



Reports on the working of the
Department of Agriculture of
the Central Provinces for the
years ending the 31st March
1932 and the 31st March 1933

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NAGPUR
GOVERNMENT PRINTING, C.P.
1933

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No. 608-564-XIV

GOVERNMENT OF THE CENTRAL PROVINCES

AGRICULTURE DEPARTMENT

Nagpur, the 17th August 1933.

READ—

- (1) Report on the working of the department of Agriculture for the year ending the 31st March 1932.
- (2) Report on the working of the department of Agriculture for the year ending the 31st March 1933.

RESOLUTION

1. The agricultural and financial conditions being more or less the same during the 2 years under review, it is proposed to review the working of the Agriculture department for these 2 years together rather than for each year separately. The recommendations made by the Financial (Retrenchment) Committee were given effect to by abolishing one Deputy Director's circle, holding in abeyance 2 posts of the Deputy Director of Agriculture, and abolishing the post of the Agricultural Engineer. The cadre of Extra-Assistant Directors of Agriculture has been reduced by 4 posts and that of Agricultural Assistants on the field staff by 13 posts. Five agricultural farms and 4 district headquarter gardens which were managed by the department have been leased out. The financial result of these retrenchments has been that the net expenditure of the department is now slightly over six lakhs having thus reached the lowest figure since 1927-28, when it was in the neighbourhood of 10 lakhs.

Government, however, notes with satisfaction that this retrenchment has not had any immediate adverse effect on the main activities of the department such as the production and distribution of improved seed or the

number of practical demonstrations carried out by the district staff. The total number of private seed farms increased during the period under review by over 2,000 and the approximate area sown with improved seed obtained from various sources was approximately 16 lakhs of acres. The increased outturn resulting from the improved seed even with the present prices comes to about 68 lakhs, which shows that the money spent by the tax-payers on the department brings a substantial return despite the prevailing low prices.

2. Government notes with pleasure that the Agricultural College has once again settled down to steady work and it is a matter for satisfaction that the Inspectors, one of whom was the Principal of the Agricultural College, Cawnpore, pronounced the general tone of discipline in the College to be excellent at their quinquennial inspection carried out on behalf of the University of Nagpur. In this connection Government notes with regret the departure of Mr. Allan who was the principal of the college since 1907, except for two periods, to take up his duties in another province. During his time the college rose from an agricultural school to its present status of a constituent college of the Nagpur University, and Government desires to acknowledge Mr. Allan's devotion to the welfare of the college and his insistence on a high standard of efficiency. There is a fall in the number of applications for admission to the college, 75 in 1932-33 as against 132 in 1930-31, which is probably due to restricted prospects of employment in Government service. Annual visits to selected farms in the province continue to be a commendable feature of the training imparted in the college.

3. Government has read with interest the progress made by the Powarkheda Agricultural Anglo-Vernacular Middle School, and is glad to learn that it is attracting the sons of malguzars and cultivators. It is likely that the number of applicants seeking admission may be affected by the present wave of depression, although during the period under review the number of boys on the roll has not undergone any change. In these circumstances the school authorities have taken a step in the right direction in reducing the messing charges and thus lowering the cost of training in the institution.

Government has learnt with interest that efforts are being made to impart training in dairy farming and gardening to persons belonging to classes which make their living by these occupations. Government, however, trusts that it will be realized sufficiently that the aim of agricultural training is to impart technical knowledge useful for agricultural and allied professions and not to secure Government service for those who receive such training. With the curtailment in expenditure which the department is compelled to effect, the prospects of employment in Government service are bound to diminish appreciably in the near future.

4. Government is again glad to record its indebtedness to the Indian Central Cotton Committee for its continued support of the work of cotton improvement. Substantial grants amounting to a total of Rs. 56,325 were received from the committee to maintain the botanical scheme which deals with the fundamental aspects of the cotton improvement such as length of lint, yield, wilt resistance, etc. The experiments on the different strains of cotton are still progressing and it is hoped that they will result in the discovery of a strain which will satisfy all the commercial and agricultural requirements. Although the cotton season of 1931-32 was distinctly unfavourable to cotton and the experience of *verum* growers was not satisfactory, it is noteworthy that the area under that variety showed an increase. The demand for *verum* seed has remained unaffected, mainly on account of the organization for the sale of cotton which the department has operated during recent years and the high price for which graded *verum* lint could be sold as compared with local varieties. The assistance rendered by the Indian Central Cotton Committee has made it possible to maintain an additional temporary staff to ensure the purity of the growing crop, to assist in marketing operations and to arrange for seed distribution in the following season. The pooling scheme unfortunately dealt with a far smaller number of cotton bales than was expected in both the years under review. Thus in 1931-32 only 2,250 bales were dealt with under the scheme and in 1932-33 3,971. This shortage is due to various factors among which may be mentioned the low outturns of cotton per acre, the impossibility of keeping the full area under the variety pure and the

temptation to sell in the open market when the prices were high.

Government notes that certain modifications have been introduced in the scheme as a result of past experience which it is hoped will add to its success in future. Government however hopes that the co-operative associations which are really the best agencies for dealing with this kind of work will take their share in shouldering the responsibilities associated with these sales.

5. Government is also glad to note that a scheme financed by the Imperial Council of Agricultural Research for the improvement of rice has been inaugurated and desires to acknowledge the assistance which is thus being given to raise the standard of cultivation of this important crop. The scheme is to extend over 5 years and involves a total expenditure of approximately one lakh of rupees. It is satisfactory that a certain amount of useful work has already been done in this direction which can be continued on more intensive lines in future.

6. Propaganda work was carried out on the usual lines in the districts but the prevailing conditions make the agriculturists somewhat reluctant to undertake additional capital expenditure. As a consequence there was in general a reduced demand for implements in 1931-32 but the sales have appreciably improved during the year 1932-33. Similarly the demand for breeding bulls has fallen on account of the prevailing financial depression and the cattle breeding farms, though working satisfactorily, must wait for a return of better times before their work can be expanded appreciably. It appears to Government that efforts must be made to find out new avenues in agricultural practice whereby the income of the agriculturists can be increased, and Government has noted with interest the growing popularity of garden crops in the Chhattisgarh Division.

7. Government regrets that since the establishment of the department on the present lines about the year 1905, the time has now come when a number of senior officers, among whom is the Director of Agriculture

himself, will be retiring and the services of a number of men of long experience will be lost in the near future. It is, however, satisfactory to find that an increasing number of Indian officers with adequate experience and training is becoming available. Mr. Plymen has been holding charge of the office of the Director of Agriculture since 1920, and during his time the department has increased its activities in several directions. It has been organized and developed on sound lines and the popularity of the department is in no small measure due to his personal qualities. Government's thanks are due to him for the successful administration of the department not only during the years under review, but throughout the time he has held charge of it.

ORDER.—Ordered that a copy of this Resolution, together with the enclosure, be submitted to the Government of India in the Department of Education, Health and Lands (Agriculture), that copies be forwarded to the Director of Agriculture and to all Commissioners of Divisions and Deputy Commissioners for information and guidance; and that it be published in Part I of the *Central Provinces Gazette*.

By order of the Government
(Ministry of Agriculture),

Y. N. SUKTHANKAR,
*Revenue Secretary to Government,
Central Provinces.*

No. C-102

FROM

F. J. PLYMEN, ESQ., C.I.E., I.A.S.,
DIRECTOR OF AGRICULTURE,
Central Provinces,

TO

THE REVENUE SECRETARY TO
GOVERNMENT,
Central Provinces.

Pachmarhi, the 30th May 1933.

SIR,

I have the honour to submit, herewith, the report on the working of the Department of Agriculture, Central Provinces, for the year ending 31st March 1932.

I have the honour to be,

SIR,

Your most obedient servant.

F. J. PLYMEN,
Director of Agriculture,
Central Provinces.

REPORT ON THE WORKING OF THE DEPARTMENT
OF AGRICULTURE, CENTRAL PROVINCES,
FOR THE YEAR ENDING 31st MARCH 1932

PART I.—ADMINISTRATION

I held charge of the department throughout the year.

2. The expenditure during the financial year 1931-32 was Rs. 10,19,815, which included Rs. 74,384 on account of expenditure on botanical and other public gardens and Rs. 36,597 on account of expenditure on cotton work. The receipts amounted to Rs. 2,84,791.

The net expenditure on agriculture including expenditure on cotton work thus amounted to Rs. 7,35,024. The figure for departmental expenditure shows a decrease of over one lakh as compared with that of the previous year, this result being obtained by the exercise of rigid economy. On the other hand there was a fall in receipts of Rs. 70,000 which was largely due to the general depreciation in the value of agricultural commodities so that the net decrease in expenditure amounted to roughly Rs. 40,000 only.

3. During the course of the year the activities of the department came under review by the Financial (Retrenchment) Committee and the report issued by that committee contained a number of recommendations for reducing the strength and expenditure of the department. The orders of Government on these recommendations were issued in December 1931 and as a result the following changes were effected :—

- (a) The new Deputy Director of Agriculture's circle which had been created in the previous year with headquarters at Hoshangabad was abolished and the number of such circles reduced from five to four with effect from the 1st March 1932.
- (b) The post of Deputy Director of Agriculture, Economics and Marketing, which was created in the previous year and the post of Deputy Director of Agriculture for Animal Husbandry were held in abeyance. In the case of the former post, action was taken as soon as commitments for the disposal of the cotton crop had been fulfilled. The two vacancies in

the superior service thus created were in addition to the reduction effected during the previous year by keeping in abeyance the post of Second Economic Botanist and that of Assistant Director of Agriculture attached to the office of the Director.

- (c) The cadre of Extra-Assistant Directors of Agriculture was ordered to be reduced from 17 to 13. This was effected by abolishing one post on the field staff and another on the College and Research staff, while a second post on the latter was kept unfilled. The fourth post of Extra-Assistant Director of Agriculture will come under reduction in the near future on the retirement of a senior officer.
- (d) The number of agricultural assistants on the field staff was reduced by 13, *i.e.*, by 10 per cent.
- (e) The experimental farms at Tharsa and the seed and demonstration farms at Basim, Damoh, Sindewahi and Narsinghpur were ordered to be leased out. Arrangements for leasing out the first four were accordingly made while the Narsinghpur farm has been handed over to the Jail Department. In the case of the Tharsa and Sindewahi farms private tenants were secured at annual rents of Rs. 1,300 and Rs. 1,050, respectively. The Basim farm has been leased for two years to a local agricultural association at an annual rent of Rs. 1,200, while the Damoh farm has been leased to a number of tenants on the *batai* system.
- (f) The gardens at Chanda, Balaghat, Damoh and Hoshangabad have been leased out, while that at Chhindwara is in process of being handed over to the Jail Department. The management of the Narsinghpur garden has been transferred to the Revenue Department.
- (g) Although the step was not specifically recommended by the Financial (Retrenchment) Committee, as a further measure of economy the post of Agricultural Engineer was abolished with effect from December 1st, and pending the transfer of the section to the control of the Principal of the Agricultural College, which took place at the end of the year, the Director held charge of it personally.

The final result of these various steps for retrenchment is that the budget estimate of the department for the current year as passed in March 1933 was nearly Rs. 2½ lakhs below the corresponding figure of the previous year.

PART II.—AGRICULTURAL EDUCATION

4. The Agricultural College consisted of only three classes from June 1931 because, as a result of closing the college in August 1930, there were no students passing on into their fourth year. The students of the previous fourth year class all completed their course successfully since, as explained in the report for the previous year, arrangements had been made to continue their work from October 1930 until the end of the session and no student had to repeat his final year. The second and third year classes were readmitted to resume their interrupted studies, and all but 11 out of the 68 students previously constituting these classes joined the college again. For the first year class there were 84 candidates for admission, 54 were enrolled against 132 in the previous year; of these, including 21 students who had joined the same class in the previous session. The fall in applications was probably due to restricted prospects of employment in Government service, the aspect of the college as a technical institution affording a training in a profession being imperfectly realized.

The total number of students attending the college during the session was as follows, the figures being as at the end of July by which time the classes in normal times have settled down:—

3rd year	...	...	29
2nd year	...	...	29
1st year	...	...	48

The third year class will only appear for their final qualifying examination for the degree of B. Ag. in March 1933. The second year class, with the exception of two students not considered qualified, appeared for the University Intermediate examination in Agriculture. Judged by the small number of failures the results were not unsatisfactory, but a review of the classes obtained by the candidates indicates that the year contained no student of outstanding ability. The subject-group which proved to be the greatest stumbling block was Mathematics and

Survey. The students of the third year class were given the usual examination for promotion and all except four were successful. These are to be given a further chance to qualify before the new session opens, and the next fourth year class will therefore be a fairly large one of at least 24 students. The promotion examination held at the end of the first year indicated that 11 students out of the 44 appearing for examinations could not be considered qualified to continue the course. They will be allowed to repeat the work of the first year if they so desire, but seven of them have been strongly advised to choose some other career.

5. With regard to the general organization of the Agricultural College the most notable feature was the departure of the Principal, Mr. Allan, just before the close of the year under review. Mr. Allan took up the duties of Principal on joining the Indian Agricultural Service in November 1907 and except for two periods when he officiated as Director of Agriculture he has held the same post during the whole of his service. He has seen the institution of which he has held charge rise in status from little more than that of an agricultural school to a constituent college of the Nagpur University. Mr. Allan's devotion to the welfare of the college and his insistence on a high standard of efficiency in practical work will long be remembered. Another change in the staff of the college was the appointment of Mr. (now Rai Sahib) G. R. Dutt, an officer of long experience in the Entomological Department of the Agricultural Research Institute, Pusa, as head of the Entomological Section of the college in a Provincial Agricultural Service, Class II, post. Towards the end of the year it was decided that the duties of the post of lecturer in English could be taken over by the staff of the Science College and as a measure of economy this post was retrenched.

Some changes have also taken place in the management of the college hostel, the former Assistant Superintendent taking over the duties of Superintendent from an officer of the Provincial Agricultural Service, Class II, who had held the post for a considerable time. Another fairly junior officer was appointed as Assistant Superintendent. The health of the students was very satisfactory throughout the year, but it would be a great advantage if the municipal sewage depôt situated in close proximity to the hostel could be moved.

An examination of the areas from which the students of the college are drawn reveals the following figures :—

North C. P.	South and East C. P.	Nagpur-Wardha.	Berar.	Central India.	Elsewhere.	Total
37	6	13	18	4	23	101

The occupation of the parents of the students is given as follows :—

Agriculture 47, Government service 33, private service 14, profession 7.

The system of agriculture followed on the college farm cannot include practices in vogue in all parts of the province, but the training of the students was widened by visits to farms at Jubbulpore, Hoshangabad and Sindewahi where, amongst other things, students were given the opportunity of seeing the working of a military farm, potato growing, the manufacture of sugar and power cultivation.

6. The Powarkhera Agricultural Anglo-Vernacular Middle School started the session with 59 boys in the three senior classes. Subsequently 24 boys out of 34 applicants were admitted into the most junior class but as a few left during the year the total number of boys on the roll at the end of the session was 81. Of these, 25 were the sons of malguzars and 56 the sons of cultivators. It is to be feared that the present wave of agricultural depression is likely to affect the numbers seeking admission to the school. Meanwhile efforts are being made to bring the cost of messing down to as low a limit as possible consistent with the provision of good food. The messing charge per month is however in the neighbourhood of Rs. 4 and this, coupled with the expenses of getting the boys to and from the school each term, is undoubtedly affecting the admissions. Classified by castes it is seen that out of the total of 81 boys, 37 are Brahmins, 12 Rajputs, 8 Kurmis and 2 Mohammadans, the other castes together contributing 22. The Hoshangabad district still supplies about 90 per cent of the boys attending the school. The area of $16\frac{1}{2}$ acres used for instruction in practical agriculture and cultivation by the boys themselves yielded crops to the total value of about Rs. 330. The main sources of income were vegetables, sugarcane, oranges and wheat, the cotton crop having been almost a failure

on account of the unfavourable season. The benefits of mixed cropping and the importance of supplementing the staple field crops by even a small area under irrigated garden crops were thus demonstrated in a very practical manner.

The total expenditure on the school amounted to Rs. 7,987, a decrease of about Rs. 1,000 in comparison with the corresponding figure of last year. The receipts were Rs. 2,680, excluding the arrears recovered, so that the net cost of the school was Rs. 5,307, which divided over 81 boys gave an annual cost of about Rs. 65 per head, a reduction of Rs. 5 per head in comparison with the figures of the previous years. The examination results were satisfactory, 17 out of 23 candidates being successful in the high school entrance examination.

PART III.—RESEARCH AND EXPERIMENTAL WORK

7. Cotton.—Research work on this crop continues to receive substantial support from the Indian Central Cotton Committee, and during the year under review the sum of Rs. 32,524 was received from that committee for the maintenance of the Economic Botanist for cotton and his staff of six assistants. The programme followed by the section deals with problems of length of lint, yield, wilt resistance and the place of cotton in a general rotation with other suitable crops. The scheme of work which has been approved by the Indian Central Cotton Committee has been in progress for nine years and has still one year to run. The fundamental work of selecting and testing numerous strains of different varieties of cotton obtained by hybridization or selection has involved the growing at Nagpur of more than 2,500 single line cultures, all self-fertilized, these individual growths having to undergo further examination for such properties as length of staple, high ginning percentage, early or late maturity, freedom from bud or boll shedding, high yielding capacity, etc., the most promising strains being selected for further trial and propagation in the following season. The succeeding phase of the work is the trial of selected strains on cultivators' land or Government farms away from Nagpur, to test their response to wider variations in soil, climate, incidence of wilt attack, etc.

During the year under review two new strains have been developed after trials on a field scale as they show promise of being excellent cottons. One of these, at present known as No. 438, has a uniform staple of one

inch, gives a fairly good yield compared with *verum* 262, is early in coming into flower and highly resistant to wilt. Grown at a number of places from Mehkar to Chhindwara it has been well reported on but the past season was too abnormal for any definite conclusion to be drawn regarding its cropping powers. The other strain of promise was mentioned in last year's report and is a *bani* (*Gossypium indicum*) known as E. B. 31. The results obtained in a spinning test carried out by the Director of the Technological Institute, Bombay, during the past year were very satisfactory. Possessed of a fine long silky staple, suitable for the highest standard warp counts of 41's, it is yet under good cultivation capable of yielding 600—800 lbs. of *kapas* per acre. It can thus be placed with another good strain of *bani*, known as *bani* 300, as likely to be suited to the Hinganghat tract as well as to Hoshangabad, Harda and Nimar, where conditions differing from those of the Berar cotton tract prevail. The experience of growers of *verum* cotton during the past season was not very satisfactory. In the year 1930-31 the area sown was 157,000 acres and in the year under review it was 164,400 acres, an increase of about 7,400 acres, which indicates that the variety had achieved a certain measure of popularity. The 1931-32 season was however particularly unfavourable for cotton. Excessive and prolonged rainfall during the months of August and September resulted in the neglect of weeding operations and intercultivation. Even then, however, a moderate crop was anticipated, and on the Akola farm a yield of 400—500 lbs. per acre was estimated. Late rains continuing up to the middle of October caused a heavy loss through boll shedding and any hopes of a normal crop fell. A break in the weather of about three weeks encouraged the optimistic outlook that possibly, after all, the late rains might induce late flowering and a correspondingly delayed crop of bolls but further heavy rains again caused further shedding of buds and bolls. The final result can be judged fairly accurately by a consideration of the figures of carts of *kapas* coming into the markets from the beginning of September 1931 up to the end of May 1932. The season was undoubtedly an unfavourable one for cotton growers and *verum* 262, being a higher quality cotton than that generally grown and probably more delicate, suffered considerably. Even on the Akola farm its yield was only about 150 lbs. per acre or one-quarter of the crop gathered in the previous year. In

a season when the rainfall was so abnormal the merits of the early and late strains of *verum* could not be adequately tested as the former is particularly intended for areas where there is usually a shortage in soil moisture towards the end of the monsoon and also when frost is likely to occur in December and January, while the latter, with its delayed maturity, is expected to escape damage caused by the extension of the rainy season beyond September. It could not, however, be expected to withstand the unusual and unexpected rain experienced in October and November 1931.

Further study of the root systems of *verum*, *roseum* and *bani* cottons has confirmed the conclusions reached in the previous year that *roseum* possesses a more widely developed root system than *verum* and this explains to some extent its greater hardiness. The work of hybridization to produce new strains has been continued and amongst the promising strains produced is one obtained by crossing a *bani* cotton with *verum*. The result is a cotton highly resistant to wilt with a fine silky staple of satisfactory length and a ginning percentage of 30 to 34. Its future behaviour under field conditions will be watched with interest. One of the important duties of the botanical staff is the maintenance of a supply of pure seed of standard varieties of cotton. This is achieved by self-fertilizing sufficient seed to sow the whole cotton area on the Akola farm and part of the Nagpur farm. The crop produced from selfed seed provides the necessary seed of high quality for distribution to other Government farms and a certain number of private growers known collectively as "A" class farmers. From the latter, seed goes to "B" and "C" class growers who attain a somewhat lower degree of purity in the seed they produce.

The improved strains of Chanda *jari* cotton, a form of *bani* grown as a *rabi* crop in one small tract of the province, have now been multiplied for distribution and sufficient seed for about 10 acres is available for the 1932-33 season. When this stage has been reached the further multiplication of a stock of seed can proceed rapidly.

Notwithstanding the poor acreage outturn of *verum* 262 obtained during the past season the average rate at which it was sold was Rs. 269-2-0 per *khandi* on a F. O. R. Bombay basis, or a premium of about Rs. 60 over Broach which, during the period 15th November 1931 to 31st March 1932, sold at an average price of Rs. 209-6-0.

Another interesting feature of the season's transactions was that practically the whole of the crop of *verum* was taken up by local mills with the exception of a small quantity bought up and exported by traders outside the province. The amount of *verum* seed distributed for sowing in the 1931-32 season was 6,549 *khandis* or something like 5 million pounds. Evidently the seed was in considerable demand and this was particularly the case in tracts where wilt is prevalent; for the fact must not be overlooked that it was as a wilt-resistant cotton that *verum* was first placed at the disposal of growers. Unfortunately the unfavourable season has reduced the available supply of seed to a figure much below that anticipated and the department has now to endeavour to re-establish a large stock of reliable seed.

The study of the seedling blight of cotton caused by *Rhizoctonia bataticola* was continued by the Mycological section and it was again found that infection was less where germination had been normal and greater when the seedlings were late in appearing above the soil surface. The disease was also far more prevalent in fields in which cotton was sown early and without sufficient soil moisture to ensure rapid germination than in those fields where the water content of the soil was satisfactory.

Another disease which was responsible for much damage to the cotton plant during the past year was *Anthracnose* which affected bolls, lint and seed. The incidence of the disease was heaviest on the early bolls and on the lint and seed of the first picking. The result of infection is the drying up of young bolls or premature bursting with discoloration of lint or general malformation of the boll and whole or partial discoloration. The usually heavy loss of bolls and lint caused by this disease in the past year is attributed to the excessive rainfall. Bolls which developed after the rains had ceased were only slightly affected. *Verum* 262 was found to be more susceptible to both seedling blight and *anthracnose* than *roscum*. No remedies for these two diseases can yet be suggested but investigations are in progress.

With a view to determining the extent of the damage done to the cotton crop by insect pests, the Entomologist visited the Akola farm in October and found that although the crop had undoubtedly suffered heavily, the primary cause was the prevalence of adverse climatic conditions, pink boll worm, spotted boll worm and the gram caterpillar had however done or were doing a certain amount

of damage. As the pink boll worm threatens to be a serious menace to the cotton crop and as the insect is carried on from one season to another through infected seed, a popular leaflet has been published in English, Marathi and Hindi giving information on the life history and habits of the pest and a simple method of destroying by sun heat larvae resting in the seed.

