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REPORT

ON THE

OPERATIONS OF THE DEPARTMENT
OF AGRICULTURE

MADRAS PRESIDENCY

FOR THE OFFICIAL YEAR

1919-20

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எக்கொப்பம்

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OFFICE OF THE
DIRECTOR OF AGRICULTURE, MADRAS
Dated 23rd September 1920.

From

THE HON'BLE DIWAN BAHADUR
L. D. SWAMIKANNU PILLAI AVARGAL, I.S.O.,
ACTING DIRECTOR OF AGRICULTURE,
Madras,

To

THE SECRETARY TO GOVERNMENT,
REVENUE (SPECIAL) DEPARTMENT,
Ootacamund.

SIR,

I have the honour to submit the annual report on the Department of Agriculture in the Madras Presidency for the year 1919-1920. I regret the late submission of this report which has been due principally to a strike at the Government Press, and to my having been obliged, in consequence, to entrust to a private press the work of printing some of the appendices to the report.

I.—ADMINISTRATION.

2. His Excellency the Governor of Madras visited the Hagari Agricultural Station on 2nd July 1919 when the Director of Agriculture, Mr. R. Cecil Wood, was present. His Excellency also visited the College of Agriculture and Central Farm, Coimbatore, on 18th September 1919, and inspected besides the Sugarcane Breeding Station, the laboratories of the various research officers.

A.—STAFF.

3. Mr. R. Cecil Wood was in charge of the department practically throughout the year, having taken charge from the permanent Director, Mr. G. A. D. Stuart, I.C.S., on the 9th April 1919; I took charge from Mr. Wood on the 1st April 1920. Mr. Wood was on tour for 191 days, exclusive of thirty days of departure from or return to headquarters. In May and November 1919 he inspected the Experimental Stations in the Planting districts, in June he attended the Cattle Show at Tiruppur; in August he attended a meeting of the United Planters' Association at Bangalore; in December 1919 he attended the meeting of the Board of Agriculture at Pusa; in January 1920 he conferred with the District Forest Officer, Nellore, regarding the kancha system; in February and March 1920 he spent nearly three weeks with the Indian Sugar Committee, visiting all the stations which the Committee visited in this Presidency.

4. The Acting Government Sugarcane Expert toured for six weeks in the various provinces of Northern India, studying the behaviour of the seedlings distributed to the different farms there and collecting data about indigenous canes. The Government Agricultural Chemist attended the Indian Science Congress at Nagpur and was otherwise on tour for 75 days in the year. The Government Entomologist toured in the Kistna district for the inspection of paddy stem borer experiment and he visited Kollegal for considering proposals regarding the silk industry; he was on tour for 67 days in all. The Professor of Agriculture was permitted by Government to visit the Agricultural Institutes at Pusa, Nagpur and Poona.

REPORT ON THE OPERATIONS OF THE DEPARTMENT OF AGRICULTURE, MADRAS PRESIDENCY, FOR THE OFFICIAL YEAR 1919-20.

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between the 1st and 25th January 1920. The Assistant Lecturing Botanist toured in the Chintaladevi tract and the Kambakkam hills for 18 days to study and collect specimens of fodder grasses. The Government Agricultural Engineer toured for 42 days at Nagpur and elsewhere to attend trials of motor tractors and to study the working of the Mansfield water fider.

5. The Deputy Directors of Agriculture performed the usual tours of inspection, among which has to be mentioned, in accordance with the Government orders on the subject, the inspection of the Bhuvanagadda (Madanapalle) Criminal Settlement in Chittoor district and of Aziznagar Criminal Settlement in South Arcot district by the Deputy Director of Agriculture, IV Circle, who took the occasion to draw up schemes for cropping and to make suggestions for the guidance of the managers of the respective settlements.

6. The distribution of circles among Deputy Directors stood very much as it was at the end of 1917-18 (vide paragraph 2 of the Report for 1917-18), except that Mr. P. H. Rama Reddi, after a short period of training under the Deputy Director of Agriculture, IV Circle, and in the office of the Director of Agriculture, was placed in charge of the II and III Circles, *vice* Mr. G. R. Hilson on leave. Among Assistant Directors the only change made during the year was that M.R.Ry. S. Subrahmanya Ayyar was appointed as Assistant to the Deputy Director of Agriculture, IV Circle, with effect from the 15th January 1920. Mr. K. T. Achaya, the newly appointed Sericultural Expert, joined the department on 4th October 1919 with headquarters at Kollegal. Mr. R. C. Broadfoot, recruited as Deputy Director of Agriculture, joined the service on 17th May 1919 and was posted as Superintendent of the Central Farm of which till then, the Principal and Professor of Agriculture had been in charge. The post of Engineering Assistant at the College was converted into one of gazetted rank and another Supervisor's post was also created to help in the teaching of Survey and Engineering at the College. Mr. J. Narayanamurti was appointed Lecturer in Engineering on relief from his special duty, on 1st May 1919. M.R.Ry. V. Bhogappayya Sastri, Deputy Collector on special duty, was in charge of Palm Disease operations in Gōdāvari and Kistna districts from 1st October 1919.

7. Mr. Roger Thomas, Deputy Director of Agriculture, continued to be on deputation in Mesopotamia, and his period of deputation was further extended by two years from 1st April 1920. Mr. Allan Carruth, Deputy Director of Agriculture, Live-stock, resigned the service from 5th November 1919, and pending the appointment of his successor by the Secretary of State, M.R.Ry. M. V. Raghavulu Nayudu, Farm Manager, who had been trained by Mr. Carruth, was in charge of the duties of the post. Mr. E. Ballard, Government Entomologist, was relieved of his military duty and rejoined civil functions at Coimbatore on 17th May 1919. Mr. F. R. Parnell, Government Economic Botanist, was on leave for twelve months from 30th April 1919 and during his absence, M.R.Ry. G. N. Rangaswami Ayyangar officiated as Government Economic Botanist. From 6th February 1920 Mr. H. C. Sampson was on deputation to Cambodia and Cochin China, and he was on this special duty at the close of the year under report.

8. The Personal Assistant to the Director, M.R.Ry. C. S. Subrahmanya Ayyar, went on one year's furlough and was succeeded by M.R.Ry. V. N. Viswanatha Rao Avargal on 13th August 1919.

9. Three Assistants in the Scientific section, M.R.Ry. B. Viswanath, M.R.Ry. Y. Ramachandra Rao and M.R.Ry. S. V. Venkatakrishna Mudaliyar were deputed to Mesopotamia as Assistant Chemist, Assistant Entomologist and Assistant Mycologist, respectively, and they were on this duty at the close of the year under report. M.R.Ry. P. A. Subrahmanya Ayyar, Assistant to the Government Agricultural Chemist, died on 26th December 1919, much regretted by all his colleagues in the Research Institute.

10. The state of depletion of the superior staff in both the agricultural and scientific branches, which was commented on in the two previous reports, continued with little or no abatement during the year 1919-20, and it was not till the end of that year that intelligence was received of the action being taken by the Secretary of State to fill up ten appointments in the Indian Agricultural

Service, recruitment for which had been pressed on the India Office as a matter of urgent necessity since April 1917. As regards subordinate appointments the following statement will show that there are still numerous gaps in the scheme drawn up by Mr. Chadwick and sanctioned by Government in 1915.

