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Department of Agriculture, Madras

A POPULAR ACCOUNT

OF THE WORK OF THE

**MADRAS AGRICULTURAL
DEPARTMENT**

MADRAS

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P R E F A C E .

THE first visit made to the Agricultural College and Research Institute by the Hon'ble Rai Bahadur K. Venkata Reddi Nayudu Garu after becoming Minister for Development Departments so impressed him with the value of the work being done by the expert officers there that he asked each of these officers to write a short account of the work of his section.

Later on, I was asked to edit these so that a popular account of this work might be made more widely known.

It was suggested to me, however, that this account should include the work of the whole Department, not only at Coimbatore, but throughout the Presidency, and that an attempt should be made to form some estimate of the value to the country of the work which has been and is being done by the Agricultural Department.

I wish to acknowledge here the help and assistance given by every one in the Department to make this account as complete and accurate as possible.

CAMP, KOILPATTI,
23rd June 1922.

H. C. SAMPSON,
Offg. Director of Agriculture.

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APPENDIX A.

Statement showing the gain (both present and prospective) to the ryots in the Madras Presidency by the work of the Agricultural Department.

Crop.	Nature of the improvement.	Area under the improvement.	Estimated gain per acre.	Total estimated gain per annum.	Possible area under the improvement.	Estimated gain per acre.	Possible estimated gain.	Remarks.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)

I Circle (Agency Division, Ganjām, Vizagapatam, Gōdāvāri, and the five northern taluks of Kistna, i.e., Yernagudem, Tanuku, Narasapur, Bhimavaram, and Ellore).—Cultivated area 8,345,000 acres; paddy 4,179,000 acres, including an area of 1,204,000 acres under rain-fed paddy; sugarcane 51,200 acres; plantain 19,500 acres.

Paddy ...	Cultivation of improved strains.	ACS. 14,000	RS. 4½	RS. 63,000	ACS. 240,000	RS. 4½	RS. 10,80,000	Col. (7) relates mostly to <i>Rasangi</i> 3 and <i>Konamani</i> 3, grown mainly in the taluks of Ramachandrapuram, Cocanada, and Amalapuram. They are pure selections of delta paddy varieties grown at the Samalkota farm. They ripen uniformly and yield about 100 lb. per acre more than the varieties ordinarily cultivated. They also command a higher price but this has not been taken into account here. The figure in column (6) represents one-fourth of the area under irrigated paddy in the delta taluks of the districts of Gōdāvāri and Kistna. The strains in question cannot suit all the varying conditions of the deltas.
Do. ...	Economic transplantation or the reduction in the seed-rate used for transplanted paddy.	93,100	about 3½	2,97,100	1,000,000	About 3½	31,55,000	Col. (3).—Gōdāvāri 55,000 (about 50,000 acres in the Ramachandrapuram taluk); Vizagapatam 38,000. Col. (4) represents only the saving in seed and labour. There is, besides,

				<p>an increase in yield. These remarks apply also to the other circles. The gain is greater in the Godāvāri district, where the lands are more fertile than in Ganjām and Vizagapatam.</p> <p><i>Col. (6).</i>—Generally speaking, the transplanted area under paddy depends on the sufficiency of water-supply and the availability of labour. It is only the irrigated variety that can be transplanted. About one-third of the area under irrigated paddy in Ganjām, half of the area in Vizagapatam, and most of the area in Godāvāri are transplanted. In the Agency Division, the crops have to depend mainly on rain. For the most part, paddy is transplanted in Ganjām on wet lands under channel irrigation. But more than 70 per cent of the area is irrigated from tanks and "other sources" and these wet lands are inclined to be precarious. Much of the area in Vizagapatam is broadcasted as there is not sufficient water in tanks and as paddy has therefore to depend largely on rain. In Godāvāri, irrigated paddy is raised mostly by transplantation. Economic planting was practised in Kistna even before the advent of the Department.</p> <p><i>Col. (7).</i>—Rs. 5 per acre will represent the gain to the ryots by planting paddy seedlings singly or by twos and threes according to the fertility of the land. The usual seed-rate is very excessive and varies from 60 to 150 lb. per acre except in Kistna, where it is not more than 25 to 30 lb. per acre. Better crops are obtained by reducing the seed-rate in the seed-bed so as to obtain strong, healthy seedlings and by transplanting them singly so as to leave them room to tiller. This reduces the seed-rate to 20 lb. per acre and even less on good lands. As early as 1912-13, many ryots valued the improvement at Rs. 7 an acre. But ryots have not yet adopted single-seedling on an appreciable scale though they have reduced the seed-rate. These remarks apply to all Circles.</p>	<p><i>Cols. (6) to (8)</i>—It is not possible to fill in these columns for each Circle because the limit of area for the use of concentrated manures like fish manure, bone meal and oil cake is the amount of the manures available. This can be worked out only for the whole of the Presidency. The summary at the end gives (1) the area in the Presidency on which concentrated manures which are now exported can be applied if their export were stopped and (2) the prospective gain to the ryots by stopping their export. These remarks apply to all Circles.</p>
Do.	Application of bone meal and fish guano.	1,000	5	5,000 ... | ... | ...	

Crop.	Nature of the improvement.	Area under the improvement.	Estimated gain per acre.	Total estimated gain per annum.	Possible area under the improvement.	Estimated gain per acre.	Possible estimated gain.	Remarks.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)

I Circle (Agency Division, Ganjām, Vizagapatam, Gōdāvari, and the five northern taluks of Kistna, i.e., Yernagudem, Tanuku, Narasapur, Bhimavaram, and Ellore).—Cultivated area 8,345,000 acres; paddy 4,179,000 acres, including an area of 1,204,000 acres under rain-fed paddy; sugarcane 51,200 acres; plantain 19,500 acres—cont.

Paddy —cont.	Growing of green manure crops.	ACRES.	RS.	RS.	ACRES.	RS.	RS.	The improvement refers to the growing of leguminous crops on the land with the object of ploughing them in as manure to the paddy crop. They may either be sown in the off-season or before harvest on the standing crops of paddy. The raising of such crops during the hot months depends on timely and copious summer rains or supply of channel water. In fact, green manuring would be confined almost entirely to the lands which are transplanted. These remarks apply to all Circles. Ryots in the I Circle grow dhaincha in their field bunds, collect their own seed, and sell the surplus to others. Col. (6).—represents one-fourth of the area under paddy in Ganjām and Vizagapatam, half of the area in Gōdāvari and one-third of the area in Kistna. The scope for green manures is not large in Ganjām and Vizagapatam as the crops have to depend largely on rain. The use of green manures (sunhemp and green gram) is already well known in parts of the Gōdāvari district. A large area in Kistna already grows sunhemp for fodder.
		6,000 mainly in Rāma-chandra-puram taluk.	5	30,000	1,000,000	5	50,00,000	
Total Paddy	3,95,100	...	...	92,35,000	

Sugarcane.	Extension of area under improved varieties.	8,100 mainly in Godavari.	300	24,30,000	8,100	300	24,30,000	Col. (3).—The area under sugarcane in the Godavari district has increased from 4,975 acres in 1902-03 when the
Do.	Replacement of the local canes by improved varieties.	5,300 mainly in Godavari.	200	10,60,000	26,600	200	53,20,000	Samalkota farm was opened to 13,000 acres in 1921-22. The increase is due to the introduction of Red Mauritius and other exotic varieties which are resistant to a large extent to the "red-rot" fungus which was causing much loss to the local canes. A good crop of purple Mauritius yields as high as 4½ tons of jaggery. Col. (4) and (7).—The gain of Rs. 300 per acre represents the difference between the net profits per acre of sugarcane and paddy (Rs. 370 and 70, respectively.) Col. (4).—The difference in yield between the exotic varieties and the
Do.	Planting canes in lines and reducing the seed-rate.	100 in Godavari	65	6,500	51,200	65	33,28,000	local varieties displaced by them is at least ¼ ton of jaggery, the value of which at present prices is not less than Rs. 200. This is based on the assumption that the cane crop in Godavari would have survived the onslaught of the red-rot disease (<i>Colletotrichum</i>). But it was reported that the crop was threatened with extinction when work was commenced in 1902, in which case the lands would have been cropped with paddy. Hence, really the work of the Department has resulted to the ryots in a gain of 5,300 (acres) × Rs. 300 (per acre) or Rs. 15,90,000. Col. (6).—The area in this column excludes an extent of over 16,000 acres in Vizagapatam which is under introduced varieties of sugarcane as a result of the work of the late Mr. Gillman, who imported these from Mauritius in 1896 when he was the Estate Collector of the Vizianagram Zamindari. Sugarcane setts are usually sown broadcast between the irrigation and drainage furrows made in the land and trodden in. Between 20,000 to 30,000 setts are used per acre. But by planting canes in lines, a good deal of labour is saved for all the operations during cultivation (wrapping the canes, weeding, irrigation, etc.) and supervision is rendered easier. This means a saving of Rs. 50 per acre. The number of setts per acre can also be reduced to 15,000, thus effecting a saving of at least Rs. 15 per acre with setts at Rs. 3 per thousand. Planting in lines is largely the practice in the southern part of Vizagapatam, where it was practically unknown ten years ago but the ryots plant the setts closely; this area is not included in col. (3).
Total Sugarcane ...		...	...	34,96,500	...	...	1,10,78,000	

Crop.	Nature of the improvement.	Area under the improvement.	Estimated gain per acre.	Total estimated gain per annum.	Possible area under the improvement.	Estimated gain per acre.	Possible estimated gain.	Remarks.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)

I Circle (Agency Division, Ganjām, Vizagapatam, Gōdāvāri, and the five northern taluks of Kistna, i.e., Yernagudem, Tanuku, Narasapur, Bhimavaram, and Ellore):—Cultivated area 8,345,000 acres; paddy 4,179,000 acres, including an area of 1,204,000 acres under rain-fed paddy; sugarcane 51,200 acres; plantain 19,500 acres—cont.