8. **Wheat.**—The hybrids and selections obtained in previous years have been subjected to a further rigid comparative test with the standard wheats of the Jubbulpore and Hoshangabad tracts. This was done by sowing the new strain in lines, the standard variety being introduced after every group of ten lines. Only such new strains as promise to give definitely better yields than existing standard varieties have been retained for trial on a larger scale next season. The hybrids under observation were produced three years ago, the object being to combine rust resistance with high yield, but it takes a succession of seasons to fix the desired characteristics. Another type of wheat under observation is early maturing and possesses awns. This is being grown on the Nagpur farm as it is likely to be more suited for the southern part of the province.

An interesting confirmation that a heavy incidence of foot rot in wheat is due to too high a temperature at sowing time was obtained last season. The prolonged rainy season was followed by a sudden drop in air temperature at the time of *rabi* sowings and the attack of foot rot on wheat was practically negligible.

9. **Rice.**—The main objects in view in the work of rice improvement were detailed in last year's report and it is unnecessary to repeat them. The hybrids which have been produced by crossing well established local varieties have now been fixed and the following figures indicate that they are better yielders than either of the parents. In addition they possess the advantage of being easily distinguishable from the wild rices and thereby enable the latter to be removed from the rice fields as undesirable weeds. The figures below were obtained during the season 1931-32 on the Government farm, Raipur :—

	Average yield per acre.	
Bhondu × Parewa	...	2,800 lbs.
Bhondu × Gurmata	...	2,980 „

A difficult task has been attempted and some success has been achieved in crossing the two standard varieties *luchai* and *bhondu*. The object of this work was to

combine the strength of straw of the former variety with the high yielding capacity of the latter, the main defect of *bhundu* being its tendency to fall down or lodge in the fields as it approaches maturity. The technical difficulties inherent in the work were due to the fact that these two rices differ considerably in their flowering seasons, the flowers of *bhundu* being practically over before those of *luchai* open. It remains for further trials to show whether the object in view has been achieved and whether as a result a rice acceptable to the cultivator will be available for distribution.

The heavy-yielding strains of standard varieties produced in the Botanical section have now reached the stage when, having been grown on a field scale in co-operation with the Deputy Director of Agriculture, Eastern Circle, they are available for distribution to rice growers and meet the demand for improved seed.

The Agricultural Chemist's section has published the results of a study of some factors controlling the growth of rice in heavy soils, the main point under consideration being the delay which occurs in reaching a normal level of productivity when a heavy soil formerly growing a *rabi* crop without irrigation is brought under rice. The results obtained indicate that when this change in cropping takes place there is a decrease in the lime content of the soil with a corresponding change in the reaction of the soil and that the rice plant prefers a slightly acidic or neutral medium to an alkaline one. These factors in conjunction with green manure and a dressing of sulphur, superphosphate or both gives an increased outturn.

10. Millets.—It is not possible to record any striking development in the work on *juar* (*Andropogon sorghum*) and *bajra* (*Pennisetum typhoidem*) as both crops are of a class in which it is somewhat difficult to effect improvement. A large number of pure strains of *juar* have been maintained and selection work has, as its main object, the production of large sized cobs giving a high acreage yield. Two selections have given satisfactory results and will be tried on a wider scale in comparison with existing varieties in the coming season. *Bajra* proves to be a difficult crop to obtain in a pure state by self-fertilization and the more promising method of dealing with it is bulk selection, by which means a number of useful types have been obtained, but the crop is not of sufficient importance to warrant more than a small amount of attention being given to it.

The relative merits of copper carbonate and sulphur as remedies for smut in *juar* were again compared but although they both proved decidedly effective, neither at present can be said to show any great advantage over the other. Probably owing to the excessive rainfall *striga* was less in evidence in *juar* fields than in the previous year. The relative susceptibility of a number of varieties was again compared and various grades of resistance to *striga* recorded. Unfortunately the varieties least subject to attack by this parasite are not always those preferred for human consumption. An interesting observation has been made that all strains of *striga* have not the same virulence and further that some *juars* although badly infected, suffer less in vitality of the plant from the attack of the parasite.

11. Oilseeds.—*Til* (*Sessamum indicum*).—Work on the improvement of this crop has been continued, the main object being to evolve a high yielding variety and in addition, fundamental studies such as the inheritance of characters in natural crosses and the systematic classification of types have been made. There is a very wide variation in the cropping powers of the many strains of *til* grown in the provinces and a collection of specimens which was made as a preliminary to fundamental work revealed that out of the 420 samples to be dealt with, some were distinctly promising.

Linseed.—The hybrids which have been obtained between local linseed and rust resistant strains from Pusa or Irish flax are passing through successive generations leading to their fixation, some of the strains having in fact been already fixed. It is hoped that before long the department will have a rust-resistant linseed to offer for distribution, but the seed produced has still to be multiplied and tested for yield and rust resistance on a field scale. Further crosses are being made with Russian flax which, although very late for growing in this province, is rust resistant and thereby merits a trial as a parent in hybridization work. The investigations on the root system of the linseed plant has yielded interesting results and shown the existence of two types of root development, deep and shallow, each having two forms of lateral roots.

12. Other crops.—*Pulses*. *Gram* (*Cicer arietum*).—Continuous selection of promising strains is being made now that the isolation of unit species, obtained by growing 520 pure line cultures, is nearly complete. Some four

fresh selections appear to be promising and sufficient seed for trial on a field scale will shortly be available. A hybrid has been produced between the wilt-resistant Cawnpore *gram* and the best local selection No. 28 which, after repeated trials, continues to give the highest yield.

In many parts of the province the formation of pods on the *gram* plant is defective and it is proposed to undertake a study of the root system of *gram* to discover, if possible, the reason for this defect.

Following on the completion of the study of the inheritance of important characters in *tur* (*Cajanus indicus*) and the classification of different types, the work of evolving wilt-resistant strains has been continued. This has been done by the Botanical staff and the Mycologist working in collaboration. A series of 72 pure cultures of *tur* were grown in a field on the Nagpur farm which had deliberately been inoculated with the wilt-producing organism. The incidence of wilt attack varied from 3 to 94 per cent and any *tur* showing an incidence of over 25 per cent was rejected, the remainder being kept for further test. Attention has also been paid to the multiplication and distribution of *tur* No. 3 which has proved in the past to be a satisfactory strain.

Fodders.—The experiment started at the Telinkheri farm to investigate some of the problems concerning the nutritive value of pasture grasses has completed its first year. This work is of importance in view of the world-wide attention now being paid to grazing problems and the more efficient utilization of pastures, the fact being sometimes overlooked that grass is, after all, one of the world's most important crops. The experiment had been laid out according to modern methods, the Latin square design being adopted and the plots are quadruplicated. Two types of herbage have been selected, one the normal pasture of the locality containing chiefly *Andropogon pumilus* and the other an area seeded with better strains of grass such as *Ischaemum sulcatum* and *Ischaemum laxum*. The results so far obtained indicate the outturn of dry grass per acre to be 50 per cent greater with the seeded area than with the local pasture. On the other hand the proportion of minerals in a local pasture proved to be somewhat higher, although in view of the lower yield it is probable that the actual amount of calcium and phosphoric acid removed from the soil will be more or less the same in both areas.

Assistance was given to the Forest Department in laying out a series of experiments to determine the yield of forest grazing areas and the influence of opening and closing to grazing on the total quantity of grass produced.

Garden crops.—A certain amount of damage by insect pests to fruit trees came under observation and in most cases suitable remedies could be suggested. One interesting case was that of black ants attacking date palms on which a sticky band encircling the tree was fastened. This completely prevented the ants from swarming up the tree and is similar to methods used in other countries to prevent injurious insects crawling up the stems of fruit trees. One problem on which some experimental work has been done but which still awaits solution is that of fruit sucking moths which do a considerable amount of damage to oranges. With a view to securing cheap and easily obtainable remedies against insect attack the Entomologist is experimenting upon the insecticidal value of indigenous plants. The fruit of *Sapindus mitorossi* (soap nut) when powdered and dissolved in water has been found, for example, to give a good spraying fluid for use against soft bodied insects and further work in this direction is being continued.

PART IV.—AGRICULTURAL ENGINEERING

13. The retrenchment effected in this section has already been mentioned.

It was decided that the Engineering section should be placed under the control of the Principal of the Agricultural College, an arrangement which it was considered would eventually lead to more effective co-ordination between the general activities of the section and the instruction given in engineering in the College. This scheme was put into effect from the end of the year. Further economies were also effected by reducing the workshop staff and in future the section will no longer exist as a separate unit but will be maintained on a considerably reduced scale. The workshop is now fairly well equipped with a small but useful collection of machinery and can do the ordinary constructional and repair work it is expected to undertake.

The main services rendered to the agricultural community in the past year has been the erection of *rahat* water lifts, an implement found to work effectively to a depth of 30 to 35 feet. Twenty-four of these have been

erected by the staff of the section during the past year, of which 18 are in the Nagpur district. The prevailing agricultural conditions have not been such as to induce agriculturists to instal plant worked by power and only four sets of this type of equipment were erected during the year.

The usual oil engine and tractor training class was held and was attended by 16 boys sent by malguzars and cultivators and 10 students of the Agricultural College whose regular studies had been interrupted.

PART V.—ANIMAL HUSBANDRY INCLUDING CATTLE-BREEDING AND DAIRY FARMS

14. The general policy of the Animal Husbandry section of the department's activities has been described fully in previous reports and there is no necessity to state it again. That all efforts towards cattle improvement must necessarily be slow is clear from the fact that only one new generation of animals is produced each year. Of the five cattle farms controlled by this section three are now in a position to supply bulls. The value of a good bull in improving the quality of a herd is well known and appreciated, but the present low prices for agricultural produce has not left much money available in the hands of prospective buyers for the purchase of bulls. The difficulty has however been partly met by granting *taccavi* loans and by the premium bull system but the prevailing condition of the agricultural community as regards ready cash was reflected in the annual sales of bulls where the competition was less keen than usual. The average price obtained for 20 bulls sold from the *Gaolao* herd at Garhi was Rs. 236 and for the four *Hansi-Hissar* bulls from Ellichpur was Rs. 187-8-0. The corresponding figure for the Garhi herd in the previous year was Rs. 234 but over the past few years it was Rs. 300. Ten years ago the average price secured was Rs. 156 which indicates some improvement. The Ellichpur farm has only just started to produce bulls of breeding age but as the herd becomes more widely known and if agricultural conditions improve, the demand will doubtless increase. The Montgomery bulls bred at the Telinkheri farm are not meeting with a very ready sale at present but it is a breed particularly intended to improve the milk supply of urban areas and it is somewhat difficult to get

members of the *Gaoli* community, who largely control this trade, to realize the importance of keeping good bulls of a recognized milking strain. The more recently established farms at Pendra and Bod have not yet commenced the distribution of animals bred at these farms, but it is expected this will be done in the coming year.

The Telinkheri dairy farm had a successful year and finished with a credit balance of Rs. 5,383 in comparison with a debit balance of Rs. 4,191 for the previous year. The supply of milk has been made more regular over the year by regulating the calving of cows and buffaloes so that milk is produced at a time when it is usually scarce in Nagpur. In addition, the area served by the farm and the Byramji dairy run in conjunction with it has been considerably extended and the milk depôt opened as an experimental measure in Nagpur city in the year 1930-31 has served the purpose for which it is intended very well. The satisfactory results obtained by the Telinkheri dairy farm can be attributed to reducing expenditure to a minimum, better organization, increased productivity of the herd and, as a consequence, the enlargement of the area served.

A new series of experiments has been planned to compare the effects of feeding silage made from green grass and ordinary hay on the quality and quantity of milk produced. Another new line of work which has been taken up is the possibility of establishing controlled breeding areas. Draft rules and regulations for such a scheme have been drawn up and if a suitable response is met with, it may be feasible to inaugurate the scheme in the near future. Numerous enquiries on cattle breeding and dairying were received by the Animal Husbandry section and it is clear that the subject is one of increasing interest to the agricultural public. The *Gaolao* bulls introduced into the Chhindwara tahsil a few years ago as a part of the village uplift scheme are reported to have convinced the people that the keeping of pure bred bulls does result in the improvement of the village herds. There is however a big demand for good milch cows and buffaloes which cannot be met from the few herds maintained by Government and there are obviously considerable possibilities for such work to be taken up by *Gaolis* and other milk producers once their interest can be aroused and they can be made to realize the need to keep fewer but better cows. It is hoped in the near future to undertake definite propaganda work to this end. The

total number of cattle sold from Government farms during the year under review was 187, *vide* Appendix A to this report. The corresponding number in the previous year was 126. The difference is largely due to the reduction in the herd kept at the College farm by selling off excess cows, she-buffaloes and young stock.

The financial working of the Garhi farm also improved considerably during the past year, the deficit of Rs. 3,797 shown in 1930-31 being reduced to Rs. 582 only. With a further increase in the output of bulls the position should be still more satisfactory. In the case of the Malvi herd at the Powarkhera farm also, the financial position of the farm showed a distinct improvement over the previous year, the expenditure being reduced by Rs. 1,400 while the receipts showed an increase of Rs. 850. The demand for bulls was more satisfactory also and nine were sold at an average price of Rs. 155. This was somewhat lower than the price obtained in previous years but the prevailing agricultural conditions made some adjustment of the price necessary. The health of the herd was good and the beneficial effects produced by feeding mineral substances on the condition of the animals were recorded.

PART VI.—ECONOMICS AND MARKETING

15. The main functions of the section were in connection with the extension scheme for *verum* cotton and included seed distribution, the provision of an adequate supply of pure seed to meet future requirements and marketing operations. The actual arrangements for the distribution of seed were in the hands of the Deputy Directors of the cotton-growing circles. As a result of the previous year's marketing operations a large quantity of seed had been concentrated at seed depôts, co-operative seed stores, ginning centres, etc., classified, on the basis of purity, into three grades. Only the two higher grades were acceptable for sowing purposes and this seed met with a heavy demand in spite of the fact that *verum* had not passed through the ordeal of the previous year's adverse climatic conditions any too satisfactorily. During the hot weather months of 1931 the district staff in conjunction with some agricultural associations distributed 4,690 *khandis* of seed, while in addition 1,859 *khandis* of reasonably pure seed were distributed extra-departmentally, the total being sufficient to sow over 2½

lakhs of acres. The following figures show the rapidity with which *verum* has spread during the past five years :—

Year.	Amount of seed distributed (in khandis of 784 lbs)	
1927-28	...	9½
1928-29	...	51
1929-30	...	537
1930-31	...	3,750
1931-32	...	6,549

To exercise departmental supervision over an area of 2½ lakhs of acres was obviously impossible and it was therefore a minimum area of 50,000 acres under a pure crop that was adopted as the objective. This area, given a normal year, was expected to produce 10,000 bales of lint and seed sufficient for 5 lakhs of acres in the year 1932-33. To supplement the departmental staff 10 agricultural assistants with peons and 50 jamadars were recruited temporarily from August 1st, the cost of this additional staff being met entirely by the Indian Central Cotton Committee. Each temporary agricultural assistant with the help of 5 jamadars was expected to supervise at least 5,000 acres of cotton, the work being under the guidance of the permanent staff. The duties of this staff in detail were—

- (a) to rogue the growing crop and thus ensure its purity ;
- (b) to assist in subsequent marketing operations, and
- (c) to arrange for seed distribution in the following season.

An interesting innovation was made in the scheme as worked during the year under report by the award of a bonus to encourage growers to keep their crops absolutely pure. As originally framed, the scheme involved the offer of competitive prizes in each taluq but heavy and continuous rains rendered roguing operations too difficult. With the prospect of only a short crop it was decided to reward every grower who brought his crop to maturity rather than give him a possible chance of securing a prize. Funds for this new development were also provided by the Indian Central Cotton Committee and the sum of Rs. 3,478 originally intended for prizes was distributed at the rate of Rs. 3-4-0 per *khandi* to all growers who contributed *kapas* of the first grade of purity into the departmental pool. It is hoped that this scheme will be maintained for a few years longer as it

affords a tangible means of bringing home to growers the advantage of growing a pure crop.

To carry on the ensuing marketing operations a temporary staff of accountants and inspectors and an office staff for the marketing officer at headquarters were provided by the Indian Central Cotton Committee on lines similar to those followed in the previous year but seasonal conditions proved an important factor in the working of the scheme. In view of the extreme probability that the crop would be light, many growers were averse to roughing out foreign plants and thus destroying a part of any of the crop which might come to maturity.

The total cotton crop was forecasted at less than one-half the actual crop of the previous year and in that decrease *verum* took its full share. As the marketing season approached it became very clear that the organization would have to deal with considerably less than the originally estimated number of 10,000 bales. The temporary staff was therefore reduced and altogether about Rs. 20,000 were saved out of the sum of over Rs. 50,000 provided by the Indian Central Cotton Committee for the scheme as originally conceived.

In the light of the previous year's experience the marketing arrangements, which had not met with universal approval, were modified and the scheme adopted at a meeting of the representatives of *taluq* agricultural associations and the departmental staff was adopted. The main modifications were as follows:—

- (a) Each cotton pressing centre was constituted an independent selling unit instead of treating all the pressing centres of a district as one unit.
- (b) Marketable lots were sold as soon as collected and the proceeds distributed without waiting for the period covered by the pool to expire and all the cotton contributed to the pool to be sold.

The results of these changes were that the lots of cotton sold were uniform, there was no delay in remitting the proceeds and each centre received payment according to the merits of its own cotton.

Another innovation was the appointment of local committees consisting of two representative, of the co-operative associations, two growers not members of the associations and the agricultural assistant. The approval of the rates offered for the cotton was left to these bodies

instead of giving full discretion to the marketing officer as in the previous year. The local committees also had control of all matters regarding the ginning and pressing centres except the actual grading of the *kapas* which was left to the agricultural assistant. In addition, a central committee was formed to advise the marketing officer on general matters connected with cotton sales, insurance, etc. It consisted of one representative for Nimar, two for Berar and one for the Nagpur Division. It was decided that sales within the province would be effected departmentally but for outside sales four firms of brokers were employed. It eventually happened however that the services of brokers were not utilized, all the cotton being sold departmentally at rates which prevented brokers from competing.

In order to give *taluk* agricultural associations experience in enterprises of this kind, vigorous efforts were made to induce them to market the *verum* of their *taluks* independently and to finance the transactions, but eventually only two associations, *viz.*, those at Khamgaon and Jalgaon in the Buldana district, came forward to produce funds for advances to growers. These associations were given full control of operations and a share of the temporary staff employed. They were also in touch with brokers but ultimately sold practically the whole of their stocks through the agency of the department. A start has, however, been made in transferring co-operative cotton marketing to co-operative bodies and the example set by these two associations may well be followed by others in the future.

To finance the operations of the general pool the Central Provinces Government placed 2 lakhs of rupees at the disposal of the Director of Agriculture on terms similar to those of the previous year and the money was returned in full by the 31st March 1931. In the early stages of the operations, advances up to 75 per cent of the prevailing rate for *Oomras kapas* were made but the proportion was subsequently reduced to 66 per cent. The outstanding feature of the marketing season was the high rate ruling for *Oomras* cotton in up-country markets. In the previous season the difference between *Oomras* and Broach was from Rs. 30 to Rs. 35 in favour of the latter. With the moving of the new crop this disparity disappeared until by December 9th the Broach and *Oomras* contracts were equal and by January 15th *Oomras* was actually obtaining a premium of Rs. 21 over

Broach. The reason for this unusual state of affairs was the smallness of the *Oomras* crop and when this was fully realized there was a rush to purchase. Towards the end of January the price for *Oomras* became easier.

The high prices ruling for *Oomras* naturally affected the arrivals of *verum* into the pool and for a time it was doubtful if the pool would function at all but the sale of a few small lots at attractive prices eventually drew appreciable quantities into the pool. The total number of bales sold through the scheme was however only 2,255 instead of 10,000 as originally anticipated. This shortage was due to—

- (a) generally low outturn of cotton per acre,
- (b) the impossibility of keeping pure the full area of 50,000 acres of *verum* as contemplated when the scheme was prepared, and
- (c) the temptation to sell pure *verum* in the open market while high prices prevailed in the early days of the pool.

In his detailed report the officer who had charge of the marketing operations shows why it is necessary for purposes of comparison to give the prices at which the cotton was sold on a f. o. r. Bombay basis, although actually no cotton went to Bombay and the figures at which the cotton changed hands were not the f. o. r. Bombay prices. This basis has to be adopted to give a true comparison with the early quotations for Broach and *Oomras* contracts on the Bombay market. Taking the average for the season, the pool *verum* obtained a price equivalent to Rs. 269-12-0 per *khandi* f. o. r. Bombay equal to a premium of Rs. 59-12-0 over Broach and Rs. 63-9-0 over *Oomras* for the same period. The marketing experience which the department has gained indicates clearly that any organizations which undertakes these operations in future should aim at disposing of its entire stocks by the 15th February at the latest because until that date *verum* has very little cotton of the same class to compete with it. The scheme followed this year may also be claimed to be a success as sales were effected quickly and proceeds distributed promptly. The system of consulting local committees also worked well, although it had been necessary to work through brokers, the time necessarily absorbed in consultation might have been found a disadvantage. As all *verum* was sold locally it was possible to obtain an idea of the total amount of

verum produced in the province and this was in the neighbourhood of 21,600 bales by the end of April although not all of this could be classed as pure. The figure shows however the expansion which has taken place since the year 1927-28 when the total crop was 88 bales from an area of 375 acres. Until a strain less susceptible to adverse climatic conditions has been produced, however, further expansion on the scale experienced in the past cannot be anticipated.

PART VII.—DEMONSTRATION AND PROPAGANDA

16. **Southern Circle.**—With the reduction in the number of Deputy Directors' circles from five to four which took place towards the close of the year, the area of the Southern Circle has been enlarged by the addition of the Betul and Chhindwara districts which include the farms at the headquarters of these districts and the seed and demonstration farm at Seoni. The circle is therefore a very large one since it includes seven districts, and whereas rice and cotton were formerly the chief crops grown to those has now been added wheat, the most important crop in the plateau districts.

The season in this circle was by no means satisfactory as although the monsoon arrived in good time and well distributed showers enabled sowings to be made under excellent conditions, heavy and continuous rains severely hampered subsequent cultivation.

The only crops which appeared to do well in the circumstances were the medium and late rices. The price obtainable for paddy has, however, fallen so low that the use of artificial manures which in times of higher prices promised to be a decided boon to cultivators has now received a set-back. The Coimbatore canes Nos. 219 and Co 237 are popular in the Betul district but throughout the circle as a whole Co 210 is the most suitable variety. The cane grower is, however, in difficulties as the low price obtained for gur scarcely yields any profit on cane cultivation if the crop is marketed in that form. Whether there is scope for small sugar-producing plants in the limited area available for cane cultivation in this province remains a subject for further investigation. It would certainly appear, however, that such a project would have to be operated on a co-operative basis in order to benefit the growers with only small areas under cane, and the subject is one well deserving the attention

of co-operative agricultural associations in cane-producing areas. The Deputy Director of Agriculture, Southern Circle, has already such a scheme in view. An interesting attempt has been made in the Balaghat district to substitute a small engine for bullock power to drive a cane crusher and the trial made with an ordinary bullock cane mill adapted for driving by an engine gave encouraging results. Support for the contention that agricultural depression may be accompanied by an increased demand for labour-saving implements was experienced in the Southern Circle where a considerable number of water lifts and rolls of wire fencing were sold and where the increased demand for spare parts of implements recorded last year was again experienced to an even greater extent. The advantage of using iron ploughs was clearly demonstrated on the Seoni farm where deep ploughing in the early summer resulted in an average yield of 776 lbs. of wheat in comparison with the local average yield of 570 lbs.

