	Profit or loss.
			N.	P ₂ O ₅	K ₂ O												
1	Safflower cake	Lbs. 4,954	Lbs. 350	...	Lbs. ...	Rs. a. p. 121 9 0	30,880	83,400	13,724	64,000	76.8	10,444	16.2	12.5	291 14 4	606 4 3	+404 5 11
	Sulphate of potash ...	104	...	50	10 3 10												
2	Safflower cake	4,981	350	...	...	121 9 0	26,120	70,440	11,252	52,000	73.9	8,396	10.1	11.8	289 11 0	559 11 11	+331 0 11
	Sulphate of potash ...	208	...	100	20 7 8												
3	Safflower cake	4,984	350	...	...	121 9 0	30,420	86,478	16,972	69,000	73.6	11,452	16.8	11.5	318 6 8	763 7 9	+145 0 6
	Sulphate of potash ...	312	...	150	30 11 6												
4	Safflower cake	4,984	350	...	...	121 9 0	31,048	88,172	16,723	68,000	76.6	11,620	17.9	13.1	325 12 4	774 10 5	+448 14 4
	Sulphate of potash ...	416	...	200	40 15 4												

The results of these manurial experiments with sugarcane are not conclusive this year. But there is a decided increase apparently from the use of potash and it has also increased the percentage of sugar.

8. *Phosphoric acid requirements for sugarcane.*—Four plots were manured at the rate of 50, 100, 150 and 200 lbs. of phosphoric acid in the form of Superphosphate in addition to 350 lbs. of nitrogen in safflower cake to determine the quantity of phosphoric acid required by sugarcane. The results are tabulated below :—

No. of Experiment.	Manurial treatment per acre.					Results per acre.											
	Kind of manure.	Quantity.	Containing			Cost of manure.	No. of canes.	Weight of canes topped and stripped.	Weight of tops.	Weight of juice obtained.	Per-centage of juice to cane.	Weight of Gul.	Per-centage of Gul to juice.	Per-centage of Gul to cane.	Cost of cultivation.	Value of outturn.	Profit or loss.
			N.	P ₂ O ₅	K ₂ O												
1	Safflower cake	Lbs. 4,984	Lbs. 350	...	...	Rs. a. p. 121 9 0	35,948	87,944	17,136	66,000	77.9	11,952	17.5	13.6	293 2 8	792 12 8	+496 10 1
	Super phosphate	146	...	50	...	11 7 5											
2	Safflower cake	4,984	350	...	...	131 9 0	26,284	65,288	11,732	52,000	79.6	9,296	17.9	14.2	279 2 4	619 11 6	+340 9 4
	Super phosphate	292	...	100	...	22 14 11											
3	Safflower cake	4,984	350	...	...	121 9 0	30,068	86,740	15,444	66,000	78.4	11,876	17.4	13.7	307 11 8	791 13 8	+484 2 1
	Super phosphate	438	...	150	...	34 6 4											
4	Safflower cake	4,984	350	...	...	121 9 0	23,365	77,724	13,048	60,000	77.02	10,540	17.6	13.5	312 13 4	702 10 8	+389 13 4
	Super phosphate	584	...	200	...	45 14 0											

It is to be noted that Plot 1 was planted much thicker than the other plots, having 35,948 canes as compared with 26,284 of Plot 2. If the plots are all reduced to 30,000 canes we see that there has been a small gain due to phosphoric acid.

9. *Top-dressing of sugarcane.*—Various top-dressings were tried. All plots received at planting farm yard manure furnishing 200 lbs. of nitrogen per acre and one plot a quantity sufficient to furnish 350 lbs. of that element. In all the other plots a top-dressing was given furnishing 150 lbs. of nitrogen.

The results of the experiments are tabulated below :—

No. of Experiment.	Manurial Treatment.					Results per acre.											
	Kind of manure.	Quantity.	Containing.			Cost of manure.	No. of canes.	Weight of canes topped and stripped.	Weight of tops.	Weight of juice obtained.	Per-centage of juice to cane.	Weight of Gul obtained.	Per-centage of Gul to juice.	Per-centage of Gul to cane.	Cost of cultivation.	Value of outturn.	Profit or loss.
			N.	P ₂ O ₅	K ₂ O												
1	Farm yard manure	Lbs. 44,876	Lbs. 350	...	...	Rs. a. p. 90 0 0	21,450	40,368	6,889	28,000	69.3	5,066	18.2	12.6	221 11 4	339 11 9	+118 0 0
	Farm yard manure and	25,640	200	...	...	50 0 0											
2	Top-dressing with safflower cake	2,140	150	...	...	52 0 0	30,304	49,828	12,044	36,000	72.4	6,204	17.2	12.4	248 2 8	413 9 11	+165 7 3
	Farm yard manure and	25,640	200	...	...	50 0 0											
3	Top-dressing with nitrate of soda	940	150	...	...	143 3 3	29,208	53,316	11,716	40,000	75.02	6,959	17.4	13.4	344 9 8	463 7 5	+118 13 7
	Farm yard manure and	25,640	200	...	...	50 0 0											
4	Top-dressing with poudrette	1,400	150	...	...	72 10 0	25,744	52,648	9,740	40,000	75.5	7,212	18.03	18.6	299 13 0	480 12 10	+180 15 10
	Farm yard manure and	25,640	200	...	...	50 0 0											
5	Top-dressing with crude nitre	1,400	150	...	...	199 1 2	27,796	71,128	15,068	56,360	79.2	9,632	17.02	13.5	382 9 6	642 2 3	+259 8 7
	Farm yard manure and	25,640	200	...	...	50 0 0											

One noticeable fact is that no plot produced as highly as it should on account of not having a supply of available nitrogen in the early stage of growth as appears to be the case when safflower cake is applied at the time of planting.

Crude nitre (KNO₃) was much superior to Chili saltpetre, (NaNO₃) and poudrette comes second. Safflower cake is nearly equal to nitrate of soda in

point of yield ; but if net profit is considered the nitrate is behind both the cake and poudrette.

The farm yard manure plot was very small and stunted throughout, still it is as profitable as the nitrate at the price we paid for the latter article.

10. *Mineral manures* were compared with safflower cake as entire sources of manure for sugarcane. Two plots were manured, one with safflower cake in 2 dressings giving 350 lbs. of nitrogen, the other with nitrate of soda in three dressings of 150 lbs., 100 lbs. and 100 lbs.

The results are tabulated below :—

No. of Experiment.	Manurial Treatment.					Outturn Results.											
	Kind of manure.	Quantity.	Containing.			Cost of manure.	No. of canes.	Weight of canes stripped and topped.	Weight of tops.	Weight of juice obtained.	Per cent. of juice to cane.	Weight of Gul obtained.	Per cent. of Gul to juice.	Per cent. of Gul to cane.	Cost of cultivation.	Value of outturn.	Profit or loss.
			N.	P ₂ O ₅	K ₂ O												
1	Safflower cake in two dressings ...	Lbs. 4,984	Lbs. 350	Lbs. ...	Lbs. ...	Rs. a. p. 121 9 1	29,893	89,823	13,644	64,000	79.1	11,372	17.8	14.07	295 6 8	753 2 1	+462 11 5
2	Nitrate of soda in 3 dressings ...	Lbs. 2,264	Lbs. 350	Lbs. ...	Lbs. ...	Rs. a. p. 300 12 4	20,304	70,248	10,600	56,000	79.7	9,492	16.9	13.5	473 1 8	632 12 8	+159 11 0

The safflower cake gave not only more Gul but also gave nearly three times as great a profit.

A plot receiving a complete manure in the shape of mineral manures gave the large yield of 13,044 lbs., and the profits were Rs. 335 which shows that cane can be profitably grown with mineral manures alone.

No. of Experiment.	Manurial Treatment.					Results per acre.											
	Kind of manure.	Quantity.	Containing.			Cost of manure.	No. of canes.	Weight of canes stripped and topped.	Weight of tops.	Weight of juice obtained.	Per cent. of juice to cane.	Weight of Gul obtained.	Per cent. of Gul to juice.	Per cent. of Gul to cane.	Cost of cultivation.	Value of outturn.	Profit or loss.
			N.	P ₂ O	K ₂ O												
1	Nitrate of soda ...	Lbs. 2,264	Lbs. 350	Lbs. ...	Lbs. ...	Rs. a. p. 300 12 4	39,712	97,068	17,040	76,000	78.2	13,044	17.2	13.4	534 12 4	869 9 7	+334 13 3
	+ Sulphate of potash ...	Lbs. 203	Lbs. ...	Lbs. 100	Lbs. ...	Rs. a. p. 20 7 8											
	+ Super phosphate in 3 dressings ...	Lbs. 292	Lbs. ...	Lbs. 100	Lbs. ...	Rs. a. p. 22 14 4											

11. *Nitre experiments with paddy.*—To determine the quantity required for paddy four plots each of Dodka, Kamod, and Ambemohor were selected. The first plot received no manure, the second 80 lbs. of crude nitre per acre, the third 160 lbs. and the fourth 240 lbs. of nitre per acre.

The results of experiments are given below :—

Name.	Manure.	Outturn per acre.	
		Grain.	Straw.
		Lbs.	Lbs.
Dodka ...	Nil	1,580	1,920
Do. ...	80 lbs. nitre	1,540	2,000
Do. ...	160 " "	1,340	1,600
Do. ...	240 " "	1,360	1,800
Kamod ...	Nil	1,800	2,480
Do. ...	80 lbs. nitre	2,200	2,640
Do. ...	160 " "	1,624	2,096
Do. ...	240 " "	1,696	2,600
Ambemohor ...	Nil	1,620	2,160
Do. ...	80 lbs. nitre	2,430	3,105
Do. ...	160 " "	2,575	3,348
Do. ...	240 " "	1,400	3,180

Nothing can be made of the results and they are published for record only.

B.—Irrigation Experiments.

12. A demonstration irrigation plot was put down to Pundia cane and the results are in accordance with that of previous year highly in favour of the smaller supply of water.

Details are given below :—

Details of Irrigation.				Results per acre.										
Each watering equal to inches of rainfall.	Interval between each watering.	No. of waterings.	Quantity of water in cubic ft. exclusive of rainfall.	No. of canes.	Weight of canes topped.	Weight of tops.	Weight of juice.	Per cent. of juice to cane.	Weight of Gul.	Per cent. of Gul to juice.	Per cent. of Gul to cane.	Cost of cultivation.	Value of outturn.	Profit or loss.
					Lbs.	Lbs.	Lbs.		Lbs.			Rs. a. p.	Rs. a. p.	Rs. a. p.
2½	10	27	245,025	21,370	63,118	10,974	42,000	79.1	7,378	17.3	13.7	259 7 4	465 9 9	+225 11 1
4½	15	20	325,700	19,994	46,698	9,318	30,000	78.1	6,068	16.9	12.9	248 9 8	405 11 0	+157 1 4

13. *Khapli*.—An experiment to ascertain the quantity of water required for *Khapli* 8 plots were irrigated with different quantities of water and at different intervals. Half of each plot was fallow in the kharif season, the other half being cropped with fodder *Jowár*. Little can be learnt from the results. The details of experiment are given below :—

Results per acre.					
Quantity and intervals of watering.	Treatment of land in the kharif season.	Outturn with	Average outturn of the Plot.	Cost of Cultivation.	Value of outturn.
1	2	3	4	5	6
Ordinary (every 10th day 2")	Fallow ...	Lbs. 3,032	2,598	42 10 2	103 14 8
	Cropped with <i>Jowár</i> fodder ...	2,164			
2" Every 7th day	Fallow ...	2,208	1,878	44 4 2	75 1 10
	Cropped with <i>Jowár</i> fodder ...	1,548			
3" ,, 7th ,,	Fallow ...	2,780	2,506	44 14 2	100 3 10
	Cropped with <i>Jowár</i> fodder ...	2,232			
3" ,, 10th ,,	Fallow ...	1,720	1,396	43 0 2	56 12 8
	Cropped with <i>Jowár</i> fodder ...	1,072			
4" ,, 10th ,,	Fallow ...	2,072	1,856	43 6 2	74 3 10
	Cropped with <i>Jowár</i> fodder ...	1,640			
3" ,, 15th ,,	Fallow ...	2,192	1,512	42 6 2	60 7 10
	Cropped with <i>Jowár</i> fodder ...	832			
4" ,, 15th ,,	Fallow ...	2,928	2,362	42 4 2	94 7 8
	Cropped with <i>Jowár</i> fodder ...	1,796			
5" ,, 15th ,,	Fallow ...	2,400	2,046	42 1 2	81 13 6
	Cropped with <i>Jowár</i> fodder ...	1,692			

C.—New Methods of Cultivation.

14. *Tillage*.—In most countries where agriculture has advanced the system of frequently stirring the soil between the rows of plants is carried on to a much greater extent than is common in India. The beneficial effects of interculture that have resulted in those countries as well as those that have been obtained in some parts of India where interculture is practised to a certain extent leads one to think that this practice should be universally taken up in India and carried on as often as possible. With a view to vividly show the public

the above benefits, experiments were tried with Bájri, maize, and Jowár. Two plots of each crop were made. One was intercultured with Planet J. hoe every week as long as the bullocks were able to walk through the rows and the other was not intercultured.