Plantains...	Introduction of the improved method of cultivation (South Indian system) in the Gōdāvāri district.	ACS.	RS.	RS.	ACS.	RS.	RS.	The South Indian system consists in planting <i>single</i> suckers when very young, the spacing being ten links apart. Thus, 1,000 suckers are planted per acre against the local method of 200 pair of full-grown suckers. The land is then manured heavily; side-shoots are removed till bunching time and the crop is treated as an annual like sugarcane, the field being cleared in about 12 to 14 months. The local method of cultivation hardly gives an annual net income of Rs. 150—200 per acre, while the improved method gives Rs. 500 per acre.
		340	300	1,02,000	6,900	300	20,70,000	
Palmyras...	Operations against the bud-rot (<i>Pythium palmivorum</i>) disease of palmyras in the districts of Gōdāvāri and Kistna.	500,000 trees.	Rupee one per tree.	5,00,000	500,000 trees.	Rupee one per tree.	5,00,000	The disease is due to a fungus. The only remedy for it is to cut away and burn all diseased tissue before the growing tip is affected. Government have been conducting operations against the disease for a long time. It has now been brought under control and the palmyra industry has, it is hoped, been saved from ruin. The figure in column (3) represents an estimate of the number of trees which are tapped for sweet juice, etc. Col. (4).—During a season of five months, a tapper is able to deal with 80 trees which are estimated to yield from 5 to 6 candies of jaggery. A net gain of rupee one per tree per annum is a modest estimate. All products of the palmyra palm are useful.

Total I Circle	44,93,600	2,28,83,000
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General remarks.—
 1. The Department has done no work till now in the Agency Division.
 2. The figures for the southern taluks of Kistna have been included in the figures above for the sake of convenience. It is not possible to separate the figures in all cases.
 3. The crops dealt with are paddy, sugarcane, plantains, and palmyras.

*II Circle (Southern taluks of Kistna, Guntūr, and Nellore—a newly formed Circle where work is being started).—
 Cultivated area 3,903,000 acres; paddy 794,000 acres; turmeric 5,600 acres.*

Paddy ...	Fish guano ...	400	5	2,000	...	...	...
	Growing of green manure crops.	500	5	2,500	300,000	...	5 15,00,000
about half of the area under irrigated paddy in Nellore. In Guntūr, sunnhemp is already largely grown for fodder purposes after the harvest of paddy; the delta ryots also apply their surplus paddy straw as manure to their fields. The South-West Monsoon in Nellore is precarious. Green manures would be confined mainly to single-crop paddy lands under the Pennar canals system.							
Total Paddy ...		...	...	4,500	...	...	15,00,000
Turmeric...	Improved furnace ...	15	10	150	5,200	10	52,000
	and drying turmeric is wasteful of fuel. The gain of Rs. 10 does not take into account the better price obtained for the turmeric on account of its superior quality due to the uniformity in boiling.						
Total II Circle ...		...	...	4,650	...	...	15,52,000

Col. (6).—This represents one-third of the area under irrigated paddy in Guntūr under the Kistna delta and
Col. (7).—This represents the saving in fuel by using the sugar-pan and Sindewahi furnace. The local method of curing
Note.—See general remark 2 against I Circle. The crops so far dealt with are paddy and turmeric.

Crop.	Nature of the improvement.	Area under the improvement.	Estimated gain per acre.	Total estimated gain per annum.	Possible area under the improvement.	Estimated gain per acre.	Possible estimated gain.	Remarks.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)

III Circle (Kurnool, Bellary, Anantapur, and Cuddapah).—Cultivated area 7,712,000 acres; paddy 372,000 acres; cholam 2,061,000 acres; sugarcane 12,000 acres; cotton 1,000,000 acres.

Paddy ...	Economic transplantation.	ACS. 200 in Kurnool and Bellary.	RS. 3	RS. 600	ACS. 30,000	RS. 3	RS. 90,000	Col. (6).—The transplanted area is small in this Circle owing to want of sufficient water for irrigation in canals and tanks. Transplanting is not in vogue in Bellary. Paddy is seldom transplanted in Anantapur. The area under paddy irrigated by classes I and II works (Kurnool-Cuddapah canal, Chepad channel, etc.) in Kurnool and Cuddapah is about 54,000 acres, but the whole of this area cannot be transplanted owing to the uncertainty of the water supply. Col. (7).—Rs. 4 will represent the gain to the ryots by adopting single-seedling wherever possible.
Do. ...	Application of concentrated manures.	500 in Kurnool and Bellary.	10	5,000	...	...	...
Do. ...	Growing of green manure crops.	500 in Kurnool and Bellary.	5	2,500	30,000	5	1,50,000	Col. (3) includes the area under green manure crops grown from seed distributed by merchants and the local co-operative society in the Hospet division where the Department has discontinued this distribution as the advantages of green manuring are now well known.
Total Paddy ...		...	...	8,100	...	...	2,40,000	

Cholam ...	Cultivation of selections from local cholam-T ₁ in Bellary and T ₂ in Kurnool.	2,450 (2,000 in Bellary).	3	7,300	350,000	3	10,50,000	Col. (3) gives the area in 1921-22. The strains in question yield higher than the local varieties.
Do. ...	Soaking cholam seed in a solution of copper sulphate before sowing as a preventive of smut.	47,450 (Kurnool 36,450; Bellary 11,000).	1½	71,200 (1,42,300)	2,000,000	3	60,00,000	Col. (6).—Represents about a fourth of the area under cholam in Kurnool and Bellary. The strains cannot suit all the varying conditions of the whole area. Col. (5).—The season in 1920-21 was bad. The figure in brackets show what the gain would have been in a normal season.
	Total Cholam ...	...	...	78,500	...	...	70,50,000	Col. (6) represents the total area under cholam in the Ceded districts. The damage to the crop by sowing untreated seed is placed by some as high as 32 Madras measures per acre. The cost of the copper sulphate required is trifling, about half an anna per acre.
Cotton ...	Replacement of the local cotton by Nandyal 14 (a strain evolved from the local cotton) in the "Northern" tract.	30,000 (Kurnool)	About one rupee.	31,000 (2,10,000)	400,000	7	28,00,000	Col. (2).—N. 14 is a white cotton of good length and strength. It gives a higher yield than the local cotton which is a mixture of red and white cotton.
Do. ...	Replacement of the local cotton by Hagari 25 in the "Western" tract.	12,000 (Bellary).	½	4,000 (30,000)	600,000	2½	15,00,000	Col. (5) represents the profit in the abnormally bad season of 1920-21 from 17,000 acres on which extent alone N. 14 was grown pure. The figure in brackets shows what the gain would have been in a normal season. Col. (6) gives the average area in the taluks of the Kurnool district (with the exception of Cumbum and Pattikonda), of Jammalamadugu and Proddatur of the Cuddapah district and of Tadpatri in the Anantapur district and in the Banganapalle State. The local cotton is a mixture. H. 25 is an improved strain.
	Total Cotton ...	...	...	35,000	...	...	43,00,000	Col. (5) represents the profit in 1920-21, when the season was bad. The figure in brackets shows what the gain would have been in a normal season. Col. (6) gives the average area under cotton in the Bellary district and in the taluks of Gooty, Pattikonda, and others in the Western tract.

Crop.	Nature of the improvement.	Area under the improvement.	Estimated gain per acre.	Total estimated gain per annum.	Possible area under the improvement.	Estimated gain per acre.	Possible estimated gain.	Remarks.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)

III Circle (Kurnool, Bellary, Anantapur, and Cuddapah).—Cultivated area 7,712,000 acres; paddy 372,000 acres; cholam 2,061,000 acres; sugarcane 12,000 acres; cotton 1,000,000 acres—cont.

		ACS.	RS.	RS.	ACS.	RS.	RS.	
Sugarcane.	Improved furnaces in Kurnool.	30	25	700	200	25	5,000	The local furnaces are small, are not provided with chimneys and use considerable wood as fuel. The improved furnaces are bigger with fairly tall chimneys. No extra wood is used as fuel as the megass and trash from the cane itself are sufficient. Col. (4) represents the saving in fuel per acre.
Total III Circle ...		...	...	1,22,300	...	...	1,15,95,000	The crops dealt with are paddy, cholam, sugarcane, and cotton.

IV Circle (Chingleput, North Arcot, South Arcot, and Chittoor).—Cultivated area 4,716,000 acres; paddy 1,874,000 acres; sugarcane 10,400 acres.