The number of privately owned demonstration plots in this circle is now double that of Government plots, and in view of the reduced overhead charges the results are satisfactory.

The number of seed farms in the circle shows a considerable increase over the figures of the previous year, particularly in the case of rice, cotton and wheat, and the amounts of seed distributed has also risen accordingly. Although it was not possible to arrange for so many agricultural fairs and shows there was no decrease in the number of practical demonstrations given, while the number of illustrated lectures increased approximately three-fold.

The Waraseoni farm in the Balaghat district showed satisfactorily financial results and is likely to be of still greater importance in the future, while the Tharsa and Sindewahi farms are no longer in operation. Although classed as a seed and demonstration farm it also carries out a considerable amount of experimental work and variety trials.

In spite of the prevailing conditions there were increased sales of implements from the Tharsa farm, particularly in the case of water lifts (*rahats*) and rolls of fencing, the total receipts amounting to Rs. 7,631 compared with Rs. 5,946 for the previous year. The fact that such sales are stimulated by *taccavi* grants cannot however be overlooked.

Special attention is being paid to experiments on potato seed in the Chhindwara district with a view to making the district self-supporting and to obviate the necessity for purchasing potato seed each year from outside sources.

17. **Western Circle.**—The organization of the department's work in this circle continued on the lines previously followed but it is clear that if any considerable extension is to be expected, the staff employed on demonstration work must be increased. The number of villages in Berar is about 6,700 and to meet the needs of the vast population engaged in agricultural pursuits only 19 agricultural assistants are available in the districts. This means an average of 350 villages per assistant, so it is not a matter for surprise if the residents of many villages rarely come into contact with the department's activities. The Deputy Director in charge of the circle also notes that the attention given to political reforms has to some extent reduced the interest shown in constructive measures leading to the improvement in the economic condition of the people.

The season was unfavourable to the staple crop, cotton, excessive rain having interfered with weeding in the early stages and led to the shedding of buds and bolls, encouraged boll worm attacks towards the close. The damage was particularly marked in the case of *verum* on account of its more delicate nature. The other *kharif* crops also suffered, and some of the *kharif* area had to be cleared up and sown with *rabi* crops. Of the three important *kharif* crops of the tract groundnut suffered the least, being grown on lighter types of soil, while cotton and *juar* both suffered fairly heavily. *Rabi* sowings were completed under favourable circumstances and promised to yield well, but an unusual increase in the number of field rats resulted in considerable damage. The department made special efforts to deal with this pest and the experience gained will be of value should the trouble recur in future years. The general state of the crops can be gathered from a consideration of the yields produced on Government farms. Groundnut varied from 1,640 lbs. per acre at Boregaon to 578 lbs. per acre at Basim. *Juar* was fairly uniform with a yield of about 500 lbs. per acre over all the farms. Wheat gave 303 lbs. per acre at Basim, the only farm in the circle where it is grown. The cotton crop at Buldana was very poor and that at other farms varied from 113 lbs. to 227

lbs. per acre in the case of *verum* and from 143 lbs. to 331 lbs. per acre for *roseum*.

These farms form the basis of the organization for seed distribution, the demand for selected and pure seed of the principal crops being as keen as ever. Seed produced on departmental farms and plots, private seed farms and unions reached the total of 74,767 maunds, an appreciable decrease compared with the figure of 100,594 maunds for the previous year. The number of seed farms in operation was 4,076, a figure not appreciably differing from that of the previous year and the decrease in the amount of seed distributed is undoubtedly due to the poor harvests following an unfavourable season. It will be readily understood that the distribution of such a large amount of seed occupies a large part of the time of the departmental staff and must to some extent interfere with ordinary demonstration work. To this must be added the extra labour involved in running the *verum* marketing scheme, which duty partly falls on the departmental staff although a special temporary staff is supplied by the Indian Central Cotton Committee. No objection can however be legitimately levelled against these developments since it is now less necessary than was formerly the case to undertake the demonstration of implements and more attention can also be paid to showing how the supply of manure can be improved by preserving and treating vegetable waste material. Moreover, the demand for iron ploughs has decreased as a result of prevailing economic conditions and only 933 were sold in the past year, a figure only slightly in excess of that of the previous year. These figures are only approximately one-tenth of the sales recorded in the good years of not long ago but they must not be taken to indicate that the value of better cultivation is not appreciated, since the steady improvement of crops following good cultivation is increasingly evident and appreciated. The department is still encouraging the use of the iron plough which is already very popular and which may be said to advertise itself as a means of cleaning foul land. The decrease in sales of ploughs is simply due to shortage of capital amongst the farming classes and the tendency to hire ploughs from agricultural associations and village societies rather than to purchase them outright. Tractors have never caught on appreciably in Berar and with the fall in the price of bullock and manual labour are not likely to do so at present.

Taluq agricultural associations and the smaller but similar organizations known as village agricultural societies continue to function with varying degrees of success. Twenty-six *taluk* agricultural associations and nine village societies have been in operation during the past year and undoubtedly some of these have done excellent work in the past. Others, however, have lacked in the true spirit of co-operation and self reliance, far too much dependence being placed on the assistance obtained from Government officers. This assistance has always been readily given in the past but a far greater degree of self-help is called for, and it is hoped this may be forthcoming with the development of the general movement towards rural uplift.

18. Eastern Circle.—In this circle the necessity for retrenchment has, to some extent, affected the touring done by the district staff, but in order to counteract the effect of such restriction more intensive propaganda has been carried out by the members of the staff within a radius of 5 miles from their headquarters.

The season was not entirely favourable as although light showers were received from the 15th of June which facilitated the sowing of the *kharif* crops, a trying break followed which particularly affected late sown paddy. *Biasi* operations were retarded except in low-lying fields or where irrigation was available. The situation improved at the end of August and in September and October good rain was received so that eventually a crop approximating to the normal was secured. So far as the *rabi* crops were concerned, wheat suffered from delayed sowings on account of November rain, but linseed was a good crop and covered a larger area than usual.

The combined effect of careful cultivation, improved seed, timely irrigation and suitable manuring has resulted in the seed and demonstration farms in this circle producing more than double the normal yield of paddy, while even under the prevailing general depression the financial position of the farms improved so that they well fulfilled their function as centres of demonstration and sources from which the cultivating classes could obtain supplies of seed and implements. The Drug and Bilaspur farms gave outturns of approximately 2,000 lbs. of paddy per acre, but that of the Chandkhuri farm was only about 1,300 lbs. as a considerable area of new rice land was brought under cultivation.

Nine Government demonstration plots were working during the year against ten in the previous year, two being closed on the expiry of the leases while one new plot, commanded by the Sorli tank in the Drug district, was opened. The area of these plots averages about 11 acres and by adjusting the labour to meet the altered conditions every plot showed some profit in spite of the abnormal fall in the value of agricultural produce. The profit obtained varied considerably from Rs. 2 to Rs. 81 but, this represents the net savings to a cultivator after considering his expenses as equivalent to the wages paid for working the plot. It is unnecessary to increase the number of Government plots in the Eastern Circle, and these are gradually being replaced by private plots of which sixteen have been in operation during the past year, an increase of two over the preceding year. These plots have given an average profit of about Rs. 9 per acre, but the variations are considerable. They generally belong to *mal-guzars* who manage them under the supervision of departmental *jamadars*. The results obtained on the private plots are better than those of Government plots as they are more favourably situated and no initial expenditure is necessary on levelling of fields or improving embankments. Further, as they form a part of larger holdings, working expenses are less and payment of labour is frequently made in kind. Applications to open more plots are frequently received, but the number is limited by the trained staff of *jamadars* or *kamdars* available for supervision. To demonstrate the value of irrigation either alone or combined with improved seed and better methods of cultivation a special series of 26 plots was maintained under the Kharung and Maniari reservoirs. Irrigation alone gave an increase of 258 lbs. of paddy per acre, irrigation and improved seed an increase of 492 lbs. per acre, while the adoption of the practice of transplantation in addition to irrigation and improved seed enhanced the yield by 758 lbs. per acre over that obtained from the unirrigated plot growing ordinary seed and cultivated in the manner commonly in vogue in the Bilaspur district.

The propagation and supply of seed of improved rices continued to expand, and as many as 1,701 private seed farms were in existence against 1,475 in the preceding year. The total amount of paddy grown on both private and Government farms reached the high figure of 177,362 maunds, an increase of about 3,400 maunds over the previous year. There is a danger, however, that the

work of maintaining the purity of seed grown on the seed farms will tax severely the resources of the available staff as the broadcast system of sowing usually practised entails very careful supervision at the time of weeding and threshing.

Of the other staple crops in this circle, wheat is the most important and the number of private wheat seed farms now reaches 640. From these and the Government farms a total of 12,167 maunds of wheat seed was distributed, an increase of about 1,000 maunds over the figure for the previous year. As an indication of a growing interest in garden crops it may be observed that 2,274 budded orange plants and a number of grafted mangoes were supplied through departmental agency. Calculated on the basis of seed distributed the area under improved paddy and wheat has reached the totals of 183,819 and 13,096 acres, respectively, in comparison with 150,051 and 10,313 acres in the preceding year. While these figures indicate what has been achieved, they equally emphasize the vast area still awaiting to be reached. It must be remembered, however, that there is a fairly large amount of seed passing from cultivator to cultivator beyond the knowledge of the department. Much of the work of seed distribution is carried on by seed unions, 210 of which have been in operation, a slight increase over the previous year. It is satisfactory to record that 19 of these have reached the stage for registration under the Co-operative Societies Act. These unions may well form one of the main features of village uplift work in the future. Another desirable line of work is the establishment of fruit gardens, six of which were planted up under departmental supervision during the year under review. Other crops which have been grown over increasing areas are sugarcane and groundnut, although expansion is considerably influenced by irrigation facilities in the case of the former crop and by price in that of the latter. An early variety of *tur* which was tried on Government farms has met with encouraging results when grown under ordinary village conditions.

Although no agricultural fairs and shows could be organized departmentally on account of lack of funds, opportunity was taken to co-operate with Mission Societies in giving demonstration at two fairs, when, in addition to the exhibition of agricultural produce and ocular demonstration, illustrated lectures were given.

The value of implements sold in the circle rose from Rs. 8,683 in the previous year to Rs. 20,046. This was

largely due to an increased demand for sugarcane mills, an indication of the interest taken in this crop which, although small in total area, is of considerable money value.

19. Northern Circle.—Although the Narsinghpur farm in this circle has ceased to exist as a Government farm it is hoped that under the control of the jail authorities it will still act as a centre for demonstration and seed supply for the Narsinghpur district. With an area of 89 acres only it was a difficult farm to manage economically if the pay of the trained staff in charge was taken into consideration and it will probably still be possible to use the farm as a trial ground for wheats to test their suitability for the district. Particular attention has been paid on this farm to *gram* D. 8 known as *Gulabi chana* for which the demand is heavy. It commands a good price in the market on account of its suitability for making *Phutanas* (roasted gram) and is well suited for irrigation.

The season in the Northern Circle was unfavourable for the important *kharif* crops of cotton and *juar*, although rice and the smaller millets did well. Lack of winter rain considerably reduced the yield of the wheat crop and cold weather *til*, which is an important money crop in the Hoshangabad district, could not be sown to the extent expected. Even where sowing was possible excessive rain did considerable damage when the plants were in the seedling stage.

The chief organization in this circle for the distribution of seed is that known as the *Pande-Barhi* scheme which deals with wheat only. This scheme has now been in operation for six years and the main objects in view at the time of its inception were (a) to develop the work of *tahsil* agricultural associations and (b) to popularize improved varieties of wheat. The unfavourable agricultural conditions of the last four years have unfortunately given the scheme a severe setback and no new unions were opened in the year under review in the Jubbulpore, Mandla and Saugor districts. In the Hoshangabad district 17 new unions were started with a membership of 136 and for these wheat seed was advanced to the extent of 2,711 maunds. The total number of unions has now reached 380 with a membership of 2,776 and the value of wheat seed issued on loan approximates to nearly two lakhs of rupees in value.

Of the two objects of the scheme stated above it may be said that the second has well been achieved but for the first it will be necessary to await the return of more normal conditions. For the present, attention is concentrated on stabilizing existing unions and recovering dues. The 10 per cent *barhi* contributions recovered from unions for subsidizing *tahsil* agricultural associations to carry on various forms of agricultural improvement are being deposited in co-operative central banks and their utilization will be under the direct personal control of the Deputy Director of Agriculture. Non-official agency to carry out such improvements are at present somewhat in deficit but it is hoped this state of affairs will be remedied as normal conditions again set in and as the associations get themselves registered to enable them to deal with the funds which will gradually accumulate. Considering the fall in prices and the prevailing agricultural depression the recoveries have been, on the whole, fairly satisfactory but ten unions may have to be closed on account of persistent default and thirty more are working indifferently. The remainder of the unions are making efforts to bring their accounts up to date and it is hoped will pass satisfactorily through the present trying period.

There is a well recognized need for still better types of wheat to meet the varying conditions of the north of the province, but the combination of qualities required may not be easy to secure. On occasions, the limiting factor in determining the yield of wheat is lack of soil moisture for which a deep rooting strain appears to be indicated. At other times rust caused by excessive moisture seriously reduces the outturn and the grower looks for a heavy yielding variety in all circumstances. How these various requirements can be met is a botanical problem of considerable magnitude with which the department is attempting to deal. The *sharbatti* wheats which formerly commanded a premium for export have suffered in popularity with the fall in the export trade and a general impression exists that these wheats do not give a satisfactory yield in dry seasons. A series of well replicated tests over five farms in the year under review did not show that A-115 (*sharbatti*) wheat gave a definitely lower outturn than *deshi* wheats in a dry season, the average result being about 30 lbs. per acre in its favour. This type of wheat is however mainly recommended for rust resistance and as such can be looked upon as a form of insurance.

Improved varieties of paddy of which three, early, medium and late, are generally distributed, occupied 15,350 acres, mostly in the Jubbulpore district. The attempt to follow a late variety of paddy with a second or *utera* crop of pulses has not met with marked success and it would appear that in this circle the rice soils commanded by irrigation are generally too light in character for *rabi* pulses. Cotton is of very great importance only in the Nimar district where the *verum* pool scheme was in operation and where seed for 46,400 acres was distributed. The crop suffered, however, from the unfavourable climatic conditions already described.

In spite of the general depression implements and spare parts valued at Rs. 49,023 were sold against the figure of Rs. 58,806 in the previous year, and in the circumstances this must be considered quite satisfactory. One implement which is becoming popular in this circle, the iron Persian water wheel or *rahat*, of which 40 were sold. No agricultural shows could be organized for lack of funds but practical demonstrations, illustrated lectures and cinema shows were given in satisfactory numbers. The agricultural associations at Burhanpur and Khandwa have rendered considerable help both in meeting the needs of agriculturists for implements and seeds and in taking a part in the cotton pooling scheme.

The working of the steam tackle in the Jubbulpore district was considerably handicapped by lack of sufficient credit amongst the landholders. To a large extent it was found impossible to secure work for the tackle in compact blocks as the necessary credit upon which work can be undertaken could not be given owing to indebtedness. Much time was therefore wasted in moving the outfit from village to village and only 333 acres of land were ploughed against 708 in the previous season. The average area ploughed per day was 6 acres, an output less by one acre than was obtained in the previous year. The total receipts from ploughing were Rs. 7,394 as against Rs. 13,955 in the previous year.

PART VIII.—HORTICULTURAL GARDENS AND ARBORICULTURE

20. The Maharajbagh and Telinkheri gardens at Nagpur benefited from the abundant rains of the monsoon which filled the tanks on which these gardens depend for their water-supply. The rainfall was however at times too heavy to permit gardening operations being carried out

at the proper time and a certain amount of work has still to be done to repair the damage caused during some of the past unfavourable years and in the hot weather of 1932 when the water-supply was very short. Moreover, expenditure has had to be curtailed to meet the present times of financial stress. In spite of these difficulties the gardens continued to present a very respectable appearance and added considerably to the amenities of Nagpur. The general depression naturally reduced sales of garden produce and the total income of the Nagpur gardens fell from Rs. 14,781, the figure of the previous year to Rs. 11,706, a decrease of Rs. 3,075. Against this however must be set the large fall in expenditure which reached the total figure of Rs. 37,744, a decrease of Rs. 6,686 in comparison with the previous year. The stock of plants maintained for sale is sufficient and well varied, but new varieties are added occasionally as opportunity offers. The fruit area at Maharajbagh is now well in bearing but has unfortunately suffered somewhat through the water-supply failing in dry seasons.

The training class for *mali* boys was continued at Maharajbagh, the boys being supported by a certain number of Government scholarships. There are some complaints that the pay of Rs. 15 to Rs. 20 which the trained *malis* are able to command after finishing their full period of instruction is lower than they consider they have a right to expect, but this is entirely a matter of public demand and Government cannot interfere. It is considerably more than they would receive without the training.

The Pachmarhi garden with its sub-station at Pagara experienced an unusually heavy monsoon amounting to a total 105 inches of rain. Of this quantity 46 inches were received in August with the result that almost all the vegetable crops intended for the following season were washed away. This unfortunate occurrence caused a substantial reduction in the receipts from the sale of vegetables, while a poor mango crop had a similar effect with regard to fruit sales. In spite of these difficulties which were increased by a general fall in the demand for garden produce, the total receipts of the two gardens exceeding the expenditure by Rs. 2,695, which on the whole records a satisfactory position.

With regard to district gardens, as already pointed out, six have been leased out or transferred to other control. In the remaining cases efforts are being made to

reduce the net expenditure, *i.e.*, the excess of expenditure over receipts to the figure prescribed by Government, *viz.*, Rs. 500 for district headquarter gardens and Rs. 800 for divisional headquarters. The gardens which showed improved financial returns were Amraoti, Akola, Yeotmal, Balaghat, Seoni, Bhandara, Mandla, Hoshangabad, Drug and Raipur. In the case of the gardens at Drug, Bhandara and Seoni, the receipts actually exceeded the expenditure, but there is a danger that such a position can only be achieved by sacrificing the appearance of the gardens in order to produce field or other money crops.

In general there was a reduction in receipts due largely to the fall in the prices of agricultural produce. The Buldana garden still needs a fair amount of capital expenditure to repair completely the damage caused to the bund of the tank by the heavy rain of 1930 which in addition to bursting the bund washed away a lot of the surface soil of the garden. Temporary repairs have, however, been made and it is hoped the garden will be restored to its normal condition in 1933. The most attractive district gardens in the province from the point of view of general appearance and the amenities they offer the public are at Betul, Chhindwara, Seoni and Narsinghpur and it may be noted that these are the districts where gardening operations can be carried out under the best conditions in the province.

Arboricultural operations in Nagpur were largely confined to maintaining existing avenues by filling up gaps and replacing dead trees. On the whole the general appearance of Nagpur indicates that the roadside trees are well cared for although there is sometimes a regrettable tendency for some members of the public to forget that the trees are the property of and for the benefit of the public itself with the result that cases of wanton damage are not uncommon.

F. J. PLYMEN,
Director of Agriculture,
Central Provinces.

APPENDIX A

Number of cattle sold from the Government Cattle-breeding Farms in the Central Provinces and Berar during the year 1931-32.

Name of circle.	Bulls.	Bullocks.	Cows.	Male buffaloes.	She buffaloes.	Young stock of cows and buffaloes.	Total for 1931-32.	Total for previous year.
1	2	3	4	5	6	7	8	9
Southern ...	34	...	13	3	...	2	52	24
Western ...	7	...	17	...	...	2	26	43
Eastern ...	3	19	...	...	...	...	22	26
Northern ...	9	...	24	...	...	6	39	30
Agricultural College ...	1	...	15	...	4	41	61	3
Total ...	54	19	69	3	4	51	200	126
Total for previous year.	27	31	23	1	8	36	126	...

APPENDIX B

Name of circle.	Number of private seed farms.					Other crops.	Total for 1931-32.	Total for previous year.
	Wheat.	Rice	Cotton.	Juar.	Groundnut.			
1	2	3	4	5	6	7	8	9
Southern ...	1,053	1,180	944	45	156	373	3,751	1,810
Western ...	219	...	1,561	595	1,501	20	4,096	4,089
Eastern ...	640	1,701	5	...	56	31	2,433	2,159
Northern ...	4,306	492	1,305	597	443	931	8,074	6,964
Total ...	6,218	3,373	4,215	1,037	2,156	1,355	18,682	16,205
Total for previous year.	5,539	2,850	3,504	1,390	2,099	823	16,205	...

Name of circle.	Seed distributed in maunds and whole canes						Total for 1931-32.	Total for previous year.
	Wheat.	Rice.	Juar.	Cotton.	Groundnut.	Canes.		
1	10	11	12	13	14	15	16	17
Southern ...	33,261	34,579	650	8,094	151	930,918	76,735	34,892
Eastern ...	12,167	91,964	7	12	311	52,450	1,67,461	111,570
Western ...	3,378	...	3,336	34,322	33,777	...	74,813	1,00,954
Northern ...	144,179	6,288	8,134	27,386	32,041	196,495	218,028	247,763
Total ...	192,985	135,831	12,127	69,814	66,280	1,179,863	477,037	495,179
Total for previous year.	152,938	129,782	10,286	142,537	59,636	1,081,312	495,179	...

APPENDIX C

Name of circle.	Approximate area in acres sown with improved seed from private seed farms and other sources.					
	Wheat.	Rice.	Cotton.	Juar.	Groundnut.	Other crops.
1	2	3	4	5	6	7
Southern ...	27,395	137,098	126,378	9,502	10,752	5,635
Western ...	4,418	..	334,999	84,885	97,020	...
Eastern ...	13,096	183,119	13	20	2,743	3,059
Northern ...	283,083	15,350	96,709	22,785	16,878	16,826
Total ...	427,992	336,267	558,169	117,192	127,393	25,519
Total for previous year ...	377,372	254,781	683,695	153,282	115,831	37,343

Name of circle	Total for 1931-32.	Total for previous year.	Approximate value of the increased outturn resulting from use of improved seed.	
			1931-32.	1930-31.
1	8	9	10	11
Southern ...	416,760	...	1,859,252	...
Western ...	521,322	641,121	3,587,320	3,925,816
Eastern ...	102,820	167,291	941,326	929,385
Northern ...	451,631	...	466,219	...
Total ...	1,592,532	...	6,854,117	9,555,356
Total for previous year ...	1,622,304	...	8,555,356	...

APPENDIX D

Name of circle.	Number of implements and parts of implements sold					Spare parts.	Total for 1931-32.
	Ploughs.	Sugarcane mills.	Fodder cutters.	Akola hoes	Other implements.		
1	2	3	4	5	6	7	8
Southern ...	518	94	7	10	270	,000	1,899
Western ...	933	...	3	3	28	11,667	12,634
Eastern ...	81	90	...	2	48	216	437
Northern ...	788	28	8	243	590	2,931	4,498
Agricultural College Farm.	8	...	...	...	...	125	137
Total ...	2,328	212	18	258	816	15,939	19,601
Total for previous year.	2,700	112	38	462	974	14,324	18,610

Name of circle.	Value of implements in rupees.		Books and Bulletins.		Total for 1931-32.	Total for previous year.
	1931-32.	1930-31.	Books sold.	Bulletins sold.		
1	2	3	4	5	6	7
Southern ...	55,450	53,242	39	409	443	338
Eastern ...	20,046	8,683	3	193	196	535
Western ...	16,327	45,089	31	33	366	358
Northern ...	49,023	77,561	109	291	403	588
Agricultural College Farm.	369	957	...	...	...	...
Total ...	1,71,215	1,85,522	185	1,228	1,413	1,860
Total for previous year.	1,85,532	2,95,909	247	1,613	1,860	3,897

APPENDIX E

Name of circle.	Number of agricultural shows held.	Number of practical demonstrations carried out by district staff.	Number of illustrated lectures given.
1	2	3	4
Southern	15	1,316
Western	1,363
Eastern	2	688
Northern	1,118
Total	17	4,485
Total for previous year	...	23	4,700
			343

No. 2986

FROM

F. J. PLYMEN, ESQ., C.I.E., I.A.S.,

DIRECTOR OF AGRICULTURE,

Central Provinces,

TO

THE REVENUE SECRETARY TO
GOVERNMENT,

Central Provinces.