The plan was not thoroughly carried out but a benefit was found in the case of Jowár and maize but not in the case of Bájri. The experiment will be continued in the next year. It was such a very poor year that the crops were all rather small and the Jowár almost a failure and lack of experience with this method made its cost very high.

The statement below shows results:—

Name of Crop.	Per acre.				Increase or Decrease.		Total value of Increase or Decrease.	Cost of inter-tillage.	Net grain or loss.
	Intertilled.		Not intertilled.		Grain.	Fodder.			
	Grain.	Fodder.	Grain.	Fodder.					
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.	Rs. a. p.
Bájri ...	548	1,696	772	3,312	-224	-1,616	-28 7 0	2 4 0	-30 11 0
Maize ...	904	1,168	880	1,488	+24	-320	-0 11 9	2 14 0	-3 9 9
Jowár ...	104	7,620	68	7,160	+36	+460	+3 15 8	3 4 0	+0 11 8

D.—Systems of planting.

15. Two plots of Broach cotton were planted one with Egyptian and the other with ordinary system. The first was dibbled in rows 4 feet apart and 2 inches between the plants on ridges and the second in rows 2 feet apart and plants 1 inch apart. The results of the experiment are tabulated below:—

Plot Number.	Method.	Outturn per acre.	Value of Outturn.
1	Egyptian Method	Lbs. 512	Rs. a. p. 42 10 8
2	Country Method	346	28 13 4

Irrigated cotton was badly attacked by the boll worm and under the advice of the Assistant Entomologist, the Superintendent caused all the affected bolls from the greater part of Plot 1 and the whole of Plot 2 to be removed. This considerably reduced the yield. The outturn was still further lessened by the rain of January which caused all bolls there were on the plants to fall.

E.—Rotation experiments.

16. *Rotation experiments for sugarcane for block system of irrigation.*—To ascertain which are the most profitable crops to rotate with sugarcane in the block system of irrigation, plots were sown with cotton, Jowár, groundnut, sweet potatoes, maize, Tur and San. All the crops were affected more or less by the season.

Name of Crop.	Outturn.		Cost of cultivation.	Value of outturn.	Profit or loss.
	Principal product.	By-product.			
	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.	Rs. a. p.
Cotton ...	577	...	35 11 11	48 2 0	+12 6 1
Jowár ...	966	3,900	52 7 2	49 11 0	-2 12 2
Groundnut ...	2,864	...	100 1 0	143 3 2	+43 2 2
Sweet potatoes ...	6,170	...	129 6 6	40 15 0	-83 7 6
Maize ...	564	5,150	34 1 0	44 8 10	10 7 10
Tur ...	1,808	...	25 10 8	60 4 4	+24 9 8
San ...	110	306	70 9 4	25 0 10	-45 8 6

Note.—Sweet potatoes were grown principally for sets and the value of the outturn cannot be properly estimated. The expense of extracting San fibre with the unskilled labour available has increased the cost by Rs. 40.

F.—Light Soil study.

17. A considerable area of the Mánjri Station is of the light *murum* type similar to that found throughout the Deccan. This class of soil is often found mixed with the better type in the irrigated districts and a study of its capabilities is being made on the Station. Half is cropped with kharif pulses and rabi cereals and the other half with kharif cereals and rabi pulses. Just which of these systems or which crops of other systems are most paying is the first point of study.

The statement below shows the details of the year with the first half. :—

System.	Name of Crop.	Outturn.	Value of outturn.	Cost of cultivation.	Profit or loss.
Kharif pulses and rabi cereals.	Kharif ... San	Lbs. 400 fibre 200 seed	Rs. a. p. 33 14 6	Rs. a. p. 28 15 9	Rs. a. p. +4 14 9
	Rabi ... Barley		Rs. a. p. 55 13 4	Rs. a. p. 28 8 4	Rs. a. p. +27 5 0
	Total ...	...	Rs. a. p. 89 11 10	Rs. a. p. 57 8 1	Rs. a. p. 32 3 9
	Kharif ... Guvár	60	Rs. a. p. 15 0 0	Rs. a. p. 36 5 8	Rs. a. p. -21 5 8
	Rabi ... Barley	1,185	Rs. a. p. 49 6 0	Rs. a. p. 28 8 4	Rs. a. p. +20 13 8
	Total ...	...	Rs. a. p. 64 6 0	Rs. a. p. 64 14 0	Rs. a. p. -0 8 0
	Kharif ... Udid	1,900	Rs. a. p. 26 7 4	Rs. a. p. 21 10 8	Rs. a. p. +4 12 8
	Rabi ... Barley	1,360	Rs. a. p. 56 10 8	Rs. a. p. 28 8 4	Rs. a. p. +28 2 4
	Total ...	...	Rs. a. p. 83 2 0	Rs. a. p. 50 3 0	Rs. a. p. +32 15 0
	Kharif ... Mug	805	Rs. a. p. 32 3 0	Rs. a. p. 23 11 2	Rs. a. p. +8 7 10
	Rabi ... Barley	1,330	Rs. a. p. 55 6 8	Rs. a. p. 28 8 4	Rs. a. p. +26 14 4
	Total ...	...	Rs. a. p. 87 9 8	Rs. a. p. 52 3 6	Rs. a. p. +35 6 2
	Kharif ... Field beans	1,010	Rs. a. p. 50 8 0	Rs. a. p. 19 4 9	Rs. a. p. +31 3 3
	Rabi ... Barley	1,660	Rs. a. p. 69 2 8	Rs. a. p. 28 8 4	Rs. a. p. +40 10 4
	Total ...	...	Rs. a. p. 119 10 8	Rs. a. p. 47 13 1	Rs. a. p. +71 13 7

The profits of barley raised after a kharif pulse show that this crop is worthy of more attention than it now gets. The soil is very shallow averaging less than 1 foot in depth and a crop giving profits of from Rs. 18 to Rs. 40 per acre makes it a paying one. Til was also tried as a kharif crop.

G.—Linseed for fibre.

18. The extraction of fibre from linseed was tried in 1903 and 1904. The same experiments were tried this year. But as the plants did not attain the height of even 6½ inches and as they were all branching they were allowed to seed and no fibre was extracted. A consignment of Russian linseed was received from the Russian Consul but it came very late. It gives promise as a fibre crop. White linseed was also grown.

The details of cultivation with ordinary seed are given below :—

Name of Crop.	Results per acre.			
	Outturn.	Value of outturn.	Cost of cultivation.	Profit or loss.
Linseed ...	Lbs. 257	Rs. a. p. 10 11 4	Rs. a. p. 14 0 1	Rs. a. p. -3 4 9

II.—Sugar-borer experiments.

19. Twelve plots of $\frac{1}{2}$ guntha each were sown with sugarcane from the 3rd of February to the 23rd of May at intervals of 10 days to see when sugar-borers attack sugarcane most. The plots were inspected weekly and infested stalks from each plot were counted and removed.

The following statement gives the number of infested stalks of sugarcane at each counting:—

Date of planting.				Number of stalks attacked by borer.
3rd February	1905	...	...	147
11th	"	...	...	190
21st	"	...	...	186
3rd March	"	...	...	189
13th	"	...	...	191
23rd	"	...	...	193
2nd April	"	...	...	207
12th	"	...	...	206
22nd	"	...	...	212
2nd May	"	...	...	261
12th	"	...	...	268
22nd	"	...	...	269

It will be seen that the attacks of the borer in May were nearly double those in February from which it would seem that early planting is highly desirable.

VIII.—New crops.

20. *English and American Peas.*—One variety of indigenous peas, one of English peas and six varieties of American peas were grown for seed. The American varieties are much sweeter than the indigenous ones. Three varieties of American peas—Earliest of all, Heroine and Daniel O'Rooke, failed. The others gave a good yield and seed for distribution to local gardeners was saved.

All the varieties of peas were attacked by mildew.

21. *Soybeans.*—Nineteen varieties of Soybeans were sown. The average yield was greater than last year. The use of this crop in India has not been demonstrated. The statement shows the results:—

Name of variety.				Yield per acre.	Value of outturn (estimated).	Cost of cultivation.
					Rs. a.	Rs. a. p.
Soybeans	No. 1	390	19 8	} 15 9 8
"	No. 2	...	...	310	15 8
"	No. 3	...	...	700	35 0
"	No. 4	...	...	650	32 8
"	No. 5	...	...	420	21 0
"	No. 6	...	...	520	26 0
"	No. 7	...	...	510	25 8
"	No. 8	...	...	440	22 0
"	No. 9	...	...	410	20 8
"	No. 10	...	...	370	18 8
"	No. 11	...	...	480	24 0
"	No. 12	...	...	610	30 8
"	No. 13	...	...	690	34 8
"	No. 14	...	...	440	22 0
"	No. 15	...	...	290	14 8
"	No. 16	...	...	210	10 8
"	No. 17	...	...	220	11 0
"	No. 18	...	...	20	1 0
"	No. 19	...	...	40	2 0

22. *American Maize.*—Eight American varieties of maize, including Golden Beauty, were sown for seed but none of the seed except the Golden Beauty germinated. The following is the outturn of that variety:—

Name.	Outturn per acre.		Value of outturn.	Cost of cultivation.
	Ear heads.	Fodder.		
Golden Beauty	Lbs. 1,200	Lbs. 3,388	Rs. a. p. 61 6 0	Rs. a. p. 22 1 2

23. *American Field Beans*.—These continue to flourish in India. They grow on poor soil and give a larger outturn than any of the Indian leguminous crops. The bean is sweet and liked by natives whenever tried. The yield was 1,010 lbs. per acre which is about one-third that obtained in America for this crop. An attempt to introduce this into the Poona bazar is being made.

24. *Jire (cumin seed)*.—Three gunthas of cumin were grown for seed. As it was sown late the crop gave only an outturn of 150 lbs. per acre.

IX.—Comparative variety tests.

25. *Bájrí*.—Six plots of Bájrí alternating with Tur were sown. Bazar seed gave the greatest yield. The season affected all and the results are valueless and are published only for record.

The statement is given below :—

No.	Name of varitey.	Outturn per acre.	
		Grains.	Fodder.
		Lbs.	Lbs.
1	Awned	596	2,784
2	Poona select	600	1,600
3	Bazar seed	832	2,800
4	Bhávnagari	596	2,340
5	Nadiád	320	1,584
6	Málbandro	461	2,280

26. *Tur*.—Six varieties of Tur were grown. The results are given below :—

Name of variety.	Outturn per acre.
	Lbs.
White Tur, Bárámati	1,600
Red Tur, Bellary	617
Do. Salem	1,257
Do. Khándesh	1,440
White Tur, Nadiád	880
Red Tur, Ratnágiri	945

27. *Jowár*.—Five varieties of Jowár were grown for grain. Sholápuri stands first and Chapti second.

The statement shows the results :—

Name of variety.	Results per acre.	
	Outturn.	
	Grain.	Fodder.
	Lbs.	Lbs.
Kumbhária	384	3,648
Khondi	888	4,832
Sholápuri	1,380	5,120
Chapti	1,292	4,432
Gidgap	210	4,000

28. *Maize*.—Six American and three Indian varieties of maize were on trial. Jawnpore has given the highest yield. Next comes Yellow Dent and then Extra Early Waterloo.

The statement below shows the details :—

Name of variety.	Outturn per acre.		Value of outturn.	Cost of cultivation.
	Grain.	Fodder.		
	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.
Golden Beauty ...	1,328	3,432	61 5 1	} 35 13 7
Yellow Dent ...	2,120	3,840	97 11 5	
Extra Early Waterloo ...	1,524	3,504	71 14 0	
Early Mastedon ...	912	3,450	46 0 6	
Southern Maize ...	1,296	2,940	62 11 2	
Hickery King ...	672	4,800	48 14 3	
Jawnpore ...	2,136	3,600	97 1 9	
Cawnpore ...	1,336	2,800	63 7 8	
Poona Local ...	688	3,400	42 7 8	

29. *Fodder Jowár for grain*.—Seven varieties of fodder Jowár were grown for seed. Sorghum Collier and Sorghum Amber gave the highest yield. The statement below shows the results :—

Name of variety.	Outturn per acre.		Value of outturn.	Cost of cultivation.
	Grain.	Fodder.		
	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.
Nilva ...	868	612	57 7 1	} 31 13 3
Utávli ...	1,192	708	71 13 1	
Sundhia ...	960	752	56 14 0	
Rájahansa ...	500	448	38 2 10	
Sorghum Amber ...	1,628	768	87 5 9	
Do. Collier ...	1,720	528	77 4 10	
Kági Jola ...	772	448	45 15 3	

30. *Safflower*.—Safflower is generally grown as subordinate crop to Jowár. To see whether it can be grown profitably alone as a field crop it was sown separately.

The statement below gives the results and also compares it with linseed :—

Name of Crop.		Outturn per acre.	Value of outturn.	Cost of cultivation.
		Lbs.	Rs. a. p.	Rs. a. p.
Linseed ...	...	257	10 11 4	14 0 0
Safflower ...	...	746	46 10 0	19 8 7

31. *Miscellaneous crops* were grown on odd areas and as catch crops. The statement below shows results :—

Name of crop.		Outturn per acre.	Value of outturn.
			Rs. a. p.
Gram ...	...	48	3 6 4
Masur ...	..	300	15 0 0
Lang ...	...	200	8 0 0
Country Peas ...	...	364	22 12 0
English Peas ...	...	114	14 4 0
Wheat ...	...	677	33 13 7
Suran ...	...	3,584	112 0 0
Ginger ...	...	6,040	100 10 8
Turmeric ...	...	21,554	373 9 1

X.—Fodder Crops.