	Number sanctioned at reorganisation of 1915 and subsequent additions.		Number permitted to be filled up.		Number actually filled up.		Vacancies.	
	1918-19.	1919-20.	1918-19.	1919-20.	1918-19.	1919-20.	1918-19.	1919-20.
Science section—								
Upper Subordinates	24	31	24	29	22	29	2	Nil.
Agricultural section—								
Upper Subordinates	68	68	50	67	37	57	13	10
Science and Agricultural sections—								
Lower Subordinates	141	97	92	94	75	74	17	20

The strength of the subordinate establishment in both the scientific and agricultural sections will have to be very much enlarged on the arrival of the new officers referred to above.

11. The Inspector of Agricultural offices visited fourteen gazetted officers' stations, eleven Agricultural stations and two supervisors' stations for the purpose of auditing accounts; he spent 273 days in outdoor work which included besides the regular audit of offices visited, various inquiries conducted under the orders of the Director; he also prepared a Departmental Manual for the press and drafted instructions for the maintenance of cash and stock accounts in the office of the Principal of the College of Agriculture and in connexion with the distribution of green manure seed.

B.—BUILDING AND LAYING OUT OF FARMS.

12. The laying out of the four coconut stations on the West Coast described in the report for 1917-18 continued to make progress. A further area of about 15 acres was planted out near Nileshwar. The main work at these stations consisted in ploughing and cultivating in order to keep down weeds and to ensure the surface soil mulch in the dry weather.

13. On the new Cambodia Cotton Farm near Pollachi in the Coimbatore district much preliminary work was done, in laying out an area of some 40 acres into fields of suitable size for experimental work; in levelling the fields for irrigation and making wells and irrigation channels and in erecting the necessary farm buildings. Pending the commencement of operations on this farm, the selection work on Cambodia cotton has been carried on for the last two years at the Central Farm at Coimbatore and considerable progress is reported to have been made.

14. Work on the Bantanahal Sheep Farm described in the report for 1917-18 is rather at a stand-still, partly owing to unexpected and continual losses among the sheep and partly owing to the difficulty noticed in the report for 1917-18, namely, that the sub-soil water is brackish and the stream running through the farm is not perennial.

15. At Chintaladevi Cattle Farm in the Ongole tract, the irrigable area was laid out into fields and roughly levelled in anticipation of irrigation from the Mopad Project which has not yet commenced. The continuation of the approach road within the farm limits was taken up departmentally, and sheds for cattle and offices as well as quarters for clerks and labourers were erected. As the farm is very much exposed to wind, the planting of shelter belts of trees is in active progress. The Public Works Department has commenced the construction of permanent buildings and are collecting materials.

16. *Potato Farm, Nilgiris.*—The erection of Farm buildings, the planting of wind screens, the construction of an approach road and the extension of the farm itself so as to convert it into a mixed farm, were all projected during the year under report, but mainly owing to difficulties of supervision, these improvements have not made much progress.

17. *Experimental stations in the Planting Districts.*—Three of the four sanctioned experimental stations were completed during the year and work has begun upon them. The fourth experimental station for the study of rubber at Tenmalai in South Travancore is in course of construction.

18. At the newly opened station at Gudiyattam in the North Arcot district, the construction of store room, cattle shed and office was completed during the year. The Naduvarpet Groundnut Sub-Station in the same circle, opened recently as an adjunct to the Palur Agricultural Station in the South Arcot district (vide report for 1917-18, page 4), was laid out during the year under report, a block of 10 acres being subdivided into 100 equal plots; the standardization of these plots has been only partially accomplished.

19. At Coimbatore, the following buildings were sanctioned for the Agricultural College, but apart from the collection of some material for the foundations of the first two items, nothing more was done beyond the digging of trial pits:—

- (1) A new College.
- (2) Two quarters for Imperial officers.
- (3) Three quarters for Provincial officers.
- (4) Three A type quarters.
- (5) Five B type quarters.
- (6) Four C type quarters.
- (7) Twenty-four Intermediate type quarters.

20. An office building for the Deputy Director of Agriculture, Planting Districts, was almost completed. The Gasometer at the College having gradually become so leaky as to be dangerous, the working of gas was stopped at the end of the year, resulting in very considerable delay in the work of the Chemical and Mycological laboratories. The gas plant has been since re-erected. The open space to the west of the Students' hostel was ploughed with a motor tractor and made into an additional hockey ground for the students. At the Sugarcane Breeding Station the only sweet water well on the Farm, on which the whole of the cane area depends for irrigation, was cleaned and built up during the year and an additional depth of 8 feet of water was added.

II.—AGRICULTURAL EDUCATION.

21. No change was made during the year in the system of instruction imparted at the College of Agriculture, Coimbatore, but the foundation for certain important changes which have been carried out during the current year was laid by the appointment of a Committee under Government Order No. 1796, Revenue (Special), dated 21st September 1919, for the purpose of considering and recommending means whereby the standard of the diploma and certificate examinations of the College could be raised. The Committee were desired to consider the ways and means of

- (1) attracting a better class of students,
- (2) improving the training given at the College.

The Committee reported to Government in December 1919, and the orders passed by Government on their report were given effect to in the current year.

22. *Certificate Course.*—There were 232 applications for admission to this course. Of the 51 students who were offered admission 6 did not join and 2 resigned in the first few days. Six fresh candidates were admitted and the strength of the class became 49. At the end of the year the same class was 47 strong. The outgoing class of short course students was examined for the grant of certificates in February 1920 with the result that 38 passed out of 42. The credit of this achievement was due to the special interest evinced by the Principal Mr. McRae who instituted a daily revision class during the third and last term and also persuaded the students to devote a definite period every evening to private study.

23. *Diploma Course.*—The diploma examinations were postponed from December 1919 to February 1920 as the students had spent sometime on special duty, i.e., in a campaign for an increase of food production. A class of ten students appeared for the diploma examination and all passed, two of the students securing first class diplomas. The outside examiners who were employed on this occasion appear to have been thoroughly satisfied with the performances of the students.

24. *Special Lectures.*—These were given by

- (1) Dr. Gilbert Slater on Economics,
- (2) M.R.Ry V. N. Viswanatha Rao Avargal on Land Revenue Settlement and Administration,
- (3) M.R.Ry. K. Devasikamani Mudaliyar on Co-operation,
- (4) M.R.Ry. G. N. Rangaswami Ayyangar on Probable Error,
- (5) Mr. C. E. C. Fischer on Forestry.

25. Athletics continued to engage the attention of both staff and students, the teams of the various games having a busy time throughout the playing season. Under a wholesome rule which is strictly enforced in the College, all students are required to be out of doors, for a specified period on Tuesday and Saturday afternoons, during which time they have either to play at games or to accomplish a three-mile run.

26. *Affiliation of the College to the University.*—Much ground was broken during the year in order to pave the way for the affiliation of the College of Agriculture to the University of Madras. A reference on the subject was made by the University of Madras to the authorities of the College who have submitted a scheme. It remains to be seen whether the scheme will meet with the approval of the University authorities, and of Government; but it may be observed in passing that in affiliation probably lies the true remedy for the complaints which have been consistently made in previous reports regarding the poor quality of the students admitted to the College of Agriculture.

27. *Agricultural Middle Schools.*—An Agricultural Middle school was to have been started last year at Taliparamba; and the necessary land is in process of being acquired for the purpose and two agricultural diplomates who had undergone training at the Teachers' College, Saidapet, were held in readiness for opening the school. Owing, however, to delays in the preparation of plans and estimates and differences of opinion as regards the design of school and hostel buildings, the actual construction and opening of the school are still in abeyance. The subject of Agricultural Middle Schools was, however, discussed a good deal in the Legislative Council and Government have undertaken to open another school in the Northern Circars, possibly near Anakapalle.