Paddy ...	Cultivation of improved varieties.	2,000	16½	32,500	170,000	15	25,50,000	Chitrakali and Svarnawari are recommended as second crop varieties in the districts of North Arcot and Chittoor. They are short duration varieties (3-3½ months) and hence the cost of irrigation is considerably minimized in places which depend on tanks or spring channels for their water.
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Do. ...	Economic transplantation.	100,000 (Chingleput 38,000, South Arcot 60,000.)	3½	3,50,000	500,000	3½	17,50,000	<p>Thus, if the season fails after three months, which is not uncommon, the varieties in question can be harvested with the aid of one or two irrigations from wells in the land whereas the local crop, being of five months' duration, will have to be irrigated for two months at an expense of Rs. 16 to 20. Poombalai, a native of Tinnevely and a fine white-riced <i>Samba</i>, is a five-months crop which is recommended when the season for samba is too late. The local practice in such cases is to sow a kar crop the rice of which is coarse and red. Poombalai commands a higher price than kar. The extra gain on this account alone is not less than Rs. 20 per acre. Ramagarudan samba is a selection from <i>Garudan Samba</i> which it has replaced in a number of villages round Palur and yields 15 per cent more.</p> <p><i>Col. (6).</i>—The area under irrigated paddy in the circle is about 1,700,000 acres. This includes single and double crop lands, kar and samba areas and lands with an assured supply of irrigation as well as a precarious supply. Local conditions also vary largely over the area. It is estimated therefore that these varieties will suit some 10 per cent of the area.</p> <p><i>Col. (3).</i>—Several villages in South Arcot have adopted single planting of paddy seedlings.</p> <p><i>Col. (6).</i>—Very large areas in Chingleput, especially the paddy sown in August, September, are either broadcasted or drilled. Large areas in South Arcot are sown broadcast. Broadcasting is a common practice in most parts of North Arcot and Chittoor; transplanting is more or less confined to the samba crop. About 30 per cent of the area under irrigated paddy in the Circle is therefore taken as being transplanted.</p> <p><i>Col. (7).</i>—Rs. 3½ is taken on the basis of the present reduced seed-rate. This can be reduced still further when the improvement will be worth about Rs. 5 per acre.</p>
Do. ...	Application of fish guano and oil-cakes.	1,200	10	12,000	...	...	...

Crop.	Nature of the improvement.	Area under the improvement.	Estimated gain per acre.	Total estimated gain per annum.	Possible area under the improvement.	Estimated gain per acre.	Possible estimated gain.	Remarks.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)

IV Circle (Chingleput, North Arcot, South Arcot, and Chittoor).—Cultivated area 4,716,000 acres; paddy 1,874,000 acres; sugarcane 10,400 acres—cont.

Paddy— <i>cont.</i>	Growing of green manure crops.	ACS.	RS.	RS.	ACS.	RS.	RS.	The practice of collecting green leaves from forests, carting them to the fields, and applying them on the land has been in vogue for many years. With the extension of cultivation and with the restriction in the supply of leaves from the local forests, such manuring has become more and more difficult. Raising green manure crops is much less expensive and involves less labour and trouble. The net profit obtainable from growing green manure crops varies with the distance from which green leaves have to be brought. These remarks apply also to the VI and VIII Circles. <i>Col. (3).</i> —Green manure seeds sufficient for 930 acres were distributed by the Department in 1920-21. More than five times this area would have been sown by ryots with their own seed or with seed purchased from others or with self-sown kolinji which gets itself established when sown in single crop wet lands for two or three years. <i>Col. (4).</i> —At least two cart-loads of tree leaves collected from forests are applied per acre. The cost, including carting, is estimated at Rs. 10 to 12. The cost of raising a green manure crop and ploughing it in is only Rs. 2 to 3. And a green manure crop usually adds to the soil by far a larger quantity of vegetable matter than any possible heavy dose of carted leaves. <i>Col. (6)</i> represents about 20 per cent of the area under irrigated paddy in the Circle.
		6,000	8	48,000	350,000	8	28,00,000	
Total Paddy ...		...	...	4,42,500	...	...	71,00,000	

Sugarcane.	Extension of area under improved varieties.	1,800	200	3,60,000	1,800	200	3,60,000	Col. (3).—Relates to the taluk of Cuddalore where the Palur farm, opened in 1905, is situated. The area in this taluk has increased from 180 acres in 1906-07 to 2,000 acres in 1921-22. This is due to the introduction of Red Mauritius from Samalkota. Messrs. Parry & Co. co-operated with the Department in the introduction of Red Mauritius through their sugar factory at Nellikuppam.
Do.	Replacement of the local canes by improved varieties.	259	100	25,900	22,600	150	33,90,000	Col. (4).—This represents the difference between the net profits per acre of sugarcane and paddy. The farmers here do not, as a rule, make jaggery themselves but sell canes to the factory.
Do.	Reduction in the number of setts planted.	59	60	3,500	13,600	60	8,16,000	Col. (7).—The difference in yield between the improved varieties and the local canes displaced by them is 1,200 lb. of jaggery per acre, the value of which according to present prices is not less than Rs. 150. The area in column (6) relates to the whole Circle except the taluk of Cuddalore and the farmers in this area generally make jaggery themselves. Hence, the gain in column (7) is greater than that in column (4) which refers mainly to the taluk of Cuddalore where the farmers sell canes to the factory at Nellikuppam.
Do.	Improved furnaces and pans for preparing jaggery.	40	50	2,000	24,400	50	12,20,000	The ryots of North Arcot and Chittoor plant as many as 30,000 setts per acre while 10,000 setts are quite sufficient. A saving of 20,000 setts or Rs. 60 per acre can thus be effected.
								Col. (4). There is a saving of Rs. 50 worth of fuel for an acre of sugarcane by using the improved furnace and the thin and wide mouthed pans. The megass and the trash of the cane are used as fuel in the improved furnace.
	Total Sugarcane ...	...	...	3,91,400	...	...	57,86,000	
	Total IV Circle ...	...	...	8,33,900	...	...	1,28,86,000	The crops dealt with are paddy and sugarcane.

Crops.	Nature of the improvement.	Area under the improvement.	Estimated gain per acre.	Total estimated gain per annum.	Possible area under the improvement.	Estimated gain per acre.	Possible estimated gain.	Remarks.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)

V Circle (Tanjore and Trichinopoly).—Cultivated area 3,010,000 acres ; paddy 1,393,000 acres ; cotton 40,900 acres.

		ACS.	RS.	RS.	ACS.	RS.	RS.	
Paddy ...	Cultivation of improved varieties.	7,000	About 12½	87,300	160,000 (100,000 in Tanjore, and 60,000 in Trichinopoly.)	12	19,20,000	<p>Col. (3).—6,500 acres under Red <i>Samba</i> 76 in Tanjore; 300 acres under G. E. B. 24 in Trichinopoly.</p> <p>Col. (4).—Red <i>Samba</i> 76 is a selection of Red <i>Samba</i> grown at the Manganallur farm. It gives an extra yield of 4 kaisams per acre over the ordinary Red <i>Samba</i>, i.e., about Rs. 12 per acre.</p> <p>G. E. B. 24 ripens evenly and earlier than the local varieties, does not shed grain and can resist drought. It is therefore useful in places with a precarious and insufficient supply of water and yields in such places 300—500 lb. per acre over the local varieties, i.e., Rs. 25 per acre.</p> <p>Col. (6).—Red <i>Samba</i> 76 is purely a delta variety. There are many other <i>Samba</i> varieties, such as white <i>Sirumani</i>, Nellore <i>Samba</i> and <i>Sembalai</i>, besides a large area of "Udu" and <i>Kar</i> which is grown on high level lands where there is not enough water in November—December to mature a <i>Samba</i> crop and therefore an extent of only 100,000 acres has been shown as the possibilities of the extension of Red <i>Samba</i> 76.</p> <p>G. E. B.'s strain 24 may occupy not more than a fifth of the area under irrigated paddy in Trichinopoly as it is advantageous mainly in places with a scanty supply of water. It is a fine variety which is not suited to the needs of the labouring classes.</p>

Paddy ...	Economic transplantation.	375,000	3	11,25,000	950,000	3	28,50,000	Col. (3).—Economic planting has become fairly general in Tanjore as a result of the work of the Department for 12 years. At least half the transplanted area is now transplanted economically. In Trichinopoly, economic planting has been adopted in some cases in the Cauvery and Amaravathi basins. But most of the ryots have not yet realized the value of the improvement.
Do. ...	Application of fish guano.	1,650	5	8,200	...	...	...	Col. (3).—Tanjore—1,250; Trichinopoly—400.
Do. ...	Application of manure mixture.	1,000	5	5,000	...	...	...	Col. (3).—Tanjore—900; Trichinopoly—100.
Do. ...	Growing of green manure crops.	17,000 (Tanjore—14,000; Trichinopoly—3,000.)	About 6½	1,08,000	500,000 (400,000 in Tanjore and 100,000 in Trichinopoly.)	5	25,00,000	Col. (3).—12,500 acres in Tanjore will be under Kolingi collected in the Vedaranniyam tract in the Tiruturaipundi taluk. Seed enough to cover an area of 750 acres in Trichinopoly was distributed by the Department in 1920-21. Besides this, dealers from Rāmnād district stock large quantities of seed in the taluks of Lalgudi and Trichinopoly for sale to ryots. Indigo is also used as green manure. And, finally, there is self-sown <i>Kolingsi</i> in at least 50 per cent of the fields where there was <i>Kolingsi</i> in previous years and hence the quantity of seed sold is no indication of the area where <i>Kolingsi</i> is grown as green manure.
								Col. (6).—Green manures would be confined to the lighter soils in the delta which do not crack in the dry weather. They would be raised on single crop lands which are transplanted and where the usual manures (dung of sheep and cattle, ashes and leaves) are either not available or sufficient. About half the transplanted area may benefit by the application of green manures in the whole Circle.
								Col. (7).—The ultimate gain is reduced to Rs. 5 as it represents the average over a large area.
Tot. Paddy	13,33,500	72,70,000	

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Crop.	Nature of the improvement.	Area under the improvement.	Estimated gain per acre.	Total estimated gain per annum.	Possible area under the improvement.	Estimated gain per acre.	Possible estimated gain.	Remarks.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)

V Circle (Tanjore and Trichinopoly).—Cultivated area 3,010,000 acres ; paddy—1,393,000 acres ; cotton—40,900 acres—cont.