Nagpur, the 14th July 1933.

SIR,

I have the honour to submit, herewith, the report on the working of the Department of Agriculture, Central Provinces, for the year ending 31st March 1933.

I have the honour to be,

SIR,

Your most obedient servant,

F. J. PLYMEN,

*Director of Agriculture,
Central Provinces.*

REPORT ON THE WORKING OF THE DEPARTMENT OF AGRICULTURE, CENTRAL PROVINCES FOR THE YEAR ENDING 31st MARCH 1933.

PART I—ADMINISTRATION

I was in charge of the department throughout the year. On reversion to the department from employment as Secretary, Indian Central Cotton Committee, Mr. J. H. Ritchie remained attached to my office as Deputy Director from the 1st to the 31st March 1933. Messrs. Hill and Mutkekar held charge of the Southern and Western Circles, respectively, throughout the year. Rai Sahib B. L. Dubey was in charge of the Northern Circle from the 1st of April 1932 to the 10th November 1932 and Mr. Churchill from the 11th November 1932 to the end of the year. The charge of the Eastern Circle was held by the following officers :—

Rai Bahadur Tundilal Powar ...	From 1-4-32 to 1-3-33.
Mr. D. R. Moharikar ...	From 2-3-33 to 17-3-33.
Rai Sahib B. L. Dubey ...	From 18-3-33 to 31-3-33.

Mr. McDougall officiated as Principal, Agricultural College, throughout the year, while the charge of the Chemical Section was held by Mr. D. V. Bal. Mr. Takle continued in charge of the Animal Husbandry Section. The charge of the offices of the Economic Botanist for Cotton and the Second Economic Botanist was held as under :—

Economic Botanist for Cotton—

Mr. S. C. Roy ...	From 1-4-32 to 6-11-32.
„ D. N. Mahta ...	From 7-11-32 to 31-3-33.

Second Economic Botanist—

Mr. K. P. Shrivastav ...	From 1-4-32 to 26-1-33.
„ D. N. Mahta ...	From 27-1-33 to 31-3-33.

Mr. J. F. Dastur remained in charge of the Mycological Section throughout the year. The charge of the Agricultural Engineering Section was held by Mr. McDougall in addition to his duties as Principal of the Agricultural College, there being now no officer holding the post of Agricultural Engineer.

It is perhaps worthy of remark that, since the department was established on the present lines about the year 1905, the time has now come when a number of the senior officers will be retiring under the age-limit rule and the services of a number of men of long experience is likely to be lost in the near future. The particulars given above also indicate to what extent the department is becoming Indianized now that an adequate supply of experienced or thoroughly trained men is available for recruitment in India.

2. The expenditure during the financial year 1932-33 was Rs. 8,94,175, which included Rs. 66,489 on account of expenditure on botanical and other public gardens, Rs. 42,854 on account of expenditure on cotton work and Rs. 11,746 on the rice research scheme. The receipts amounted to Rs. 2,88,312.

The net expenditure on agriculture including expenditure on cotton work and the rice research scheme thus amounted to Rs. 6,05,863, but of this sum Rs. 54,600 were received as contributions from outside sources and expenditure from provincial funds reduced accordingly.

The statement below gives the corresponding figures for the past 14 years and indicates how the expenditure of the Agriculture Department has fluctuated during the period :—

Year.	Receipts.	Expendi- ture.	Net expendi- ture.
	Rs.	Rs.	Rs.
1918-19	... 1,56,379	6,57,699	5,01,320
1919-20	... 2,19,034	7,83,813	5,64,809
1920-21	... 2,01,631	8,83,167	6,81,536
1921-22	... 2,45,908	9,64,049	7,18,141
1922-23	... 2,73,882	9,15,207	6,41,326
1923-24	... 2,79,992	9,63,097	6,83,105
1924-25	... 3,19,986	8,87,503	5,67,517
1925-26	... 2,73,357	9,70,752	6,97,395
1926-27	... 2,81,333	10,78,644	7,97,211
1927-28	... 3,04,933	12,93,879	9,88,945
1928-29	... 3,82,130	11,95,679	8,13,549
1929-30	... 3,71,245	11,78,853	8,07,608
1930-31	... 3,54,119	11,29,025	7,74,906
1931-32	... 2,84,791	10,19,815	7,35,024
1932-33	... 2,88,312	8,94,175	6,05,863

It will be observed that the figure for departmental expenditure shows a decrease of $1\frac{1}{4}$ lakhs compared with that of the previous year, while the receipts are a little above those of the previous year, facts which indicate that an effort has been made to carry on the department with a full appreciation of the financial position of the province.

PART II.—AGRICULTURAL EDUCATION

3. Normal conditions prevailed in the Agricultural College during the year under review and all the four classes in the Degree Course worked smoothly. The Certificate Course continued to be held in abeyance and it certainly appears there is no great demand for such a course at present. Applications for admission to the first year course amounted to 75, 49 intending students being called for interview and subsequently admitted provisionally. Of these 32 were duly enrolled, of whom two left and two died. The number of students in different classes during the year were as follows :—

Class.	Number on roll at the end of July 1932.	Number in examination.
First year degree ...	30	28
Second ,, ...	36	37
Third ,, ...	18	18
Fourth ,, ...	28	28

The examination results were on the whole distinctly satisfactory. Of the 28 students who finished the first year, 25 were considered fit for promotion to the second year. The second year class consisted of 36 students including two who were repeating the course. Making allowance for three students who were not allowed to sit for the Intermediate examination and four compartmental students who sat as private candidates a total of 37 appeared for the examination. Of these only two students failed, three candidates passed in the first

division, 15 in the second and three in the third division, the remainder being given ordinary passes or compartmentals. Of the 18 students in the third year all were promoted to the final year. The fourth year class consisted of 28 students taking the University examination for the degree of Bachelor of Agriculture (B. Ag.). Of these 24 passed, two were given compartmentals and there were only two failures. No student was placed in the first division but there was a high proportion of passes in the second division, 18 out of 24 candidates reaching that standard. The examination papers in Botany and Plant Pathology were apparently the cause of the failure of any student to reach the highest division.

The students were taken on tour to a number of places where agricultural methods differ from those followed on the College farm. Opportunities were afforded for studying sugarcane cultivation at Bhandara and Jubbulpore and rice cultivation in Chhattisgarh. In addition the working of the Military Dairy at Jubbulpore was shown and thanks of all connected with the College are due to the officials and private gentlemen who placed these facilities at the disposal of the students.

Owing to the need for economy in running the College, two concessions formerly enjoyed by the students have had to be withdrawn. They now pay for the electricity consumed by them and also the cost of the cooks and other mess servants. The Hindu messes were run on a contract basis, the rate charged per student by the caterer being about Rs. 10 per month in the vegetarian and Rs. 12 per month in the non-vegetarian mess, these rates being inclusive of the wages of cooks and servants. The electric light charges amounted to about Re. 1-4-0 per student per month but this charge will probably be reduced when students realize that by switching off the lights when not required, economies can be effected to their own advantage.

The health of the students was generally good, the two deaths already reported being amongst the students who came from outside the province. One student is reported to have been ill with malaria at his

own home, while the other died from an obscure and infrequent disease after being treated both in Nagpur and Bombay.

During the course of the year a quinquennial inspection of the College was carried out on behalf of the Nagpur University by the Principal of the Agricultural College, Cawnpore, and P. S. Kotwal, Esquire, Bar-at-Law, Dean of the Faculty of Law, Nagpur University. The main points in the quinquennial inspection report were —

- (a) That while generally satisfied with the qualifications of the teaching staff the inspectors suggested that future employees of the College should so far as possible be graduates, preferably with Masters' degrees. It was also recommended that the staff of the Entomological Section might well be strengthened by the appointment of a graduate demonstrator.
- (b) The inspectors considered an addition to the College office establishment might be desirable.
- (c) The time-table was thought to require more periods of recess as the hours of work were heavy.
- (d) The general tone of discipline in the College appeared to the inspectors to be excellent.

4. The Powarkhera Agricultural Anglo-Vernacular Middle School had a successful year's work, and it is satisfactory to record that out of 24 boys sent up for the High School Scholarship Entrance examination 23 passed. The year started with 58 students on the roll, this number excluding the new entrants for the 1st year class. 33 applications from new students were received out of which 29 were accepted. The total number on the roll including students who were repeating their previous year's work amounted to 94, but of these 10 left during the session so that the number of students in the school at the end of March 1933 was 84, a figure three in excess of that of the previous year. The following classification shows the castes from which the boys were derived :—

Brahmins 31, Rajputs 15, Kurmis 15, Depressed classes 3, Muhammadans 2, and others 18.

Out of the total of 84 boys, 75 came from the Hoshangabad district itself, more than half of these being from the Hoshangabad tahsil. That the school caters for the sons of agriculturists is clear from the fact that 37 students were the sons of malguzars and the remaining 47 the sons of cultivators.

No addition to the school buildings have been made in the year under review and there appears to be no justification for further additions at present. Apart from the fact that the school is established in the centre of a large farm, individual agricultural practice was provided on an area of 1.5 acres under vegetable crops and 5 acres under cotton, wheat, gram and *til*. Although the season was not particularly favourable, great interest was shown by the boys in maintaining their plots in good condition and also in the flower garden adjoining the school and the value of the produce from the students' area after allowing for the vegetables supplied to the boys free of cost enabled small sums of approximately Rs. 2 to be distributed to each boy.

The general health of the boys was good, this desirable end being achieved partly by the regular attendance by the medical officer from Hoshangabad and partly by the provision of good clean food. The messing arrangements were carefully supervised by the teachers in charge and the messing expenses including ghee and vegetables amounted to between Rs. 3-12-0 and Rs. 4 per month. The sound education provided and the healthy environments of the school enable it to maintain its hold on the agricultural classes in the areas it serves, in spite of the general depression.

5. Another school of the Powarkhera type has been established at Betul Bazar under the control of the Betul District Council but the status of the school will only be raised to that of Powarkhera by successive stages. In this case, the buildings are not the property of the Agriculture Department. Facilities for giving instruction in practical agriculture exist on the Betul seed and demonstration farm which adjoins the school compound. No hostel has yet been constructed but this is under contemplation by the Betul District Village Uplift Committee. Should residential accommodation be required it can be provided to a small extent as a temporary measure in the Betul farm buildings.

6. The Peace Memorial Agricultural School at Buldana has been in operation since the year 1929. The Agriculture Department is only responsible for the training in agriculture and allied subjects which is given in the school, the management of the school and the hostel resting with the committee appointed for the purpose. The institution has now been registered under the Societies' Registration Act, XXI of 1860. During the year under report the first and second year classes consisted of 9 and 12 boys, respectively. A fairly large number of applications for admission into the school were received but only those students receiving stipends actually joined.

7. On the suggestion of the Advisory Board of the Imperial Council of Agricultural Research an attempt was made in the year under review to provide a short vernacular course in practical dairy farming for *gaolis* and small dairy farmers. The course was conducted in Hindi although special arrangements were made for teaching any students who were unable to follow Hindi sufficiently well and whose mother-tongue was Marathi. The instruction was given in the cultivation, harvesting and conservation of fodder crops, in the breeding, feeding, rearing and management of cattle and in the handling of milk and the manufacture of milk products. No appointments were offered for those who had completed the course satisfactorily. Of the 25 students enrolled, 20 actually joined the course of whom only 14 completed it. These, however, did well in the final examination and all passed. The course was taken by the permanent staff under the control of the Principal of the Agricultural College.

PART III.—RESEARCH AND EXPERIMENTAL WORK

8. Cotton.—The scheme financed by the Indian Central Cotton Committee for the improvement of cotton is still in operation and has about one year more to run. No change in the current programme of work which has received the approval of the committee will, therefore, be made until the scheme comes under revision. The chief feature of the year's work was the confirmation of results previously obtained which

demonstrated the superiority of late *verum* cotton over all other types grown in comparison with it. As this is a relatively new variety it has only been possible in past seasons to grow it on experimental farms but last season it was grown on a field scale in different areas and the results were in accordance with those previously obtained on departmental farms. On the Agricultural College farm at Nagpur a yield of over 1,000 lbs. of seed cotton per acre was obtained, and though the outturn was not quite so good on the Akola farm, it was still highly satisfactory.

With regard to price it is sufficient to state that local mills paid a premium of Rs. 10 per *khandi* over that given for ordinary *verum* 262. The spinning test on this cotton was again very favourable and it has been adjudged as suitable for spinning up to 31's warp counts. The fact that this strain was grown in a number of widely distributed areas enabled growers to see it for themselves under field conditions with the result that the applications for seed have been far greater than it was possible to meet. It is anticipated, however, that the total area under late *verum* cotton will be over 1,000 acres in the coming season, some 10,000 lbs. of seed having been distributed by departmental agency for growing in suitable areas. Of this quantity about 700 acres will be under the direct supervision of the Agriculture Department. The breeding and testing of new strains of cotton has been continued, the principal object being to obtain increased yield. The irregular germination in the plots first planted disorganized the trials to some extent, but the final results in view of the climatic conditions that prevailed were satisfactory on the whole. In the selection of single plants particular attention was paid to obtain those of a type, free from excessive vegetative growth with bolls opening well, while in regard to lint, attention was paid to fineness, silkiness, evenness of length, lint percentage and the size and character of seed. Observations were made on 27 new cotton strains received from outside the province but the majority of them had to be rejected as unsuitable for the conditions prevailing in the province. As an example the variety known as Allen cotton from Sudan may be quoted. This produced a fibre of excellent

staple but the plant suffered heavily from red blight, and if such a type is to be made use of in this province, the undesirable characteristics must be eliminated.

The Botanical Section is far from being satisfied that *verum* 262 is the ideal cotton for the province and further improvement is being sought for. Among promising strains are V. 434 and V. 438 which will be sent out for multiplication in the cotton-growing districts in the coming season. The chief merit of the former is that while retaining its good qualities of yield, ginning percentage and spinning qualities, it appears to be adaptable to varying conditions of soil and climate. The slight tendency of late *verum* towards unevenness of fibre will, if possible, be eliminated by the multiplication of seed from single plants.

Work on *bani* cottons has continued on lines of the past year, the main object in view being to obtain uniformity of lint. The two strains receiving particular attention are E. B. 31 and *bani* 306. The performance of the former in the field was again promising and it indicates that it is well able to withstand adverse climatic conditions. The latter is, however, superior in spinning quality to the former, being suitable for spinning up to 43's warp counts as against 39's in the case of E. B. 31. Its yield is also satisfactory and on the Akola farm in the past season it averaged about 550 lbs. per acre, its defect, however, lies in the low-ginning capacity and dulness of lint. Further work is necessary in order to remove these disadvantages.

Since the introduction of *verum* 262 on the Akola farm it has always yielded higher than *roseum*, but in the year under review the yield of *roseum* was actually higher than by about 23 per cent. This was due to an attack of a seedling disease which affect *verum* more than *roseum*, but in value per acre the *verum* gave a return of Rs. 56 against Rs. 53 for *roseum* on account of the premium obtained for better quality lint.

The Economic Botanist has continued hybridization work with cotton, but beyond gaining some knowledge regarding the mode of inheritance of certain characters

no important results can yet be reported. Observations are also being continued to examine the effect of climatic conditions upon the development of the cotton plant with regard to growth, flowering, boll-shedding and boll-opening. So far as the past season was concerned, bud-shedding appeared to be the chief factor in reducing yield.

Work at the Akola farm emphasizes the need for improvement in cultural operations just as much as in breeding new and desirable varieties, and to obtain success in cotton cultivation, a suitable rotation of crops must be practised. Important results have also been obtained in the utilization of cotton stalks for increasing the quantity of available manure and these will shortly be put into a form which can be brought to the notice of a cotton grower.

9. **Wheat.**—Work on this crop falls within the scope of the Second Economic Botanist's Section but as this post has been held in abeyance for some time and the section is controlled by the Economic Botanist for Cotton in addition to his own duties, any outstanding progress cannot be expected, more particularly as the work of the Second Economic Botanist's Section includes giving instruction in botany to the students of the Agricultural College. The work on the improvement of wheat crop can be divided into two parts, (a) production of rust resistant and high-yielding wheats for the main wheat tracts of the northern districts, and (b) rapidly maturing awned types of good cropping power for the southern districts. Two strains, E. B. 8 and No. 31, which have reached the stage of trial on a field scale are being tested in the Northern Circle. Out of a large number of crosses between Australian and local wheats tested at the Kheri farm in the Jubbulpore district, about 17 were selected for further trial and grown at Jubbulpore and Hoshangabad and three of these are giving hopeful results. A number of other crosses which have not yet reached the final stage were under observation during the year and it is hoped that a good rust-resistant wheat suitable for growing under the conditions prevailing in the Central Provinces will be developed during the course of the next two years. Further work on the hybridization of wheats of different

types is in progress. The Mycologist has issued a paper and a leaflet on two diseases of wheat occurring in the province.

10. Rice.—With the inauguration of the Rice Research Scheme financed by the Imperial Council of Agricultural Research, the work on this crop has been placed upon a new footing during the past year. Two Provincial Service officers, a Bio-chemist in the Provincial Agricultural Service, Class I, who is in charge of the work and a Botanist in the Provincial Agricultural Service, Class II, with two agricultural assistants have been provided for and the experimental area at the Labhandi farm, Raipur, together with certain buildings to be used as laboratories, have been allotted to the scheme which has been sanctioned for a period of five years. The appointments of the officers could not be made until the last kharif season was almost over, but a considerable amount of preliminary work had to be done in preparation for the ensuing kharif season. The work on rice formerly carried on under the Second Economic Botanist has been transferred to Raipur and a certain amount of continuity will be ensured as the Botanist employed on the scheme was previously on the staff of the Second Economic Botanist, Nagpur. The Agricultural Chemist has also recently published two papers on rice so that a certain amount of work on this crop has already been done which can be continued on more intensive lines in future.

11. Oilseeds—*Groundnut*.—The work on rotation of crops with cotton already referred to has emphasized the value of groundnut since this crop has now been accepted as the most suitable for rotation with cotton. A new variety of Spanish peanut AK. 12-24 has recently been developed. This variety possesses bigger pods than the parent type and in this respect is like the small Japan variety with which it also compares in respect of maturity and oil content. In addition it is comparatively easy to harvest and in cropping power superior to both Spanish peanut and small Japan. In spite of the unfavourable season an average yield of 1,400 lbs. per acre was obtained with the new variety as against 1,200 lbs. given by the smaller varieties. The entire stock of about 5,000 lbs. seed of the new type has been distributed for the coming season.

Linseed.—The main characters required in this crop are early maturity, rust resistance and high yield and with this object, hybridization and selection are in progress. A selection known as E. B. 3 has maintained its reputation and the demand for its seed is increasing. In addition to producing a bold type of seed the root system is well developed and deep-seated so that it withstands drought conditions successfully while its early maturity enables it to escape rust attack, a frequent factor in reducing the yield of the linseed crop. In cropping power it is a distinct improvement on local types.

An interesting series of crosses between Irish flax and local linseed and Punjab linseed with the strain known as E. B. 3 are under observation and some of them have yielded very satisfactory results with regard to yield and resistance to rust.

Til.—Work on this crop has only recently been started, the object being to produce high-yielding strains containing a satisfactory percentage of oil. The systematic classification of this crop is in progress but will take one or two more years to finish. The isolation of pure types of this crop is rendered difficult by the large amount of natural cross-fertilization which takes place but a few strains have already been isolated. In all work on oilseeds the assistance of the Chemical Section is necessary to watch any serious fluctuations in oil-content.

12. *Millet*s (*Andropogon sorghum*).—Pure strains of the most desirable types were maintained and selection for high yield and large sized cobs was continued. Three yellow-grained *juars* known as improved Saoner 123-A and E.B. 1 call for particular note and have been distributed for multiplication in the coming season. A few exotic varieties received from America and Ceylon have proved disappointing under the conditions prevailing in this province. In the case of bajra (*Pennisetum typhoideum*) a number of strains have been obtained by continuous self-fertilization but the chief success achieved by the section under the Economic Botanist for Cotton has been the increased yields obtained from bulk selection which, although not resulting in a crop of absolute purity, yet does result in the production of a considerable proportion of large sized heads. This crop is, however, difficult to maintain at a high standard of yield as it is liable to deteriorate rapidly through excessive natural cross fertilization.

A report of damage to juar and cotton plants was received in July and this was attributed to *khurpadi* or cut worms. A spot examination by the Entomologist revealed the fact that insects were not responsible for the damage but that it was due to the combined efforts of millipede, birds, squirrels and mice. Rats were also threatening to become a nuisance on the Government farm, Akola, in September 1932, but these were effectively dealt with by poisoning with a strychnine bait, a method which although cheap and effective, needs careful and responsible control. Demonstration of the use of barium compounds as a rat poison were successfully made on a wider scale in Berar.

The Mycologist has compared the relative merits of copper carbonate and sulphur for controlling smut in *juar*. He finds the former considerably more efficient, but sulphur has an advantage in being cheaper.

13. Other crops.—*Pulses*.—Work on the gram crop (*Cicer arietinum*) has as its object the breeding of a wilt resistant, high-yielding type, and as an essential preliminary the work of classifying this crop into types has been maintained. Out of a number of cultures studied previously ten have been selected for further trial at the Hoshangabad and Jubbulpore farms. Further trials have shown the superiority of Cawnpore and Karachi gram in their power to resist wilt.

In the case of *tur* (*Cajanus indicus*), the chief problem upon which attention is now being concentrated is the production of wilt-resistant strains. For this purpose the selected types are grown in a field artificially infected with wilt and selections are made from the individual plants which survive. A number of strains have thus been obtained for further comparative tests. The problem is an important one since *tur* wilt is frequently reported as doing considerable damage and the crop is grown on a large scale in many parts of the province.

Sugarcane.—Two fairly serious pests on sugarcane came to the notice of the Entomologist in Betul during the hot weather of 1932. The first was a species of fungoid bug (*Pyrilla*) which was dealt with by collecting the egg clusters, at a cost of Re. 1-5-0 per acre, and by causing the adult bugs to fly when disturbed on to sticky surfaces kept in motion above the crop.

The next was a grasshopper which was successfully controlled by trapping in a big net. It is obvious that such outbreaks can be attacked with a considerable hope of success if only they are reported sufficiently early.

14. **Garden crops.**—The Entomologist has been able to get into personal touch with a number of fruit growers and afford them assistance in dealing with insect pests affecting their orchards. Arrangements have been made to make it easier for the necessary remedies to be obtained and an extension of these facilities to farms in the districts is under consideration. The Mycologist is paying particular attention to diseases of crops grown on an extensive scale such as chillies, tomatoes, potatoes and *pan* (betul vine). The storage in underground pits of potatoes to be used for seed purposes was demonstrated at Tamia in the Chhindwara district. The cost of storage was only about $4\frac{1}{2}$ annas per maund which is practically negligible since the materials can be used more than one season. The extension of this work to storage of seed potatoes during the monsoon for the *rabi* crop has been undertaken. On account of the customs and prejudices governing the cultivation of *pan*, continuous work on the “baris” or *pan* gardens is difficult to ensure.