32. All the available area not given to experiments was cropped with Jowár, maize, sorghums, peas and oats for fodder.

XI.—Selection and Distribution of Seed.

33. An area of 5 gunthas of sugarcane of red and green Mauritius, Vánsi and Sannabile was grown for distribution. Other kinds of seeds were taken from the experimental plots after careful selection and distributed.

Varieties of sugarcane, groundnut, sweet-potatoes, maize, fodder varieties of Jowár, Bájri, rice, Tur, soy-beans, ginger, turmeric, Suran, tapioca were supplied from this Station during the year under report.

The requisition from cultivators and other landholders was mostly for varieties of sugarcane, maize, fodder Jowár and groundnut.

The rest of the supply was made to the Government Agricultural Stations of this Presidency and of other provinces.

XII.—Visitors.

34. In all 40 parties of visitors consisting of 258 persons visited this Station during the year under report.

Of the above, 1 party consisted of 30 cultivators present at the Agricultural Exhibition held at Mánjri, and 9 consisting of 15 land-owners of the Poona, Sholápur, Belgaum and Nagar districts, 5 parties consisted of 69 students of the College of Science, 90 students of the Poona Training College and 12 Junior Civilians.

The remaining 25 parties mostly consisted of the officers of the Agricultural Department of this Presidency and the Imperial Agricultural Department, etc.

XIII.—Accounts.

35. The balance sheet below shows a net gain of Rs. 3,284-8-11. But it includes receipts and expenditure for the crop of 1904-05 of Rs. 8,130-12-7 and Rs. 1,182-8-9 respectively. Excluding these and the cultivation charges for the coming year (Rs. 352-8-3) the net cost to the Government for the year 1905-06 was Rs. 3,310-15-8 as compared with the net profit of Rs. 925 for the last year. Nearly all of the area was sown twice which increased the cost of cultivation. The greater net cost is due to the smaller area under sugarcane harvested. For this crop alone is uniformly paying at this Station.

Receipts.	Amount.		Expenditure.	Amount.	
	Rs. a. p.	Rs. a. p.		Rs. a. p.	Rs. a. p.
To Sale of Produce of 1904-05—					
Gul and sugarcane sets ...	7,502 9 8		By Cost of establishment ...	1,532 0 0	
Grains and seeds ...	349 7 7		" Travelling allowance ...	181 2 6	
Cotton ...	187 5 0		" Postage and service stamps ...	58 15 0	
Garden crops ...	91 6 4		" Stationery and miscellaneous office expenses ...	63 12 8	
		8,130 12 7	" Purchase of livestock ...	140 0 0	1,835 14 2
" Value of Produce of 1905-06—			" " implements ...	293 2 9	
A.—Sold during the year—			" Petty construction and supplies ...	65 14 11	409 1 8
Gul ...	2,958 2 7		" Cultivation charges for the crop of 1904-05—		
Grains and seeds ...	211 7 7		Gul making expenses ...	668 11 9	
Garden crops ...	94 4 11		Irrigation charges ...	516 0 0	1,182 11 9
Livestock ...	9 14 0		" Cultivation charges for 1905-06—		
Miscellaneous ...	72 15 4	3,346 12 5	Labour ...	2,711 9 9	
B.—Value of grains and seeds on hand ...	870 7 0	870 7 0	Purchase of seeds for sowing ...	238 8 0	
" Value of manure on hand ...	950 0 0	950 0 0	Purchase of manures ...	1,240 8 9	
" " distribution of seeds (free). ...	54 0 0	54 0 0	Up-keep of work cattle ...	877 12 0	
" Increase in value of livestock ...	66 0 0	66 0 0	Irrigation charges ...	484 12 0	
			" " (paid after the close of the year) ...	108 6 0	
			Miscellaneous expenses ...	548 15 9	6,230 3 3
			" Cultivation charges for 1906-07 ...	352 8 3	352 8 3
			" Decrease in valuation of imple-ments, etc. ...	63 0 0	63 0 0
			Total ...	.....	10,133 7 1
			By net profit ...	.....	3,284 8 11
			Grand Total ...	.....	13,418 0 0
Total ...	13,418 0 0	13,418 0 0			

IX.—OPERATIONS ON THE LANOWLI AGRICULTURAL STATION

(AND RICE EXPERIMENTS ELSEWHERE).

I.—Introduction.

The rice experiments of the year consist of the ráb experiments, the nitre and the potash experiments and the trial of varieties at Lanowli and the trial of nitre in cultivators' fields at Chouk, táluca Karjat (district Kolába), Parsik (Thána) and Karjat (district Kolába).

Rainfall.

2. The following statement shows the rainfall at the experimental stations:—

Month.	Lanowli.		Thána.		Karjat.		Khálápur.	
	Rainy days.	Rainfall.	Rainy days.	Rainfall.	Rainy days.	Rainfall.	Rainy days.	Rainfall.
		In. cents.		In. cents		In. cent.		In. cent.
May	1	0 11	3	1 7	1	0 26	2	0 28
June	4	1 31	6	4 57	4	2 81	9	3 59
July	14	25 58	14	20 6	14	24 1	14	19 49
	16	35 11	14	12 31	14	21 97	16	22 39
August	12	11 75	13	4 84	11	6 75	11	5 42
	12	16 41	11	5 8	12	10 50	13	9 84
September	11	8 38	11	7 67	11	9 94	10	9 16
	1	0 23	2	1 16	...	0 5	1	1 6
October	2	0 77	1	0 10	1	0 10	1	0 10
	3	0 76	1	0 92	1	0 52	1	0 12
November	...	.....	...	.....	...	...	...	.....
	1	0 87	2	0 54	2	0 88	2	0 37
	86	106 67	77	58 32	71	77 79	80	71 82

II.—Lanowli experiments.

3. The field No. 26 under ráb experiments last year was found to contain too much organic matter and had to be abandoned. This field is situated near the town and receives the washings. The crabs too did much damage to seedlings in the field. A new site consisting of 5 survey numbers was, therefore, selected about two miles to the south from the railway station. This area is situated in the Bhushi village. The Survey No. 51 was retained in addition.

The following statement shows the areas, rent and assessment:—

Survey Nos.	Area.	Rent.	Assessment.
	A. g.	Rs. a. p.	Rs. a. p.
51	4 37	} 50 0 0	{ 9 0 0
91	7 10		{ 1 8 0
74	3 6	15 0 0	5 0 0
100	3 11	} 100 0 0	{ 9 0 0
104	7 2		{ 3 0 0
102	4 31	50 0 0	12 0 0
.....	* 30 17	215 0 0	39 8 0

* Of this area, 11 acres 9 gunthas were under cultivation, the rest of the portion being hilly.

4. *Plotting.*—This was done by a probationer. The six survey numbers were divided into 16 fields for convenience. Fields V and VI were divided into 25 one-guntha plots where seedlings were raised under different kinds of ráb. Fields VII, IX and XII were devoted to raising seedlings of varieties. The area of each plot being half a guntha.

The fields Nos. I, II, III, IV, VI and VIII were divided into 4-guntha plots where the seedlings raised on different kinds of ráb were transplanted. The varieties were transplanted in the rest of the area in 2-guntha plots (fields Nos. VIII part, X, XI and XIII).

The seedlings for the potash and nitre plots were raised in field No. XIV in 8-guntha plot. These were transplanted in 6 five-guntha plots in field No. XV. The rest of the area was under general cultivation.

In the hilly-portion of survey No. 104 two varieties of Náchani (Mutki and Zipri), Vari and Sáva were grown.

A few plants of tree cotton raised on the Poona Station from the seeds received from Mr. Tytler were also transplanted here.

Season.

5. During the year under report there were ante-monsoon showers of rain which fell on the 15th of May damaging a few ráb plots. As usual, the seed was sown by the end of May. Heavy rain fell by the middle of June which was sufficient for germination. After a long break, the rainfall, about the beginning of July, was quite opportune. In the first two weeks of July the rainfall was continuous and heavy. The transplantation of rice and Nágli commenced from the middle of the month and lasted till the 4th of August. From 18th to 24th the transplantation work had to be stopped on account of heavy and continuous rain. From August onwards the rainfall was deficient and at times there were long breaks. This irregularity of rain has considerably reduced the outturn of the crop.

Ráb experiments.

6. Rice may be sown direct in the field or, as is the usual custom in Konkan part of the Bombay Presidency, it may be sown first in the seed-beds and then the seedlings transplanted to the field. In the preparation of the seed-beds in this tract it is the custom to cover them with a layer of branches, grass, leaves or cowdung or a mixture of all and slowly burn. The ground is then lightly stirred with a harrow and the seed sown. The burning of this material constitutes the process known in vernacular as *dádha bhájane* and the material used is ráb.

7. *Objects of the present experiments.*—The practice of raving as at present carried on is very injurious to forest growth and in the case of cowdung there is a great loss of manurial substance. The present experiments were instituted to investigate the following questions:—

I.—What does the efficiency of ráb depend upon?

II.—What rábs are most beneficial?

III.—Can any substitute for the present custom be found?

IV.—Will any after treatment of the crop secure the effects of ráb?

8. *Treatment of seed-beds.*—Twenty-five one-guntha plots were treated as follows:—

Plot No. 1.—*Leaf ráb.*—Covered with the usual quantity of grass and earth. All materials were weighed and burnt. No other treatment was given to the plot except at the time of sowing.

Plot No. 2.—This was treated with Ain ráb, covered with grass and earth and burnt in the usual manner. Quantity of each material was separately weighed and recorded.

Plot No. 3.—This was treated with cowdung covered with grass and earth, weighed and burnt as usual.

Plot No. 4.—This was treated with grass ráb covered with earth and burnt. All materials were weighed.

Plot No. 5.—This was treated with mixed branches covered with grass and earth; materials were weighed and burnt.

Plot No. 6.—This was treated with ashes obtained in the following way:—An equal quantity of leaves, grass and earth was spread on corrugated iron sheets in the same thickness as in plot No. 1. The material was weighed and burnt, ashes were collected, weighed and spread out equally on the plot and mixed lightly with earth by rakes (Dántále).

Plot No. 7 was treated with half the ashes obtained by burning equal quantity of cowdung, grass and earth as in plot No. 3. The same directions were observed as in No. 6.

Plot No. 8 was treated with half the quantity of cowdung used in plot No. 3. The manure was ploughed in shallow. The land was harrowed several times until the whole earth was turned into powder.

Plot No. 9 was treated with ashes obtained from Ain, grass and earth with the same quantity as in plot No. 2. The same directions were followed as in plot No. 7.

Plot No. 10.—The earth to the depth of 3 inches was taken off and spread in a layer 3 inches deep on 4 sheets of corrugated iron raised on stones 1 foot high. This earth was heated for one hour by putting fuel underneath the sheets. When the earth was cooled down it was collected and spread again evenly on the plot.

Plot No. 11.—This received no treatment. It received only the cultivation as the other ráb plots.

Plot No. 12.—75 lbs. of powdered lime were evenly distributed and mixed with the soil.

Plot No. 13.—200 lbs. of fish manure were evenly spread on the plot and mixed. The spreading was done 4 days before sowing.

Plot No. 14.—Sheep were folded in the plot for 7 days.

Plot No. 15.—Two loads of poudrette from the Lanowli Municipality poudrette depôt were evenly spread out on the plot and mixed.

Plot No. 16.—200 lbs. of safflower cake was spread out on the plot and mixed.

Plot No. 17.—10 lbs. of nitre from the United Provinces were put on the plot just before sowing. The plot was harrowed after the application of the nitre and afterwards the seed was sown.

Plot Nos. 18—22 received no ráb or other treatment, but instead the fields to which the seedlings were transplanted were treated as follows:—

Plot No. 18.—Cotton seed furnishing nitrogen equal to two maunds of crude nitre (160 lbs.).

Plot No. 19.—Safflower cake furnishing nitrogen equal to two maunds of crude nitre (160 lbs.).

Plot No. 20.—Nitre 160 lbs. per acre.

Plot No. 21.—No treatment of any kind.

Plot No. 22.—Cowdung furnishing nitrogen equal to two maunds of crude nitre (160 lbs.).

Plot No. 23.—The soil in this plot was pulverized until a condition similar to that of road earth was obtained.

Plot No. 24.—This plot received ashes of mixed branches, grass and earth. The quantity used was the same as in plot No. 5. Details of directions put forth in plots Nos. 6, 7 and 9 were followed.

Plot No. 25 was treated with ashes obtained from outside. The weight put on was the average weight of ashes as used in plots Nos. 6, 7, 9 and 24.