28. The farm schools and connected night-schools opened for the benefit of juvenile agricultural labourers on the Government Farms at Palur, Anakapalle and Coimbatore continued to be maintained on the lines laid down by Government. There was some dissatisfaction on the part of departmental officers regarding the poor attendance at these schools, where the students receive a full day's wages for a half day's work done outside school hours; but the schools without doubt fulfil a useful purpose in serving as an object lesson to labouring agriculturists and the inspecting officers of the Education Department, who are in a position to assess the right value of such schools, have commended their work and advised their continuance.

III.—RESEARCH AND EXPERIMENTS.

A.—AGRICULTURE.

29. For details of research and experiments carried on at the various Agricultural Stations as well as at the Research Institute, Coimbatore, reference is requested to the detailed reports of the stations and to the accounts of their work during the year, given by the various experts who compose the Research Institute. Only a summary, consistent with the limitations of space prescribed for this annual report, will be attempted in this chapter.

3,082 lb. of straw per acre; but on account of its black colour and pasty nature when cooked, there was little demand (presumably locally) for this variety. The Superintendent reports that the area grown in future with this variety will be restricted; but it is worth enquiry whether a good market for this article cannot be found in Madras where it enters largely into pastry dishes. The standardization of plots for cultivating paddy varieties has for its object the reduction to a convenient minimum of the probable error—a subject which is now given a prominent place in all experimental work, since by the method of probable error a single season may be made to yield results for which otherwise a number of years' experimenting would be necessary. The probable error so far determined at Coimbatore, however, is too large to be of any practical use and the standardization will have to be continued. At Anakapalle six local varieties of paddy were tested for probable error.

36. *Manurial*.—The experiment described in the report for the Coimbatore station last year was continued for testing the value of bulky organic manure and nitrogen added to paddy soils, and also for bringing out any difference due to growing a green manure crop on the field as compared with green manure brought from outside. The plots which received nitrogen in addition have given better yields than those without nitrogen; but contrary to what is generally supposed, one of the plots grown with green manure yielded better than the corresponding crop to which green manure was brought in from outside.

37. The art of manuring paddy has been studied at Manganallur in a series of carefully designed experiments. In one, daincha was grown over the whole area of the field and the crop was cut and finally trampled in over the surface; ground Trichinopoly phosphate, 250 lb. per acre, was then applied to alternate strips of 5 cents area. The experiment showed that the phosphate became available for the crop of paddy grown in the same year. Small quantities of sulphate of potash gave an increase of over 400 lb. per acre when applied along with green leaf, but when superphosphate was applied in addition, there was no increase in yield; when sulphate of potash was applied in larger quantities, the yield was considerably less than if it had not been used at all. Ammonium sulphate at 168 lb. per acre gave a higher yield than green leaf of which 2,500 lb. were applied to the acre. Bonemeal and Trichinopoly phosphate were both compared with

(1) superphosphate applied under similar conditions and in the same quantity of total phosphate,

(2) with green leaf applied by itself as a check,

(3) with a check plot where no manure was applied.

38. The manures in question having been applied for two seasons, Mr. Sampson notes that the results were not satisfactory as the duplicate plots frequently contradict the results from the original plots and as the yield from plots where green leaf had been applied was shown to be less than the yield from the plots which had received no manure at all. In another experiment groundnut cake was applied to each of four series of plots and to three of these series bonemeal or Trichinopoly phosphate or bone super was applied in addition to groundnut cake; the experiment showed that—

(1) both bonemeal and Trichinopoly phosphate had a considerable effect in the first year of the experiment, although not as marked as in the case of superphosphate;

(2) in the second year there was very little difference in the yield of grain between superphosphate and either bonemeal or Trichinopoly phosphate;

(3) that it is probably advantageous to supplement oil cakes in this way with phosphatic manures.

39. The experiments at Manganallur to test the availability of phosphate by itself, i.e., without leaf manure, to paddy soils, are equally interesting. When superphosphate was applied at 350 lb. per acre there was, after four years of application, a residual value of manure equal to 240 lb. or crop per acre. Bonemeal at 250 lb. per acre also showed a similar residual value. In another experiment, increasing quantities of soluble phosphates were applied for four years in succession to four different plots, the second receiving more than the first, the third more than the second and the fourth more than the third. It was determined that the

value of 100 lb. per acre of manure applied in this way is 338 lb. of grain, but when 200 lb. per acre are applied, the value of 100 lb. of this manure is only 145 lb. of grain, and when 300 lb. per acre are applied the value of every 100 lb. of this is 173 lb. of grain; finally when 400 lb. per acre are applied, the value of every 100 lb. of this is 133 lb. of grain. The conclusion is drawn that when money is a consideration, the best return is undoubtedly that obtained from the smallest of the above doses of manure. From another experiment is drawn the inference that the less concentrated manures like basic super and basic phosphate show more manurial residues than the corresponding concentrated manures.

40. At Manganallur also certain manurial experiments were continued on mixed paddy crops with unequal periods of growth, the later harvested crops in such cases being called "Udu" (Tamil for "in between"), kuruvai and ottadam being in order of time the two crops thus mixed; the result so far reached is that manures like superphosphate which have been applied as a top-dressing to the Udu crop after the kuruvai has been cut and harvested are unable to penetrate into the soil and become available to the ratoon crop. The experiment has however also shown that the continuous use of cattle manure greatly increases the cropping value of the land especially so far as the kuruvai crop is concerned. Another experiment carried on for five years has shown that 500 lb. of fish manure per acre, whether applied at the time of planting, or after the harvest of the kuruvai crop gave the same yield as 15 cartloads of cattle manure. Groundnut cake applied at the rate of 500 lb. at the time planting gave a slightly lower yield, while when half was applied at the time of planting and half after the harvest of the kuruvai crop, the yield was considerably less.

41. *Tanjore manure mixture*.—This mixture was intended to combine the results of field experiments in the application of manures with those obtained in the laboratory. Mr. Sampson invites the attention of landowners in the delta to the lay out of these experiments as given in the report of the Manganallur station. "For" he remarks, "however carefully such an experiment is conducted it does not follow exactly that precisely similar results will be obtained on other land where the conditions of drainage and irrigation vary." It is reported from Taliparamba that the Tanjore mixture was tried there on paddy with good result.

42. *Composting*.—The attention of the public may also be drawn to the important experiments on composting with green manure crops at the Manganallur farm. In every case the application of the compost gave an increased yield.

43. *Nitrolin or Calcium Cyanamide*.—At Sirvel "super" was tried by itself and in company with nitrolin, with fish manure and with groundnut cake. The last gave the best result, and the same result was established by experiments at Nandyal. At Coimbatore the experiments conducted with calcium cyanamide obtained from the Nitrogen Fertilizer Company showed that the plots to which nitrolin was added yielded 20 per cent more, which was not the case last year. At Manganallur one cwt. of nitrolin per acre gave a decided increase whereas two cwt. per acre seemed to have no effect on the kuruvai crop, though the yields from the ottadam seemed to indicate an increased outturn due to this manure.

44. Superphosphate was applied in addition to nitrolin so as to supply the other ingredient of plant food deficient in the soil, and the nitrolin was applied to puddled soil ten days before transplantation so as to avoid injury to seedlings. It is noted as the results of the experiments tabled at the report on the Manganallur station that nitrogen supplied in the form of ammonium sulphate is of greater value than that supplied as nitrolin.

(c) Cotton.