PART IV.—AGRICULTURAL ENGINEERING

15. During the year under report this section has been placed under the administrative control of the Principal of the Agricultural College and the superior technical staff consists now only of an Assistant Agricultural Engineer together with a specially trained agricultural assistant to help in the management of the workshop and in conducting oil engine and tractor training classes. A considerable amount of retrenchment has been effected in this section and at the same time it has been brought more closely in touch with the Agricultural College. The demand for power machinery purchased by means of *taccavi* loans has not been very large, a natural corollary to the reluctance of landholders to put more capital into farming under present conditions. A few pumping plants and power-driven sugar centrifugals have been erected by the Engineering Section and the usual repair work for cultivators and departmental farms has been undertaken. The oil engine and tractor

training class consisted of 20 candidates of whom 15 were successful. The largest item of machinery installed by the Engineering Section was a small sugarcane factory in the Narsinghpur tahsil. The plant consisted of a 21 B. H. P. engine with cane-crushing mill, centrifugal machine and centrifugal pump, all capable of being worked by the prime mover simultaneously. The plant is sufficient to deal with 30 acres of cane.

From the beginning of the monsoon the steam tackle which has hitherto worked entirely in the Jubbulpore district was laid up for a time and no work was done with it. The heavy fall in the price of agricultural commodities made it impossible for cultivators to pay in cash the rates charged for its use and *taccavi* loans were not easy to obtain on account of the large arrears of land revenue outstanding. In the circumstances it would have been unwise to add still further to the prevailing indebtedness. Should it be thought desirable and possible to issue loans more freely in the coming season work will be recommenced but it may be necessary to move the outfit to another district.

PART V.—ANIMAL HUSBANDRY INCLUDING CATTLE-BREEDING AND DAIRY FARMS

16. The post of Deputy Director of Agriculture in charge Animal Husbandry continued to be held in abeyance during the year and the section was in charge of an officer of the Provincial Agricultural Service, Class II. The aims of the section and the methods by which it is hoped to raise the standard of agricultural cattle in the province have been fully described in previous reports and repetition is unnecessary. The cattle-breeding farms in Berar, which are situated at Ellichpur and at Bod in the Melghat, continued to work satisfactorily. The former, which accommodates a herd of dual-purpose Hansi-Hissar cattle, produced 46 pure-bred bulls during the year of which four were sold on the farm and the remainder transferred to bull depôts at Khandwa and Borgaon in the Akola district. By distributing the young animals in this way they can easily be inspected by intending purchasers and brought to maturity cheaply and without encroaching on the limited grazing facilities at Ellichpur. Unfortunately the prevailing period of financial depression coincides with the

coming of this farm into full working order and the demand for breeding bulls in Berar is disappointing. When the situation improves it is expected that greater advantage will be taken of the cattle which the Ellichpur farm is able to supply. The Bod farm, which is not in a position at present to offer graded bulls, is, however, a source of supply of cross-bred bullocks and these are being tried on Government farms until such time as increased production enables the department to offer animals to the general public.

In the Eastern Circle the Pakaria farm near Pendra, although still in its early stages, is producing graded bulls for sale to the public, and these are kept at the bull depôt at Drug to be within easy reach of prospective purchasers. At the Bod and Pakaria farms, which are both situated in jungly tracts, the cultivation of crops suitable to the locality is practised and good demonstration centres thereby provided.

The Garhi farm in the Balaghat district produced 30 breeding bulls of the *gaolao* strain during the year, but although there is undoubtedly a demand for this type of animal, lack of funds due to the low prices prevailing for agricultural produce hampered sales. Assistance was given in the form of *taccavi* loans and premia under the Premium Bull system but even with these facilities only 15 could be sold, and it is evident that a return to more prosperous times must be awaited before the production of better class cattle is taken up on any large scale by agriculturists and the resources of the department are ample to meet current demands.

The Telinkheri dairy farm continues to make good progress in building up a pure-bred herd of Montgomery (*Sahiwal*) cows which are particularly recommended for improving the milk supply of urban areas. It is satisfactory to record that some success has been achieved in regulating and equalizing the milk supply throughout the year and in reducing the heavy mortality amongst calves which was formerly prevalent on this farm. The farm showed a credit balance of over Rs. 5,000 in its working account during the year. Acting in co-operation with the Telinkheri farm, the Byramji dairy made good progress in the sale of milk,

and the milk depôt opened two years ago in Nagpur city is serving well the purpose for which it was started and is creating demand for milk and its products in that area.

In the Northern Circle a part of the Malvi herd originally at Hoshangabad has been removed to the Ratona area on the Saugor farm. The change has improved the condition of the animals to a considerable extent and the presumption is raised that the more elevated portions of the Vindhya plateau are better suited for cattle rearing than the Nerbudda valley proper since the herds at Khandwa, Hoshangabad and Richhai have never fared so well as that now kept near Saugor.

17. The feeding of bone meal which has been started in accordance with recent ideas of mineral deficiencies in the rations of farm animals is reported to be having a very good effect, but it will take about three years to see the full result of breeding from parents which received a bonemeal ration which, in addition to the same material, is being supplied to the young growing stock. In this connection the Agricultural Chemist has been successful in combining the necessary mineral ingredients in the form of a brick which serve as cattle "licks". Formerly these bricks had to be imported at a much higher cost. The Agricultural Chemist has also in hand a number of investigations on the nutritive value of common fodder grasses and the effect of feeding bone meal on the composition of milk. Grasses grown under various manurial treatments and supplied with lime and phosphate do not show any appreciable variations in respect of those constituents. It appears also that while some of the lime and phosphates artificially fed to cattle passes into the milk a large proportion of it is avoided.

PART VI.—ECONOMICS AND MARKETING

18. Although no section for economics and marketing was working throughout the whole of the year, the post of the Deputy Director of Agriculture, Economics and Marketing, being still held in abeyance on account of retrenchment, the marketing of *verum* cotton was again undertaken as a special item of work, the necessary

funds being provided by the Indian Central Cotton Committee. To carry on these duties a special staff consisting of a Marketing Officer and an inspector of accounts, a small office staff for clerical work and a temporary staff of six agricultural assistants and 21 accountants was employed. The agricultural assistants and accountants were, however, placed under the direct control of the Deputy Directors of Agriculture in cotton-growing areas and it must be recognized that the work of the Deputy Directors was considerably increased by these additional duties. The year was not altogether favourable for *verum* cotton on account of heavy rain in the month of July and part of August, and although conditions improved towards the end of August, the crop did not recover from the setback it had received in the early part of the year. The general lines on which *verum* marketing was conducted were settled by a Central Organization Committee consisting of two officials and five non-officials which met early in November 1932, and it is gratifying to record that non-official assistance in the operations has been so readily forthcoming. The Organization Committee dealt with such questions as insurance and the engagement of brokers for transacting sales outside the province, but it was found eventually that the services of brokers were not required. The Central Provinces Government sanctioned a sum of 1½ lakhs of rupees for advances to *verum* growers, these advances being made on the basis of 75 per cent of the market rate for ordinary Oomra cotton on the date on which *kapas* of the grower was taken into the pool. It is satisfactory to record that all the advances so given out were fully recouped and credited by the close of the financial year, this being in fact a feature of the scheme since its inception.

The sale of cotton commenced with the small consignment of 40 bales sold in Nagpur early in December and in the month of January, with larger quantities of cotton arriving at the pooling centres, business became brisk so that by the end of the month of January a total of over 2,000 bales had been sold. The maximum rate obtained during January was Rs. 250 per *bhandi* for *verum* 262 and Rs. 260 for late *verum*. During February the maximum rate obtained was only Rs. 230 and by the middle of that month the admission

of cotton into the pool was generally discontinued in order to complete transactions by the end of the financial year. The total number of bales dealt with during the pooling season was 3,971. This figure was lower than expected, the reason being that the unfavourable season had resulted in a reduced outturn and some of the growers had not been prepared to carry out roguing operations necessary to bring their cotton to the standard required for the admission of cotton to the pool. In addition the keen competition in places like Akola and Khamgaon, where purchasers offered a high premium in order to induce growers not to take advantage of the pool, resulted in the sale of some cotton outside the organization. Taking the average figures for the season it is found that the *verum* sold through the pooling organization obtained a price equivalent to Rs. 226 per *khandi* f. o. r. Bombay. Average figures during the same period for Broach and Oomras cotton worked out to Rs. 190-1-0 and Rs. 171-10 0, respectively, or a premium of Rs. 36-13-0 over Broach and Rs. 55-4-0 over Oomras on a f. o. r. Bombay basis. A study of the fluctuations in rates between Broach and *verum* cotton indicates that the margin remained fairly constant and the premium continued to be steadily maintained. This was contrary to the experience of the previous two years. As Broach rates started to decline from the last week of January quotations for *verum* fell in sympathy. Taluq agricultural associations were approached to take up the work of financing the growers and disposing of the produce, but none were able to deal with the business of selling the cotton although the Khamgaon and Chikhli associations provided the necessary finance for making advances. The Jalgaon association, which was able to finance these operations in the previous year, was unable to do so in the year under review. In general it may be claimed that the year's operations were successful, but this must be attributed in part at least to the fact that the cotton was sold locally. At the beginning of the season, quotations were obtained from Bombay and Ahmedabad as well as from Nagpur, but compared with the prices offered at the last place the other quotations were comparatively low. There is considerable advantage to be gained from effecting local sales as prices can be fixed and weighments made with relatively little

delay, the result being prompt payment to the growers. Should the area under *verum* cotton expand however to any large extent, the output would probably be more than local mills would take up and prices would probably not always be so favourable to the grower as they have been in the past. The total value of the cotton sold under the scheme during the year under review amounted to close on $4\frac{1}{2}$ lakhs of rupees, the Government advance for financing operations being, as previously stated, $1\frac{1}{2}$ lakhs of rupees only. Taking the total quantity of cotton dealt with under the scheme as 4,000 bales approximately or 2,000 *khandis* and the premium obtained over *Oomras* cotton at Rs. 55, it will be seen that the extra profit accruing to the grower over what he would have obtained had he tendered the same quantity of *Oomras* cotton was well over 1 lakh of rupees.

PART VII.—DEMONSTRATION AND PROPAGANDA

19. **Southern Circle.**—The monsoon commenced in this circle about the third week of June and *kharif* sowings were completed by the middle of July. The rice crop benefited from the rain of July and early August which was heavy and fairly continuous, although in places excessive rain caused damage to rice bunds and hindered transplantation. Due to the same cause cotton sowings were restricted to some extent and part of the areas intended for cotton was sown with *juar* or left fallow for the time. Later in August breaks in the monsoon had a favourable effect on plant growth, but the sudden and early cessation of the rain in September severely checked all unirrigated crops with the exception of *verum* cotton. On the whole, however, the paddy crop was normal but the cotton crop only amounted to about 9 annas.

The *rabi* crops were effected by the necessity to sow early and somewhat hurriedly without sufficient preparatory cultivation. The outturn was still further reduced by lack of cold weather showers and later by heavy showers of rain and hail in February, this being particularly the case in the plateau districts.

The farms at Tharsa and Sindewahi which have been let out to licensees on rents of Rs. 1,300 and Rs. 1,050, respectively, were cultivated under the new conditions for the first time during the past year and

yielded satisfactory returns, the total receipts credited into the treasury on account of these farms being Rs. 5,494 and Rs. 6,231. Implement depôts are, however, still maintained at these farms, and the sales amounted to over Rs. 10,000 in each case. Two crops, which have received more attention in the circle during the past year than formerly, are sugarcane and potatoes. In the case of the former, the manufacture of sugar by small centrifugals was carried out by the licensees of the Tharsa and Sindewahi farms, also by the Balaghat tahsil agricultural association at Lanji and by the department on the Betul farm. As the figures available are for one year only and as the plant employed was not always working to the highest degree of efficiency the results cannot be considered as more than tentative but the experience gained has been valuable and it certainly appears that when properly conducted sugar-making on co-operative lines will improve the financial position of the small cane growers of these tracts. This statement has, however, to be made with some reservation since the establishment of sugar factories on a large scale in other parts of India where cane can be grown under favourable conditions may affect the selling price of the local product. Two small power cane-crushers manufactured by the Kirloskar Company of Satara were supplied to the department and were found to crush cane efficiently and rapidly when compared with the ordinary bullock-driven iron mill. Two Coimbatore canes, Nos. 210 and 237, appeared to be particularly suitable for *gur* and sugar-making. The former, an early maturing variety, has practically established itself in the cane-growing areas of the Southern Circle, and if this is grown with No. 237, a late maturing type of fair yielding capacity but producing *gur* of high quality, the work of *gur* or sugar-making can be continued throughout the season while, as they both ratoon well, they are much appreciated by the poorer class of cultivator. In the Betul district the cane which has been grown hitherto is C-219, and although this has given satisfaction in the past it will probably have to be replaced by another variety if the object in view is the manufacture of white sugar.

The other crop calling for remark is the potato. Since it has been demonstrated by the department that

potatoes can be stored with very little loss throughout the hot weather at such elevations as Tamia and Chhindwara and Khamla in Betul, there has been a great increase in the demand for good potato seed, applications for over 800 maunds of seed for planting in the *kharif* season of 1933 having been received in the Bhainsdehi tahsil alone. The *kharif* crop of potatoes can be only successfully grown in these provinces at a fair elevation and it would appear that the extension of this crop in the plateau area will give the cultivator a good money crop to rely upon and a distinct improvement over his usual crops of *kodon* and maize.

The seed distribution returns in this circle indicate that while there was considerable increase in the quantities of wheat, rice and cane setts distributed, there was a fall in the case of cotton and *juar*, the decrease in the amount of cotton seed distributed was mainly due to the rejection of the seed of those growers who on account of the previous unfavourable season preferred to leave their crops unrogued and so did not attain the desirable degree of purity.

The total value of implements sold in this circle amounted to Rs. 73,707 against Rs. 55,450 in the previous year. There was a slight fall in the sale of ploughs but a fairly large increase in the number of spare parts sold which indicates that cultivators are wisely taking steps to repair their old machinery rather than incur new capital expenditure. In the case of sugar mills, however, 170 were sold, a figure nearly double that of the previous year, and there was a considerable demand for *rahats* for irrigation purposes, 88 of which were taken by cultivators. In assisting local agricultural improvement the efforts of Waraseoni and Balaghat associations deserve mention as they have both done excellent work in hiring out cane mills and other implements and by general propaganda.

The officers of the department were closely concerned in the work of village uplift, particularly in the Betul and Chhindwara districts and special mention may be made of the enthusiasm shown by the Chaurai Association.

20. Western Circle.—The monsoon commenced in the third week of June and cotton sowings followed shortly afterwards, these being continued during the first week of July. The early sowings were distinctly the more successful, and on account of poor germination in part of the crop due to heavy and continuous showers the cotton crop in some cases was thin and had to be re-sown, while other areas were either sown with *juar* or left for *rabi* crops. Weather conditions during July and part of August interfered with weeding and intercultural operations but occasional spells of dry weather in August remedied this to some extent and prospects improved until the latter part of September when a long break in the rains affected the condition of the crop particularly on light soils. On the whole the cotton crop was below normal but *juar* gave satisfactory returns, while the groundnut crop failed to mature quite properly. Conditions were favourable at the time of *rabi* sowings and germination was satisfactory but the absence of cold weather rains and also of dew reduced the outturns. On the four Government farms in this circle *verum* cotton gave yields ranging from 374 to 409 lbs. per acre, groundnut from 608 to 1,148 lbs. and *juar* from 511 to 1,855 lbs. per acre.

The Basim farm was cultivated on the *batai* system by the local taluq agricultural association. Three Government departmental demonstration plots were at work in this circle and 13 private demonstration plots. The demonstration plot at Amraoti showed an excess of receipts over expenditure of Rs. 804 on an area of 39 acres. The Pusad plot only showed a bare profit of Rs. 9 over 33 acres. Of the 13 private demonstration plots in operation, 12 showed a profit but difficulty is experienced in working such plots as the owners will not always carry out the necessary operations in good time. The demand for pure seed of improved varieties of crops was particularly keen during the year under review. Seed distribution was carried on in close co-operation with revenue officers and seed of the value of Rs. 13,373 was distributed in the form of *taccavi* loans. The total number of seed farms in operation was 3,954, a figure slightly less than that of last year and the total quantity of seed distributed was 58,654 maunds against 74,764 maunds in the previous year. The difference in the figures quoted above can be attributed to the unseasonable

conditions of the previous year which made it difficult to secure a sufficient supply of seed of the requisite standard of purity. The work of seed distribution in this circle occupies a very large part of the time of the staff of the department, and although it may interfere with demonstration and other propaganda work, its magnitude indicates that it is an essential part of the department's activities.

The general fall in the prices of cotton has led to an increase of the area under groundnut, the popular varieties being Spanish peanut and Small Japan. The departmental variety, Akola No. 10, is a heavy yielder and is particularly suited for eating purposes. The acreage under groundnut in Berar in the year 1922-23 was only about 2,529 acres, the figures for the year 1931-32 was well over one lakh of acres with the result that a number of mills and oil expellers for extracting groundnut oil have been established. This is all to the good as groundnut cake is a valuable cattle food and should certainly be retained in the country. Due to economic depression the sale of implements in this circle has fallen considerably and only 611 ploughs were sold in comparison with 933 in the previous year. As in the case of other circles however the sale of spare parts has gone up but it could not be expected that the sale of implements under present circumstances would approach those of the days when cotton was obtaining a high price.

The departmental staff took part in a campaign to control the sudden outbreak of damage by rats and the experience gained will be of value should the pest again make one of its unforeseen appearances.

Twenty-four taluq agricultural associations are in operation in the circle, while, in addition there are eight agricultural societies and eight branch associations working in inaccessible places away from the larger towns. These institutions deal in agricultural implements, pure seed and other agricultural requirements, but on account of the general depression the business done during the year was relatively small. Such organizations are, however, a nucleus around which the general work of agricultural improvement can be concentrated. Few of them have, however, shown any enterprise in launching out into new directions for agricultural development, but exception

must be made of the Khamgaon and Chikhli associations which took part in the marketing of *verum* cotton contributed to the cotton pool. Unfortunately the frequent tendency of these associations is to look to Government officers to do everything and, in consequence, a spirit of co-operation and self-reliance is often lacking.

21. Eastern Circle.—Following the break of the monsoon in the third week of June, rice and other *kharif* crops were sown under favourable conditions and germination was satisfactory. The rainfall in the latter part of August was insufficient and *biasi* operations were delayed in places and prolonged until the beginning of September. Good showers in September improved the general condition of the crops but a long break in the first three weeks of October proved very trying and the season on the whole was only fair for the rice crop, although late October rains improved the situation considerably. *Rabi* sowings were done rather hurriedly on unsatisfactory seed beds.

The seed and demonstration farms at Bilaspur and Drug produced satisfactory crops, in spite of adverse conditions the average outturn of paddy on these farms being 2,505 and 2,657 per acre, respectively. The Chandkhuri farm was not so successful, partly because sugarcane had to be grown on a somewhat unsuitable area. Four Government demonstration plots were working in the circle compared with the figure of 9 for the preceding year. Four plots were closed on the expiry of their leases but two were opened, one to introduce cultivation in selected tracts commanded by the Maniari reservoir and the other to determine the effect of irrigation on heavy black soils. Of the five well-established Government plots, four showed increased profits compared with the previous year but the two new plots will take a little time to get into condition. In addition to the departmental plots, 15 private plots managed by the owners under the supervision of the department were in operation. Largely owing to the facts that these plots can follow the custom of paying for labour in kind, that no time is wasted in bringing the land in condition and that no investment is required for buildings, they gave more satisfactory results than departmental plots and they all showed profits in the year's

working although the amount of profit varied considerably. Although these plots are of undoubted utility, the number which can be opened is limited by the departmental staff available for supervision. To demonstrate the value of irrigation, either alone or combined with improved seed and better methods of cultivation, 32 plots were worked by the department as against 26 in the previous year. Of these 20 were under the Kharung reservoir and 12 under Maniari. In the heavy soil area under the Maniari reservoir, irrigation alone gave an increased yield of 140 lbs. of paddy per acre and irrigation combined with improved seed increased the yield by 235 lbs. per acre. After taking irrigation and cultivation charges into consideration, the money value of the increase obtained works out to Re. 1-1-6 and Rs. 3-3-0, respectively. In the case of the area commanded by the Kharung reservoir, the soil is of a lighter description and transplantation was also demonstrated. The increases of crops due to irrigation alone, irrigation combined with improved seed and irrigation combined with improved seed and transplantation were 395 lbs., 185 lbs. and 471 lbs., respectively. Expressed as cash after deducting the extra charges on account of irrigation and cultivation, the benefit resulting to the cultivator works out at Rs. 4-4-6, Rs. 2-12-5 and Rs. 3-13-9 per acre, respectively. The demand for improved varieties of paddy seed continues to increase and the varieties of *Surmatia* and *Ludko* which have been added to the standard varieties have given satisfaction. Estimated on the basis of seed supplied directly the areas under improved paddy varieties and wheats during the season under review were 234,723 and 15,730 against the figures of 183,819 and 13,096 acres in the preceding year. There are considerable areas also under improved seed of cotton, *tur*, *juar*, groundnut and sugarcane. Taking the average increase in yield which is known to accrue through the use of improved varieties, the value to the cultivators of the area shown above is estimated at a little over 9 lakhs of rupees. Arrangements for the distribution of seed continue to be made to a large extent through village seed unions of which 223 were working at the close of the year against the figure of 210 for the preceding year. Ten of these unions are sufficiently large in the scope of their operations to secure registration under the Co-operative Societies Act.

In this circle implements to the value of over Rs. 20,000 were sold, a figure nearly double that of last year. The sale of iron ploughs and cane mills was quite satisfactory and the number of spare parts which were sold showed a distinct increase.

One of the interesting features of recent work in Chhattisgarh has been the efforts made to follow the example set on Government farms in planting fruit trees. Special attention is being paid in this circle to concentrate work in individual villages in order to find out new avenues in agricultural practice whereby the income of agriculturists can be increased.