9. The quantities of ráb put on appear below :—

No. of plot.	Kind of ráb.	Quantity of ráb materials for one-guntha plot.	Cost of ráb materials and application charges.
			Rs. a. p.
1	Leaf ráb	1037 lbs. dry leaves 236 „ grass 390 „ earth	1 7 0
2	Ain ráb	1201 „ Ain branches 243 „ grass 297 „ earth	1 3 0
3	Cowdung ráb	1106 „ cowdung 140 „ grass 280 „ earth	2 7 0
4	Grass	512 „ grass 362 „ earth	1 7 0
5	Mixed branches	500 „ mixed branches 240 „ grass 380 „ earth	1 3 0
6	Ashes of leaves	477 „ ashes of leave	1 8 0
7	Ashes of cowdung	588 „ cowdung ashes	2 8 0
8	Cowdung ploughed in	553 „ cowdung	3 0 0
9	Ashes of Ain	426 „ ashes	1 4 0
10	4 inches of earth dug and burnt.	.....	2 0 0
11	No treatment	.....	.....
12	Lime	75 lbs.	0 12 0
13	Fish manure	200 „	8 10 0
14	Sheep-dung	8 bags	2 12 0
15	Poudrette	2 cart-loads	3 10 0
16	Safflower cake	200 lbs.	4 3 10
17	Nitre	10 „	0 15 5
18	No ráb	.....	.....
19	Do.	.....	.....
20	Do.	.....	.....
21	Do.	.....	.....
22	Do.	.....	.....
23	Earth pulverized	.....	0 6 0
24	Ashes of mixed branches	512 lbs.	1 4 0
25	Outside ashes	500 „	0 8 0

10. Samples were taken from all plots as below :—

- (a) The total ráb material contained in 4 square feet of the bed.
 (b) The total ashes after burning from 4 square feet.
 (c) The earth to a depth of 2 inches from 4 square feet.
 (d) The unburnt earth from adjacent path from 4 square feet.

The samples were sent to Dr. Leather for analysis. The following statement gives the details:—

No.	Description.	Mois- ture.	Organic matter.	Lime.	Carbonic Acid.	Total Phos- phoric Acid.	Total Potash.	Avail- able Phos- phoric Acid.	Avail- able Potash.	Nitro- gen.
		Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
425—05	Grass ráb	11.39	76.14	.467	...	.060	.742	...	...	.26
435—05	Grass ráb ashes	4.51	24.80	.961	...	.208	.998	...	...	.25
432—05	Grass ráb earth	4.68	12.66	.418	.140	.125	...	.009	.071	.12
426—05	Ain ráb	8.31	38.88	.934	...	.113	.571	...	...	.30
439—05	Ain ráb ashes	3.68	21.97	3.66	...	.247	1.26	...	...	.33
431—05	Ain ráb earth	4.88	11.62	1.09	.499	.130	...	.008	.108	.15
427—05	Cowdung ráb	7.94	32.94	.989	...	.192	.475	...	...	.35
438—05	Cowdung ráb ashes	4.17	21.74	1.32	...	.460	.914	...	...	.45
436—05	Cowdung ráb earth	4.69	13.41	.697	.220	.206	...	.080	.107	.22
428—05	Leaf ráb	11.53	63.25	1.18	...	.135	.799	...	...	.54
434—05	Leaf ráb ashes	4.20	29.14	2.40	...	.170	.631	...	...	.39
437—05	Leaf ráb earth	4.62	12.95	.724	.319	.174	...	.009	.077	.14
429—05	Mixed branches ráb...	8.41	45.74	1.27	...	.146	.647	...	...	.34
430—05	Mixed branches ráb ashes.	3.26	11.00	2.84	...	.232	.914	...	...	.17
433—05	Mixed branches ráb earth.	4.34	10.85	.976	.475	.149	...	.014	.145	.13

Umrábed earth was found by Dr. Leather to contain the following :—

Insoluble silica and sand	...	...	...	58.29
Ferric oxide (Fe ₂ O ₃)	...	...	...	15.10
Alumina (Al ₂ O ₃)	...	...	...	14.84
Lime (Cao)	...	...	...	.91
Magnesia (Mgo)	...	...	...	.02
Potash (K ₂ O)	...	...	...	.30
Phosphoric Acid (P ₂ O ₅)	...	...	...	.11
Carbonic Acid (Co ₂)	...	...	...	.19
Organic matter and combined water	...	...	...	9.81
Total Nitrogen	...	...	...	.099
Available Potash	...	...	...	.0089
Available Phosphoric acid	...	...	...	.0031

11. *Transplanting.*—The seedlings from the one-guntha rábed seed-beds were transplanted in 4-guntha plots in the month of July.

12. At the inspection the plots treated with poudrette, fish, safflower cake, cowdung and cowdung ploughed in were greener and better than others. They were graded according to the general appearance and colour on the 21st of August 1905 as follows :—

XV.—Poudrette.	VI.—Ashes of leaf ráb.
XIII.—Fish manure.	IX.—Ashes of Ain ráb.
XVI.—Safflower cake.	XIV.—Sheep manure (soil was poor).
III.—Cowdung.	XXV.—Outside ashes.
VIII.—Cowdung ploughed in.	IV.—Grass ráb.
V.—Mixed branches.	XXI.—No ráb.
X.—Land heated.	XXII.—No ráb.
XXIV.—Ashes of mixed branches.	XVIII.—No ráb.
XXIII.—Soil pulverized.	XIX.—No ráb.
II.—Ain ráb.	XX.—No ráb.
I.—Leaf ráb.	XI.—No ráb.
XVII.—Nitre.	XII.—Lime.
VII.—Ashes of cowdung.	

13. *Results with regard to seedlings.*—During the year the seed-beds were not much affected by crabs. Only the leaf ráb plot was damaged a little. In the statement given below the actual area transplanted from one guntha of seedlings is shown :—

No. of plot.	Kind of ráb.	Area actually transplanted.	Corrected for crab-eaten portion.	Cost of raising seedlings sufficient for transplanting one acre.
		Gunthas.	Gunthas.	Rs. a. p.
1	Leaf ráb	5	6.25	12 13 4
2	Ain ráb	5	5	10 13 4
3	Cowdung ráb	5	5	20 13 4
4	Grass ráb	5	5	12 13 4
5	Mixed branches ráb	5	5	10 13 4
6	Ashes of leaves	5	5	13 5 4
7	Ashes of cowdung	5	5	21 5 4
8	Cowdung ploughed in	5	5	25 5 4
9	Ashes of Ain branches	5	5	11 5 4
10	Four inches of earth dug and burnt	5	5	17 5 4
11	No treatment	4	4	6 10 8
12	Lime	4	4	9 2 8
13	Fish	7	7	70 5 4
14	Sheep dung	5	5	23 5 4
15	Poudrette	6	6	30 5 4
16	Safflower cake	7	7	35 4 0
17	Nitre	5	5	9 0 8
18	No ráb	5	5	2 13 4
19	Do.	5	5	2 13 4
20	Do.	5	5	2 13 4
21	Do.	5	5	2 13 4
22	Do.	5	5	2 13 4
23	Earth pulverized	5	5	4 5 4
24	Ashes of mixed branches	5	5	11 5 4
25	Outside ashes	5	5	5 5 4

14. In almost all cases one-guntha seed-bed has furnished just sufficient seedlings to plant a 5-guntha plot, except the safflower cake and fish manure plots which have furnished seedlings for 7 gunthas each. Poudrette plot supplied seedlings for transplanting an area of 6 gunthas.

The cost per acre for raising seedlings varies greatly. The minimum expenditure was on the no ráb plot and the highest was on the fish manure plot. On the whole the expenditure on the different kinds of ráb was considerably reduced from that of the last year, owing to our fields having been situated near to the forests. The Ain and mixed branches ráb materials were brought from the hills belonging to the Station.

The prices of fish, oil-cake and cotton seed are liable to variation. The materials are much cheaper in the places of production.

15. *Results of field crops.*—After transplanting the vigorous seedlings made good progress. The seedlings from the sheep manure plot and those from the no ráb plots were specially poor, small and sickly. The seedlings from the top-dressed plots suffered the most. After transplantation heavy and continuous rain flooded the plots and kept the seedlings drowned for several days which caused the plants to rot. The seedlings remained unhealthy and never recovered. All the manure was washed away and had no effect on the crop. Last year the top-dressed plots gave the highest yield.

It will be seen from the table that the cowdung ráb has given the highest yield of all the plots rábed with different ráb materials. The cowdung ploughed in plot and the plot to which ashes of cowdung were applied have beaten all the other ráb plots. Among the ashes the Ain plot stands first and the land heated the next. Amongst the manures the yield from the fish plot is greater. The statement is given below:—

Plot No.	Ráb material.	Cost per acre.				Outturn per acre.					Profit or loss.
		Cost of raising seedlings.	Cost of after treatment.	Cost of cultivation in the transplanted area.	Total cost of cultivation.	Grain.	Straw.	Value of grain.	Value of straw.	Total value of outturn.	
1	2	3	4	5	6	7	8	9	10	11	12
1	Leaf ráb ...	Rs. a. p. 12 13 4	...	Rs. a. p. 14 6 0	Rs. a. p. 27 3 4	800	1,900	Rs. a. p. 25 0 0	Rs. a. p. 8 14 9	Rs. a. p. 33 14 9	Rs. a. p. + 6 11 5
2	Ain ráb ...	10 13 4	...	14 6 0	25 3 4	1,240	1,533	38 12 0	7 3 2	45 15 2	+20 11 10
3	Cowdung ...	20 13 4	...	15 0 0	35 13 4	1,620	2,000	50 10 0	9 6 3	60 0 3	+24 2 11
4	Grass ...	12 13 4	...	14 6 0	27 3 4	1,107	1,733	34 9 6	8 2 3	42 11 9	+15 8 5
5	Mixed branches ...	10 13 4	...	16 14 0	27 11 4	1,120	1,600	85 0 0	7 8 3	42 8 3	+14 13 11
6	Ashes of leaf ráb ...	13 5 4	...	15 0 0	28 5 4	1,260	1,600	40 0 0	7 8 3	47 8 3	+10 2 11
7	Do. cowdung ...	21 5 4	...	15 0 0	36 5 4	1,600	1,600	60 0 0	8 7 3	58 7 3	+22 1 11
8	Cowdung ploughed in... 25 5 4	...	...	18 12 0	44 1 4	1,700	1,860	53 2 0	8 11 0	61 13 0	+17 11 8
9	Ashes of Ain ráb ...	11 5 4	...	15 0 0	26 5 4	1,400	1,860	43 12 0	8 11 9	52 7 9	+26 2 5
10	Land heated ...	17 5 4	...	14 6 0	17 11 4	1,380	1,700	48 2 0	7 15 8	51 1 8	+33 6 4
11	No ráb ...	6 10 8	...	11 14 0	18 8 8	400	960	12 8 0	4 8 1	17 0 1	- 1 8 7
12	Lime ...	9 2 8	...	12 8 0	21 10 8	533	1,333	16 10 6	6 4 2	22 14 8	+ 1 4 0
13	Fish ...	70 5 4	...	14 6 0	84 11 4	1,520	1,600	47 8 0	7 8 3	55 0 3	-29 11 1
14	Sheep dung ...	23 5 4	...	15 0 0	38 5 4	773	800	24 2 6	3 13 1	27 14 7	-10 5 9
15	Poudrette ...	30 5 4	...	14 6 0	44 11 4	1,320	1,050	41 4 0	4 14 10	46 2 10	+ 1 7 6
16	Safflower cake ...	35 4 0	...	15 0 0	50 4 0	1,333	2,133	41 10 6	10 0 2	61 10 8	+ 1 6 8
17	Nitre ...	9 0 8	...	12 8 0	21 8 8	747	1,067	23 5 6	5 0 1	28 5 7	+ 6 11 9
18	Cotton seed applied after transplantation...	2 13 4	10 5 6	12 8 0	25 10 10	693	1,087	21 10 6	5 0 1	26 10 7	+ 0 15 9
19	Safflower cake applied after transplantation...	2 13 4	5 2 6	12 8 0	20 7 10	800	1,120	23 0 0	5 4 2	30 4 2	+ 9 12 4
20	Nitre applied after transplantation ...	2 13 4	15 8 8	11 14 0	30 4 0	660	1,040	20 10 0	4 14 1	25 8 1	- 4 11 11
21	No ráb, no manure ...	2 13 4	...	11 4 0	14 1 4	600	1,413	25 0 0	6 10 1	31 10 1	+27 8 5
22	Cowdung applied after transplantation ...	2 13 4	2 11 4	13 3 0	18 11 8	720	1,250	22 8 0	6 0 2	28 8 2	+ 9 8 6
23	Earth pulverized ...	4 5 4	...	12 8 0	16 13 4	980	1,500	30 10 0	7 0 8	37 10 8	+20 13 4
24	Ashes of mixed branches...	11 5 4	...	16 14 0	28 3 4	840	1,000	26 4 0	4 11 1	30 15 1	+ 6 7 9
25	Outside ashes ...	5 5 4	...	16 14 0	22 2 4	880	907	27 8 0	4 4 2	21 12 2	+ 9 8 10

16. *Results from Seed-beds.*—The following statement shows the results from the seed-bed areas :—