		ACS.	RS.	RS.	ACS.	RS.	RS.	
Cotton	Introduction of Cambodia (irrigated) in Trichinopoly.	3,000	60	1,80,000	3,000	60	1,80,000	<i>Col. (4).—See remarks against VIII Circle. The standard of cultivation is below that of the Coimbatore district. Hence the profit is less.</i>
Do.	Cultivation of improved strains of Cambodia (irrigated) in Trichinopoly.	1,000	10	10,000	3,000	10	30,000	The improved strains give a greater yield than the ordinary Cambodia and the cotton commands a higher price owing to its superior quality.
Do.	Cambodia (dry)--prevention of the loss due to the boll-worm insect by the application of Pest Act.	7,000	9	63,000	7,000	9	63,000	See remarks against VIII Circle.
	Total Cotton ...		...	2,53,000	..	...	2,73,000	
	Total V Circle ...	...	...	15,86,500	...	...	75,43,000	The crops dealt with are paddy and cotton.

VI Circle (Madura, Rāmnād, and Tinnevely).—Cultivated area 4,527,000 acres; paddy 965,000 acres; cumbu 500,000 acres; cotton 650,000 acres.

Paddy ..	Application of fish guano in Rāmnād and Tinnevely.	3,500	5	17,500	...	...	...	Col. (3).—Fish guano sufficient for about 900 acres was distributed by the Department in 1920-21. Not less than thrice this area would have been manured by ryots from the stock supplied by private agencies. A large portion of this manure was used for paddy lands in the Tambraparni valley.
Do. ...	Growing of green manure crops.	8,000	15	1,20,000	120,000	15	18,00,000	Col. (3).—Green manure seeds sufficient for about 1,600 acres were distributed by the Department in the Periyar tract in 1920-21. The Department has been pushing the work systematically for a long time with the result that the merchants have set up a regular trade in green manure seeds in this tract and a large area is sown by ryots with seeds privately purchased. Col. (4).—In Periyar, at least two cart-loads of green leaf manure costing Rs. 20 are applied to one acre of paddy land. It is very common to bring green leaves in truck-loads about 50 miles by train. It has to be carted to and from the railway at either end before being spread on the field. The cost of growing a green manure crop and pulling and spreading it on the land before ploughing it in is only Rs. 5 per acre. Col. (6).—The lands in Rāmnād and Tinnevely are mostly tank-fed except in the Tambraparni valley where the use of kolingi gathered from the dry lands near the hills is common. The area that can benefit by the application of the green manures will be small. The figure in column (6) relates mainly to the Periyar tract.
	Total Paddy ...	...	...	1,37,500	...	...	18,00,000	

Crop.	Nature of the improvement.	Area under the improvement.	Estimated gain per acre.	Total estimated gain per annum.	Possible area under the improvement.	Estimated gain per acre.	Possible estimated gain.	Remarks.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)

VI Circle (Madura, Rāmnād, and Tinnevelly).—Cultivated area 4,527,000 acres; paddy 965,000 acres; cumbu 500,000 acres; cotton 650,000 acres—cont.

		ACS.	RS.	RS.	ACS.	RS.	RS.	
Cumbu ...	Drill sowing	1,778	4	7,100	500,000	4	20,00,000	See remarks against drill sowing under cotton.
Cotton ...	Introduction of pure crops of improved strains known as Company cottons, evolved at the Koilpatti farm.	200,000	25	50,00,000	200,000	25	50,00,000	Company cotton yields more than ordinary "Tinnevellies," has a higher ginning percentage, and has a longer and finer staple. It is not possible to forecast what further improvement can be made in Tinnevelly cotton.
Do. ...	Introduction of Cambodia (irrigated).	26,300	60	15,78,000	26,300	60	15,78,000	Col. (3).—Madura, 9,000; Rāmnād, 14,000; Tinnevelly, 3,300. Col. (4).—See remarks against VIII Circle. The standard of cultivation is below that of the Coimbatore district. Hence the profit is less.

Cotton ...	Cultivation of improved strains—Cambodia (irrigated).	400	5	2,000	23,000	5	1,15,000	Improved strains of Cambodia have a longer and a stronger staple than that of the crops grown here and therefore command a higher price in the market. They have been introduced in the districts of Madura and Rāmnād.
Do. ...	Drill sowing	6,424	4	25,700	650,000	4	26,00,000	The use of the drill facilitates weeding and, what is much more important, hoeing.
<p><i>Col. (4).</i>—The gain of Rs. 4 represents the saving in after-cultivation expenses (thinning, weeding along the lines, bullock hoeing, etc.). Neither the saving in sowing expenses nor the increase in outturn due to the preservation of the tilth and the conservation of moisture has been taken into account here. Drill sowing was unknown in Tinnevely as late as 1906. The usual practice is to sow broad cast and to weed by hand subsequently.</p>								
<p><i>Col. (6).</i>—This represents the area under cotton in the VI Circle.</p>								
Do. ...	Cambodia (dry)—prevention of the loss due to the boll-worm insect by the application of the Pest Act.	19,000 in Madura.	9	1,71,000	59,500	9	5,35,500	<p><i>Col. (3).</i>—The Pest Act was applied only in Madura.</p> <p><i>Col. (4).</i>—See remarks against VIII Circle.</p> <p><i>Col. (6).</i>—This represents the area in the Circle 19,000 acres in Madura, 20,500 in Rāmnād, and 20,000 in Tinnevely.</p>
Total Cotton ...	...	...	...	67,76,700	...	..	98,28,500	
Total VI Circle ...	...	...	...	69,21,300	...	...	1,36,28,500	The crops dealt with are paddy, cumbu, and cotton.

Crop.	Nature of the improvement.	Area under the improvement.	Estimated gain per acre.	Total estimated gain per annum.	Possible area under the improvement.	Estimated gain per acre.	Possible estimated gain.	Remarks.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)

VII Circle (Malabar and South Kanara).—Cultivated area 2,396,000 acres; paddy 1,472,000 acres; sugarcane 3,600 acres; arecanuts 93,000 acres.

Paddy ...	Cultivation of improved strains (Taliparamba farm seed).	ACS.	RS.	RS.	ACS.	RS.	RS.	The strains are selected seeds of local varieties. They ripen uniformly and give better yield. They have been introduced into Calicut taluk and North Malabar. They are spreading naturally, a large portion of the crops grown from seed distributed by the Department having been sold by the ryots for seed. <i>Col. (6).</i> —The strains are first crop paddies and local conditions vary very much in Malabar. Hence only about a sixth of the first-crop area under paddy may be brought under these strains.
		5,000	7	35,000	100,000	7	7,00,000	
Co.	Economic transplantation.	6,000	3	18,000	300,000	3	9,00,000	<i>Col. (3).</i> —The area under improved strains is transplanted economically, in addition to an extent of 1,000 acres in South Malabar. <i>Col. (6).</i> —Except in small areas, the first crop cannot be transplanted in South Malabar for want of labour and sufficient water. Again, transplantation is difficult (1) in the sandy soils near the coast and (2) in many of the inland valleys as there is not sufficient labour available for transplanting the crop within the limited time that this operation has to be done. About a third of the area under paddy may be transplanted. <i>Col. (7).</i> —Single-planting is not advocated as paddy seedlings do not tiller well owing to the lack of bright weather during the monsoon. Ryots are advised to plant two or three seedlings according to the fertility of the soil.

14	Paddy	..	Application of fish manure and fish guano.	1,000	6	6,000	..	...	...	Col. (3) includes the area manured with fish manure and fish guano purchased by ryots from merchants. The quantity purchased from Government depots alone in 1920-21 was sufficient to manure 685 acres.
	Do.		Growing of green manure crops.	300	5	1,500	200,000 (Malabar 100,000; South Kanara 100,000).	5	10,00,000	Col. (3).—Malabar 50; South Kanara 250. The green manure is Kolingi. Col. (6).—Green manure crops like Kolingi are specially applicable to the coastal taluks where considerable difficulty is often experienced in collecting green leaves. This is specially the case in South Kanara where green leaves are used for bedding cattle, instead of being applied direct to the land. The area in column (6) represents about a seventh of the area under paddy in the West Coast.
			Total Paddy ...	...	...	60,500	...	...	26,00,000	
	Sugarcane.		Extension of area under improved varieties.	1,600	250	4,00,000	1,600	250	4,00,000	Col. (3).—The Department began to introduce Red Mauritius in 1908-09. Owing to its prolific growth and to its being a hard, jackal-proof cane, the area under sugarcane has increased from 1,978 acres in 1908-09 to 3,600 acres in 1921-22. Cols. (4) and (7).—The gain of Rs. 250 per acre represents the difference between the net profits per acre of sugarcane and paddy. The jaggery made in the West Coast is of poor quality and hence the lower price taken here.
	Do.		Replacement of the local canes by improved varieties (Red Mauritius, etc.)	2,000	150	3,00,000	2,000	150	3,00,000	The difference in yield between the Red Mauritiuses and the local varieties displaced by it is 1,500 lb. of jaggery. It is interesting to note that Red Mauritius has spread from South Kanara into North Kanara of the Bombay Presidency.

Crop.	Nature of the improvement.	Area under the improvement.	Estimated gain per acre.	Total estimated gain per annum.	Possible area under the improvement.	Estimated gain per acre.	Possible estimated gain.	Remarks.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)

VII Circle (Malabar and South Kanara).—Cultivated area 2,396,000 acres; paddy 1,472,000 acres; sugarcane 3,600 acres; arecanut 93,000 acres—cont.