22. Northern Circle.—This circle as now constituted includes the whole of the Jubbulpore civil division and affords very full employment for one Deputy Director. The season of 1932-33 cannot, on the whole, be described as very satisfactory. *Kharif* sowings were delayed somewhat but germination was fair. Heavy and continuous rain in July interfered with the intercultivation of crops sown in lines, *i.e.*, cotton and *juar*, while the weeding of the paddy crop could not be carried out effectively. This state of affairs was remedied to some extent by a welcome break in August but the year's experience to some extent supported the contention of a certain number of cultivators in the north of the province that *kharif* crops are not sown in lines since the weeds grow so thickly that bullock hoes cannot be used. This objection cannot, however, be taken too seriously, as with most agricultural operations timely interculture and the seizing of favourable opportunities are two secrets of success. The rains ceased somewhat abruptly in September, and while this was prejudicial to *juar* and paddy crops it suited *verum* cotton so that this strain regained some of the ground it had lost through unfavourable season in previous years. *Rabi* sowings were only fairly satisfactory and were generally carried out early except in Damoh where some delay was caused by late rains. A fair germination followed so that a good *rabi* season was expected but no early cold weather rains were forthcoming and the chances of a good crop were thereby reduced. For the circle as a whole *rabi* crops were fair, particularly in the Hoshangabad district of the Nerbudda valley proper, although remission on account of damage by hail had to be given in the Gadawara tahsil. A good

deal of damage was also done by unseasonable weather in Mandla and adjoining parts of Jubbulpore, also in the Satpura hill tracts. Towards the end of the cold weather and too late to be of value to the growing crop a certain amount of rainy and cloudy weather was experienced and this was followed by the usual trouble of rust and insect pests. Fortunately, on the whole, the damage came about harvest time when the crops were on the threshing floor and not in the fields, but the effect on prices of staple crops was to keep them steady so that the usual drop in prices immediately after harvest was not experienced. In his survey of the conditions in the north of the province the Deputy Director makes the interesting observation that what is distressing the cultivator most during the present difficult times are not the legitimate charges on the land such as land revenue, but the numerous items of expenditure he must meet and which can scarcely be called *bona fide* or necessary but which he must pay according to the prevailing customs of the country; in other words, the grower must get a greater share in the final price obtained for his produce. In order to achieve this end improved methods of marketing appear to be called for and a stimulus is being given to this aspect of agricultural development by the success achieved by the department in the marketing of *verum* cotton. It is doubtful, however, whether the Agriculture Department could undertake the organization of a "wheat pool" on the lines it has followed successfully in the case of a definitely superior class of cotton grown over a limited area, and in any case the present strength of the departmental staff would be insufficient to cope with such a scheme. The first essential would be the grading of produce, and the operations involved in grading the ordinary mixed wheat produced in the Nerbudda valley would be of a very different order to those necessary in dealing with a pure type of cotton. It is also very evident that any extension of marketing operations will mean that the departmental section for Economics and Marketing, which has had to be held in abeyance on financial grounds, will have to be resuscitated and even the extension of pools for the marketing of cotton cannot be contemplated with any degree of confidence unless the post of a Marketing Officer is made permanent.

During the year under review an old departmental wheat known as AO'0 (*Lal Kusalwallah*) gave the best results in the trying weather experienced in the Mandla district. The *Sherbati* wheats A113 and A115, which did so much better than AO'0 a few years ago, appear to be deteriorating and losing their rust-resistant properties. This is probably not due to any inherent deterioration in the strain itself but rather to the fact that the strain is becoming mixed with the result that many wheat crops which claimed to be *Sherbati* are probably not that strain of wheat at all but an unknown mixture containing a certain percentage of *Sherbati*. Every effort is, therefore, being made at the main wheat farms of Adhartal and Powarkhera to re-select wheats A113 and A115 and to maintain a pure stock, but it is obvious that much more work on the botanical side is required. It must be admitted that the department has not been able to show so much progress in the production of superior strains of wheat as it has done in the case of cotton but this is no doubt partially due to the fact that, for some time, the botanical staff has been reduced to meet the financial position and no full-time botanist has been employed for crops other than cotton and those grown in rotation therewith.

The *kans* problem in the Saugor district, the most northerly portion of the circle, is still of some importance, for the trouble is largely due to the fact that it is difficult to make the cultivation of wheat remunerative at present prices. The departmental method of *kans* destruction, *i.e.*, a cultivated fallow, is quite sufficient for adoption by local cultivators if the growing of wheat or any other *rabi* crop is sufficiently profitable.

Cotton is only of importance in this circle on the south-western side and the second largest cotton pooling centre during the past season was at Burhanpur in the Nimar district. A certain interest was shown in *huri* cotton which is grown to some extent round about Burhanpur. The present strain of *huri*, although a fair staple, is brittle and generally considered inferior to *verum*. An improved strain has been evolved by the Botanical section at Nagpur and this is undergoing test on a field scale in Nimar, a good deal being hoped from it.

The *barhi* system for the supply of wheat seed is not being extended at present as the scheme, although fundamentally a good one, has suffered somewhat from the unfavourable seasons experienced in the wheat tract in recent years. It is only in the old Hoshangabad district and parts of Gadarwara tahsil that the seed unions are working really satisfactorily and until the position is consolidated, expansion is inadvisable.

With regard to rice there is little to report. As already stated the season was not particularly favourable but all the same some really good crops of high grade paddy were produced on Government farms. A particularly good type of demonstration plot has been started at Silari near Pipariya, and is being worked in conjunction with the *gram sudhar* movement. The site is an old encamping ground of 64 acres. There are no expensive buildings or highly-paid superintending staff, the local demonstration jamadars being in immediate control of the farm under the general guidance and supervision of the Agricultural Assistant, Pipariya.

PART VIII.—HORTICULTURAL GARDENS AND ARBORICULTURE

23. As there is no gazetted officer now in charge of these operations the provincial gardens are managed by their respective superintendents under the general guidance and control of the Director. The Deputy Directors and their assistants inspect such district gardens as are under departmental supervision.

At Nagpur the weather was favourable throughout the year for gardening work and an ample and even distribution of rain economized the supply of water in Telinkheri reservoir. The total sales from the Maharajbagh and subsidiary gardens amounted to Rs. 12,763, an increase of Rs. 1,000 on the previous year's figures. The expenditure was Rs. 33,653, a decrease of over Rs. 4,000 compared with the year 1931-32. These figures indicate that considerable efforts were made to maintain the gardens on economical lines. A fairly large proportion of the receipts comes from the fruit garden which is now well established. The vegetable area is only sufficient to afford a training in the culture of vegetables to the boys of the *mali* class and to obtain seeds

for sale. A greater income from this source is only possible with a larger area and a more ample and certain water-supply. That the gardens are generally well maintained and are a source of pleasure to a large number of visitors, those who had the opportunity of seeing them, particularly the Telinkheri garden during the visit of His Excellency the Viceroy in the cold weather, will testify.

As regards arboriculture work over 100 trees have been planted in the Nagpur civil station area during the season under report but the main operations have been in the pruning and maintenance of existing avenues. It is proposed to plant on a larger scale in the near future.

Of the gardens at Pachmarhi little need be said. They enjoy special facilities regarding climate and market and pay their way. The appearance of the main garden at Pachmarhi at most times of the year, and particularly in the early hot weather, is a source of considerable pleasure to all who visit that hill station.

The district gardens have been run on the most economical lines, although it must be admitted that this is often done at the expense of their appearance and by growing remunerative crops. The gardens at Raipur, Drug, Seoni, Bhandara, Buldana and Betul showed improved financial results, the ratio of receipts to expenditure being increased. The gardens at Drug, Seoni, Bhandara and Buldana were worked at a profit, while the receipts at Mandla almost met the expenditure. The cost of the gardens at Akola, Amraoti and Yeotmal are less than the limit prescribed by Government for district and divisional headquarters gardens and still better results are expected. Arrangements have been made to hand over the Khandwa garden to the Jail Department as has been done at Chhindwara.

The water-supply at the Bhandara garden has been improved, while steps are being taken to repair completely the damage done at Buldana by floods a few years ago.

24. I cannot close this report without expressing some regret that it is the last I shall write. Since I first held charge of the office of the Director of Agriculture in 1920 the department has increased its activities in

many directions and has, I believe, made many friends amongst the agriculturists it exists to serve. That the financial position of the province has necessitated some retrenchment in recent years has been a source of disappointment to all who have worked in and with the department. I am convinced, however, that during the 27 years or so of its existence it has been organized and developed on sound lines and need fear no comparison with any other Agricultural Department in India. When more prosperous times return, as everyone interested in the welfare of the agriculturist hopes they will at no distant date, the Central Provinces Department of Agriculture will, I am confident, once again extend its activities to meet the further demands which will then be made upon it.

F. J. PLYMEN,
Director of Agriculture,
Central Provinces.

STATEMNET A

Name of circle.	Bulls.	Bullocks.	Cows.	Ma'e buffaloes.	She-buffaloes.	Young stock of cows and buffaloes.	Total for 1932-33.	Total for previous year.	Remarks.
1	2	3	4	5	6	7	8	9	10
Western Circle	2	52	20	...	...	...	74	26	
Northern Circle	4	7	8	...	...	3	22	39	
Southern Circle	17	...	4	11	...	...	32	52	
Eastern Circle	15	11	1	1	...	1	29	22	
Agricultural College	...	...	3	4	2	12	21	61	
Total	38	70	36	16	2	16	178	200	
Total for previous year	54	19	69	3	4	51	...	...

STATEMENT B

Name of circle.	Number of private seed farms and unions.							Total for 1932-33.	Total for 1931-32.
	Wheat.	Rice.	Cotton.	Juar.	Groundnut.	Sugarcane.	Other crops.		
1	2	3	4	5	6	7	8	9	10
Southern Circle ...	960	1,233	521	28	138	436	42	3,358	3,751
Western Circle ...	588	...	1,237	443	1,686	...	15	3,969	4,096
Northern Circle ...	3,536	587	726	388	536	...	1,640	7,413	8,074
Eastern Circle ...	613	1,858	...	...	29	29	5	2,534	2,433
College Farm, Nagpur ...	...	...	...	...	...	...	...	...	...
Total ...	5,597	3,678	2,484	859	2,389	465	1,702	17,274	18,354
Total for previous year ...	6,218	3,373	4,215	1,637	2,156	...	1,355	...	...

STATEMENT B—concl'd.

Name of circle.	Seed distributed in maunds and canes.								Total for previous year.
	Wheat.	Rice.	Cotton.	Juar.	Groundnut.	Cane.	Other crops.	Total for 1932-33.	
1	11	12	13	14	15	16	17	18	19
Southern Circle ...	38,667	37,540	4,428	487	81	1,168,778	315	81,518	76,735
Western Circle ...	3,512	...	16,555	5,001	32,640	...	945	58,653	74,861
Northern Circle ...	140,550	9,145	17,848	1,759	33,335	719,400	...	202,637	218,028
Eastern Circle ...	10,235	92,155	6	2	110	99,341	...	102,508	107,463
College Farm, Nagpur ...	19	...	48	7	2	...	21	97	372
Total ...	192,983	138,840	38,885	7,256	66,168	1,987,519	1,281	445,413	477,459
Total for previous year ...	193,036	135,831	70,079	12,174	66,279	1,179,863	60	...	...

STATEMENT C

Name of circle.	Approximate area in acres sown with improved seed from private seed farms and other sources.					
	Wheat.	Rice.	Cotton.	Juar.	Groundnut.	Other crops.
1	2	3	4	5	6	7
Southern Circle ...	131,065	145,419	103,610	14,005	9,117	7,713
Western Circle ...	5,013	<i>Nil</i>	189,077	102,814	96,815	...
Eastern Circle ...	15,730	234,723	31	25	3,178	3,236
Northern Circle ...	307,124	20,139	104,047	21,104	19,132	69,094
Total ...	458,932	400,281	396,765	137,948	128,242	80,043
Total for previous year ..	427,992	336,267	558,169	117,192	127,393	25,519

STATEMENT C—concl'd.

Name of circle.	Total for 1932-33.	Total for previous year.	Approximate value of the increased outturn resulting from use of improved seed for	
			1932-33.	1931-32.
1	8	9	10	11
			Rs. a. p.	Rs.
Southern Circle ...	410,929	416,760	19,15,000 0 0	18,59,252
Western Circle ...	393,719	521,322	13,14,176 0 0	35,87,320
Eastern Circle ..	256,923	202,820	9,22,959 6 9	9,41,326
Northern Circle ...	540,640	451,631	10,25,927 0 0	4,66,219
Total ...	1,602,211	1,592,533	51,78,062 0 0	68,54,117
Total for previous year ...	1,592,533	...	68,54,117 0 0	...

STATEMENT D

Name of circle.	Number of implements and parts of implements.						Total number.	Total value in rupees.	Total value in rupees for previous year.
	Ploughs.	Cane mills.	Fodder cutters.	Akola hoes.	Other implements.	Spare parts.			
1	2	3	4	5	6	7	8	9	10
								Rs. a. p.	Rs. a. p.
Southern Circle ...	477	170	4	3	313	1,654	2,621	73,706 8 9	55,450 2 6
Western Circle ...	611	...	1	7	61	13,043	13,723	30,724 0 0	46,327 0 0
Northern Circle ...	708	33	5	24	822	3,667	5,259	55,704 0 0	49,032 0 0
Eastern Circle ...	39	37	5	1	63	141	286	10,159 13 11	20,046 3 9
College Farm, Nagpur ...	...	...	...	...	...	91	91	78 11 11	369 9 4
Total ...	1,835	240	15	35	1,259	18,596	21,980	1,70,373 2 7	1,71,224 15 7
Total for previous year ...	2,328	212	18	258	816	15,939	19,601	...	...

STATEMENT D--concl'd.

Name of circle.	Books sold.	Bulletins sold.	Total.	Total for previous year.
1	11	12	13	14
Southern Circle ...	38	365	403	448
Western Circle ...	60	936	996	366
Northern Circle ..	7	159	166	403
Eastern Circle ...	5	223	228	196
College Farm, Nagpur
Total ..	110	1,683	1,793	1,413
Total for previous year ..	185	1,228

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STATEMENT E

Name of circle.	Number of agricultural shows and fairs held.	Number of practical demonstrations carried out by the district staff.	Number of illustrated lectures given.
1	2	3	4
Southern Circle ...	15	1,356	106
Western Circle ...	9	1,500	325
Northern Circle ...	2	1,179	124
Eastern Circle ...	2	674	146
Total ...	28	4,709	701
Total for previous year ...	17	4,485	392

No. 1013-620-XIV

GOVERNMENT OF THE CENTRAL PROVINCES
 AGRICULTURE DEPARTMENT

Nagpur, the 5th September 1934.

READ—

Report on the working of the Department of Agriculture for the year ending the 31st March 1934.

RESOLUTION

In spite of the heavy retrenchment already effected in the staff, signs of progress were in evidence in all the principal activities of the Department of Agriculture during the year 1933-34. The number of seed farms was 18,843 (17,274) and the quantity of pure seed distributed, was 464,834 maunds (445,413 maunds). The increase is a welcome indication of the growing appreciation on the part of agriculturists of the superiority of improved seed and of their readiness to find money for it even with their reduced resources. The approximate area sown with improved seed was 1,693,812 acres (1,602,211 acres) and the value of the increased outturn resulting from the use of the seed is estimated at Rs. 54.08 lakhs (Rs. 51.78 lakhs). There was no falling off in the work of propaganda and demonstration and the number of practical demonstrations carried out increased considerably. The slight reduction in the number and value of improved implements sold was inevitable during the present depression. The institution of "farmers' days" on the Government farms and demonstration plots in Chhattisgarh and Berar is a happy idea; and Government hopes that this method of bringing large numbers of farmers into closer touch with the activities of the Department will be used more extensively.

2. Research work continued on well established lines and Government is pleased to note that the botanical section is within sight of giving to the growers of wheat improved strains which, in addition to being more

productive, will free them from the losses caused by rust. The cultivation of linseed has received an impetus from the Ottawa Agreement, and as the Central Provinces is the largest grower of this crop in India, every effort should be made to obtain for the grower in this Province a share of the increased trade. This can only be done by the replacement of the present poor yielding varieties by higher yielding and rust resistant types. Government is pleased therefore to note that extensive and intensive trials are being conducted by the Department, and trusts they will bear early fruit.

3. Cotton remained in the forefront of the research programme of the Department. Government has read with interest that new strains of *verum* have been developed which are expected to stand up to more adverse weather conditions, and hopes that the results will be consolidated. It is also gratifying to note that the scheme for the marketing of *verum* cotton continues to work successfully, and that it put into the pockets of the growers who participated in the scheme an additional income of Rs. 1½ lakhs. This scheme has certainly passed the experimental stage and its success and possibilities have been demonstrated beyond doubt. Government hopes that private organizations will now take over this work and extend the area of its operations so that all cotton growers may receive their due share of the final price of their produce. On the recommendations of the Indian Central Cotton Committee a scheme has been accepted for a large extension of the area under *verum* cotton, which will widen the market for Central Provinces cotton and make it more independent of a single main purchaser. Government has, however, read with concern the remarks of the Director on the adulteration that has begun to take place with *verum* cotton, and trusts that all who have the welfare of the cotton grower at heart will set their face against the practice and do everything in their power to discourage it.

Government will watch with interest the course and results of the propaganda for the further extension of the cultivation of groundnut, particularly, as a rotation crop in the cotton tracts. The new rice research scheme is working in full swing.

4. Government fully realises that the maintenance of the present level of activity and efficiency in carrying

out the demonstration and research work has been rendered possible by the special staff financed from funds provided by the Indian Central Cotton Committee and the Imperial Council of Agricultural Research. Government records its gratefulness to these bodies for their assistance and is pleased to note that several fresh research schemes have been submitted to them. They deal with problems the elucidation of which is calculated to add considerably to the prosperity of the cultivators.

5. The Agricultural College had a successful year. Its passed students included several from other provinces and Indian States, and the utility of the institution has begun to extend beyond the boundaries of the province. Government trusts that the proposal pending before the University for instituting a post graduate degree for research in agriculture will serve as a stimulus to specialization. The various other concessions by virtue of which the degree of the college will cease to be the blind alley it has been felt to be, should attract students with the best calibre to agricultural education and it is hoped more of them will now make practical use of the knowledge they acquire.

6. Much credit is due to all ranks of the staff who by their intensive efforts have partly made up for the curtailment in the strength of the Department. Mr. Plymen retired during the year after a distinguished career, and Government reiterates the tribute paid to him in the resolution of the previous year. It also records its appreciation of the initiative, vigour and enthusiasm with which Mr. Ritchie, the new Director, has set about his duties.

ORDER.—Ordered that a copy of this resolution, together with the enclosure, be submitted to the Government of India in the Department of Education, Health and Lands (Agriculture), that copies be forwarded to the Director of Agriculture and to all Commissioners of Divisions and Deputy Commissioners for information and guidance; and that it be published in Part I of the *Central Provinces Gazette*.

By order of the Government.
(Ministry of Agriculture),

R. N. BANERJEE,
Revenue Secretary to Government,
Central Provinces.

No. 2429

FROM

J. H. RITCHIE, ESQ., M.A., B.SC., I.A.S.,

DIRECTOR OF AGRICULTURE,

Central Provinces.

TO

THE REVENUE SECRETARY TO
GOVERNMENT,*Central Provinces.**Nagpur, the 19th June 1934.*

SIR,

I have the honour to submit, herewith, the report on the working of the Department of Agriculture, Central Provinces, for the year ending 31st March 1934.

I have the honour to be,

SIR,

Your most obedient servant,

J. H. RITCHIE,

Director of Agriculture.

REPORT ON THE WORKING OF THE DEPARTMENT OF AGRICULTURE, CENTRAL PROVINCES, FOR THE YEAR ENDING 31st MARCH 1934

PART I—ADMINISTRATION

Mr. F. J. Plymen held charge of the Department from the 1st April 1933 to the 13th October 1933 when he proceeded on leave prior to retirement. I took over from Mr. Plymen on the 14th October 1933 and continued to hold charge for the remaining period of the year.

2. Expenditure on the Department during the year amounted to Rs. 9,46,967 which included Rs. 63,035 on botanical and other gardens, Rs. 51,405 on cotton work, Rs. 19,108 on the rice research scheme and Rs. 10,683 on a Cotton cost enquiry scheme. Receipts amounted to Rs. 2,30,909. The net expenditure on all branches of the Department's activities thus amounted to Rs. 7,16,058, but of this a sum of Rs. 81,196 was received as contributions from the Indian Central Cotton Committee and Imperial Council of Agricultural Research and expenditure from provincial funds reduced accordingly.

PART II.—AGRICULTURAL EDUCATION

3. The two year certificate course continued to be held in abeyance during the year. It is doubtful if it will ever be revived unless a demand springs up for a thoroughly practical and comparatively inexpensive education for those desirous of returning to the land. There is little prospect in future of employment in the Agriculture Department for men so trained except perhaps in the role of agricultural jamadars. Sixty-five applications were received for admission to the first year of the Degree Course, of whom 37 were finally admitted and 31 finished the year.

The number of students in the different years was—

Class.	Number on roll at the end of July 1933.	Number in examination.
1st year ..	36	31
2nd year ..	29	24
3rd year ..	34	31
4th year ..	19	22
		(including 3 compartmentals).

Of the 31 on the roll at the end of the first year, 26 were promoted to the second year. In the second year, 22 out of 29 on the roll appeared for the Intermediate examination and with two compartmentals from the previous year, secured three first division passes, nine second divisions, three passes and one compartmental. In the third year, 29 out of 34 students were promoted and of these 3 failed by a narrow margin and will be permitted to sit at a special promotion examination in June. In the fourth year, 19 students, plus three compartmentals, appeared for the B. Ag. degree and 19 qualified. Two passed in the first division, 12 in the second, one in the third and four secured a pass, while one was granted a compartmental.

The third and fourth year classes made their customary tours in the wheat and rice growing tracts respectively. The second year students visited the farm of Mr. Pandit of Bhandara to study sugarcane cultivation. The Examiner in Intermediate Agriculture pointed out that the class was weak in the practical side of rice cultivation and suggested that more extensive touring in the rice-growing tract was necessary. This will necessitate larger provision under travelling allowance.

4. It is pleasing to record that several handicaps under which students and graduates in agriculture have laboured in the past have been removed by the University authorities. In the first place graduates in agriculture are now eligible to proceed to the course qualifying for the LL. B., a decision of the Executive Council which is important—more because it removes an undesirable and unfair discrimination against the College of Agriculture than because of the prospect that large numbers of trained agriculturists will take to the profession of Law. The Academic Council of the University has also accepted in principle a resolution framed by the Faculty of Agriculture recommending the institution of a degree of Master in Agriculture. This degree will, it is hoped, encourage specialization and research in the agriculture sciences. The minimum percentage of marks for a first division pass in the Inter and B. Ag., examinations has been reduced from 66 per cent to 60 per cent of the aggregate, thus removing another grievance of agriculture students. The recent amendment by the Local Government of paragraph 13 (1) (d) of the Revenue Book Circular V-1 clarifying the position regarding the eligibility of B. Ags. for appointment

to the Subordinate Civil Service has made this decision a very important one because in making appointments the division in which a candidate has taken his degree carries great weight and agricultural graduates will now be able to compete on equal terms with other graduates. Another concession obtained during the year was that students securing a compartmental pass in the Intermediate examination are now permitted to keep terms for the B.Ag. examination on condition that they pass the Intermediate examination before appearing for the B. Ag. This privilege prevents the loss of a full year to a student securing a compartmental.

This year students were for the first time required to pay for accommodation in the hostel at the rate of Rs. 20 per annum but as an offset, the Local Government extended to the sons of *bona fide* agriculturists studying in the College the same concessions in respect of tuition fees as that granted to students studying in other Colleges, *viz.* a reduction amounting to one-third of the normal fees.

5. Government securities of the face value of Rs.1,000 were purchased from contributions by past students and members of the Department of Agriculture to endow a gold medal at the University to commemorate the late Mr. H. R. Chakradeo, Principal of the Agricultural School till 1906, and later Assistant Professor of Agriculture at the College of Agriculture till 1913. The medal will be awarded to the candidate for the B. Ag. degree who secures the highest aggregate of marks in the first division.

6. The Powarkheda Agricultural Anglo-Vernacular Middle School started the session with 58 boys on the roll. Forty-two applications for admission to Class V were received but only 27 boys were admitted to Class V and five to Class VI. The term thus commenced with 90 boys, of whom 9 left during the course of the year. Forty were the sons of malguzars and 41 the sons of cultivators. Hoshangabad district provided 78, Nagpur 2 and Damoh 1. There were 28 Brahmins, 9 Rajputs, 8 Raghuwansis, 15 Kurmis, 16 others and 5 belonged to the depressed classes. The total value of the produce grown by the boys on their own plots was Rs. 295-12-0 which was divided amongst the students or consumed in the different messes, of which there were three—one cash and two ration paying. Charges in the cash mess ranged between Rs. 4 and Rs. 4-4-0 per

month. Twelve boys were sent up for the High School Scholarship and Entrance Examination and passed. Expenditure on the school amounted to Rs. 7,474 with receipts at Rs. 2,081. Divided over the 81 students, the annual cost per head was Rs. 54 which is Rs. 11 per head less than in 1932.