Plot No.	Name of Ráb material.	Outturn per acre.				Total value of outturn.	Cost of cultivation per acre.
		Grain.	Straw.	Value of grain.	Value of straw.		
1	2	3	4	5	6	7	8
		Lbs.	Lbs.	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.
1	Leaf ráb ...	1,547	1,600	48 5 6	7 8 2	55 13 8	} 20 0 0
2	Ain ráb ...	1,320	1,520	41 4 0	7 2 2	48 6 2	
3	Cowdung ráb ...	1,600	1,760	50 0 0	8 4 2	58 4 2	
4	Grass ráb ...	1,460	1,600	43 12 0	7 8 2	51 4 2	
5	Mixed branches ...	1,520	1,680	47 8 0	7 14 2	55 6 2	
6	Ashes of leaf ráb ...	1,320	1,400	41 4 0	6 9 2	47 13 2	
7	Do. cowdung ...	1,520	1,600	47 8 0	7 8 2	55 0 2	
8	Cowdung ploughed in ...	1,920	2,200	60 0 0	10 5 3	70 5 3	
9	Ashes of Ain ráb ...	1,480	1,560	46 4 0	7 5 2	53 9 2	
10	Land heated ...	1,493	1,707	46 10 6	8 0 2	54 10 8	
11	No ráb ...						
12	Lime ...						
13	Fish manure ...	3,200	3,920	100 0 0	18 6 5	118 6 5	
14	Sheep manure ...	1,333	2,133	41 10 6	10 0 2	51 0 8	
15	Poudrette ...	1,720	3,200	53 12 0	15 0 4	68 12 4	
16	Safflower cake ...	3,040	3,280	95 0 0	15 6 4	110 6 4	
17	Nitre ...	960	1,493	30 0 0	7 0 1	37 0 1	
18	No ráb ...	1,067	1,600	33 5 6	7 8 2	40 13 8	
19	Do. ...	1,200	1,600	37 8 0	7 8 2	45 0 2	
20	Do. ...	1,120	1,400	35 0 0	6 9 2	41 9 2	
21	Do. ...	1,227	1,547	39 5 6	7 4 2	45 9 8	
22	Do. ...	1,387	1,600	43 5 6	7 8 2	50 13 8	
23	Soil pulverized ...	960	1,160	20 0 0	5 7 1	35 7 1	
24	Ashes of mixed branches ...	1,040	1,200	32 8 0	5 7 7	37 15 7	
25	Outside ashes ...	1,360	1,200	42 8 0	5 7 7	47 15 7	

17. The following statement shows the results from potash and nitre plots. The seedlings for them were raised on cowdung ráb. They were weak and small from the beginning on account of poor rainfall. The first two plots are comparable. The yield in the rest of the plots is too low. These experiments do not furnish any satisfactory information.

No.	Area.	Kind of manure.	Quantity per acre.	Value of manure per acre.	Per acre.				Total value.	Cost of cultivation per acre exclusive of manure.
					Grain.	Straw.	Value of Grain.	Value of Straw.		
1	2	3	4	5	6	7	8	9	10	11
	Gun.		Lbs.	Rs. a. p.	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.	Rs. a. p.	
1	5	Nitre ...	123	11 9 0	856	880	26 12 0	4 2 1	30 14 1	} 24 5 0
2	5	Do. ...	256	23 2 0	1,040	1,280	32 8 0	6 0 2	33 8 12	
3	5	Do. (in two applications).	384	17 5 6	784	1,136	24 8 0	5 5 4	29 13 4	
4	5	Sulphate of Potash ...	304	29 4 8	560	976	17 8 0	.....	22 1 3
5	5	Dissolved bones ...	128	10 10 6	320	1,040	10 0 0	.....	14 14 1
6	5	No treatment ...	.....	.....	344	1,120	10 12 0	.....	16 0 1

Variety tests at Lanowli.

18. Fifty-three varieties of rice were again tried this year. Bárka Máháya, Garva Dodka, Kachora Garva, Patni, Máhádi, Kálisál, Ambemohor Lámboda, Konkani Garva and Halva, Chimansál and Támbkudai have given yields over 1,000 lbs. per acre. Most of these varieties are early and the rainfall was just enough for them. The late varieties suffered from insufficiency of rainfall. The yields from seed beds are much higher. In some varieties it has reached 3,000 lbs. per acre and in one case it is 4,160 lbs. The statements below show details :—

(1) Transplanted area.

No.	Name of Variety.	Outturn per acre.				Total value of outturn per acre.	Cost of cultivation per acre.
		Grain.	Straw.	Value of grain.	Value of straw.		
		Lbs.	Lbs.	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.
1	Támsál Halva ...	366	686	11 7 0	3 3 6	14 10 6	} 42 0 9
2	Máhádi ...	340	747	10 10 0	3 8 1	14 2 1	
3	Halvár Halva ...	791	1,143	24 11 6	5 5 10	30 1 4	
4	Ghosálvel ...	163	427	5 0 0	2 0 0	7 0 0	
5	Bhadas ...	320	800	10 0 0	3 12 1	13 12 1	
6	Halva Máhádi ...	560	800	17 8 0	3 12 1	21 4 1	
7	Ambemohor Halva ..	571	777	17 13 6	3 10 4	21 7 10	
8	Málbhat Halva ...	960	1,029	30 0 0	4 13 4	34 13 4	
9	Halva Ambemohor ...	267	400	8 4 6	1 14 0	10 2 6	
10	Halvi Patni ...	640	800	20 0 0	3 12 1	23 12 1	
11	Dodka semi-garva ...	860	1,000	26 14 0	4 11 1	31 9 1	
12	Hemdi ...	160	320	5 0 0	1 8 0	6 8 0	
13	Khári Patni ...	366	549	11 7 0	2 9 3	14 0 3	
14	Bárka Máhádyá ...	1,280	1,760	40 0 0	8 4 3	48 4 3	
15	Garva Dodka ...	1,320	1,520	41 4 0	7 2 2	48 6 2	
16	Kachora Garva ...	1,280	1,920	40 0 0	9 0 3	49 0 9	
17	Garvi Patni ...	640	1,200	20 0 0	5 10 2	25 10 2	
18	Ambemohor Garva...	840	1,760	26 4 0	8 4 3	34 8 3	
19	Sonwel Garva ...	400	1,360	12 8 0	6 6 2	18 14 2	
20	Támsál Garva ...	533	827	16 10 6	3 14 1	20 8 7	
21	Ghosálvel Garva ...	800	1,000	25 0 0	4 11 1	29 11 1	
22	Jáda Kolamba ...	840	1,100	26 4 0	5 2 8	31 6 8	
23	Rájáwal Garva ...	640	823	20 0 0	3 13 10	23 13 10	
24	Nirpunji Garva ...	820	1,140	25 10 0	5 5 8	30 15 8	
25	Máhadya Varangal ...	860	1,257	27 2 6	5 14 5	33 0 11	
26	Bodka Garva ...	400	507	12 8 0	2 6 1	14 14 1	
27	Jhina Kolamba ...	617	1,189	19 4 6	5 9 4	24 13 10	
28	Bárka Kolamba ...	660	1,000	20 10 0	4 11 1	25 5 1	
29	Dodka ...	427	1,280	13 5 6	6 0 2	19 5 8	
30	Dodka (Khadakvásá)	594	1,234	18 9 0	5 12 8	24 5 8	
31	Kudurthi ...	937	1,829	29 4 6	8 9 4	37 13 10	
32	Patni ...	1,303	2,171	40 11 6	10 3 1	50 14 7	
33	Máhádi ...	1,189	1,600	37 2 6	7 8 2	44 10 8	
34	Torna (Thána) ...	914	1,509	28 9 0	7 1 4	35 10 4	
35	Ráta ...	791	1,463	24 11 6	6 13 10	31 9 4	
36	Bhura Rice ...	453	1,067	14 2 6	5 0 2	19 2 8	
37	Dagi or Dangri ...	373	1,067	11 10 6	5 0 2	16 10 8	
38	Welchi ...	360	960	11 4 0	4 8 1	15 12 1	
39	White Sál (Khadakvásá)	731	1,417	22 13 6	6 10 6	29 8 0	
40	Kamod Jiri Patni ...	754	1,714	23 9 0	8 0 9	31 9 9	
41	Káli Sál ...	1,041	1,800	32 8 0	8 7 3	40 15 3	
42	Ambemohor Lámkodi ...	1,211	2,400	37 13 6	11 4 4	49 1 10	
43	White Kolamba ...	860	1,600	26 14 0	7 8 2	34 6 2	
44	Tin Pákhí Kudai ...	640	1,280	20 0 0	6 0 2	26 0 2	
45	Kowd ...	720	1,160	22 8 0	5 7 2	27 15 2	
46	Ambemohor Bodka ...	960	2,160	30 0 0	10 2 3	40 2 3	
47	Konkani Garva ...	1,147	2,187	35 13 6	10 4 3	46 1 9	
48	Konkani Halvár ...	1,120	3,840	35 0 0	18 0 6	53 0 6	
49	Chímansál ...	1,560	1,920	48 12 0	9 0 3	57 12 3	
50	Táukudai ...	1,120	1,400	35 0 0	6 9 1	41 9 1	

(2) Seed-bed area.

No.	Name of Variety.	Outturn per acre.				Total value of outturn per acre.	Cost of cultivation per acre.
		Grain.	Straw.	Value of grain.	Value of straw.		
		Lbs.	Lbs.	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.
1	Támsál Halva ...	1,760	2,240	55 0 0	10 8 3	65 8 3	} 25 4 6
2	Máhádi ...	1,920	3,200	60 0 0	15 0 5	75 0 5	
3	Halvár Halva ...	1,808	2,959	56 8 0	13 14 3	70 6 3	
4	Ghosálvel ...	1,760	2,880	55 0 0	13 8 4	68 8 4	
5	Bhadas ...	1,193	1,751	37 4 6	8 3 6	45 8 0	
6	Halva Máhádi ...	2,080	1,760	65 0 0	8 4 3	73 4 3	
7	Ambemohor Halva ...	1,760	2,400	55 0 0	11 4 0	66 4 3	
8	Málbhat Halva ...	1,920	2,400	60 0 0	11 4 3	71 4 3	
9	Halva Ambemohor ...	3,200	4,800	100 0 0	22 8 7	122 8 7	
10	Halvi Patni ...	2,080	2,400	65 0 0	11 4 3	76 4 3	
11	Dodka semi-garva ...	4,160	4,800	130 0 0	22 8 7	152 8 7	
12	Ghudia do. ...	3,520	4,800	110 0 0	22 8 7	132 8 7	
13	Tulsia ...	1,440	1,600	45 0 0	7 8 3	52 8 3	
14	Hemdi ...	1,760	2,080	55 0 0	9 12 3	64 12 3	
15	Khári Patni ...	2,880	4,480	90 0 0	21 0 6	111 0 6	
16	Bárka Máhádyá ...	1,440	1,600	45 0 0	7 8 3	52 8 3	
17	Garva Dodka ...	1,600	2,400	50 0 0	11 4 3	61 4 3	
18	Kachora Garva ...	1,200	1,280	37 8 0	9 12 3	47 4 3	
19	Garvi Patni ...	1,440	2,400	45 0 0	11 4 3	56 4 3	

No.	Name of Variety.	Outturn per acre.				Total value of outturn per acre.	Cost of cultivation per acre.
		Grain.	Straw.	Value of grain.	Value of straw.		
		Lbs.	Lbs.	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.
20	Ambemohor Garva	2,000	3,600	62 8 0	16 14 5	79 6 5	
21	Sonvel Garva	2,320	4,160	72 8 0	19 8 6	92 0 6	
22	Támsál Garva	1,760	2,400	55 0 0	11 4 3	66 4 3	
23	Ghosálvel Garva	2,240	2,800	70 0 0	13 2 4	83 2 4	
24	Jáda Kolamba	2,080	3,200	65 0 0	15 0 5	80 0 5	
25	Rájáwal Garva	1,920	2,400	60 0 0	11 4 3	71 4 3	
26	Nirpunji Garva	1,680	2,560	52 8 0	12 0 4	64 8 4	
27	Máhádya Varangal	1,391	1,670	43 7 0	7 13 5	51 4 11	
28	Bodka Garva	2,080	2,240	65 0 0	10 8 3	75 8 3	
29	Jhina Kolamba	1,440	1,520	45 0 0	7 14 2	52 14 2	
30	Bárka do.	3,200	3,840	100 0 0	18 0 5	118 0 5	
31	Dodka (Khadakvásla)	1,600	4,000	50 0 0	18 12 6	68 12 6	
32	Kudurthi	1,600	3,200	50 0 0	15 0 5	65 0 5	
33	Patni	1,600	2,400	50 0 0	11 4 3	61 4 3	
34	Máhádi	1,120	1,760	35 0 0	8 4 3	43 4 3	
35	Torna (Thana)	1,760	3,200	55 0 0	15 0 5	70 0 5	
36	Ráta	1,600	3,200	50 0 0	15 0 5	65 0 5	25 4 6
37	Munda Ráta	2,560	6,000	80 0 0	28 2 8	108 2 8	
38	Bhura	1,760	2,880	55 0 0	13 8 4	68 8 4	
39	Dagi or Dangri	1,200	1,440	37 8 0	6 13 0	44 5 0	
40	Welchi	1,280	2,560	40 0 0	12 0 4	52 0 4	
41	White Sál (Khadakvásla)	1,120	1,280	35 0 0	6 0 2	41 0 2	
42	Kamod Jiri Patni	1,040	1,920	32 8 0	9 0 3	41 8 3	
43	Káli Sál	1,200	1,600	37 8 0	7 8 3	45 0 3	
44	Ambemohor Lámbodi	1,440	1,920	45 0 0	9 0 3	54 0 3	
45	White Kolamba	1,920	1,760	60 0 0	8 4 3	68 4 3	
46	Tin Pákhí Kudai	1,760	4,480	56 0 0	21 0 6	76 0 6	
47	Kowd	2,720	3,200	85 0 0	15 0 5	100 0 5	
48	Ambemohor Bodka	1,760	4,800	50 0 0	22 8 6	77 8 6	
49	Konkani Garva	1,440	3,520	45 0 0	16 8 5	61 8 5	
50	Konkani Halvár	1,920	2,560	60 0 0	12 0 4	72 0 4	
51	Chimansál	3,840	3,200	120 0 0	15 0 5	135 0 5	
52	Támb Kudai	1,440	1,600	45 0 0	7 8 3	52 8 3	