45. A complete history of the research in cotton, carried on in the Madras Presidency down to the date of the Indian Cotton Committee's report which was published last year will be found at pages 92—96 of that report along with the recommendations made by the committee for the future continuance of that work. At Hagari the two types of H. 25 and N. 14 were tested for yield and after making allowance for the probable error, the Deputy Director of Agriculture concludes that H. 25 has proved to be a far better yielder than N. 14. Two mixtures of each,

II. 25 and Roseum, and N. 14 and Roseum, were sown last year in two different plots for the purpose of natural intercrossing and four lots of kappas, two from each plot, were collected separately and ginned and sown on separate plots during the year under report. In each of these plots there were a number of natural crosses whose kappas were separately collected for separate trial. Comparisons were made at Nandyal between Company No. 2, No. 3 and N. No. 14; though No. 14 was shown to be decidedly inferior to the other two types in yield of kappas and lint, yet it is noted that its lint fetched Rs. 79 per candy (500 lb.) above the market rates owing to the fineness and length of its staple. At Kovilpatti the cotton crops were devoted to testing the various strains produced on that station in order to ascertain their yielding powers: two new strains were tested during the year under report against Company No. 3; but were found to give no higher acre yield. One of them however showed much greater vigour in that it maintained its ginning outturn in the second or summer picking; and this year it is being grown on seed farms. When, instead of taking the total acre yield as a basis for comparison, monthly pickings from each selection were ginned separately it was found that the ginning outturn showed considerable variation according to the vigour of the plants at that particular period.

46. At Coimbatore the varieties of cotton grown on the Central Farm during the year under report were—

- (1) Cambodia,
- (2) Saigon,
- (3) Uppam,
- (4) Karunganni.

47. The highest yield per acre was that of Cambodia strain No. 11, being 2,168 lb. of kappas against the previous year's yield of 1,893 lb. per acre. This particular yield represented a profit of Rs. 469 per acre, the cost of production being only Rs. 76, which for purposes of food production may be compared with the highest profit yielded on the same farm by paddy, which is Rs. 229 per acre. Saigon cotton yielded 1,320 lb. of kappas per acre, but the lint was of fine quality and favourably reported on by Messrs. Stanes and Co. of Coimbatore. Karunganni cotton does not do so well at Coimbatore as on the Tinnevely soils. The ginning percentage of the four varieties grown at Coimbatore were:

32.42	per cent	(Cambodia).
32.28	"	(Saigon).
30.71	"	(Karunganni).
25.24	"	(Uppam).

For spinning tests see the station report.

Mr. Broadfoot concludes "An average crop of cotton is still one of the most profitable crops a ryot can grow and so long as this remains so, the area under food grains will always be restricted to the ryot's bare necessities." At the same farm a course of two rows of tenai and a row of uppam, drilled with country gorru, was found to be a profitable mixture.

48. The object of the cotton rotation experiments at Nandyal was to show that a three course rotation, namely,

- (1) Indigo, sorghum and cotton,
- (2) groundnut, sorghum and cotton,
- (3) sorghum and cotton,

was more profitable than the two courses of the local rotation. The experiment having been carried on for six years was brought to an end during the year under report, as the results were satisfactorily established.

49. The work done on the new Cambodia station at Anamalai near Pollachi in the Coimbatore district, was confined to the erection of buildings and the laying out of land suitably for experimental work. The farm has been since handed over to the newly appointed Cotton Specialist Mr. G. R. Hilson.

(d) Dry Grains.

50. *Cholam*.—For the first time, 3,568 lb. of selected sorghum seed were distributed from the Nandyal and Hagari farms and their yields were favourably reported by the ryots. At Coimbatore the usual experiments in the irrigation of cholam were carried out, showing, as in the previous year, that the crop required 14.8 inches of water per acre, including a rainfall of 8.35 inches received during the growing period. The rotation experiment of sorghum (dry cholam) on the same farm went to show, as in previous years, that a leguminous crop entering into rotation, in this case *Dolichos lablab*, exercised considerable influence on the yield of the subsequent cereal. The bulk of the area at the Central Farm was harvested by means of the Narbada Reaper drawn by a Fordson tractor.

51. *Ragi*.—At Anakapalle, Hagari No. 8 ragi was tried along with a local variety and proved to be a crop of longer duration. A small quantity of 181 lb. of the same ragi was for the first time distributed to ryots in the II and III Circles and was reported to have given wherever it was tried better yields than local ragi. The same ragi at Coimbatore was badly attacked with borer and the Government Entomologist advised that the affected plants should be pulled out and destroyed. Late ragi at the Central Farm was found invariably to give lower yields than early ragi. Nitrolin applied to ragi on this farm gave somewhat uncertain results. The irrigation experiments upon ragi showed that that crop required 21.94 inches of water, including a rainfall of 15.67 inches.

(e) Groundnut.

52. The Palur Agricultural Station and the sub-station attached thereto at Naduvarpet are devoted to the study of groundnut varieties and the cultivation of groundnut generally. In the dry rainfed area at Palur an experiment in cereal groundnut rotation has been conducted since 1907-08 in A series (cereal inter sown every year) and B series (cereal and groundnut rotation spread over two years). Among the cereals tried, tenai yielded better in the year under report in both A and B series. In the varietal tests in the well-irrigated dry area, local Mauritius yielded the best, Big Japanese and Carolina ranking second and third respectively. In the same area, comparative manurial experiments on ragi and groundnut as a mixture brought out the superiority of powdered shell-lime and cattle manure for ragi, while the no manure plot yielded best in the case of groundnut. In the irrigated sulphur-experimental plots as well as in similar experiments in the rain-fed area, the plots manured with lime gave the best yield, as against sulphur and calcium sulphate. At the sub-station it was decided to manure all the plots, with fish guano at 3 cwt. per acre and to raise a crop of cambu in all in order to work out the probable error before groundnut varieties could be grown on them.

(f) Coconut.

53. Considerable progress was made in the study of coconut during the year under report. A complete record, which will be worked out as soon as staff is available for the work, has been secured in respect of the cropping of all the trees on the station at Kasaragod. These trees are divided into ten blocks, one of which No. III, is left uncultivated as a check while all the other blocks have been under regular cultivation since July 1917. Block III is a marked contrast to the rest of the station as will be seen from the figures in the report; it is not only yielding very much fewer nuts per tree than the other blocks but every year it is visibly declining in yield. Block III represents the average coconut tope of the locality and the main cause of the increase in yield of the other blocks is the deeper root system encouraged by the cultivation given, coupled with the preservation of soil moisture by means of the soil mulch which is maintained during the dry weather. Mr. Sampson notes that the bearing registers at this station are beginning to be of interest and that everything seems to point to the necessity of a more thorough study of the root system of this tree which is expected to throw light on the causes of the great variation between the yields of different trees grown under apparently identical conditions. Another subject for future study in

regard to the coconut will be its capacity as a sugar producer as to which very little information seems to have been recorded. An interesting series of soil moisture determinations were made during the year, showing the value of cultivation in conserving soil moisture and the rate of penetration of rain water under different conditions in the same kind of soil, and also the way a crop of coconuts affects the moisture content of the soil.

(g) *Pepper.*

54. Considering the yield of the previous year (6,032 Madras measures or the same number of pounds per acre), that of the year under report (5,621 lb.) was inferior, but still it was better than the normal. The vines of the Balamkotta variety gave a much heavier yield than in the previous year, while those of the Kalluvalli variety gave less. Manurial experiments were continued in respect of pepper, but it is noticed that on account of inherent differences in soil and situation, no inference with any pretence to exactitude can be drawn from the record of these experiments, which has been maintained since 1910. There is no doubt, however, that fish manure, leaf mould, lime and soil mulch are beneficial to pepper.