7. The Peace Memorial School, Buldana, was opened in 1929 to provide a practical training in Agriculture and allied subjects to the sons of *bona fide* agriculturists who have passed either the Vernacular VI or English II standard. The school is maintained from the funds collected as a Peace Memorial. The management of the school and the hostel attached is in the hands of a committee appointed for the purpose, while the Department provides free training. At the time of admission every student is made to understand that he is being trained for work on his own land and not for service. The teaching is carried out by the Farm Superintendent and two overseers on the Farm. Sixty applications were received for admission into the first class, of which 20 were accepted by the Selection Committee and 14 stayed the course. There were nine boys in the second year. All the boys received stipends.

8. The management of the Anglo-Vernacular Agricultural Middle School, Betul Bazar, remained under the control of the district council who added one more English teacher trained in Agriculture to the staff during the year.

PART III.—RESEARCH AND EXPERIMENTAL WORK.

9. **Chemical Section.**—In addition to the routine analyses of 222 samples of soils, manures, fodders, oilseeds water and milk, special investigations were conducted into the nutritive value of common grasses, the preparation of mineral brick licks, the availability of soluble phosphatic fertilizers in typical rice and cotton soils of the Central Provinces, the determination of phosphoric acid in soils, the mineral analysis of the clay fraction from typical Central Provinces soils. Minor investigations were also made to test the effect of the time of application of green manure on the yield of paddy in *matasi* soil, the effect of varying concentrations of sodium chloride and sodium carbonate on the growth of cotton in black cotton soil, the inoculation of leguminous seeds with nodule bacteria and nitrogen fixation *kharif* and *rabi* legumes.

The section continued to be in the unsatisfactory position of not having a permanent head, the result being that it was impossible to embark on any item of research necessitating any lengthy period of time.

10. Mycological Section.—Diseases of cotton; ground-nut, rice, juar, gram, chillies, tomatoes, potatoes, citrus, pan and coffee were investigated in different parts of the province and in many cases an effective cure was recommended. Trials of several proprietary fungicides and home-made Bordeaux mixture were carried out.

11. Entomological Section.—Carbon bisulphide is becoming popular amongst orange growers for controlling the orange tree borer (*Indarbela quadrinotata*) and a demand sprung up for this insecticide during the year. Fumigation with Sulphur Arsenic has given good results in the destruction of the mound building termites. Grasshoppers in Bhainsdehi tahsil were controlled by the use of field bags and the demonstrations were attended by large numbers of cultivators from 58 villages. Damage to standing wheat and peas by field rats was controlled by strychnine sulphate baits. A close study of the *moorda* disease of chillies showed that it is caused by three different organisms, one of which is caused by mites. This type of *moorda* can be controlled by lime-sulphur.

12. Botanical Section—Cotton.—Research work on cotton continued to receive a substantial grant from the Indian Central Cotton Committee and the year under review was the last year of the second quinquennium for which the scheme was sanctioned. In addition to cotton are included those crops which are usually associated with cotton in rotation, *viz.*, groundnut and *juar* and also all cultural operations connected with them. The year's results confirmed the previous findings of the suitability of a 3-course rotation and in order to induce growers to adopt this practice, considerable headway has already been made by the dissemination of leaflets and by holding demonstrations. A much more vigorous propaganda is necessary, however, before the system becomes part and parcel of the growers' practice. The chief drawback to the growth of groundnut has been the high lifting charges and this section has now devised a suitable lifter which effects a saving of Rs. 5 per acre and should help to make the crop more popular. The low prices received

during the last few years for agricultural produce has brought the question of economic production even more to the front than ever before. Successful results have been achieved in the preparation of cotton stalks as manure and the simplicity of the method devised on the Akola farm has appealed to the cultivator and is likely therefore to be extensively used.

The work on cotton was mostly concerned with the testing and multiplication of the two new strains—late *verum* and V-434. The latter was conspicuously successful under the most widely divergent conditions. It possesses, in addition to wilt resistance, drought resistance, prolific flowering capacity, quickness in forming buds and setting fruit, excellent lint characters and good ginning percentage. Eight bales produced on the Akola farm were sold to the Empress Mills, Nagpur, at Rs. 230 per *khandi* on the day when V-262 fetched Rs. 208 and late *verum* Rs. 220. It has been specially selected for areas of short duration rainfall. Seed sufficient for 2,000 acres has been obtained.

The results of experiments with late *verum*, which is suitable for areas of late rains, were in keeping with those of previous years. In view of the large demand for seed, it was decided to multiply this strain as much as possible. Seed for 16,000 acres is available. Work on *bani*, E-B-31 and *bani* 306 was continued and new selections have been made in the event of a demand springing up for a cotton which can only be grown with profit if the spinner pays a price more commensurate with its value. Work on Chanda *jari* consisted in the isolation of high yielding strains from the white linted types. 80 lbs of a white linted strain were handed over to the Deputy Director of Agriculture, Southern Circle, for distribution.

Attention was also paid to acclimatized *buri* (*Gossypium hirsutum*) owing to a demand for this variety from Burhanpur. Small scale trials of three types—AK-Special, Nos. 84 and 107—were carried out at Burhanpur. AK-Special appeared to be the best. An effort is being made to obtain stronger fibre the chief defect of this variety being the weakness of its staple.

Hybridization work was continued on the same lines as in previous years, and a number of new crosses was made including E-B-31 \times *bishnoor*, *roseum* \times *bishnoor*, *verum* \times *roseum* and *malvensis* \times *roseum*. Some *G. indicum* \times *G. cernuum*

crosses appear to be promising and have shown great resistance to wilt. The purification of these is in hand and only those which show uniformity of lint and good ginning percentage will be retained.

13. Groundnut.—This crop is dealt with by the Cotton Section, being one of the rotation crops of cotton. Selection and hybridization work were continued. AK 12-24 was distributed for the first time during the year and met with marked success. Both from the point of view of the grower and the miller, it is a good variety. A new selection—AK 8-11—gives promise of being a heavy yielder and will be developed to a field scale as rapidly as possible. The importance of the groundnut crop to Berar cannot be overrated and it is pleasing to record the steady increase in area. This, however, is still far below what is necessary to ensure the best results from both the cotton and *juar* crops and intensive propaganda must be carried on to increase the area.

14. Juar.—*Juar* was also dealt with by the Cotton Section. 89 new selections were grown in single line cultures and selections of desirable ones made. In the varietal trials No. 121-A and E.B. 1 again stood out prominently. No. 33—a variety with white grain—shows considerable cropping performance and is being developed for Nimar district where a white *juar* is favoured.

15. Bajra.—*Bajra* is the last of the crops which have been allotted to the Economic Botanist for cotton. 139 single lines were sown for test of purity and yield but only five were found to breed true, thus showing the difficulty of obtaining pure crops, despite continuous selfing. Six new selections were tested on the Akola farm.

16. Research work on the crops dealt with below is normally carried out by the Second Economic Botanist but owing to retrenchment the post continued to be held in abeyance during the year, and the Economic Botanist for cotton was placed in charge of the current duties of the office. This section is also responsible for the teaching of botany to the students of the Agricultural College.

17. Wheat.—The chief work with wheat is the production of rust resistant, high yielding types for the main wheat growing part of the province, and early maturing, hard, awned strains for the south. The work has now

reached a stage when it can be confidently stated that the desired types have been found and will be available for distribution in a year or two. Ten new strains were tested at Kheri farm against A-115 taken as a standard and four stood out prominently. The seed of these strains has been handed over to the Deputy Director of Agriculture for multiplication and testing on a large scale. Similar results were obtained at the Powarkheda farm where two gave excellent performances. One in particular survived a heavy hail-storm and would thus seem suitable for tracts habitually subject to such destructive agencies. Six selections of *hawra* were tested for yield by the check board method and two stood out prominently. The seed of these two selections will be multiplied up as rapidly as possible. Sixteen crosses were grown in the F-1 generation. Most of 150 lines in the F-4 generation bred true to the desired characters with some promising results. Selections from these will be grown for another year before a final decision is arrived at.

Three Pusa wheats—P80-5, P111 and P114—proved higher yielder than local *Hawra*, and the last will be grown on a larger scale next year. P80-5 and P111 are unsuited to the main wheat tracts of these provinces because of their awnlessness.

18. Linseed.—The Central Provinces has the largest area under linseed in India, but the yield is very poor. As a result of the Ottawa agreement, Indian linseed receives a bounty of 10 per cent when imported into Great Britain. This has given a distinct impetus to the growth of the crop and the Department has been endeavouring to obtain for the grower by crossing and selection high yielding, rust resistant, early maturing types. In comparative trials, E.B.3 again gave the best results. It is an early maturing strain and thus generally escapes rust which is the chief disease with which the grower has to contend. In addition it possesses a bold seed and has a deep well branched root-system which enables it to withstand drought. An increase of from 80 to 100 lbs. per acre over the local type can be confidently expected. Another selection—No. 30—has given a good field performance of 337 lbs. per acre. The chief work on this crop has been to evolve rust-resistant forms by hybridization. Attempts to introduce rust resistant Pusa forms and European flax have not been successful. A number of crosses between local varieties and Pusa rust

resistant strains and European flax were tested in the F-3 and F-4 generations at Kheri. Three gave very promising results. The fixed crosses amongst these will be tested next year. Three strains from crosses of local and Punjab linseed were tested for yield against E. B.-3 on the Powarkheda farm and one gave very good results. Four varieties received from Pusa, 5 from Bombay and several from Morocco, Iraq and the United States of America did not reach the yield of E. B.-3. Some of them however may prove useful as parents for hybridization. A study of the inheritance of certain characters is also being made and the root systems and effect of manures on root development are being studied. It has been found that nitrogenous manures produce shallow roots while phosphatic manures promote deeper penetration.

19. Rice.—As was pointed out in last year's report work on rice in the province assumed a new aspect with the starting of a rice research scheme financed by the Imperial Council of Agricultural Research. The staff consists of a bio-chemist, botanist and two upper subordinate assistants. Considerable work was entailed in fitting out as laboratories old buildings on the Labhandi farm for the chemist and botanist before actual work could be started. The chemical side devoted itself to collecting and analysing typical soils from the rice tracts of the province in an attempt to correlate yield with the soil types. A study will also be made of soil profiles in the important rice tracts to arrive at conclusions regarding the manurial requirements of the different paddy soils. The physical and chemical composition, reaction, *humus* content, C/N ratio and micro-bacteriological activities of the different classes of soils will also be studied. The botanical side confined itself to collecting varieties from different parts of the province, of which 1,299 were received through the help of the staff of the department. Some of these being duplicates of the approved varieties evolved by the Department were rejected as pure lines were already being maintained. The remainder were sorted out according to colour of glume and size and colour of kernel. They were then sown in lines and single plant selections will be made for the isolation of pure types. Nine crosses were made with *Nagkesar* as one of the parents with a view to imparting to the offspring the red colour of *Nagkesar* as an aid to the elimination of *karga* or wild rice in the

field. Crosses were also made between high yielding, weak-strawed varieties and lower yielding, strong-strawed types to obtain the desirable characters of each. The new section has been made responsible for all the experimental work on rice on the Labhandi farm during the currency of the scheme.

20. Til.—At present prices of agricultural produce, this is one of the most remunerative crops that can be grown in the province and an extension of area is desirable. Work on this crop consists in the production of high yielding strains, which are at the same time of good oil yielders. During the year 68 unit types from amongst the *kharif* varieties and about 300 single plants of *rabi til* were isolated. The seed of the best of these strains will be multiplied for distribution. Two types received from Pusa proved quite useless under the conditions prevailing in these provinces.

21. Minor oilseeds.—Work was started during the year on the selection of high yielding types of castor, mustard and rape. Samples were collected from all over the province. Castor showed much variation—both in agricultural and botanical characters.

Tur.—The classified types of this crop were maintained in pure culture. E. B.-3 *tur*, which is the best all round strain found up to date, was grown on a large scale to supply seed for distribution to growers and for the renewal of seed on Government farms. No. 38-7 again gave the best results as a wilt-resistant type. Six wilt-resistant types received from Pusa were found to be too late for this province, but proved useful as parents in hybridization work with E. B.-3 with a view to combining their wilt resistant character with the yield and earliness of the local varieties.

Chillies.—The work of classification was continued and a few high yielding strains were isolated.

PART IV.—AGRICULTURAL ENGINEERING

22. The Section continued to be under the administrative control of the Principal of the Agricultural College. Its activities were considerably restricted owing to a reduced budget grant, but 30 estimates for water-lifts, power plants for pumping, cane crushing, rice hulling and sugar making were prepared and 80 enquiries relating to technical work were attended to. Mechanics were also

deputed to repair the power plant on four Government farms and for one private owner. A new combined groundnut lifter and plough was made for the Economic Botanist for Cotton, which has proved very efficient. In addition to the usual work of preparing improved hoes, groundnut shellers, etc., 50 moulds for preparing mineral lick bricks, three trusses of 25 feet span, 500 feet of feed trough and material for the extension of the monkey house in the menagerie were prepared. Ten men were given training in oil engines and repairs to tractors of whom 8 received certificates of proficiency.

PART V.—ANIMAL HUSBANDRY INCLUDING CATTLE-BREEDING AND DAIRY FARMS

23. This Section continued to be in charge of a Provincial Agricultural Service, Class II, officer. The general policy of the Department in cattle-breeding is— (1) to improve the indigenous breeds of cattle by scientific breeding followed by rigid selection, (2) to create new breeds, if necessary, suitable to the several tracts of the province, (3) to test various fodders and forage crops, (4) to improve the quality and quantity of grasses in pastures and (5) to carry out research work in animal nutrition. This programme is carried out on 8 cattle-breeding and dairy farms in different parts of the province, five being under the direct control of the section, while the college dairy is under the Principal of the Agricultural College and two farms in the northern circle are under the Deputy Director of Agriculture.

The Telinkheri dairy farm in Nagpur consists of the well-known milch breed—*Sahiwal* or Montgomery, the foundation stock of which was obtained from Pusa and the Punjab. The intention underlying the importation of this breed was to acclimatize it, by further breeding and selection, to the food and other environmental conditions of the province for the production of milk in urban areas. The farm showed a credit balance of Rs. 4,230. The milk produced is sold through the agency of the Byramji dairy which had to report a loss in its trading account for the first time. This loss is more apparent than real, however, as the producers (members of the *Gaolis'* Society) who share the profit and loss of this institution received a higher rate for their milk than circumstances demanded. The *Gaolis'* Co-operative Society continued to make progress.

The share capital was raised from Rs. 3,400 to Rs. 5,100, of which Rs. 4,027 was paid up. Rs. 2,974 were added to reserve fund, making a total of Rs. 7,000.

The herd of cattle maintained on the Garhi farm in Balaghat district is the *Gaolao* with which line-breeding is followed. The herd is divided into two groups, sired by two unrelated pedigree bulls of known ancestry. The demand for bulls has fallen off considerably as a result of the general depression of agricultural prices. Eighteen bulls were sold at prices ranging from Rs. 130 to Rs. 175.

The two cattle-breeding farms in Berar, *viz.*, Ellichpur and Bod passed through a difficult year. No bulls were sent for sale from Ellichpur to the depot at Borgaon as some of the previous year's supply were still on hand. The herd at Ellichpur is a medium-sized strain of *Hansi-Hissar* imported from the Punjab—one of the best dual purpose animals in the country. Owing to the lack of demand for bulls, the opportunity is being taken to make a drastic reduction in the size of the herd, keeping only those animals which have shown a very good milking performance.

The Bod cattle-breeding farm in the Melghat was stocked by transferring cross-bred cows from Borgaon and Khandwa and by the purchase of local cows. The herd is sired by pure bred *Hansi-Hissar* bulls. Grade breeding and selection are the methods followed. It will be many years before the farm is in a position to issue bulls for breeding purposes by this method, but the general tone of the female stock will be graded up. Twenty-two young bullocks were distributed to various Government farms to find out their suitability for tillage operations and their adaptability to the food and environmental conditions.

The northern circle has two main farms—at Powarkheda and Richhai—and a subsidiary one at Ratona. The breed at Powarkheda and Ratona is pure Malvi and the method followed is selective breeding. The herd at Richhai in Jubbulpore district consists of cross-bred cows in the F/1 generation—cross between *Malvi* and *Sahiwal*—and further crosses between the crosses will be continued, the object being to produce a new type of dual purpose animal suitable to the tract.

Breeding work for the eastern circle is carried out at Pakaria in the Pendra zemindari in Bilaspur district.

Local animals are being graded up by crossing with a medium-sized *Malvi* bull—the aim being to produce a larger sized animal, but one not too big for the available food supply of Chhattisgarh. Twelve high grade bulls were issued for breeding purposes and six young bulls were castrated and issued to Government farms as bullocks.

The breeding of draught animals is the main interest of the cultivator, milk production being a very secondary consideration. Any demand for improvement in the milk cow is likely to be found only in urban areas, where only a limited number of bulls can be sold.

Sixty-three bulls were sold during the year, mostly on taccavi. The premium system worked satisfactorily, Rs. 3,200 being spent in this connection. Premia were reduced to Rs. 60 for Class I bulls and Rs. 45 for Class II bulls.

PART VI.—ECONOMICS AND MARKETING SECTION

24. Though the post of Deputy Director of Agriculture, Economics and Marketing, continued to be held in abeyance during the year, the marketing of *Verum* cotton was again undertaken with the help of funds supplied by the Indian Central Cotton Committee. This grant enabled the employment of a marketing officer of the Provincial Agricultural Service, Class II, an inspector of accounts, 7 temporary agricultural assistants, 23 accountants, 26 demonstration jamadars, and a small clerical staff. The season which at the end of July had every indication of being a bumper one, proved most unfavourable in August, September and October, heavy rains marring the outturn which was finally estimated at 9 annas for the province as a whole. *Verum* cotton in Nagpur, Wardha and Yeotmal districts suffered rather heavily. At the beginning of the season it was anticipated that 7,000 bales would be dealt with in the pools but this figure had to be reduced in the month of October to 5,000. Actually 5,087 bales were dealt with, 73 per cent of the output being provided by Buldana and Nimar districts. Taking the average of the season, *Verum* cotton sold through these pools fetched a price equivalent to Rs. 226.04 per *khandi* e.o.r. Bombay basis. Average figures for *Broach* and *Oomras* worked out to Rs. 193.9 and Rs. 170.3 respectively. The premium of nearly Rs. 56 per *khandi* over *Oomras* is

almost identical with that received last year. Put into other words, the growers of this cotton received an added income of nearly $1\frac{1}{2}$ lakhs of rupees. A study of the prices obtained shows that the premium was fair at the beginning of the season, larger during the latter part of December and January, while it narrowed in February towards the close of the pool. Previous seasons have to record the same experience. It would therefore be advantageous to the growers to market their crop by the middle of February at the latest, when other stapled growths begin to appear in the market.

All sales were as usual carried out in consultation with the pooling committee at each centre. The system worked well except in a few instances towards the end of the season when some local committees expected to obtain the high rates ruling in January and held on to their cotton, thus involving themselves in lower prices. This system of consulting the local committees is not likely to work in a big pool when cotton is sold outside the provinces through brokers.

The taluq Agricultural Association at Chikhli was the only association which provided advances to growers. The rest of the finance was borne by Government which again placed an advance of Rs. 2 lakhs at the disposal of the Department on the same terms as in previous years. The Chikhli association also reduced its organization fee from Re 0-8-0 to Re 0-4-0 per bale as an inducement to other associations to take upon themselves the financing of this work.

The entire stock was sold to mills in the province. An attempt was made to sell Nimar district cotton to mills in Indore but better prices were quoted in Nagpur. As the area under *verum* expands and an extra-provincial market becomes imperative, the premium is bound to fall, but if only half the present premium is obtained, the growers stand to gain $1\frac{1}{4}$ crores of rupees by putting all their land under strains of *verum*.

Local mills absorbed not only the pool *verum* but also much of the *verum* cotton brought to the open market. Figures collected by the District staff show that *verum* cotton equivalent to 13,749 bales was marketed up to the end of April. Growers who sold in the open market obtained a much smaller premium than those who sold to the pool.

25. As the new and better strains of *verum* cotton are taken up, the question of mixing will become more acute. A premium is given by merchants for *verum* cotton in the open market because they realize its value for mixing with *Oomras*. The mixture is then sold as *verum* cotton and it is not therefore surprising that bazaar *verum* has acquired an unenviable reputation in the trade. If nothing is done to stop this malpractice, the general price level for *verum* will fall. The Provincial Board of Agriculture, realizing the gravity of the situation, passed a resolution calling on Government to enact legislation to put a stop to this malpractice.

26. Another way to counteract this menace would be to give the growers a larger advance than 75 per cent of the value of their cotton when it is brought to the pool, thereby enticing all the *verum* cotton to the pools and diverting it from the open market. This, however, would be only a temporary expedient because as the area expands, it will be impossible for the Department to deal with a large crop. Legislation is therefore the only cure for a disease which, if left unattended to, will ruin the prospects of the province becoming a factor in the world's cotton market.

PART VII.—DEMONSTRATION AND PROPAGANDA

27. **Southern Circle.**—The year was unfavourable both for *kharif* and *rabi* crops. Frequent showers in the hot weather months permitted good tillage to all *kharif* lands and sowings were done from mid-June under favourable conditions. Heavy rains, causing floods in September and October, did much damage generally and completely destroyed the cotton crop over a large area along the banks of the Wardha and Wanna rivers. *Rabi* crops were in many cases sown in a hastily prepared seed bed and the absence of winter rains and the incidence of frost in January depressed the outturn to under normal. Heavy rain at threshing time caused much damage to *rabi* crops. For the circle as a whole there was an excess of 18 inches of rain over the average.

In the high-lying parts of the plateau, potato seed was successfully stored in underground pits during the hot weather and gave a good outturn in the monsoon. The demand for seed however is for *rabi* sowings. Monsoon grown seed requires a rest and is not ready for sowing until

December which is too late for a successful crop. An attempt is being made to grow a hot weather crop at Tamia in the hope that by so doing, the question of seed for *rabi* sowing will be solved. Potato growers in the plateau should reap considerable profits if this proves successful.

Seventy-six bales of late *verum* and 448 bales of V-262 were sold through 7 pools in the circle. The former fetched a premium of Rs. 11 a bale over V-262 which in turn obtained prices varying between Rs. 209 and Rs. 235 per *khandi* while the average price for C.P.-1 for the season was Rs. 156. In addition, 950 carts of *verum* cotton were bought direct from growers by two mills at a premium ranging from Rs. 15 to Rs. 18 per *khandi* of *kapas*.

Co-210 and Co-237 canes continued to give the best all round results. Sugar making was demonstrated at 4 centres and the staff is now competent to instruct in the technique of preparing *rab*. The manufacture of *gur* from the molasses left over after the first extraction of sugar is an easy and profitable way of disposing of a bye-product for which there is no demand.

Demonstrations of the effect of sulphate of ammonia on sugarcane were responsible for the sale to cultivators of 1,901 maunds of oilcake and 2,030 maunds of fertilizers. Twelve malguzars in the Balaghat district now prepare bone meal in mortar *chakkis*. 87,723 maunds of seed were distributed during the year, compared with 82,913 maunds in the previous year. There was a considerable decrease in the demand for *verum* 262 seed because of its inability to withstand late rains. This has however been overcome by the success of late *verum* which will now take its place. One hundred and sixteen seed unions and 14 seed stores were engaged in seed distribution.

Balaghat and Waraseoni Agricultural Co-operative Associations showed a turnover of Rs. 1,882 and Rs. 1,967, respectively. The remaining five associations in the circle showed no enterprise.