19. Notes were taken as to the characteristics of these varieties and are shown in the statement below:—

No.	Name of Variety.	Colour of stem.	Final height.	Length of ear.	Date of sowing.	Date of transplanting.	Date of flowering.	Date of harvesting.
1	Támsál Halva	White.	2 10	0 7	30th May 1905	17th and 18th July 1905.	23rd September 1905.	2nd and 3rd November 1905.
2	Máhádi	Red	2 2	0 6	Do.	Do.	24th do.	Do.
3	Halvár Halva	White.	3 0	0 8	Do.	Do.	25th do.	Do.
4	Ghosálvel Halva	Do.	2 7	0 7	Do.	Do.	16th do.	Do.
5	Bhadas	Do.	2 5	0 7	Do.	Do.	16th do.	Do.
6	Halva Máhádi	Do.	2 8	0 7	Do.	Do.	24th do.	Do.
7	Ambemohor Halva	Do.	2 4	0 9	Do.	Do.	26th do.	Do.
8	Mábhát Halva	Reddish	3 2	0 9	Do.	Do.	24th do.	Do.
9	Halva Ambemohor	White.	3 0	0 8	Do.	Do.	26th do.	Do.
10	Halvi Patni	Do.	3 0	0 10	Do.	Do.	24th do.	Do.
11	Dodka semi-garva	Do.	3 2	0 9	Do.	Do.	28th do.	Do.
12	Ondia do.	Do.	3 10	1 1	Do.	Do.	28th do.	Do.
13	Tulsia do.	Do.	3 4	0 10	Do.	Do.	27th do.	Do.
14	Hemdi	Do.	2 11	0 7	Do.	Do.	25th do.	Do.
15	Khári Patni	Red	3 0	0 9	Do.	Do.	28th do.	Do.
16	Bárka Máhádi	White.	3 0	0 9	Do.	Do.	8th October 1905.	Do.
17	Garva Dodka	Red	3 4	0 10	Do.	18th July 1905	2nd September 1905.	3rd November 1905.
18	Kachora Garva	White.	2 10	0 8	Do.	Do.	5th October 1905.	Do.
19	Garvi Patni	Red	3 4	0 9	Do.	Do.	Do.	Do.
20	Ambemohor Garva	White.	3 9	0 9	Do.	Do.	Do.	Do.
21	Sonvel Garva	Do.	3 2	0 10	Do.	Do.	12th October 1905.	Do.
22	Támsál Garva	Do.	2 6	0 7	Do.	Do.	4th do.	3rd and 6th November 1905.
23	Ghosálvel Garva	Do.	2 10	0 6	Do.	19th July 1905	2nd do.	Do.
24	Jáda Kolamba	Do.	3 4	0 8	Do.	Do.	4th do.	Do.
25	Rájáwal Garva	Do.	3 2	0 8	Do.	Do.	28th September 1905.	Do.
26	Nirpunji Garva	Do.	3 4	0 8	Do.	Do.	4th October 1905.	Do.
27	Máhádya Varangal	Do.	3 4	0 8	1st June 1905	Do.	5th do.	Do.
28	Bodka Garva	Do.	3 2	0 9	Do.	Do.	2nd do.	Do.
29	Jhina Kolamba	Do.	2 10	0 8	Do.	Do.	5th do.	Do.
30	Bárka Kolamba	Do.	2 10	0 10	Do.	Do.	6th do.	Do.
31	Dodka	Red	3 8	0 10	Do.	Do.	4th do.	Do.
32	Dodka (Khadakvásla)	Do.	2 10	0 9	Do.	Do.	17th Sept. 1905.	Do.
33	Kudurthi (Thana)	Do.	2 8	0 9	Do.	Do.	23rd do.	6th November 1905.
34	Patni	White.	2 9	0 7	2nd June 1905	20th July 1905	17th do.	Do.
35	Máhádi	Do.	2 6	0 6	Do.	Do.	25th do.	Do.
36	Torna (Thana)	Do.	2 6	0 6	Do.	Do.	16th do.	Do.
37	Ráta	Do.	2 4	0 6	Do.	Do.	16th do.	Do.
38	Munda Ráta	Do.	2 4	0 5	Do.	Do.	18th do.	Do.
39	Bhura	Do.	2 4	0 5	Do.	Do.	19th do.	Do.
40	Dagi or Dangri	Do.	2 4	0 6	Do.	Do.	19th do.	Do.
41	Welchi	Do.	2 4	0 7	Do.	Do.	24th do.	7th do.
42	Sál white (Khadakvásla)	Do.	2 8	0 8	Do.	Do.	22nd do.	Do.
43	Kamod Jiri Patni	Red	2 11	0 8	Do.	Do.	12th October 1905.	Do.
44	Káli Sál	White.	2 11	0 11	Do.	Do.	8th do.	Do.
45	Ambemohor Lámbodi	Do.	3 6	0 10	Do.	Do.	8th do.	Do.
46	White Kolamba	Do.	2 9	0 8	Do.	Do.	1st do.	Do.
47	Tin Pákhí Kudai	Do.	2 10	0 10	Do.	Do.	8th do.	Do.
48	Kowd	Do.	3 0	0 12	Do.	Do.	2nd do.	Do.
49	Ambemohor Bodka	Do.	3 2	0 9	Do.	Do.	8th do.	Do.
50	Konkani Garva	Do.	3 4	0 12	Do.	Do.	8th do.	Do.
51	Konkani Halvár	Do.	2 11	0 9	Do.	Do.	25th September 1905.	Do.
52	Chimansál	Do.	3 4	0 11	Do.	Do.	1st October 1905.	16th do.
53	Támb Kudai	Do.	3 0	0 9	Do.	Do.	24th September 1905.	Do.

III.—*Trial of Nitre in Cultivators' Fields.*

20. The trial of nitre in cultivators' fields in continuation of the last year was made as follows :—

Name of Village and District.				Number of plots.	Area treated with nitre.	Area not treated.
					A. g.	A. g.
<i>Thána District.</i>						
Parsik	...	...	...	7	1 10	1 18½
<i>Kolába District.</i>						
Karjat	...	...	...	4	0 12½	0 12½
Chouk	...	...	...	12	1 33	1 33

21. The selection of sites was made on the 22nd of June and every possible enquiry was made regarding the previous treatment of the fields. Measurements were made by the Circle Inspectors.

22. *Varieties.*—The following varieties were selected. They include both early and late varieties. At Thána—Dodka and Kudurthi; at Chouk—Máhadya Varangal, Zina Kolamba, Dodka, Rájával, Ghosálwel and Halva Bhadas; at Karjat—Máhádi and Halvár.

23. The nitre was applied at Karjat and Chouk on the 10th and 11th of July and at Thána on the 19th. The seedlings were well established at the time of application. The height of the crop varied from 1½ feet to 2 feet. Before the application of nitre all water from the rice-beds was drawn off as far as possible. The nitre was spread out by the hand. The rate of application was one maund of 80 lbs. per acre. The cost of nitre has risen continuously since 1903-1904.

24. The fields were inspected once. The harvesting was supervised by the fieldmen at Lanowli and Mánjri.

25. *Season.*—The season on the whole was an unfavourable one on account of the deficient rainfall at all the experimental stations. The crops on poor soils suffered most. The soil cracked and the ears in several places remained unfilled. The late varieties produced considerably less outturn. The last week of September and nearly the whole of October went dry except for a few showers at intervals.

26. *Thána Series.*—The yield in all the plots is below normal. The outturns in plots 1, 2, 4 and 5 are in favour of nitre, so far the yield is concerned, but true gain is only in plots 1, 4 and 5. The difference in yield in plot No. 3 is slight.

Statement below shows details :—

Survey No.	Pot No.	Number of plots.	Outturn per Acre.				Increase of treated plot over untreated in grain per acre.	Value of increase.	Cost of nitre per acre.	Net gain per acre by rayat.	Cost of nitre per acre in 1903-04.	Net gain per acre by rayat on the prices of 1903-04.	Character of soil.
			Plot treated with nitre.		Plot not treated with nitre.								
			Grain.	Straw.	Grain.	Straw.							
			Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.	
102	8	1	832	2,040	657	1,527	175	5 0 0	7 3 7	...	3 1 6	1 14 6	Light.
104	4	2	817	1,701	800	1,423	17	0 8 0	7 3 7	...	3 1 6	...	Do.
94	2	3	1,477	2,154	1,484	1,862	Nil.	...	7 3 7	...	3 1 6	...	Medium.
96	4	4	1,652	2,752	1,430	2,420	222	6 5 6	7 3 7	...	3 1 6	3 4 0	Heavy.
94	7	5	1,943	2,636	711	1,227	1,237	35 5 6	7 3 7	29 1 11	3 1 6	33 4 0	Do.
92	2	6	1,223	1,802	1,743	2,711	Nil.	...	7 3 7	...	3 1 6	...	Do.
94	3	7	1,336	1,968	1,536	1,806	Nil.	...	7 3 7	...	3 1 6	...	Do.

27. *Chouk Series.*—The manurial experiments were much affected here by the character of the season. The standing crop had in several cases withered and the soil had cracked in many fields. The outturn results are much below normal. There is very little gain in plots 1, 2 and 9.

The following table shows the results:—

Survey No.	Pot No.	Number of plot.	Outturn per Acre.				Increase of treated plot over untreated in grain per acre.	Value of increase.	Cost of nitre per acre.	Net gain per acre by rayat.	Cost of nitre per acre in 1903-04.	Net gain per acre to rayat on the prices of 1903-04.	Character of soil.
			Plot treated with nitre.		Plot not treated with nitre.								
			Grain.	Straw.	Grain.	Straw.							
119	5	1	Lbs. 1,773	Lbs. 2,681	Lbs. 1,366	Lbs. 2,050	Lbs. 407	Rs. a. p. 7 13 3	Rs. a. p. 7 3 7	...	Rs. a. p. 3 1 6	Rs. a. p. 4 11 9	Medium.
119	2	2	954	1,220	1,074	1,412	Nil.	...	7 3 7	...	3 1 6	...	Do.
83	1	3	2,067	2,480	2,497	2,749	Nil.	...	7 3 7	...	3 1 6	...	Heavy.
2	2	4	1,643	2,052	1,451	1,814	192	3 11 1	7 3 7	...	3 1 6	0 9 7	Light.
162	1	5	703	1,249	577	1,274	126	2 6 9	7 3 7	...	3 1 6	...	Medium.
138	1	6	570	644	508	627	68	1 4 11	7 3 7	...	3 1 6	...	Heavy.
127	...	7	1,570	3,913	2,222	5,072	Nil.	...	7 3 7	...	3 1 6	...	Medium.
105	5	8	386	1,199	628	1,192	Nil.	...	7 3 7	...	3 1 6	...	Light.
134	2	9	859	1,069	665	825	194	3 11 8	7 3 7	...	3 1 6	0 10 2	Medium.

28. *Karjat Series*.—The fields treated with nitre had a soil of lighter character. The unfavourable season has reduced the yield considerably.

The following table shows the results:—

Survey No.	Pot No.	Number of plot.	Outturn per Acre.				Increase of treated plot over untreated in grain per acre.	Value of increase.	Cost of nitre per acre.	Net gain per acre by rayat.	Cost of nitre per acre in 1903-04.	Net gain per acre to rayat on the prices of 1903-04.	Character of soil.
			Plot treated with nitre.		Plot not treated with nitre.								
			Grain.	Straw.	Grain.	Straw.							
48	2	1	Lbs. 800	Lbs. 1,314	Lbs. 663	Lbs. 1,028	Lbs. 137	Rs. a. p. 2 10 1	Rs. a. p. 7 3 7	...	Rs. a. p. 3 1 6	...	Light.
1	3	2	400	1,065	586	1,000	...	Nil.	7 3 7	...	3 1 6	...	Do.
49	4	3	1,450	3,900	1,520	3,500	...	Nil.	7 3 7	...	3 1 6	...	Do.

IV.—Accounts.

29. The net cost of the experiments is Rs. 1,234-2-10, of which Rs. 1,163-9-4 may be allotted to those at Lanowli and Rs. 120-9-6 for experiments elsewhere.

The balance sheet is given below:—

Receipt	Amount.	Total.	Expenditure.	Amount.	Total.
To Sale of produce, 1905-06—	Rs. a. p.	Rs. a. p.	By Fieldman's pay ...	Rs. a. p.	Rs. a. p.
Rice	177 8 0	177 8 0	" " Travelling allowance ...	264 0 0	
„ Value of produce unsold on the 31st March 1906—			" " rent of quarters...	15 11 6	
Rice seed	39 9 7		„ Rent of land	55 4 0	334 15 6
Rice straw	73 2 0	112 11 7	„ Labour	90 0 0	
„ Increase in valuation of live stock implements, etc.	25 0 0	25 0 0	„ Purchase of seeds ...	705 2 8	
			" " of manure	3 4 6	
			" " of nitre	37 14 0	
			" " râb materials ...	73 0 0	
			" " kerosine, coir ropes, etc. ...	44 5 3	
			„ Upkeep of work cattle ...	53 9 0	
			„ Railway fare for men ...	142 0 0	
			" " on other articles...	16 15 0	
			" " on nitre	50 11 0	
			„ Travelling allowance of Fieldman for journey in connection with nitre experiments ...	35 6 0	
			„ Packing charges and hamalage on nitre ...	8 4 0	
Total ... ..	.....	315 3 7	Total .. ..	.....	1,264 6 11
By Net cost ... ..	.....	1,234 2 10			
Total ... ..	.....	1,599 6 5			1,599 6 5

No. 392 OF 1906.