(h) *Potatoes.*

55. The Government Potato Farm at Nanjanad in the Ootacamund taluk did not come under the Department of Agriculture till the 1st April 1920, but it has been usual to include an account of the farm in the annual reports of the Agricultural Department. Five tons of Australian seed potatoes were imported into this farm on 21st September 1919 and planting was commenced immediately. The potatoes were very large with the result that the total weight of the crop lifted was not so favourable as would have been the case if the seed had been smaller. Country ploughs were used to prepare the land before planting, the English "Turn Wrest" plough having failed because the local bullocks were not strong enough to work it. Fish manure was found very effective in promoting the growth of potatoes and Mr. Butcher expects to be able to do a considerable amount of business with the Badagas in the neighbourhood in demonstrating the use of fish manure. Seed potatoes purchased from the farm have been much appreciated, but a good deal more can be done at the farm than is possible to attempt in its present rudimentary stage. Its most urgent requirements at present are farm buildings, live stock (to supply, first of all, cattle manure, a serious want at present), wind-belts, a fence to keep out wild pig and a good road to connect it with Ootacamund. It is probably not generally known that potatoes have been cultivated for some years on the Government farm at Sirvel, in the Kurnool district, but the yield is reported to have been poor.

(i) *Fodder Crops.*

56. At Coimbatore the use of estate sullage for irrigating fodder crops was continued, guinea grass being one of the best crops for the disposal of sullage on the estate; Elephant and Soudan grass from Hagari were also tried at Coimbatore. Guinea grass was grown both at Palur and Gudiyattam and at the latter station it was much in demand because of the local fodder difficulties. Guinea grass was also grown at Samalkota, 73,124 lb. of green grass per acre having been obtained in twelve cuttings. Teff grass, classed by the Deputy Director of Agriculture under the category of an emergency food and fodder crop, continued to be cultivated at Palur. The yield obtained was 7,650 lb. of green fodder per acre. The stubbles were left for ratooning, which gave seed at 35 lb. per acre which has been reserved for this year's sowing. In the station report for last year was recorded the fact that the straw was relished better than other kinds of fodder by the cattle; while bread and gruel prepared out of the grain was pronounced by the labourers to be not unpalatable. Fodder cholam was as usual raised at the Central Farm at Coimbatore, being sown at definite intervals so as to maintain a steady supply of green fodder for the dairy herds throughout the year.

(j) *Medicinal Plants.*

57. Henbane *Hyoscyamus muticus* was as usual grown at Kovilpatti but suffered severely from the rains of January; the Deputy Director of Agriculture remarks that this crop seems so sensitive to heavy rain that it will always be precarious and that there is no prospect of its ever establishing itself at Kovilpatti. Mr. Butcher has no doubt that another variety of this species (*Hyoscyamus niger*) would thrive in certain localities in the Nilgiri district. His report on the Government Parks and Gardens in the Nilgiri district contains a brief account of other medicinal plants grown by him, as to all of which he thinks that no good work can be done unless and until a special staff is appointed to grow them and until favourable sites are selected where medicinal gardens can be established. As an instance he thinks that *Hyoscyamus* should be tried in different places and on a larger scale.

(k) *Live Stock.*

58. Mr. Allan Carruth was the Deputy Director of Agriculture for Live Stock till 4th November 1919 when he resigned. He had visited the Military Dairy Farm at Bangalore and arranged with the authorities for conducting breeding and feeding experiments with different cross-bred cattle for the benefit of this Presidency. Mr. Carruth also made proposals for the improvement of the Madras Dairy trade for which purpose he proposed cross breeding with Ayrshire bulls, being of opinion that until the milk capacity of Madras cows was raised to something far beyond its present limit, dairying in Madras would not be improved and could not be made a success. In pursuance of these proposals, four Ayrshire bulls were imported, at the beginning of the year 1920, their selection having been left to Mr. Carruth after he went home. The animals arrived at Madras on the 20th February 1920, and, because of the prevalence of rinderpest in Madras, were placed temporarily in the Government House stables at Guindy. In spite of the hot weather, the animals were reported to be doing well at the end of the year; (in the third week of April 1920, however, one of the animals died as a result of anti-rinderpest inoculation). The largest of these animals persistently refused to serve Madras cows and it is proposed to send it to Bangalore for trial under new conditions. The other two animals have rendered a fair amount of service, one of them being very young, but it is very doubtful how far such crossings, amid the uncertainty attending the lives of two Ayrshires in the climate of Madras, will benefit the large volume of the Madras milk trade. Other endeavours are however being made to improve Madras cows by cross breeding with half-breds supplied by the Military dairy at Bangalore. The question of the improvement of the Madras milk trade was dealt with in great detail in Mr. Stuart's report for 1917-18, but as it has not made any progress since then, I think it would be better to await the arrival of a new Deputy Director of Agriculture for Live Stock before discussing further developments. At the end of Mr. Broadfoot's report on the Central Farm, Coimbatore, will be found an interesting paragraph on the dairy herd at Coimbatore. He admits that the year was not so successful financially as its predecessors because, although the actual outturn was as high as ever, the cost of all dairy supplies had been greatly increased and as selling prices of dairy products remained the same throughout the year, a deficit was the natural result. One may be inclined to doubt whether in any year, that very useful institution, the College Dairy at Coimbatore, could have been a commercial success. The costing of this dairy was carefully analysed by Mr. Stuart in 1917-18 and his conclusion was that the actual cost of production of milk on the farm was nearer 3 annas per pound than 1 anna. One or two ambitious dairy schemes have been propounded in various parts of the Madras Presidency; their future will be watched with interest, but at present they have not carried on any operations worth reporting.

59. *Sheep.*—Last year the failure sustained with imported Shropshire rams was rather a sorry record for Bantanabal, the rams in question having succumbed very shortly after arrival to pneumonia. Frequent attacks of the same disease played havoc with the indigenous sheep left on the farm; veterinary opinion was obtained

and alterations were made in accordance with that opinion in the brick enclosure which till then had been used for the sheep. Only about 300 sheep are now left on the farm and it hardly seems worth while to keep it up for the sake of an experiment which every year is proving less and less of a success. The difficulty of water supply at this farm has already been adverted to, and a condition of things in which water for the rams has to be brought from a great distance, barring a small fresh water well recently tapped at the farm, is not very encouraging for the future.

60. *Poultry*.—In the rudimentary poultry farm at Coimbatore the number of eggs collected during the year was 6,778 against 3,226 eggs in the previous year. The financial return was equally satisfactory, reaching the total of Rs. 320 against Rs. 119 in 1918-19. Six medals were won by the poultry at the Ootacamund Show and fresh strains were obtained by purchase from the Principal, Veterinary College, Madras.

B.—CHEMISTRY.