Implements to the value of Rs. 60,938 were sold against Rs. 73,706 in the previous year. The decrease is mainly due to a smaller demand for oil engines and pumps owing to the efficiency of the cheaper *rahat* of which 100 were sold.

Lectures and practical demonstrations were given by the staff to the pupils of five anglo-vernacular middle

schools. There appears to be a demand for agricultural instruction but it is difficult to say whether it is real or assumed.

The staff assisted in the work of Village Uplift at 12 centres in Chhindwara tahsil, at nine centres in Betul and at one centre in Nagpur district.

28. Western Circle.—All *kharif* crops gave outturns below normal owing to an unsatisfactory monsoon. Early rains tempted many cultivators to sow cotton and *juar* which had to be resown when the regular monsoon arrived. A break at the beginning of July allowed adequate opportunities for weeding and intercultural operations but caused general anxiety about the fate of the crops. Timely rains received towards the end of the month saved the situation and the crops made such excellent progress that a bumper yield was anticipated. Heavy and continuous rains in September damaged the crops which, however, again revived in the subsequent break of three weeks but in October general rain marred for good the prospects of even a normal yield. *Rabi* crops showed every sign of a good yield until severe cold in the month of January did serious damage—particularly in the Melghat.

The Government farm at Basim was again leased out to the Basim Taluq Association on the *batai* system. It is being run on the same lines as before under the guidance of the local agricultural assistant. The Borgaon farm which was originally intended as the cattle-breeding centre for Berar, has been converted into a depot for the sale of bulls to cultivators. In spite of the unfavourable *kharif* season, the Buldana and Borgaon farms gave fairly good yields, while Yeotmal and Basim produced poor crops, due to excessive rains. The rainfall at the first two farms was 37 and 32 inches, while at the last two it amounted to 57½ and 53½ inches, respectively.

Three small Government demonstration plots helped to bring improved methods of cultivation to the notice of growers at Pusad, Amraoti and Dharni. Outturns were fair and in spite of an unfavourable season and depressed prices, two of them showed good profits.

These farms and plots act as centres for the growing and distribution of seed in the circle though the bulk of the seed is provided from private seed farms which numbered 4,104, during the year as compared with 3,969 last year. From all

sources, 57,823 maunds of seed were supplied, and its distribution kept the staff fully engaged for some months. Most of this was cotton which naturally is the crop to which most attention is given. New strains of *verum* cotton which, it is hoped, will ultimately replace *verum* 262 were grown on a field scale on Government farms and by private individuals and the results of such tests were most promising. Had it not been for the liability to damage by unseasonal weather to which *verum* 262 is susceptible, there is little doubt that this variety would have now covered Berar, because the premium obtained for it much more than covers the loss caused by a smaller ginning percentage. The cultivation of *roseum* has received during recent years an impetus on this account and the demand last year for *roseum* seed was very brisk. It is hoped however that the new strains of *verum* will oust all other varieties and turn the main *Oomras* tract of India into a medium-staple producing area and make the province independent of a single buyer. 3,127 bales of *verum* cotton were sold through the marketing organization in Berar at a premium ranging from Rs. 11 to Rs. 15 per *khandi* of *kapas* which works out at Rs. 3-7-7 per acre.

The low price of cotton has given a fillip to groundnut cultivation, the acreage of which has increased phenomenally during the last few years. Growers have begun to realize its value not only as a money crop but as a rotation crop for cotton and even when the price of cotton goes up, groundnut will continue to be grown. Seed of two new varieties—Akola 10 and 12.24—were distributed for the first time with most satisfactory results and the demand for seed far exceeds the supply. These improved strains should add greatly to the profits from this crop and prevent a fall back to cotton when prices improve.

The continued low prices of agricultural produce have reacted on the number of improved implements sold, though there was a slight improvement compared with last year. Seven hundred and one iron ploughs were sold during the year as against 611 in 1932-33.

Twenty-four agricultural associations and 17 Societies or branch associations in different parts of the circle helped to distribute from their shops seed of improved varieties, implements and spare parts. Many of them run their business in a lethargic fashion but there appears to be a general awakening to the need for co-operative action in all

matters of agricultural purchase and sale, and it is hoped that considerable progress in this direction will be evident before long. One of the main sources of revenue of these associations is the hiring of ploughs which brought in Rs. 4,927 compared with Rs. 3,494 last year.

The staff was very closely connected with the work of village uplift in the circle. Lectures on agricultural improvement, illustrated by magic lantern and the cinema, were given to the training class at Rahatgaon. The class also visited the demonstration plot at Amraoti and the cattle-breeding farm at Ellichpur. The staff is carrying out a definite programme which has been prepared for this work.

Poultry-breeding has been started on a small scale on each farm in the circle in an attempt to encourage this as a subsidiary industry. The large demand for birds and eggs is proof of the interest being taken in this branch of work.

29. Northern Circle.—Rainfall at short intervals during the hot weather gave cultivators an opportunity of preparing both their *kharif* and *rabi* fields. The monsoon broke in the third week of June and sowings were carried out successfully. Distribution was fair but late heavy rain caused some damage to *kharif* crops. Satisfactory conditions for *rabi* sowings were obtained however. The seed bed was good and contained ample moisture. Severe cold in January caused widespread damage to *tur* and to the last picking of cotton and all *rabi* crops were affected in differing degrees, varying from Re. 0-3-0 in the case of wheat, Re. 0-4-0 to Re. 0-5-0 to gram and Re. 0-7-0 to Re. 0-8-0 to other pulses. Garden crops suffered most, the damage varying from Re. 0-8-0 to Re. 0-10-0. No winter showers were received but in spite of this, all *rabi* crops were well above normal before the cold waves appeared. The damage was nothing like as general as that caused in 1929 when the crops in the open plains as well as in protected valleys was wiped out. Loss was confined mostly to the hollows and valleys of the riverain and forest lands. Banda, Jaisrinagar and Kesli tracts of Saugor district bore the brunt of the loss. Investigation into the damage brought to light several points of interest, *viz.*, (1) the tendency on the part of the cultivator to sow a much larger area under *birra* (probably as an insurance against such calamities), (2) the undesirability of growing in the north of the province a late maturing *tur* and (3) the necessity for caution in the wholesale introduction of varieties of fruit

and vegetables which have proved successful elsewhere. Previous experience of frost has taught the cultivator to mix his crops—a not unwelcome practice. Much larger areas under *birra* than were previously recorded are to be found in the Jubbulpore and Narsinghpur *haveli*. Early maturing *turs*, E.B.III and *Aghanav*, grown on the Powarkhera farm escaped damage completely and the spread of these strains will now receive a welcome stimulus. Owing to the poor prices obtained for the staple agricultural crops, an incentive has been given in the past few years to an extension of the area under garden crops without any attention having been paid to their suitability to withstand the rigours of a cold weather. Plantains, for example, were almost completely destroyed in Nimar district.

Verum cotton continued to extend in the Nimar district and 1,472 bales were sold through the marketing pool. *Buri* cotton has found favour in Burhanpur tahsil and when the new strains which are now being given out by the Department are grown in sufficient quantity, this variety will also be dealt with through the same organization. *Buri* at present appears to be grown mainly as an adulterant and most of it finds its way to mills in Ahmedabad.

Considerable interest is being taken in Hoshangabad district in improved methods of sowing *rabi* crops. In certain villages, cultivators have developed improved country implements by adapting them to labour saving devices. The use of the *sarta* for sowing wheat and gram is a novelty. The ground can be covered much more quickly and it is stated that the crops mature earlier. A *rabi* tiffan manufactured by a malguzar at Gurari near Khaparkheda has proved successful. One enterprising mistry at Hoshangabad now turns out a replica of the Hoosier disc drill and has received a number of orders. One of the most pressing needs of the wheat tract is a cheap and efficient seed drill to supersede the *nari* which is wasteful both of seed and labour. Modern drills are beyond the means of all but the most affluent whereas a cheap drill adapted to the conditions of the wheat circle would find a ready sale.

The rust-proof wheats, developed by the botanical section will, it is hoped, do for the wheat zone what *verum* cotton has done for the grower of cotton. The *sharbati* wheats appear to have lost favour and the growers are reverting to the soft and rust-susceptible *pissis* which were almost wiped out by rust in 1928. The new strains will

be ready for distribution in a year or two and if they prove successful a special effort will be made to multiply them as rapidly as possible.

The chief centre for village uplift work is at Pipariya but it is in near-by villages that the best results are to be seen, *viz.*, Khaperkheda and Gurari. The personality of the malguzar and the interest taken by him are the criteria for success. Without Government help and the driving force behind it, little advance would, it is feared, be made.

The *Barhi* scheme for the supply of wheat seed continued to be in the doldrums. Too many successive unfavourable *rabi* seasons have been responsible for the failure, in many instances, of a scheme which would have been a great boon to the growers. A few good seasons would help to put on their feet all but the most hopelessly involved societies.

30. Eastern Circle.—Cultivation of both *kharif* and *rabi* land was well advanced before the advent of the monsoon as a result of ample showers received in April and May. The regular monsoon commenced on the 11th of June and sowings were carried out under favourable circumstances. Rain fell continuously throughout July till nearly the middle of August. A break of three weeks occurred in Raipur and Drug districts which induced an outbreak of *maho* disease. In Bilaspur district heavy precipitation continued till the beginning of September and was responsible for the appearance of a new insect pest, called Gangai, which appeared in a mild form at the beginning of the month but later developed into a virulent stage, causing serious damage in several villages of Bilaspur tahsil. The pest also appeared in Raipur district, although to a lesser degree, whereas Drug escaped altogether. Timely showers in September helped to improve the crop in Raipur and Drug. The monsoon ceased during the last week of September, when cultivation of *rabi* land was taken in hand. Sowings were done under favourable conditions but owing to the total absence of winter rains, the crop did not fare well. The rainfall was heavier than normal but was badly distributed. Water-logged conditions alternated with long spells of fair weather which encouraged insect pests and marred the prospects of a bumper yield. The rice crop was normal in Drug and Raipur and below normal in Bilaspur. Wheat was below normal in all three districts.

The experimental work on rice at Labhandi farm has been taken over by the Rice Research Scheme financed by the Imperial Council of Agricultural Research. The seed farms at Bilaspur and Drug produced heavy crops of paddy amounting to 2,058 and 2,448 lbs. per acre respectively. Sugarcane gave a good yield and the income from oranges also was satisfactory. The revenue accounts of both farms showed a profit of Rs. 2,859 and Rs. 1,947 respectively. The Chandkhuri farm had a better year than the previous one, showing an income of Rs. 849 greater than the expenditure.

Seven Government demonstration plots are being run to serve some special purpose. Two were opened at the instance of the Irrigation Department to ascertain to what extent paddy on heavy soil would be benefitted by irrigation. Two are demonstrating the proper method of growing sugarcane. One serves the purpose of a seed distribution centre in an out-of-the-way place and two are run to acquaint growers with improved methods of agriculture. Fifteen private demonstration plots had a successful year and there is an increasing demand from progressive and enlightened malguzars for a further development in this direction. These plots are run by the owners under our guidance and advice at no cost to Government. They are much more effective than Government demonstration plots as the owners know exactly what is put into the land and what is taken out. There was no change in the number of irrigation plots, *viz.*, 32. Twenty are located under Kharung and 12 under the Maniari reservoir. They are meant to demonstrate the advantages of irrigation to paddy but at the same time the opportunity is taken to show to the growers the better yielding capacity of our improved strains of rice.

There has been no diminution in the demand for pure seed in the circle. There were 1,955 rice seed farms for the propagation of pure seed as against 1,858 last year and 6,441,200 lbs. were distributed. 636 wheat seed farms distributed 723,480 lbs. of wheat. In addition 203,198 whole canes were sold.

Seed unions numbered 249 as against 223 in the preceding year with 4,966 members. Contributions of seed amounted to 1,115,916 lbs. One union has started the co-operative cultivation of sugarcane and its progress will be watched with interest.

The dwindling purchasing power of the ryot is evidenced by the decrease in the number of improved implements sold, the value of which amounted to Rs. 8,273 compared with over Rs. 10,000 last year.

Practical demonstrations of improved seeds, manures, implements and *gur* boiling were given at 1,112 centres and lantern lectures at 172. Twenty-three co-operative rallies were also attended.

As in other circles, the low price of agricultural products has given an impetus to the growth of more remunerative crops like sugarcane and fruit. The area under improved varieties of sugarcane is steadily increasing and stood at 3,470 acres during the year. Nurseries of oranges and mangoes are being raised on all Government farms for sale. 8,953 fruit trees were supplied during the year.

To take the place of the annual shows on the Government farms which were discontinued some years ago, an innovation in the form of "Farmers' Day" was started during the year. These were held on each of the farms and on some of the private and Government plots as well. Large numbers of cultivators attended and were shown over the farm and were given demonstrations of all the Department's activities. It is intended to make this a regular feature in future in order to bring the grower in closer touch with the work of the Department. The thanks of the Department are due to the Revenue authorities for their hearty co-operation and for their help in making these "Farmers' Days" a success.

PART VIII.—HORTICULTURAL GARDENS AND ARBORICULTURE

31. A plentiful monsoon provided an abundance of water in the Telinkheri tank and the frequent showers received during the hot weather kept the gardens in Nagpur at their best. A good show of flowers in all the Government gardens attracted considerable attention all the year round. The several gardens produced receipts amounting to Rs. 13,092 compared with Rs. 12,763 last year. The increase is mainly due to a heavy demand for orange plants from Bihar and Orissa. Expenditure increased from Rs. 33,653 last year to Rs. 35,211 in the year under report. A reduction of 25 per cent was made in the charges for orange plants and packing which will have some effect on

future receipts. Large numbers of budded and grafted fruit trees are sold each year, showing the interest that is being taken in fruit cultivation. The Maharajbagh garden will be called upon to supply the trees for the experimental orchard which it is hoped to establish from funds supplied by the Imperial Council of Agricultural Research.

Arboricultural operations consisted mainly in pruning roadside trees though 109 new trees were planted out. The shallow-rooted Cork tree (*Mellingtonia hortensis*) which is so frequently met with in Nagpur as an avenue tree, is gradually being eliminated from avenues because of the ease with which it is uprooted during storms, causing considerable damage to electric mains and inconvenience and danger to the public.

The Pachmarhi gardens suffered from an excess of rain. In August alone half the average annual rainfall was received, as a result of which the vegetables intended for the second season were badly damaged. 22½ inches in September completed the destruction and damaged the young seedlings of cold weather vegetables. Severe cold and frost in January and February ruined the vegetables intended for the summer season. Peaches, plums, mangoes, bananas and papita were also damaged by frost and hail. The display of flowers was greatly appreciated as usual. In spite of such an abnormal season receipts exceeded expenditure by over Rs. 2,000, being Rs. 9,043 and Rs. 7,015, respectively.

The net cost to Government of running the district or *company baghs* has been further reduced. With the planting out of fresh orchards in many of them, there should be a progressive increase of receipts as the trees come into bearing. These district gardens are being resorted to by the public more and more as recreational centres and there is a natural desire that the ornamental portion should be kept in a high state of efficiency. The gardens were handed over to the Department so that the cost to Government should be reduced as much as possible. If it is intended that expenditure should be balanced by receipts, it is impossible to devote a large area to flowers and shrubs which produce very little financial return. The maintenance of the ornamental part of these gardens is, in my opinion, a legitimate charge on the municipality or district council.

Seoni, Bhandara, Yeotmal and Drug showed profits. The receipts at Mandla amounted to 96 per cent of the

expenditure. In Betul the ratio of receipts to expenditure increased from 62 per cent to 80 per cent. Raipur garden gave a 82.7 per cent ratio and in the remaining three gardens under departmental control the ratios narrowed.

ACKNOWLEDGMENTS.

32. The Department continued to receive substantial grants from the Indian Central Cotton Committee for several schemes of work on cotton. The second term of five years for which the botanical scheme was sanctioned terminated at the end of March 1933 but has been renewed for another space of five years. The marketing of *verum* cotton also received generous support from the Committee and enabled the Department to maintain a stock of pure seed in addition to securing a satisfactory price to the growers. During the year, an investigation into the cost of growing cotton and its rotation crops was started by means of funds supplied by the Indian Central Cotton Committee. For all these grants, amounting to Rs. 56,783-8-3 the Department has to offer its warmest thanks to the Committee.

33. The five years' scheme of research on rice financed by the Imperial Council of Agricultural Research was initiated in the September preceding the year under review and the Department acknowledges with gratitude the help received.

34. Six schemes for research work into different agricultural problems were submitted to the Imperial Council of Agricultural Research but a decision on two only was reached at the meeting of the Advisory Board in February. The schemes sent up were on—

- (1) oranges,
- (2) oilseeds,
- (3) potatoes,
- (4) sann hemp,
- (5) pan,
- (6) the "Gangai" pest of paddy.

No. (1) was accepted and is now awaiting the provision of funds by the Imperial Council of Agricultural Research. Consideration of No. (3) was postponed pending the establishment of a potato research station for India. More information on Nos. (5) and (6) was called for and the schemes

will be reconsidered at the next meeting of the Advisory Body. Nos. (2) and (4) were referred to the respective Sub-Committees which will meet in September.

35. Two new schemes submitted to the Indian Central Cotton Committee in February received approval and came into operation after the year closed, *viz.*, a small entomological scheme designed to find out the incidence of and the damage done by the pink and spotted boll worms in the Central Provinces and Berar and secondly, a scheme for the extension of *verum* cotton in the province. These two schemes entail an annual expenditure of Rs. 30,862. The first has been sanctioned for two years and the latter for three years.

36. The Department has also to thank the large number of officials and non-officials who gave ungrudgingly of their time to further the cause of agricultural improvement.

J. H. RITCHIE,
Director of Agriculture,
Central Provinces.

STATEMENT A

Number of cattle sold from the Government Cattle-breeding Farms in the Central Provinces and Berar during the year 1933-34.

Name of circle.	Bulls.	Bullocks.	Cows.	Male buffaloes.	She buffaloes.	Young stock of cows and buffaloes.	Total for 1933-34.	Total for previous year.	Remarks.
1	2	3	4	5	6	7	8	9	10
Southern Circle ..	22	6	26	8	..	15	77	32	
Western Circle ..	3	..	7	..	..	16	26	74	
Northern Circle ..	23	..	15	..	..	11	49	22	
Eastern Circle ..	21	6	11	..	..	14	52	29	
Agricultural College ..	..	..	..	1	3	17	21	21	
Total ..	69	12	59	9	3	73	225	178	
Total for previous year ..	38	70	36	16	2	16	178	..	

STATEMENT B

Name of circle.	Number of private seed farms and unions.							Total for 1933-34.	Total for 1932-33.
	Wheat.	Rice.	Cotton.	Juar.	Ground- nut.	Sugarcane.	Other crops.		
1	2	3	4	5	6	7	8	9	10
Southern Circle ..	1,070	1,257	479	40	108	589	47	3,590	3,358
Western Circle ..	153	..	1,688	556	1,686	..	21	4,104	3,969
Northern Circle ..	4,187	932	1,037	333	681	..	1,236	8,406	7,413
Eastern Circle ..	636	1,955	11	..	59	42	40	2,743	2,534
College Farm, Nagpur ..	..	..	..	..	..	..	..	..	..
Total ..	6,046	4,144	3,215	929	2,534	631	1,344	18,843	17,274
Total for previous year ..	5,697	3,678	2,484	859	2,389	465	1,702	17,274	..

STATEMENT B—concl'd.

Name of circle.	Seed distributed in maunds and canes.							Total for 1933-34.	Total for previous year.
	Wheat.	Rice.	Cotton.	Juar.	Ground-nut.	Cane.	Other.		
I	11	12	13	14	15	16	17	18	19
Southern Circle ..	41,738	41,294	3,019	512	165	1,520,742	995	87,723	81,518
Western Circle ..	7,550	..	20,742	4,098	25,433	..	..	57,823	58,653
Northern Circle ..	153,398	9,933	28,792	6,600	27,744	390,500	2,592	229,059	202,637
Eastern Circle ..	9,043	80,515	..	73	297	203,198	..	89,928	102,508
College Farm, Nagpur ..	..	..	271	13	2	..	15	301	97
Total ..	211,729	131,742	52,824	11,296	53,641	2,114,440	3,602	464,834	445,413
Total for previous year ..	192,983	138,840	38,885	7,256	66,168	1,987,519	1,281	445,413	..

STATEMENT C

Name of circle.	Approximate area in acres sown with improved seed from private seed farms and other sources.					
	Wheat.	Rice.	Cotton.	Juar.	Groundnut.	Other crops.
1	2	3	4	5	6	7
Southern Circle ..	134,604	150,480	111,540	17,943	5,609	8,852
Western Circle ..	3,426	..	231,084	102,913	102,033	..
Northern Circle ..	321,172	29,997	87,199	17,174	28,865	27,333
Eastern Circle ..	18,716	287,680	30	..	3,473	3,689
Total ..	477,918	468,157	429,853	138,030	139,980	39,874
Total for previous year ..	458,932	400,281	396,765	137,948	128,242	80,043

STATEMENT C—concl'd.

Name of circle.	Total for 1933-34.	Total for previous year.	Approximate value of the increased outturn resulting from use of improved seed for	
			1933-34.	1932-33.
1	8	9	10	11
			Rs. a p.	Rs. a p.
Southern Circle	429,028	410,929	20,32,629 0 0	19,15,000 0 0
Western Circle	439,456	393,719	13,04,142 0 0	13,14,176 0 0
Northern Circle	511,740	540,640	9,61,565 0 0	10,25,927 0 0
Eastern Circle	313,588	256,923	11,09,980 2 9	9,22,959 6 9
Total ..	1,693,812	1,602,211	54,08,316 2 9	51,78,062 6 9
Total for previous year ..	1,602,211	..	51,78,062 6 9	..

STATEMENT D

Name of circle.	Ploughs.	Cane mills.	Fodder cutters.	Akola hoes.	Other imple-ments.	Spare parts.	Total number.	Total value in rupees.	Total value in rupees for previous year.
1	2	3	4	5	6	7	8	9	10
								Rs. a. p.	Rs. a. p.
Southern Circle ..	357	122	7	2	374	1,558	2,420	60,938 3 3	73,706 8 9
Western Circle ..	701	..	4	22	81	16,509	17,317	37,891 0 0	30,724 0 0
Northern Circle ..	593	28	11	372	526	3,682	5,212	52,375 0 0	55,704 0 0
Eastern Circle ..	19	26	..	3	173	181	402	8,273 12 11	10,159 13 11
College Farm, Nagpur ..	..	..	..	..	..	61	61	36 7 0	78 11 11
Total ..	1,670	176	22	399	1,154	21,991	25,412	1,59,514 7 2	1,70,373 2 7
Total for previous year ..	1,835	240	15	35	1,259	18,596	21,980	1,70,373 2 7	..

STATEMENT D—concl'd.

Name of circle.	Books sold.	Bulletins sold.	Total.	Total for previous year.
x 1	11	12	13	14
Southern Circle ..	23	305	328	403
Western Circle ..	21	888	909	996
Northern Circle ..	11	297	308	166
Eastern Circle ..	7	255	262	228
College Farm, Nagpur
Total ..	62	1,745	1,807	1,793
Total for previous year ..	110	1,683	1,793	..

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STATEMENT E

Name of circle	Number of agricultural shows and fairs held.	Number of practical demonstrations carried out by the district staff.	Number of illustrated lectures given.
1	2	3	4
Southern Circle ..	17	1,534	49
Western Circle ..	19	1,726	312
Northern Circle ..	2	1,200	45
Eastern Circle ..	11	1,112	172
Total ..	49	5,572	578
Total for previous year ..	28	4,709	701