Sugarcane —cont.	Iron mills for crushing cane.	ACS. 3,000	RS. 50	RS. 1,50,000	ACS. 3,600	RS. 50	RS. 1,80,000	There are at present 485 iron mills which have almost superseded the country wooden mills. The percentage of juice extracted is considerably higher than the equivalent of 500 lb. of jaggery
	Do.	Improved furnaces and shallow open pans for boiling sugarcane juice.	2,500	25	62,500	3,600	25	
Total Sugarcane	9,12,500	9,70,000	

Arecanuts.	Spraying arecanut bunches with Bordeaux Mixture as a preventive against Mahali disease known as "Koleroga." (<i>Phytophthora arecae</i> .)	42,953 trees	2 annas per tree.	5,400	5,200,000	2 annas per tree.	6,50,000	The Mahali disease attacks the tender arecanuts during the monsoon months. Col. (3) represents the number of trees sprayed in 1916-17 when operations were conducted on a large scale. Since then, several sprayers have been sold to garden owners. About 10,000 trees were sprayed by the Department in 1921-22 at the expense of the garden owners. Col. (6).—The disease is common in South Malabar, especially in the Ponnani taluk where it formerly caused a loss of some 50 per cent of the crop. The spraying is not a cure but a prophylactic. Incidentally, however, it has generally reduced the incidence of the disease in places where spraying was done in previous years. The figure in column (6) relates to 5,000,000 trees in Malabar and 200,000 trees in South Kanara (mainly in Hannavar magane). A tree bears on an average 200 nuts, the value of which at present prices is 8 to 12 annas.
Total VII Circle	...	...	...	9,78,400	...	...	42,20,000	The crops dealt with are paddy, sugarcane, and arecanuts.

VIII Circle (Salem and Coimbatore).—Cultivated area 4,305,000 acres; paddy 307,000 acres; ragi 550,000 acres; sugarcane 15,600 acres; cotton 310,000 acres.

Paddy	Cultivation of improved varieties.	1,000 (Coimbatore-900).	10	10,000	200,000	10	20,00,000	The varieties are G. E. B. 24, 1303, and 91. Strain No. 24 has established itself at Erode and is spreading naturally, a large portion of the crops having been disposed of by the ryots for seed. Strain 91 is a selection from Poombalai. Col. (4).—The improved strains are of shorter duration than the local varieties and enable the ryots to raise two crops of paddy instead of only one long-duration variety. In a poor season, it is often possible to take a crop of one of these varieties on single crop lands, in the place of the longer duration crop for which there will not be sufficient water. The strains yield better and fetch a higher price than the local varieties. There is also a saving in irrigation charges. The gain is very modestly estimated at Rs. 10 per acre. Col. (6) represents two-thirds of the area under irrigated paddy in the Circle. The varieties may not suit all conditions.
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Crop.	Nature of the improvement.	Area under the improvement.	Estimated gain per acre.	Total estimated gain per annum.	Possible area under the improvement.	Estimated gain per acre.	Possible estimated gain.	Remarks.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)

VIII Circle (Salem and Coimbatore).—Cultivated area 4,305,000 acres; paddy 307,000 acres; ragi 550,000 acres; sugarcane 15,600 acres; cotton 310,000 acres—cont.

Paddy— <i>cont.</i>	Economic transplantation.	ACS. 22,000 in Coimbatore.	RS. 3½	RS. 77,000	ACS. 220,000 (160,000 Salem; 60,000 Coimbatore.)	RS. 3½	RS. 7,70,000	Col. (6).—About five-sixths of the area under irrigated paddy in Salem may be transplanted. Samba in Coimbatore is transplanted whether grown as a single or second crop. Samba is the rule as a second crop in places where the irrigation is good. Col. (7).—Rs. 6 will represent the gain to the ryots by adopting single seedling wherever possible.
Do.	Application of fish guano.	1,300	5	6,500	...	...	...	Col. (3).—Coimbatore 1,200 acres.
Do.	Application of oil-cakes ...	200	7½	1,500	...	...	..
Do.	Growing of green manure crops.	8,000 in Salem.	About 19	1,51,800	150,000	15	22,50,000	Col. (3).—Coimbatore 7,400 acres, mainly under <i>Kolings</i> ; Salem 600 acres. Col. (4).—Ryots apply three cart-loads of leaves collected from either dry lands or from forests. The cost, including carting, is estimated at Rs. 25. The expense of growing a green manure crop is Rs. 5 to 10 per acre, including cost of seed, sowing, and cutting. Thus, the gain varies from Rs. 15 to 20 per acre. Col. (6).—Green manures would be confined largely to single crop lands which are transplanted. The area under irrigated paddy in the Circle is 300,000 acres. This area includes both double cropped and broad casted lands. Village sweepings and cattle droppings in Coimbatore are required for garden lands or for dry fields when there are no gardens. Col. (7).—The ultimate gain is put at the minimum as it represents the average over a large area.
Total Paddy ...		...	...	2,46,800	...	...	50,20,000	

Ragi ...	Introduction of Hagari No. 8.	250	2	500	40,000	2	80,000	Hagari No. 8 is a strain of ragi from the Bellary district. It yields better than the local variety. Col. (6) represents about 10 per cent of the area under unirrigated ragi in the Circle. The furnaces are on the Sindewahi model.
Sugarcane.	Improved furnaces for jaggery-making in Coimbatore.	200	25	5,000	97,000	25	2,42,500	
Cotton ...	Introduction of Cambodia (irrigated), a new crop.	86,800 (Coimbatore, 84,000).	80	69,44,000	86,800	80	69,44,000	Cambodia cotton is an exotic and was introduced by the Department in 1904. It did not replace any indigenous cotton. It is cultivated mainly on land which had previously yielded precarious crops of paddy, on very favourably situated dry land or introduced into the rotation of garden crops. Thus, Cambodia supplanted crops the average profits of which could not have been more than Rs. 40 to 50 per acre. Cambodia requires less irrigation than any other garden crop. A good crop on irrigated and heavily manured land will yield about 500 lb. of lint per acre and even more. It is superior to indigenous cotton in yield, in ginning percentage, in the quality of the lint, and in price. On a modest estimate a net profit of Rs. 120 to 130 per acre can be obtained at present prices. This means a gain of Rs. 80 per acre over the crops that would otherwise be grown.
Do.	Cultivation of improved strains of Cambodia (irrigated).	21,500 (Coimbatore, 20,000).	10	2,15,000	86,800	10	8,68,000	Col. (4) represents the gain from (1) the extra yield (25 lb. of kapas per acre), (2) the higher price paid for quality and (3) the saving in seed which has been reduced from 25 lb. to 15 lb. per acre, on account of the better quality of the seed.
Do.	Cambodia (dry)—prevention of the loss due to the pink boll-worm insect by the application of the Pest Act.	32,000 (Coimbatore, 29,000).	9	2,88,000	32,000	9	2,88,000	The pink boll-worm feeds inside the green bolls and damages the vital parts with the result that the bolls often drop to the ground. It stains and weakens the cotton fibre and dirties the cotton. The damage on account of this insect is estimated to consist of a reduction (1) of 11 per cent lint for the season picking and 27 per cent for the summer picking, (2) of 15 per cent seed and (3) in price to the extent of Rs. 25 a bale. As a result of the application of the Pest Act, the cotton crop of the current season is reported to be excellent and free from the attack of the boll worm. The loss prevented in the case of dry Cambodia is not less than Rs. 9 per acre.

Crop.	Nature of the improvement.	Area under the improve- ment.	Estimated gain per acre.	Total estimated gain per annum.	Possible area under the im- provement.	Estimated gain per acre.	Possible estimated gain.	Remarks.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)

VIII Circle (Salem and Coimbatore).—Cultivated area 4,305,000 acres; paddy 307,000; ragi 550,000 acres; sugarcane 15,600 acres; cotton 310,000 acres—cont.

Cotton— cont.	Introduction of Company cotton in Coimbatore.	ACS.	RS.	RS.	ACS.	RS.	RS.	Col. (3) represents only the area for which the seed has been supplied by the Department. The natural expansion of the cultivation of Company cotton (Karunganni) in Coimbatore is much greater. The Karunganni crop is variously estimated at from 20,000 to 40,000 bales of 400 lb. in this Circle. This represents the produce of 80,000 to 160,000 acres, at the rate of 100 lb. of lint per acre. Col. (4) represents the difference between the net profits per acre of Company cotton and dry Cambodia in Coimbatore. The yield of Cambodia on dry soil is low. Col. (6) represents the area in 1921-22. The area under dry Cambodia in Coimbatore was as high as 156,000 acres in 1918-19 when the price of Cambodia was very high.
		4,000	30	1,20,000	29,000	30	8,70,000	
	Total Cotton ...	...	...	75,67,000	...	...	89,70,000	The Department has not attempted till now any district work in the Nilgiris which is also in the VIII Circle. Work on potatoes and fruits is being taken up now. The crops dealt with in the Circle are paddy, ragi, sugarcane, and cotton.
	Total VIII Circle ...	...	...	78,19,300	...	...	1,43,12,500	

Summary—Presidency figures.—Cultivated area 38,992,000 acres; paddy 11,362,000 acres; cholam 5,171,000 acres; cumbu 3,505,000 acres; ragi 2,489,000 acres; sugarcane 106,000 acres; cotton 2,272,000 acres; turmeric 42,500 acres; plantain 124,000 acres; arecanut 117,300 acres.