61. The year under review was the first complete year in which the analytical work of the United Planters' Association, Southern India, was carried out in the Government Agricultural Chemist's laboratory. Seventy-seven samples were reported on for the Association and fees amounting to Rs. 1,584 were credited to Government. Altogether 642 samples were analysed during the year against 485 in the previous year. As usual, an Assistant was deputed to the Government Sugarcane Expert's laboratory for three months to assist in the analysis of sugarcane juices, of which 2,798 samples were examined. A proposal made and approved by Government during the year under report, to place the Pallapalayam Sugarcane Crushing Factory under the supervision of the Government Agricultural Chemist, has been held in abeyance owing to the want of suitable machinery and buildings. The chemical survey of the soils of the Gōdāvari delta was completed; the results were better than those of the Cauvery and Kistna deltas, but a deficiency of nitrogen in 40 per cent of the samples and of phosphoric acid in about 25 per cent indicated that manures such as fish guano, rich both in nitrogen and phosphoric acid, should give good result there. The report of the Deputy Director of Agriculture, I Circle, regarding the successful introduction of fish guano into that area confirms the scientific opinion. The analyses of the samples collected in the Periyar survey were also well forward but the results were found to be very variable as might be expected from the physiographical conformation of the area. The next survey to be undertaken is that of Malabar soils. Composting experiments with mineral phosphates and green manures were conducted both in the laboratory and in the field. The experiments indicated that under the conditions employed (small scale compost in the laboratory) the chief change in the availability of the phosphates occurred in the first few days of composting and that no advantage resulted from prolonging the period. Dr. Norris doubts, however, whether the same results would be obtained in experiments on a larger scale. Experiments with a new fertiliser, "tetrphosphate," were disappointing. An investigation was commenced of the chemical changes taking place in the germination of coconut, notes on the various stages of germination having been supplied by Mr. Sampson. The series is still in progress.

C.—ECONOMIC BOTANY.

62. M.R.Ry. G. N. Rangaswami Ayyangar Avargal, B.A., was in charge as Acting Government Economic Botanist from the 29th April 1919 till the end of the year. The first care of the Economic Botanist was as usual to discover and propagate better yielding strains of paddy. Kichili Samba No. 24 and *Sirumani* No. 76, having been already introduced for cultivation on seed farm conditions, together with No. 1308, attention was devoted last year to five strains of *turpu sanna akulu* origin which proved to be over 20 per cent superior to Kichili Samba No. 24 and to four other strains of local Tulukka Samba which proved to be over 10 per cent superior to the local bulk seed. A cross between the local Tulukka Samba and Kichili Samba No. 24 was made in order to bring together the high yield of the

local variety and the earliness, uniformity, non-shedding and blast resistant qualities of No. 24. Lastly, No. 1308 having shown itself variable in the colour of its rice, a number of selections were made and examined with the object of eliminating this defect. The Acting Government Economic Botanist records the discovery of several items of general Mendelian interest for which reference may be made to his report. The excellent results obtained with *Red Sirumani* No. 76 in the Manganallur area are referred to under "Demonstration". The rapid spread of Nellore Samba over the Tanjore delta and the very mixed condition in which it was generally met with induced the making of 30 single plant selections in the year 1918-19 which in the following year were multiplied; and the seed from 30 of the promising plants among them was taken for comparative trial in the current year.

D.—GENERAL BOTANY.

63. The study of grasses occupied a good deal of the attention of the Lecturing Botanist's staff and to the successful collecting tours made by him and his assistants, the flora of South India is indebted for several species of grasses hitherto not recorded. From the collections made for the Herbarium in Tinnevely, Courtallam, Kodaikanal, Sheveroy, Chintaladevi, Horseleykonda, etc., 1,565 Herbarium sheets were mounted and 1,575 Herbarium specimens were identified. 2,580 sheets from previous Tinnevely collections were incorporated into the Herbarium and 156 weeds collected from the Central Farm were written on and incorporated in the Herbarium. Also 250 mounted sheets of plants were sent to the Deputy Director of Agriculture, II and III Circles (not to speak of similar work done for private collectors) and a study of the germination of the pollen of coconut was made at the instance of Mr. Sampson.

E.—ENTOMOLOGY.

64. Mr. E. Ballard resumed charge of the duties of Government Entomologist on the 17th May 1919 and continued in that capacity for the rest of the year. During the year under review he received and disposed of 199 reports of insect pests and Entomological enquiries, initiated experiments to control *Schoenobius bipunctifer* in Kistna district, and organized a campaign on a large scale, which was carried out in the current year against *Spodoptera mauritia*, the swarming caterpillar which has committed such havoc on paddy in Malabar district.

F.—MYCOLOGY.

65. The fact that Mr. W. McKee, the Government Mycologist (now Imperial Mycologist, Pusa) was also Principal of the College during practically the whole of the year redounded to the credit of the College, to the administration of which he devoted himself with great energy and enthusiasm. Some falling off in the quantity of mycological work turned out in the year might have been expected, but his report for the year is as usual filled with an interesting enumeration of items successfully carried out. The palm disease operations in the Gōdāvari and Kistna districts have for a long time claimed a leading share in the attention of the Mycologist and the very careful manner in which the disease was detected and remedial measures were applied was no doubt due to the initiation of the steps by the Mycologist's department. The blast of paddy, *Piricularia oryzae*, was continually under observation in Coimbatore, Malabar, North Arcot and Chittoor districts as well as in Tanjore where it had been first noticed. Similar diseases were found on ragi, tenai and wheat. The curious discovery was made that the blast of paddy, ragi, tenai and ginger grass can infect both wheat and barley, but that they will not infect each other. *Piricularia* from tenai does not infect ragi, though it grows on bruised portions of ragi leaves. The spraying of grape vines against Mildew (*Oidium* stage) was taken up in Michaelpatti in Madurai district and carried out with remarkable success, earning, it is needless to say, the gratitude of the vine-growers who are Indian Christians. Bleeding disease on coconut was operated on in Gudiyattam, Sholavandan, Trikarapur (South Kanara district) and Kannukara (North Malabar district). The treatment was given in the presence of

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garden owners and they were made familiar with the instruments; the trees were subsequently inspected and appeared to be free from bleeding disease. Demonstrations were given of how to spray orange and lime trees against scrub on the East Coast; and of how to spray coffee against black rot in the Anamalais; and sprayers were provided for spraying tea nurseries against brown blight.

G.—SUGARCANE BREEDING STATION.

66. M.R.Ry. Rao Sahib T. S. Venkataraman Avargal, was in charge of the Sugarcane Breeding Station throughout the year except for the first fortnight. He reports that for flowering in canes the season under report was more propitious than that of the previous year but not so good as that of 1917-18; the thick canes arrowed profusely but as the arrowing in the indigenous kinds did not come up to expectation, the difficulty had to be met by planting a number of thin canes in the special arrowing plots. The total number of seedlings raised during the year was 6,200; and although much larger numbers had been raised in 1916-17 and 1917-18, it is noted that in the earlier years the numbers represented all kinds of possibilities, whereas in the later years breeding was confined to ascertained parents known to give rise to seedlings of the right kind. The seedling house had to be temporarily extended to accommodate the large number of useful seedlings obtained during the season and 30,000 seedlings were planted out at the nursery during the year under report against 12,000, the previous record. It is reported that the station suffers from an inability to induce arrowing in some of the indigenous canes, chiefly in the "Mungo" group and that fresh attempts are being made in that direction. It was found that, thanks to the experience gained in the Expert's recent tours in the North of India, the seedlings distributed from Coimbatore grew easily under North Indian conditions and it is therefore now proposed to give greater attention than heretofore to the sucrose content of the juice. It is an indication of the care with which seedlings are selected before distribution that only 33 crossed thin seedlings out of the thousands raised on the breeding station had been distributed up to date to the North of India, 10 having been added during the current season. The behaviour of thick seedlings distributed to various stations in the Madras Presidency, such as D. 74 at Anakapalle, Fiji B at Nellikuppam, and Java-Hebbal at Palur, is noted in other parts of this report. Over 7,000 analyses of juice were carried out during the year under report and there appears to be no immediate prospect of any decrease in the number of such analyses. A dozen varieties of canes imported from overseas (Demarara and Hawaii) had to be destroyed because of the detection of fungus disease in the consignments at this end of the journey; but they have served to enlarge the pathological specimens of the Government Mycologist.