From

G. A. GAMMIE, Esq., F.L.S.,
Economic Botanist, Bombay,
Poona;

To

THE DIRECTOR OF AGRICULTURE.

Poona, 15th August 1906.

Sir,

I have the honour to submit the second report of the Ganeshkhind Botanical Gardens, Poona, and the first report of the Botanical Garden and Experimental Station at Bassein, Thána District.

I have the honour to be,

Sir,

Your most obedient Servant,

G. A. GAMMIE,
Economic Botanist.

X.—OPERATIONS ON THE GANESHKHIND GARDENS BOTANICAL STATION.

History.

The botanical garden at Ganeshkhind was established in 1873 and attached to it was a smaller garden at Hivra in the Junnar táluka. The principal object of these gardens was to supply the Medical Department with drugs.

In 1872-73 the outturn of the gardens included 700 lbs. of Senna, 1,300 lbs. of Henbane, and 1,036 lbs. of Dandelion.

In the same year experiments were made with various artificial manures—nitro-phosphate, citrate, dissolved bones, nitrate of soda, hop manure and super-phosphate.

In 1873-74 experiments were made with European artificial manures, but the result was not satisfactory. It was proved that silt from the drains of Poona city is a valuable manure, at least equal for one year's crop to dung from oil-cake-fed cattle.

Experiments were also being made in the cultivation of cork oak trees, but they ultimately proved unsuccessful. Experiments were also made for the growth of fibre for paper.

In 1874-75 the area under tillage was fifty-seven acres, seven of which were watered. It was ascertained that prickly pear made a valuable manure if it was left to rot in a cistern, through which the water of an irrigation channel was led. A fairly successful attempt was made to grow vanilla. Flax was also grown of fair quality, but of excessive dearness.

In 1875-76 the most important new introductions were *Balsamocarpon brevifolium*—a plant yielding pods useful in tanning, and the Liberian coffee. Cereal crops were raised with a view to selecting the seed.

In 1876-77 experiments in the production of tasar silk were continued.

In 1877-78 experiments were carried on with mahogany trees, the seed of which had been sent from Kew Gardens and planted in 1874. The trees could be established if well watered during the first two years.

The blue gum tree, *Eucalyptus globulus*, was found to thrive well for four or five years and then to die off. *Cinchona* died in the hot season if planted out. *Taraxacum* was grown with success. The tasar silk experiments were not satisfactory.

In 1878-79 it was decided by Government that the gardens should be constituted the recognized chief botanic gardens of the Presidency, and that arrangements should be made for forming in them as complete a collection as possible of the local plants of Western India, a Herbarium of which was to be kept permanently on the spot along with a select library of diagrams and botanical works of reference. Botanical teaching was begun at the end of February 1879 by means of lectures at the gardens and at the College of Science and Deccan College.

Experiments with Nankin cotton showed that it could not be profitably grown in the Deccan.

In 1879-80 a room was partially fitted as a Herbarium.

Experiments with the thornless prickly pear, a favourite food for cattle when skinned, showed that it grows freely as a fence.

The yield of the forage grass (*Euchlæna luxurians*) seemed nearly the same as that of Guinea grass. A crop sown in November and cut in April gave 16 tons per acre of green forage at one cutting. Experiments with lucerne grass seemed to prove the French variety superior to the acclimatised. The plant was quite as vigorous, the stalk was more delicate and the seed was only half the weight.

In 1880-81 a number of full-grown specimens of *Albizzia procera*, which had been transplanted in the cold season of 1878-79, showed satisfactory results.

In 1881-82 a mangosteen plant from Singapore died from cold in November. Potatoes received from the Secretary of State grew surprisingly well. In May

1882 the carob tree yielded a crop of fully 30 pounds weight of pods, the greater part of which were equal in size to the imported pods.

The Herbarium building was altered and repaired and numerous specimens were added.

Experiments were made in collecting the India rubber yielding milky sap of the *Cryptostegia grandiflora*, a beautiful climber. The average yield was found to be 20 grains and the acre yield 12 pounds. As the plants could not bear tapping more than twice a year, the yearly acre outturn would be 24 pounds of caoutchouc.

(Extract Gazetteer.)

Season.

2. The monsoon rain was badly distributed. There were heavy showers in the early part of the season and later on there was almost a continuous break up to the cold weather. The rabi rains were also very scanty, and drought extended to the beginning of June. The labour force was so steadily employed in hand-watering that some projected experiments had to be abandoned, as the ground could not be prepared.

Distribution of Soils.

3. The river Mula forms the northern boundary of the garden, and the three plots lying along its bank, Nos. 8, 9 and 10, are composed of a great depth of reddish alluvial loam deposited by the successive annual floods. This is an ideal soil for the growth of a great variety of trees, many of which refused to grow on the black soil. A large quantity of this soil is also used for mixing in flower beds, and it is found that vegetables can only be successfully grown on black soil after a heavy admixture of this alluvium.

4. The plot marked Banana on the right is very low-lying and is often deeply flooded. It is now utilized for the growth of jute, which is thriving admirably in spite of being under water for a few days in July. Plots Nos. 15 and 16 and 14 are of very inferior *murum* soil, and attempts are being made to use the worse patches for the cultivation of fodder grasses and fibre plants. The remainder of the garden is of intermediate black soil, ranging in depth from 2 feet upwards, becoming deeper to the northward.

Indigenous Trees and Shrubs.

5. The specimen plants in Botanical Section No. 7 are making satisfactory progress. A few which had not been well established before the end of the rains suffered considerably from the continued drought of the year.

Experiments with Rubber.

6. *Rubbers in Nos. 10, 11 and 14.*—The average increment of growth in 12 months of the first series of plants of Ceara put out in July 1903 is, height 5' 2½", girth 2·1 inches. Of the second series planted in August 1904, the increment for the corresponding period is, height 6 feet and girth 2·5 inches. The finest plants measure, height from 15 to 20 feet, and girth 8 to 10 inches. This growth in 2½ years may be considered sufficiently promising. A part of No. 14 was planted up with 300 seedlings placed 6 feet apart. Some of the trees produced seed, but not in the quantity that was anticipated. From observations made on the old trees in the College of Science garden, it appears that self-sown seed lies on the ground for one year before germinating.

7. *Cryptostegia grandiflora.*—This plant exists naturally and in great profusion along the Nála to the east of No. 16. Since the publication of the analysis of rubber by Dr. Leather, many enquiries have been received as to its cultivation, and numerous seeds were freely given to all. A sample of the rubber has been submitted to the Director of the Imperial Institute to obtain a commercial valuation and the opinion of experts. It is now proved that the rubber does deteriorate after long keeping in this climate.

8. *Castilloa elastica.*—The few plants in the garden are making exceedingly slow progress, and there is little prospect of its success in the Deccan.

9. *Hevea brasiliensis.*—Absolutely refuses to grow at all, and further experiment has been abandoned.

10. *Kickxia africana*.—The young plants introduced last year are making satisfactory growth, but the general concensus of opinion in India, at any rate, seems to be that the plant is not worth growing.

11. The latex was extracted from the following plants and submitted for chemical analysis by Mr. Hooper. His reports are tabulated here:—

No.	Name.	Moisture per cent.	Caoutchouc per cent.	Resin per cent.	Ash per cent.	Insoluble.	Remarks.
1	<i>Alstonia scholaris</i> ...	9·20	40·95	37·95	11·90	...	This contains a large amount of resinous matter and lime and the separated caoutchouc is feebly elastic. It would realize a low price in the market on account of the presence of resins.
2	<i>Synadenium Grantii</i> ...	5·55	Nil.	68·01	6·20	...	
3	<i>Ficus elastica</i> ...	13·20	76·00	9·25	1·55	...	Gutta 20·24.—The small amount of amorphous gutta indicates its unsuitability as a substitute for commercial gutta-percha.
4	<i>Pedilanthus tithymaloides</i> ...	6·5	Nil.	44·02	9·5	40·	
5	<i>Artocarpus integrifolia</i> ...	11·3	Nil.	80·10	1·80	6·8	This compares most favourably with Assam rubber in its composition.
6	<i>Euphorbia Tirucalli</i> ...	4·7	Nil.	78·2	5·9	11·2	
7	<i>Cerbera Thevatia</i> ...	8·2	Nil.	43·9	18·7	29·2	
8	<i>Ocrotropis gigantea</i> ...	15·	Nil.	44·9	7·9	32·2	

Fibre Experiments.

12. The following tabulated statement shows the result by retting:—

Name.	Weight of stalks.	Weight of dry fibre.	Percentage of fibre to stalks.
	lbs.	oz.	
1. <i>Hibiscus panduræformis</i> ...	10	11½	7·1
2. <i>Corchorus acutangulus</i> ...	10	4¼	2·6
3. <i>Corchorus trilocularis</i> ...	6	3¼	3·4
4. <i>Malachra capitata</i> ...	5	8	8·7
5. <i>Sida carpinifolia</i> ...	8	14	19·

13. *Ramie Fibre*.—Professor Gammie has observed plants of this grown in various localities for a number of years and has finally arrived at the conclusion that the soil of the Deccan and probably of the Konkan also is not suitable for this plant, which requires a more evenly distributed rainfall than we have in the west.

14. *Agaves*.—Half-acre plots of the following have been put out, so as to ultimately arrive at their approximate outturn by area:—*Agave vivipara*, *Agave cantula*, *Agave americana*, *Agave rigida*, *Fucraea gigantea*, *Yucca gloriosa*. Smaller trials are being made of various species of *Sansevieria*, *Agave*, *Aloe*, etc.

15. *Cottons*.—Further investigations in the botany of cottons have been in progress. Nearly 450 varieties of cottons, including annuals, perennials, American varieties and crosses, were grown. Small quantities of Egyptian and Upland Georgian grew well without irrigation, and two neighbouring cultivators are enterprising enough to cultivate the latter on their own account. Seeds of cotton were distributed to many enquirers.

Of the American tree cottons, the Bourbon, so far, is the most promising. The Kidney and Peruvian make poor progress during the first season and are apt to die out altogether in places exposed to the high winds.

16. *Jute cultivation*.—Two plots, aggregating one-fourth of an acre have been put under this crop, and the experiment is controlled by a Mahomedan cultivator sent from Bengal. It is too early to venture an opinion on this trial.

Flower Selection trials.

17. These have been worked out on zinnias, phlox, antirrhinum, cosmos, and holly hock. The results have been or will be reported in the Journal of

the Agri-Horticultural Society of Western India. It is too early yet to make an absolute assertion, but the results so far confirm the opinion that the deterioration of annual garden plants in India is mainly due to want of care in selecting plants for seed. Zinnias especially show a marked improvement in the second year. China asters go on from year to year from acclimatized seeds without degenerating. These seeds are very fertile and can be depended upon to germinate well, while imported seeds this season have failed to germinate at all.

Experiments with Crops.

18. *Yams.*—The following table gives the result of this year's experience with yams. The seed was supplied by the Inspector-General of Agriculture.

H. E. P. Register No.	Name of crop and variety.	Kind of soil in which sown.	Preparatory tillage.	Manure applied.	Area sown.	Date of sowing.	Number of sets planted.	Character of the season.	Field operations after sowing, such as watering, weeding, hoeing, &c.	Date of harvesting.	Outturn.	Value of the outturn at market rates.
1	2	3	4	5	6	7	8	9	10	11	12	13
20694	<i>Dioscorea alata</i>	Medium black soil.	Pits were dug 9" deep and sets planted and well covered with soil.	No manure was applied.	The pits were at a distance of 3' in lines & apart.	8th, 10th June 1905.	4	The unseason rain was not a normally distributed fall. There were one or two heavy showers in the earlier part of the season and later on there was total break up to the cold weather. The rain falls were also very scanty and drought continued for a longer time than usual.	Weeding was done whenever necessary. The crop was irrigated at an interval of from 15 to 20 days from October to end of December.	20th April 1906.	3 oz.	.....
20709	Do.						4				Did not germinate	
20657	Do.						4				3 oz.	.....
20679	Do.						4				½ oz.	.....
20714	Do.						4				1 lb.	.....
20683	Do.						3				½ lb.	.....
206951	Do.						2				Did not germinate	
20705	Do.						1				Do.	.....
20692	Do.						4				Do.	.....
21642	Do.						4				.....	.....
21169	Do.						4				6 lb.	Did not germinate.
21133	<i>D. Fasciculata</i>						3				1½ oz.	.....
226406	<i>Dioscorea</i>						3				.....	.....
20662	<i>D. alata-globosa</i>						4				6	.....
21171	Do. do.						4				2	.....
21080	Do. <i>digitata</i>						3				4	.....
20883	<i>D. Fasciculata varpinosa</i>						3				.....	.....
22446	<i>D. alata globosa</i>						3				7	.....
21610	<i>D. alata</i>						2				½	.....
21607	<i>D. alata saniformus</i>						10				Not germinated.	.....
21708	<i>D. alata</i>						10				4	.....
22304	<i>Dioscorea</i>						4				4	.....
21626	<i>D. alata globosa</i>						4				1½	.....
22867	Do. <i>rubella</i>						4				½	.....
22280	<i>D. alata</i>						3				1½	.....
.....	<i>Dioscorea</i> from U. S. Lyons Esqr., Manila.						4				1	.....
21691	<i>D. alata</i>						4				8½	.....
22444	Do. <i>purpurea</i>						2				Not germinated.	.....
19769	Do. <i>rubella</i>						2				Do.	.....
19514	<i>Dioscorea</i>						4				½	.....
17954	Do.						2				1½ lb.	.....
21165	<i>D. Fasciculata</i>						4				3	.....
21005	<i>D. alata kathur</i>	4	4	.....							
20384	Do. <i>rubella</i>	3	9	.....							
22305	<i>Dioscorea</i>	4	6	.....							
20480	<i>D. fasciculata</i>	2	2½	.....							
21702	<i>D. alata</i>	3	Not germinated.	.....							
22691	<i>Dioscorea</i>	2	1½	.....							
F. No. 22628	<i>D. bulbifera</i>	3	3	.....							
" 21707	<i>D. alata</i>	3	Not germinated.	.....							
" 21693	Do.	1	Do.	.....							
" 20161	<i>D. Fasciculata</i>	1	Do.	.....							