Paddy ...	Cultivation of improved strains and varieties.	29,000	8	2,27,800	870,000	About 9½	82,50,000	<p><i>Cols. (4) and (7).</i>—The figures in the two columns will be different as they represent the averages of two different sets of figures. Improved strains and varieties have been introduced in I, IV, V, VII and VIII Circles. The ryots not only select seed from the crop grown and keep it for their own needs but sell a portion of the surplus to others for seed at a premium. Thus, the area under improved strains will increase year after year.</p>
Do.	Economic transplantation, including single-seedling.	196,300	About 3	18,67,700	3,100,000	About 3½	95,15,000	<p>Work has been done except in the II and VI Circles.</p> <p><i>Cols. (7) and (8).</i>—The figures are based on the present reduced seed-rate. This can be reduced still further when the improvement will be worth about Rs. 1,50,90,000 without taking the increase in yield into account.</p>
Do.	Application of concentrated manures.	11,750	About 5½	68,700	1,250,000	5	62,50,000	<p>Concentrated manures consist of bone-meal, fish manures, and oil-cakes. 169,000 tons of these manures were exported by sea and rail to places outside the Madras Presidency on an average during the three years ending with 1920-21. The quantity includes also the oil-cake content of the exported oil seeds. These manures could have been applied to an extent of 1,250,000 acres of paddy at the rate of about 300 lb. per acre if their export were stopped and would have yielded a net profit of Rs. 5 per acre at a very modest estimate.</p>

Summary—Presidency figures.—Cultivated area 38,992,000 acres; paddy 11,362,000 acres; cholam 5,171,000 acres; cumbu 3,505,000 acres; ragi 2,489,000 acres; sugarcane 106,000 acres; cotton 2,272,000 acres; turmeric 42,500 acres; plantain 124,000 acres; arecanut 117,300 acres—cont.

Crop.	Nature of the improvement.	Area under the improvement.	Estimated gain per acre.	Total estimated gain per annum.	Possible area under the improvement.	Estimated gain per acre.	Possible estimated gain.	Remarks.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Paddy— <i>cont.</i>	Growing of green manure crops.	ACS. 45,300	RS. About 10	RS. 4,64,300	ACS. 2,650,000	RS. About 6½	RS. 1,70,00,000	There are several kinds of green manures suitable to various types of lands. The cultivator does not now entirely depend on the Department for the supply of green manure seeds. He either grows his own green manure seeds or purchases them from private merchants who have established a regular trade. The area in column (6) represents about one-third (32 per cent) of the area under irrigated paddy in the Presidency.
	Total Paddy ...	...	...	26,28,500	...	...	4,10,15,000	
Cholam ...	Cultivation of selections from local cholam in the Ceded Districts.	2,450	3	7,300	350,000	3	10,50,000	The operations consist in steeping cholam seed in a solution of copper sulphate to prevent the attack of smut.
Do.	Anti-smut operations in the Ceded Districts.	47,450	1½	71,200	2,000,000	3	60,00,000	
	Total Cholam ...	...	...	78,500	...	...	70,50,000	

Cumbu ...	Drill sowing	1,778	4	7,100	500,000	4	20,00,000	The figures relate to Madura, Rāmnād, and Tinnevely.
Ragi ...	Introduction of Hāgarī No. 3 in Salem and Coimbatore.	250	2	500	40,000	2	80,000	
15 Sugarcane.	Extension of area under improved varieties.	11,500	277	31,90,000	11,500	277	31,90,600	The figures relate mainly to the districts of Gōdāvāri, South Arcot, and South Kanara.
Do.	Replacement of the local canes by improved varieties.	7,559	183	13,85,900	51,200	176	90,10,000		The figures relate to I, IV, and VII Circles.
Do.	Planting canes in lines and reducing the seed rate.	159	63	10,000	64,800	64	41,44,000	The figures relate to the Circars and to the districts of North Arcot and Chittoor.
Do.	Introduction of iron mills for crushing cane.	3,000	50	1,50,000	3,600	50	1,80,000	The figures relate to the West Coast. The local wooden mills have now been displaced by iron mills.
Do.	Introduction of improved furnaces and pans.	2,770	About 25	70,200	37,900	41	15,57,500	The figures relate to the districts of Kurnool, Chingleput, South Arcot, North Arcot, Chittoor, Coimbatore, Malabar, and South Kanara.
	Total Sugarcane ...	...	...	48,06,100	...	...	1,80,81,500	
Cotton ...	Cultivation of improved strains and varieties.	242,000	About 20½	50,35,000	1,200,000	7½	93,00,000	The improved strains and varieties are N. 14 and H. 25 in the Deccan and Company cottons in Madura, Rāmnād, and Tinnevely. Cambodia (irrigated) is an exotic and has been introduced as a new crop in the districts of Salem, Coimbatore, Trichinopoly, Madura, Rāmnād, and Tinnevely.
Do. ...	Introduction of Cambodia (irrigated).	116,100	About 75	87,02,000	116,100	About 75	87,02,000	

Summary—Presidency figures.—Cultivated area 38,992,000 acres; paddy 11,362,000 acres; cholam 5,171,000 acres; cumbu 3,505,000 acres; ragi 2,489,000 acres; sugarcane 106,000 acres; cotton 2,272,000 acres; turmeric 42,500 acres; plantain 124,000 acres; arecanut 117,300 acres—cont.

Crop.	Nature of the improvement.	Area under the improvement.	Estimated gain per acre.	Total estimated gain per annum.	Possible area under the improvement.	Estimated gain per acre.	Possible estimated gain.	Remarks.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Cotton —cont.	Cultivation of improved strains of Cambodia (irrigated).	ACS. 22,900	RS. About 10	RS. 2,27,000	ACS 112,800	RS About 9	RS. 10,13,000	The figures relate to Salem, Coimbatore, Trichinopoly, Madura, and Rāmnād.
Do. ...	Introduction of Company cotton (<i>Karungani</i>) in Coimbatore.	4,000	30	1,20,000	29,000	30	8,70,000	Company cotton is replacing dry Cambodia, which is a poor yielder.
Do. ...	Drill sowing	6,424	4	25,700	650,000	4	26,00,000	The figures relate to Madura, Rāmnād, and Tinnevely.
Do. ...	Cambodia—(dry) prevention of the loss due to the boll-worm insect by the application of the Pest Act.	58,000	9	5,22,000	98,500	9	8,86,500	The figures relate to the V, VI, and VIII Circles.
	Total Cotton ...	..	...	1,46,31,700		...	2,33,71,500	
Turmeric.	Introduction of improved furnaces in Guntūr.	15	10	150	5,200	10	52,000	
Plantain	Introduction of the improved method of cultivation in the Gōdavāri district.	340	300	1,02,000	6,900	300	20,70,000	

Palmyra ...	Operations against the bud-rot disease of palmyras in the districts of Godāvari and Kistna.	500,000 trees.	Rupee one per tree.	5,00,000	500,000 trees.	Rupee one per tree.	5,00,000
Arecanut.	Spraying arecanut bunches with Bordeaux Mixture as a preventive against Mahali disease known as "Koleroga."	42,953 trees.	Two annas per tree.	5,400	5,200,000 trees.	Two annas per tree.	6,50,000
	Grand total ...	...	...	2,27,19,950	...	...	9,48,70,000

*Gain (both present and prospective) to the ryots in each Circle by following the advice of the Department of Agriculture
(The figures in the numerator below give an estimate of the present gain, while the figures in the denominator give an estimate of the prospective gain.)*

Name of crop.	I Circle.	II Circle.	III Circle.	IV Circle.	V Circle.	VI Circle.	VII Circle.	VIII Circle.	Total.	Nature of improvements recommended, etc.
Paddy ...	RS. 3,95,100	RS. 4,500	RS. 8,100	RS. 4,42,500	RS. 13,33,500	RS. 1,37,500	RS. 60,500	RS. 2,46,800	RS. 26,28,500	Cultivation of improved strains and varieties, economic transplantation including single seedling, application of concentrated manures, and growing of green manure crops. (a) The total prospective gain includes a profit of Rs. 62,50,000 from the application of concentrated manures which it is not easy to apportion among the Circles and which has therefore not been included in the Circle figures.
	92,35,000	15,00,000	2,40,000	71,00,000	72,70,000	18,00,000	26,00,000	50,20,000	4,10,15,000(a)	
Cholam ...	...	...	78,500	...	...	...	...	...	78,500	Cultivation of selections of local varieties and anti-smut operations.
			70,50,000						70,50,000	
Cumbu ...	..	...	...	...	...	7,100	...	...	7,100	Drill sowing.
						20,00,000			20,00,000	

Ragi	...	...	...	...	...	...	...	500	500	Cultivation of improved varieties.
								80,000	80,000	
Sugarcane.	34,96,500	...	700	3,91,400	...	...	9,12,500	5,000	48,06,100	Extension of area under improved varieties (Red Mauritius, etc.), replacements of the local canes by improved varieties, planting canes in lines and reducing the seed-rate, replacement of wooden mills by iron mills for crushing sugarcane, and the introduction of improved furnaces and pans for boiling the juice.
	1,10,78,000	...	5,000	57,86,000	...	...	9,70,000	2,42,500	1,80,81,500	
Cotton	...	...	35,000	...	2,53,000	67,76,700	...	75,67,000	1,46,31,700	Cultivation of improved strains and varieties (N. 14, H. 25 and Company cottons), introduction of Cambodia (irrigated), cultivation of improved strains of Cambodia (irrigated), introduction of Company cottons in Coimbatore, drill sowing of cotton, and prevention of the loss due to the pink boll-worm insect by the application of the Pest Act.
	...	...	43,00,000	...	2,73,000	98,28,500	...	89,70,000	2,33,71,500	
Turmeric...	...	150	...	...	...	...	...	...	150	Introduction of improved furnaces for drying the stuff.
		52,000							52,000	

*Gain (both present and prospective) to the ryots in each Circle by following the advice of the Department of Agriculture
(The figures in the numerator below give an estimate of the present gain, while the figures in the denominator give an estimate of the prospective gain).*

Name of crop.	I Circle.	II Circle.	III Circle.	IV Circle.	V Circle.	VI Circle.	VII Circle.	VIII Circle.	Total.	Remarks.
	RS.	RS.	RS.	RS.	RS.	RS.	RS.	RS.	RS	
Plantain.	1,02,000	...	...	...	...	...	...	...	1,02,000	Introduction of the improved method of cultivation (South Indian system) in the Godavari district.
	20,70,000								20,70,000	
Palmyra.	5,00,000	...	...	..	...	...	...	...	5,00,000	Operations against the bud-rot disease.
	5,00,000								5,00,000	
Areca nut.	...	...	...	...	...	...	5,400	...	5,400	Operations against the Mahali disease.
							6,50,000		6,50,000	
Total ...	41,93,600	4,650	1,22,300	8,33,900	15,86,500	69,21,300	9,78,400	78,19,300	2,27,59,950	
	2,28,83,000	15,52,000	1,15,95,000	1,28,86,000	75,43,000	1,36,28,500	42,20,000	1,43,12,500	9,48,70,000(a)	

(a) See remarks against (a) at page 110.