IV.—DEMONSTRATION.

A.—OPERATIONS AGAINST DISEASE.

67. *Palmyra disease in Gōdāvari and Kistna districts.*—During the first part of the year under report this work was carried on by a Tahsildar, and a Deputy Tahsildar in Gōdāvari district, and a Special Deputy Tahsildar in Kistna district, with the assistance of a staff of Special Revenue Inspectors on palm duty. The measures were carried out by this Special Staff till the present Special Deputy Collector took charge of them in October 1919. At first he and his special staff were employed in advertising the Pest Act which was to be enforced from 1st April 1920 and in propagandist work, i.e., in educating the public by means of meetings, posters, lantern lectures, leaflets and *bajana* (singing of verses to the accompaniment of music). Schools, jamabandi camps, and Co-operative conferences were made use of to further advertise the demonstration. The measures adopted since the application of the Pest Act (1st April 1920) to palmyra disease belong to the current year. During the year under report no temporary Revenue Inspectors were appointed and the services of the clerks attached to the Special Tahsildar and Deputy Tahsildars were dispensed with, as the reporting of number of trees cut and treated was given up under the orders of my predecessor in November 1919.

68. *Mahali disease (Phytophthora omnivora).*—The disease did not break out seriously, having, the Assistant Director (VII Circle) suspects, lost its virulence owing to six years' spraying with Bordeaux mixture. Only 6,000 arecanut trees in a few gardens were treated during the year under report. A note in Malayalam on the symptoms and control-methods was published and distributed broadcast.

69. *Work against smut.*—In the II and III Circles the policy of distributing copper sulphate free was totally given up in the year under report. About 1,030 lb. of copper sulphate were sold in 501 villages of Kurnool and Bellary districts and an area of 32,278 acres was treated: for want of district staff the operation was not attempted on a large scale. The benefit accruing to the ryots by this simple treatment has been estimated at a lakh of rupees per annum on a modest average gain of Rs. 3 per acre.

70. *Application of Pest Act to Cambodia cotton.*—The Agricultural Pests and Diseases Act, III of 1919, was brought into force in the whole of Coimbatore district, excluding Kollegal taluk, in respect of Cambodia cotton; the operations under the Act are intended to minimise the damage caused by two insect pests, the *stem weevil* (*Pempheris affinis*) and the *pink boll worm* (*Gelechia gossypiella*). The Act was also brought into force by G.O. No. 426, dated 27th February 1920, in three taluks of the Salem district, three taluks of the Trichinopoly district, and in the Madura district, three taluks with the portion of the Nilakkottai taluk north of the Vaigai, and the Periyar irrigated tract up to the foot of the Sirumalai hills. The present report is concerned with operations in the Coimbatore district during the year 1919-20. Although the notification directed that all the old crops of Cambodia cotton should be up-rooted by the 1st of August 1919, it was not till after the third week of that month that the bulk of the crop was pulled up. The preparations for putting the Act in force entailed a great strain on the Agricultural Department, inasmuch as officers from various circles had to be concentrated on to the area of operations until all the Cambodia cotton had been pulled out. Neither the Revenue officials nor the ryots appear to have known beforehand the exact reason why the Act was put in force, although when the officers of this department were able to show the damage done, there was little opposition on the part of ryots to the enforcement of the Act. Mr. Sampson states that the measure has fully justified itself in the current year's crop which has been remarkably free from damage by the boll-worm; the pest is still there, but its numbers have been greatly diminished.

71. *Water Hyacinth (Eichhornia speciosa, Kunth).*—This was declared a noxious weed and the Pest Act was applied to it in the taluks of Surada and Berhampur in Ganjam—G.O. No. 2371, dated 19th December 1919, and in the Municipal limits of Vizianagram and Cuddalore and in the villages of Malabar, south of the Ponnani river—G.O. No. 604, dated 24th March 1920.

B.—CROPS.

72. *Sugarcane.*—In all the circles put together, 803,195 cane setts were sold to ryots, the first two circles selling nearly 150,000, setts each. Of these setts 56,675 were distributed to eight leading ryots in IV Circle on seed-farm conditions. The Deputy Director of Agriculture, IV Circle, reports that many ryots have learned to grow cane 3½ to 4 feet apart in trenches, lessening the seed rate from 20,000 to 15,000 per acre: likewise that there is much scope for propaganda work in this direction in North Arcot and Chittoor districts. At five centres in the same circle (Palur, Gudiyattam, Tiruvallur, Melrosapuram and Tiruvannamalai) improved sugarcane furnaces were constructed and their use was demonstrated to ryots in the vicinity. Several ryots in the neighbourhood of Palur having expressed a wish to manufacture their own jaggery, instead of selling their canes, as hitherto to manufacturers, the process was taught to them for the first time, so that six have learnt it; it is proposed to start similar demonstration classes at important centres in the current year. In the III Circle, where there are thousands of acres under indigenous canes about Hospet, Cumbam, Kudligi, Harpanahalli and Hindupur, the exotic Java 247 from Coimbatore sugarcane breeding station was tried for the first time on a small scale at Nandyal, Sirvel and Hospet: in the two first-named places it was a success, but the result at

Hospet was disappointing. Eight improved furnaces were constructed for ryots, five at Cumbum, one at Nandyal, and two at Kurnool. The method of making brown sugar was demonstrated at Kampli and the sugar sold at Rs. 90 per candy against Rs. 60, the price of locally made jaggery. In the VII Circle, sugarcane cultivation continued to spread in South Kanara district, the area under cane according to Revenue figures being 3,000 acres against 2,029 acres in 1907-08 when work was started. In this district Red Mauritius shares in popular favour with B. 208, B. 147, B. 6,450 and B. 3,442. Cane growers were helped by trained workmen in constructing improved furnaces and making better jaggery. Thanks to a fall in the price of iron sheets, a number of large pans were purchased by cane growers from local firms.

73. *Cotton*.—To begin with the VI Circle (Madura, Rāmnād and Tinnevely), it will be seen from the accounts given in previous years that cotton cultivation improvement in this circle began with a number of seed farms from which the department bought the kappas (as it still does in Coimbatore) in order to gin the seed and sell it to the public; then a system of joint sale by unregistered associations of ryots, and later, a system of registered co-operative seed unions was rapidly evolved, which last were encouraged by buying firms paying a higher price for them and thus enabled to make a profit. With the resulting rapid extension of Company cotton, however, there was less need for the department to stock Company cotton seed and buying firms being less dependent on seed unions, ceased to pay them any premiums. Partly on this account, and partly, perhaps still more, on account of the extraordinary fluctuations in the price of kappas, it became difficult for the seed unions to hold together and during the year under report, less than a third of the expected quantity of seed was supplied by them. The Deputy Director observes that several of these unions entered into forward contracts with firms at Rs. 370 a candy but when the time for delivery came the price was over Rs. 500; as a result, many members of unions resigned and backed out of their obligations, saying they had not consented to the agreements. To such seed unions as did some work, a bonus of Rs. 3 on every *pothi* of 250 lb. was paid by the buying firms, and Mr. Wood presented the prizes in person, accompanying the award with gifts of monsoon ploughs to the best seed unions. Altogether the seed unions supplied 625 *pothis* seed or 156,250 lb. while 36 ryots, associated for joint sale in seven villages, secured 117,675 lb. of cotton seed by separately ginning their produce.