The growth on the whole was not as vigorous as it ought to be and that of the Fijian yams was not satisfactory, most of them having failed completely.

19. *Wheat*.—A set of permanent wheat experiments with artificial manures was commenced under the direction of Mr. Meggitt, and the following is his report :—

In November 1905, an experiment on the manuring of wheat was started, with a view to ascertaining the manurial requirements of that crop when grown on the medium black soil of the District.

Ten plots of $\frac{1}{10}$ acre each were made, on an apparently even area of ground, and the seed was sown on the 26th and 27th November. This was considered too late for successful sowing, but all plots germinated normally. The later growth, however, was not satisfactory and remarkable inequalities between the different plots, and even in the individual plots themselves, soon became apparent. It is evident that the previous cropping of this area has rendered it unsuitable, for the present, for a manurial experiment, and severe grading will be required before such can be carried out.

It is proposed to continue the grading process during the coming rabi season, since some of the plots were considerably thinned by the depredations of hares, squirrels, etc., so that the observed differences in outturn are probably not entirely due to soil variation.

With the experience of the past season, it should be possible to form a more correct estimate of the soils' capabilities, and suitability for a manurial test.

20. *Vegetable garden*.—A series of experiments were commenced on behalf of the Agri-Horticultural Society of Western India, which has no land suitable at the Empress Gardens. The results up to April are published by Mr. Hartless in the Journal of the Society.

Grass experiments.

21. Seven varieties of grasses were received from the Bureau of Plant Industry, U. S. Department of Agriculture, in December. They were sown immediately and remained under observation for six months. The whole period was one of drought, and the plots were irrigated. The notes registered are as follows —

<i>Euchloa Mexicana</i>	...	Germinated and grew well, but only male inflorescence appeared.
<i>Milo Maize</i>	... ..	Germinated, grew well, and ears appeared. Although the heads never developed properly, they were exactly like those of the compact variety of Jowár.
<i>Bromus marginatus agropyrum tenerum.</i>		These germinated well, but growth was poor and no flowers were produced.
<i>Uniola latifolia, Festuca ovina ingrata.</i>		} Failed to germinate.
<i>Panicum bulbosum</i>	...		This is the only one on the list which really succeeded. Further tests are in progress.

Steps have been taken to eradicate by hand such useless grasses as *uphorus corymbosus* and *Andropogon contortus*. One large plot, which hitherto has only produced the former, was ploughed up and, under the direction of Mr. Meggitt several varieties of European fodder grasses, *viz.*, Italian rye grass, Perennial rye grass, *Dactylis glomerata*, *Festuca elatior*, *Phleum pratense*, and an indigenous *Andropogon* were sown to ascertain whether it be possible or not to replace a bad grass by a good species.

Herbarium and general collection.

22. The Herbarium now includes mounted specimens of all the Bombay rices, wheats and the Indian cottons, and also plants of general interest growing in the garden or its vicinity. The seed collection, stored in bottles, now represents 500 species, and is used for purposes of comparison. A set of models of fruits and vegetables, difficult to preserve, is being brought together.

Visitors.

23. A number of visitors now come to the gardens, and every assistance is afforded to those who are in search of information.

IX.—OPERATIONS ON THE BASSEIN BOTANICAL STATION.

The area comprised within the walls of the old Portuguese Fort at Bassein was handed over to the Department on the 3rd February 1906. As the whole ground was more or less overrun by a dense growth of trees and scrub, clearing operations were at once taken in hand and the months of February, March and April were spent in cutting out as much jungle as possible and in the partial opening out of old roads. Nothing was cut out that could possibly be left standing and the vegetation on the walls was spared.

2. The area marked in red ink in the accompanying plan is to be preserved intact at the special desire of Mr. Cousens, of the Archæological Survey Department. Professor Gammie spent two days with this officer and came to a definite understanding regarding the preservation and treatment of the ruins so far as it concerned the vegetation on them. At the same time errors in the *Gazetteer* account were detected and corrected and the map now published is probably more correct than any now extant.

3. The soil of the Bassein garden is wholly a sandy alluvial loam equal to and similar in character to the *bágúyat* land which stretches along the vicinity of the Bassein coast. It is particularly suitable for garden cultivation and its light nature renders it amenable to all forms of treatment.

4. There are a number of wells and the best of them have been fitted with Persian wheels. They yield a plentiful supply of fresh water in spite of the short rainfall of the previous year and of the proximity to the salt water of the creek.

5. The land to the left of the road, which runs from Bassein town to the Bunder has been reserved for fibre and rice experiments. The upper end has been planted out with measured plots of various species of Agave, and the lower part has been devoted to the cultivation of rice. For the first year the latter has been cultivated by the local method to test the uniformity of the soil. One plot was sown with jute, and so far, the crop promises well.

6. On the right hand side of the road, the old gardens belonging to the various monasteries and churches have again been established as experimental grounds, and trials of the following crops and economic plants have been commenced.

7. *Rubber*.—A number of plants and seeds were put down in May, and the percentages of germination are as follows:—

Name.	Date of sowing.	Percentage of germination.	Present height.	Number of young plants received.	Now living.	Height.
			ft. in.			ft. in.
Ceara (<i>Manihot Glaziovii</i>)	12th May 1906 ...	35	1 4	18	8	2 3
Para (<i>Hevea brasiliensis</i>)...	Do. ...	...	...	45	25	1 2
Central American (<i>Castilleja elastica</i>).	Do. ...	...	...	25	19	6 10
<i>Cryptostegia grandiflora</i> ...	Do. ...	5	0 1	...	...	...

For the first time in the Bombay Presidency I have seen Para really inclined to grow. *Ficus elastica* will be put out as soon as the cuttings have taken root.

8. *Cotton*.—Seeds of the following varieties of tree cottons were also sown in May to test their suitability for the Konkan. The last three varieties are not thriving, and the percentage of germination was too low.

- | | |
|------------------------------|----------------------|
| 1. Bourbon cotton, | 5. Metaffi. |
| 2. Kidney cotton. | 6. Sea Island. |
| 3. Caravonica Kidney cotton. | 7. Caravonica No. 1. |
| 4. Abassi. | 8. Caravonica No. 2. |

9. *Cassava*.—(Mainhot utilissima). The whole set of 50 varieties was brought from the Poona Station and their progress will be watched.

10. *Millets*.—A set of these were sown to test their capabilities in this soil.

11. A number of *beans* and *gourds* were also planted with the same object in view.

12. *Plantains*.—As Bassein is a noted district for these, every endeavour is being made to introduce as large a number of varieties as possible, but probably none will ever be found to equal the best of the local varieties.

13. *Betel pepper*.—Trials have been commenced in this, which is largely grown already in the district.

14. *Lemon grass* thrives luxuriantly here and a number of clumps already existing in the fort were planted out in a plot for future experiments.

15. *Pine apples* grow admirably here. Many plants of the local red variety are already grown, and attempts are being made to introduce better sorts. Pine apple cultivation promises well at Bassein and Mr. Gammie is very sanguine of success.

16. In addition to these, large numbers of the ordinary botanical garden trees, shrubs and herbs are being rapidly brought together.

17. All open spaces are being put down in lawns, and it is hoped by next year to give a plan of the garden, showing a definite scheme of experiments.

18. As a beginning in research work, gums of the following plants have been collected for analysis.

Balsamodendron pubescens, *Stocks*.

Spondias acuminata, *Roxb*.

Acacia arabica, *Willd*.

Poinciana regia, *Bojer*.

Moringa pterygosperma, *Gærtn*.

Mangifera indica, *Linn*.

Bombax malabaricum, *D. C*.

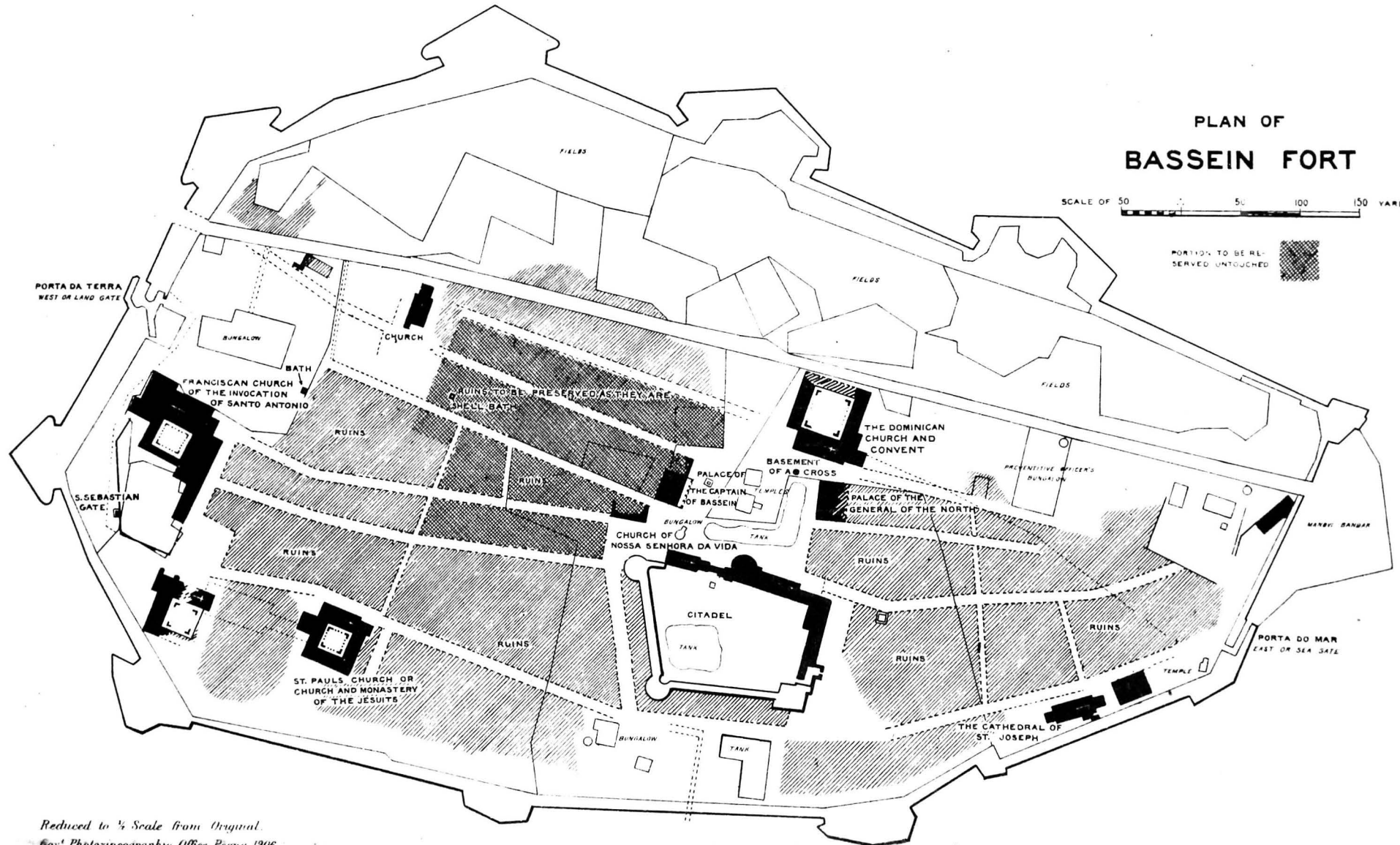
Sterculia foetida, *Linn*.

19. In addition, constant efforts are being made to collect and cultivate typical plants with special reference to the Flora of the Thána district and of the North Konkan, generally.

PLAN OF BASSEIN FORT

SCALE OF 50 50 100 150 YARDS

PORTION TO BE RE-
SERVED UNTOUCHED



Reduced to 1/4 Scale from Original.
Govt. Photoduplication Office Pona 1906