APPENDIX B.
**List of Publications of the Madras Agricultural
 Department.**

Note for the Vernacular Press.

- 1908 1. Agricultural College, Coimbatore.
 2. On the sowing of paddy.
 3. Green manure.
 4. Lime cultivation.
 5. Coimbatore Agricultural College.
- 1909 1. The use of drill for sowing cotton.
 2. Seed selection, etc.
- 1910 1. On pepper.
 2. On the improvement of plants.
 3. Cambodia cotton.
 4. The best time to visit the Palur Agricultural Station.
- 1911 ... Revised note on Cambodia cotton.
- 1913 1. List of insect pests of cultivated plants in Southern India.
 2. Note on the preparation of Bordeaux mixture for the treatment of Mahali disease.

Leaflets.

- 1909 1. Banku paddy.
 2. Uses of the harrow.
 3. Cotton cultivation.
 4. Single planting of paddy.
- 1910 1. Manuring in the Kistna Delta
 2. Groundnut cultivation on the West Coast.
 3. Method of preparing preserved ginger.
 4. Single Seedling planting of paddy.
 5. Green manuring.
 6. A note on Hairy Caterpillars.
 7. A Summary Note on the Swarming Caterpillar Pest of Paddy in North Malabar.
 8. Note on The Conservation of Cattle Urine.
 9. Experiences of Single Seedling Planting.
 10. Useful Facts Learnt From the Agricultural Station at Palur, Near Nellikuppam, South Arcot District.
 11. Do. at the Taliparamba Agricultural Station.
 12. Light Traps.
 13. (Single) Planting 8 Feet Apart, and Manuring of Individual Plants.
 14. Practical lessons learnt from the Experiments at the Central Farm.
 15. Useful facts learnt at Kōilpatti.
- 1911 1. Instructions For Sending Plants Attacked By Parasitic Fungi To The Office of the Government Mycologist, Coimbatore.
 2. Note on Sugarcane Cultivation on the West Coast.
 3. A dialogue on Single Planting Paddy.
 4. A note on wild indigo.
 5. *Bambusa* and How To Combat it.
 6. Improvements in Ryots' Land.
 7. Advantages of using iron ploughs in black cotton soils.
 8. Coconut Beetle.

9. Manuring in the Kistna Delta.
10. Dhaincha (*Takkapunda*).
11. Cambodia Cotton.
12. The Potato Crop.
13. Sugarcane Cultivation on the West Coast.
14. The Preservation of Farm-yard Manure.
15. Bud-rot in Gōdāvāri and Kistna districts.
16. Leaflet For Small Ginning Factories.
17. Cambodia cotton. The importance of sowing pure seed.
18. Improvements in Paddy Cultivation Recommended by the Department.
19. Cotton.
20. Improvements which can be effected in the Sugarcane Cultivation of South Kanara.
21. Sugarcane.
22. Jaggery Making.
23. The Cultivation of Ginger on the West Coast.
24. Paddy manuring.
- 1912 1. The methods of Reclaiming Saline Soils.
2. Note on the Agricultural College, Coimbatore.
3. On the Deccan Grasshopper Pest.
4. The Bud-rot of Palmyras in Gōdāvāri and Kistna Districts.
- 1913 1. What the Ryot Has To Say About Single Seedling Planting of Paddy.
2. Insect Pests.
3. What the Ryot Has To Say About The Use of the Drill For Sowing Seed.
4. Flies Spoiling Toddy in South Kanara.
5. Training of Practical cultivators, Maistris or Field Coolies.
6. What the Ryot Has To Say About Single Seedling Planting of Paddy.
7. The Mahāli Disease of Areca Nuts.
8. Castration and Mulling.
9. The Single seedling Transplanting of Paddy.
10. The bud-rot of Coconuts in Malabar district.
11. Ill effects of Communal Grazing.
- 1914 1. Practical Instructions for the Kollegal Mulberry—Silk-worm Rearers.
2. The advantages of co-operative sale of cotton.
3. Some General Methods of Controlling Attacks by Insect Pests, Agricultural methods.
4. Some General Methods of Controlling Attacks by Insect Pests, Mechanical methods.
5. The Fodder Question in Coimbatore.
6. A Dialogue on the Cultivation of Cambodia.
7. The Mahali or Koleroga Disease of Arecanuts.
8. Possible use for oil-engines when Not required for Pumping.
9. Indigo.
- 1915 1. What the ryot has to say about the advantages of growing dhaincha as a green manure crop for paddy lands.
2. Do. do. wild indigo as a green manure for wet land.
3. Do. do. uses of triangular harrow sold to the Ryots from the Agricultural Station, Palur (Near Nellikuppam), South Arcot district.

4. Pulichai, Mailam or Jari cotton in Tinnevely and Rāmnād districts.
 5. Water hyacinth.
 6. Compressed Air Sprayer For Spraying Arecanuts.
 7. List of Agricultural Implements recommended by the Department.
 8. Method of Collecting and Dressing kolingi seed before sowing.
- 1916
1. Experience of Mr. Kallichitti Abbayi Nayudu of Pulla, Kistna district on green manure.
 2. Some Uses of Prickly-pear.
 3. Ground-nut cultivation in the upland taluks of the Gōdāvāri district.
 4. Pulichai, Mailam or Jari cotton in Tinnevely and Rāmnād districts.
 5. Pulichai, Mailam or Jari cotton.
- 1917
1. Guinea Grass.
 2. Lucerne.
 3. The Mango Hopper Pest and its Control.
 4. Possible Improvements in the Manufacture of Indigo in the Madras Presidency.
 5. A few home-made remedies against some common plant pests.
 6. Green manure crops suitable for the Northern Circars and the Ceded Districts.
 7. Green manure crops suitable for the Tamil districts.
 8. Sorghum for fodder on the black soils of Bellary district.
 9. The coconut.
 10. Songs on improved methods of paddy cultivation.
 11. Songs on preventive methods to protect mango flowering.
 12. Hints to the ryots of the IV Circle on green manuring.
- 1918
1. Instructions for reporting insect damage and forwarding specimens for examination.
 2. The insect pests of tobacco in South India.
 3. Certified drivers for ryots' pumping engines.
 4. How to increase the yield of crops (Agricultural song).
 5. Faulty flaying of hides and the branding of cattle.
 6. Graft mangoes, how to start and maintain a mango garden.
 - *1. Rice Hispa.
 2. Hairy Caterpillar.
 3. Control of important paddy pests.
 4. Cambodia cotton.
 5. The cultivation of Cambodia cotton in the Ceded Districts.
 6. Sugarcane cultivation for the use of the ryots of the IV Circle.
 7. Tapioca cultivation.
 8. Bud-rot of palmyra and coconut palms in Gōdāvāri and Kistna districts.
 9. How to increase production of crops.
 10. Note on pepper cultivation.

* From 1919, leaflets are being numbered in one continuous series, instead of separately for each year.

11. Note on the cultivation of Modan Paddy.
12. Note on sugarcane cultivation on the West Coast.
13. The present state of the Mulberry Silk-worm Industry of the Madras Presidency and its possible improvements.
14. Note on Monsoon Plough.
15. Coconut Stem-bleeding Disease.
16. Note on mildew on grapes and how to prevent it.

Bulletins.

1. Essays on Viticulture and Fruit Culture in California.
2. Papers on the tobacco parasite *Bodu*, or *Orobanche nicotiana*.
3. Forecast of Outturn of early-sown indigo, paddy, etc., 1889.
4. Native method of cultivating and curing tobacco, etc., in Madura.
5. Report on the Sowings of Late crops, 1889-90.
6. South Indian Fodders by Dr. Van Geysel and C. Benson.
7. Forecast of Outturn of Late Crops, Paddy, Indigo, etc., 1889-90.
8. The supply of Cattle in the Madras Presidency by E. H. Hazelton and C. Benson.
9. Cotton in the Madras Presidency.
10. The Storage of Seed Grain in the Cuddapah and Kurnool districts by C. Benson.
11. Fields of demonstration in France—Extracts from a Ministerial circular.
12. Forecast of Sowings of Early Crops of Paddy, Indigo, etc., for 1890.
13. Report on the Late Sowings of the Gingelly Crops for 1890-91.
14. Forecast of the Outturn of the Early Sown Paddy, Indigo, and Gingelly crops of 1890.
15. Forecast of the Late Sown Paddy and Indigo of 1890-91.
16. Forecast of the Outturn of Early and Late Sown Cotton Crops for 1890-91.
17. Forecast of the Outturn of Early and Late Sown Cotton Crops for 1890-91.
18. Forecast of the Outturn of the Late Sown Paddy and Indigo Crop for 1890-91.
19. The growth of Cotton in Tinnevely—Report by S. Prana-tarthihara Ayyar.
20. Forecast of the Outturn of the Late Sown Gingelly Crop for 1890-91.
21. The Cultivation of Rice in Italy—Extracts translated by C. J. Peters.
22. Telugu Sayings and Proverbs—Collection of—by C. Benson.
23. The scrub Exterminator—Collection of reports regarding.
24. Names of Field Crops of the Madras Presidency.
25. The Palmyra Palm and its uses by W. A. Symonds with notes by C. K. Subba Rao.
26. Sugar Mills by C. Benson.
27. Grass-Farming in Coimbatore.

28. The Ground, Earth, or Pea-nut (*Arachis Hypogæa*).
29. The cultivation and manufacture of Ganja in Madras.
30. Note on the Extraction of *Agave Americana* fibre at Coimbatore.
31. The care and management of Farm-manure in South India.
32. Experiments With Water-lifts.
33. On the use of iron ploughs in the Ceded Districts.
34. Tamil Sayings and Proverbs on Agriculture.
35. Water-lifts by Chatterton.
36. A Sugarcane Pest in Madras.
37. The ground-nut (*Arachis Hypogæa*).
38. The ground-nut crops growing near Panruti in South Arcot.
39. The Sugarcane in South Arcot district.
40. The Seed Drill and Other Implements Used in connexion therewith.
41. The Ground-Nut Crop (A report on certain analysis of the ground-nut).
42. Native Beliefs Regarding The Hairmarks on Horses and Cattle.
43. Sugarcane in the Gōdāvāri and Ganjam districts.
44. Notes on the Cattle of the Madras Presidency.
45. A Tea Eel-worm Disease in South India.
46. The sugarcanes of Madras.
47. Note on Simple Machines for Extracting Plantain Fibre (Bulletin No. 77).
48. Note on the Experimental Sugarcane Station at Samalkota, Gōdāvāri District.
49. Diseases of *Andropogon Sorghum* in the Madras Presidency.
50. Sugarcane Cultivation in the Deccan Districts of the Madras Presidency.
51. Progress Report on the Work of the Samalkota Experimental Sugar Farm during 1903-04.
52. The Agathi Plant.
53. The Cultivation and Curing of Tobacco as followed near Dindigul.
54. Note on Irrigation by Pumping From a Well at Melrosapuram.
55. The Great Millet or Sorghum in Madras.
56. The Varieties of Cultivated Pepper.
57. Note on Fig Cultivation in Southern India and Peculiarities in Viticulture in Penukonda.
58. The Cultivation of Ground-nuts.
59. Sunnhemp (*Crotalaria Juncea*).
60. Cattle of Southern India.
61. Improvements in Paddy Cultivation on the Home Farm at Sivagiri.
62. Note on the Home Farm, Sivagiri Estate, Tinnevely district.
63. Principles of Paddy Manuring.
64. Hindupur Agave Plantation.
65. Note on the Indigenous Manures of Southern India and their application.

66. The Manuring of Sugarcane at Samalkota Agricultural Station, 1902—1912.
67. Note on the Insects attacking the Paddy Plant in Southern India.
68. A Soil Survey of the Tanjore delta.
69. Bees and the Fertilization of Coffee.
70. A Soil Survey of the Guntūr delta.
71. Irrigation.
72. A Brief Survey of the Madras Live-stock.
73. A Survey of the Madras Dairy Trade.
74. Indigo Manufacture in Madras.
75. A Soil Survey of the Kistna delta.
76. Exhibit of Food and Industrial Products made from local agricultural produce at the Madras Industrial Exhibition, December 1917.
77. Note on Simple Machines for Extracting Plantain Fibre.
78. Note on Tobacco Cultivation in Gōdāvāri Lankas.
79. Some Aspects of Dairying at the Madras Agricultural College, Coimbatore.
80. The Entomologist's Crop Pest Calendar for the Madras Presidency.
81. Bird Friends and Foes of the Farmer.
82. A Note on Casuarina Plantations in the Vizagapatam District.
83. A Soil Survey of the Gōdāvāri delta.

Year Book.

1917, 1918, 1919, 1920-21.

The Villagers' Calendar (formerly called the Agricultural Calendar) in English, Tamil, Telugu, Malayalam, and Kanarese, 1910, 1911-12, 1912-13, 1913-14, 1914-15, 1915-16, 1916-17, 1917-18, 1918-19, 1919-20, 1920-21, 1921-22.

PUSA MEMOIRS.

Botanical Series.

- (1) Vol. VII, No. 1. Studies in Indian Sugarcanes, No. I, Punjab canes, by C. A. Barber, D.Sc.
- (2) Vol. VII, No. 3. Studies in Indian Sugarcanes, No. II, Sugarcane Seedlings, including some Correlations between Morphological Characters and Sucrose in the Juice, by C. A. Barber.
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- (7) Vol. X, No. III. Studies in Indian Sugarcanes, No. V. On Testing the suitability of Sugarcane varieties for different localities by a system of measurements, by C. A. Barber, C.I.E., D.Sc., F.L.S.

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- (6) Vol. V, No. I. The Gases of Swamp Rice Soils, Part IV. The Source of the Gaseous Soil Nitrogen, by W. H. Harrison, D.Sc., and P. A. Subrahmanya Ayyar, B.A.
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- (1) Vol. V, No. VI. Lantana Insects in India. Being the reports of an inquiry into the efficiency of indigenous insect pests as a check on the spread of lantana in India, by Rao Sahib Y. Ramachandra Rao, M.A., F.E.S.

Pusa Bulletins.

- (1) Bulletin No. 58. *Calocoris angustatus*, Leth., by E. Ballard, B.A., F.E.S.
- (2) Bulletin No. 83. Progress of the Sugarcane Industry in India during the years 1916--1917. Being notes submitted to the Meeting of the Board of Agriculture in India, Pusa, 1917. Edited with an Introduction, by C. A. Barber, C.I.E., D.Sc., F.L.S.

- (3) Bulletin No. 87. A contribution to our knowledge of some South Indian Coccidae, by T. V. Ramakrishna Ayyar, B.A., F.E.S., F.L.S.
- (4) Bulletin No. 94. A Preliminary Note on the Behaviour in North India of the first batch of Sugarcane seedlings distributed from the Sugarcane breeding station, Coimbatore, by T. S. Venkataraman, B.A.
- (5) Bulletin No. 97. *Ustilago crameri* Koern, on *Setaria italica*, Beauv, by S. Sundararaman, M.A.

Articles contributed to the Agricultural Journal of India by Officers of the Madras Agricultural Department.

- 1906 1. The Origin of New Sugarcanes by Bud variation, by C. A. Barber.
 2. The Production of Early Maturing Canes, by C. A. Barber.
 3. The Samalkota Sugarcane Farm, by C. A. Barber.
- 1907 4. Report of the Agricultural Station, Palur, for 1905-06, by C. A. Barber.
 5. Sugarcane Cultivation in the Irrigated Lands of the Gōdāvāri Delta, by C. A. Barber.
- 1908 6. Leaf Manuring in South Kanara, M. E. Couchman.
 7. A comparative test between Iron and Wooden Sugar Mills, by R. C. Wood.
 8. Fish Manure in Madras, by C. K. Subba Rao.
 9. The Nendram Plantain of the Madras West Coast, by C. K. Subba Rao.
 10. The Seed of *Nymphaea Lotus*, by C. K. Subba Rao.
 11. Tobacco in South Kanara, by C. K. Subba Rao.
 12. Note on some Sheep found near Cumbam, by R. C. Wood.
- 1909 13. Management of Experiment Stations in India, by H. C. Sampson.
 14. The Introduction of Drill-Sowing and Inter-Cultivation on the Black Cotton Soils of Tinnevely, by H. C. Sampson.
- 1910 15. School Gardens, by M. E. Couchman.
 16. The College of Agriculture, Coimbatore, by R. C. Wood.
- 1911 17. Difficulties in the Improvement of Indian Agriculture, by M. E. Couchman.
 18. The Introduction and Spread of Cambodia Cotton in the Madras Presidency, by H. C. Sampson.
 19. Note on an Exhibition case, by R. C. Wood.
- 1912 20. Heavea Rubber in Southern India, by R. D. Anstead.
 21. *Mimosa Pudica* in Coorg, by C. A. Barber.
 22. Seedling Canes in India, by C. A. Barber.
 23. Cabbage White Butterfly, by T. B. Fletcher.
 24. Termites or White Ants, by T. B. Fletcher.
 25. Rows of Spots on the Leaves of Palmyra Palms, by W. McRae.
 26. Extraordinary Growth of Cane, by R. C. Wood.
- 1914 27. The Bud-rot of Coconut Palms in Malabar, by F. J. Shaw and S. Sundararaman.

28. Sub-Soil Drainage in Paddy Lands, by R. C. Wood.
 29. The Use of Fish as Cattle Food, by R. C. Wood.
- 1915 30. Improvement of Cane Cultivation in the South Kanara district, by H. C. Sampson.
 31. Sugar and the Sugarcane, by C. A. Barber.
 32. Paddy Seed-beds in the Kistna delta, by D. Ananda Rao.
 32A. Recent History of the Cotton Improvement Work in Tinnevely and Rāmnād districts, by H. C. Sampson, B.Sc.
33. Mango, Hopper Control Experiments, by E. Ballard.
- 1916 34. A Note on the Inheritance of certain stem characters in *Sorghum*, by G. R. Hilson.
 35. The Classification of Indigenous Indian Canes, by C. A. Barber.
- 1918 35A. Testing new Cane-seedlings in India, by C. A. Barber.
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