74. To meet the keen demand in the VI Circle for Cambodia cotton, 170,000 lb. of Cambodia seed was obtained from the VII Circle but only 109,800 lb. were sold for seed purposes, the rest having to be sold as cattle food. The district reports continue to point with legitimate pride to the extirpation of Pulichai cotton—an achievement which the Indian Cotton Committee have mentioned in very complimentary terms in paragraph 214 of their report. Mr. Sampson reports that the Company cottons which were introduced to replace *Pulichai* in the north of the tract have not proved altogether suitable and seldom yielded according to expectation.

75. *Drill cultivation of cotton*.—The area drilled with the aid of the department was only 606 acres and that drilled by the ryots 5,674 acres, against 1,696 acres and 10,667 acres respectively in the previous year. The decline of work in this respect was largely due to the expansion of the department in other directions and the consequent deterioration in the quality of the staff available for special operations. The Deputy Director of Agriculture remarks that a rise in prices is not unnaturally followed by a deterioration in agricultural practice, and that the black soil areas of the south have never been so foul with weeds as they are now, which is due to the lack of rotation of crops. The number of drilling implements sold was 35 against 80 in the previous year.

76. In the Coimbatore district the cotton improvement work consisted in the purchase and stocking of good Cambodia and Karunganni seed for sale and distribution and in arranging for seed farms to supply kappas under an indenture system. A total quantity of 978,250 lb. of Cambodia seed were purchased and stocked in 20 depots in order to meet the demand expected as a consequence of the enforcement of the Pest Act, but owing to a reduction in the area of Cambodia

cotton, due to high prices of food-grains and the Pest Act itself, only 360,673 lb. of seed were sold at Rs. 7 per bag of 100 lb. and the rest of the stock, or most of what remained was sold as cattle food at Rs. 4 to Rs. 5, per 100 lb. A total quantity of 256,200 lb. of Cambodia cotton was also supplied to other circles, while 7,375 lb. of Company cotton were obtained from Tinnevely district and 4,100 lb. out of this was sold as seed and the rest as cattle food. Agreements were also obtained in respect of seed farms over an area of 88.01 acres in Pollachi tract and 473.40 acres in Avanashi tract.

77. In the IV Circle 12,000 lb. of Cambodia cotton seed was imported from Coimbatore; but excepting 3,023 lb., the rest was sold as cattle food owing to seasonal difficulties experienced during sowing time. As the ryots were averse to using this seed as cattle food and preferred the local seed at higher prices, the cattle on the Palur and Gudiyattam farms were fed with Cambodia seed and a demand was thus created.

78. In the III Circle, all types of cotton distributed before the year 1918-19 were discarded on account of their low yielding capacity and weak staple, and their places were taken for the first time that year by two new types Hagari No. 25 and Nandyal No. 14, referred to in paragraph 143 of the Indian Cotton Committee's report. They were sown on seed farm conditions on an area of 403 acres and a seed-supply of 14,468 lb. of H. 25 and 44,103 lb. of N. 14 was obtained, to which 41,233 lb. and 460 lb. respectively were added from the surplus of Hagari and Nandyal farms. Of these quantities 57,013 lb. were sold to seed unions in both districts at a concession rate; 2,840 lb. were given away free to seed farms in Kurnool district and 1,170 lb. were sold to ryots in Bellary district for sowing. In 1919-20, an area of 5,439 acres was sown with the two improved types under seed union conditions (this being the first year when seed unions were started in the III Circle); of this area 3,795 acres were in Kurnool district and 1,644 acres in Bellary district.

79. In the I Circle, both Cambodia and Company No. 3 cotton, introduced into the cotton tracts of Peddapur and Rajahmundry, ended in complete failure owing to heavy north-east monsoon rains coming down immediately after sowing.

80. *Paddy*.—Over 185,000 lb. of selected seed were sold from Government farms, against 160,000 lb. in 1917-18. Three of the Botanist's selections were pretty widely distributed in the V Circle: viz., Red Samba No. 76, grown under seed farm conditions for Tanjore ryots, and two strains of Kichili Samba, No. 24 and No. 1,303, which last (as explained by the Government Economic Botanist in his report for 1917-18) had been raised from a cross of strain No. 24. The seed farm conditions for paddy are that growers should raise their nurseries and plant economically and sell the produce, after reserving one-sixth for their use, at two annas above the current market rate. The seed from produce thus obtained is sold at four annas above the purchase price. Owing to a mishap to nurseries, only 41 acres out of 100 proposed were planted under seed farm conditions; and 53,810 lb. of paddy were bought by the department of which 13,850 lb. were sold on the threshing floor to applicants at two annas over the purchase price. No. 1303 is said to have done well in two villages in the Salem district; in other villages, it did not do quite so well on account of late planting. Of strain No. 24, some 1,100 lb. were distributed: this again is an early crop and a late season does not suit it.

81. In the I and IV Circles, large quantities of selected seed of local varieties were distributed among ryots, notably 13,403 lb. of Rasangi in I Circle and 10,037 lb. of Ramagarudan Samba selected strain in IV Circle: in the last named circle there were also seed farms whose produce is not included in any of the above reckonings. The advantages of economy in seed and seed rate were demonstrated in all circles. Ryots in a number of villages named in the report from IV Circle have also been taught to select their own seed in bulk.

82. *Manures*.—Perhaps the most successful work done by the department during the year under report was in regard to manures, the uses of which were amply demonstrated to ryots partly as a stimulus to the increased production of food crops in accordance with the wishes of Government and partly in pursuance of the now established policy of the department. Green-manure, fish guano, fish

manure, bone-meal, and phosphates, all received and repaid attention according to the needs of each tract, as disclosed by soil analyses, and in the case of the last two manures, experience has demonstrated the urgent need for bringing them more within reach of ryots both as regards accessibility and as regards prices.

83. *Green Manures*.—In 1917-18, Mr. Stuart totalled up the quantity of green manure seed sold to ryots as 234,363 lb. against 166,457 lb. in 1916-17. I have conscientiously totalled all the figures given by all the Deputy Directors and Assistant Directors for 1919-20, but have been unable to advance beyond 181,309 lb. The fact is, that a great many ryots, specially, in the IV and V Circles raise or collect the green-manure seed for themselves and the seed so collected does not enter into departmental returns except as rough area estimates and that not always. Still, this is a branch of statistics which commands a special interest at present in consequence of the inquiry now being made by Government as to the need for continuing to throw open reserved forests for green leaf manure. In the I Circle 10,843 lb. of Daincha (*Sesbania aculeata*) were obtained from V Circle and sold to ryots, the green-manure account resulting in a profit of Rs. 340. Last year, the Deputy Director, I Circle, said: "The use of green-manure crops is already well-known in the Gōdāvari district and the amount of seed distributed through departmental agency forms but a fraction of the quantity purchased and used by the ryots themselves." This year he has composed agricultural songs in Telugu by the score, and trained his more youthful labourers to sing them to the accompaniment of cymbals and anklets wherever he can get a group of ryots to listen to them. The songs deal with the most varied topics, besides manure, to wit, seed economy, insect pests, fungi, care of cattle, sugarcane, etc.; and have been multiplied by tens of thousands, thanks to the Publicity Board.

84. In the II and III Circles, the work of green-manure is slowly progressing. Sunn-hemp (1,011 lb.), daincha (855 lb.) and wild indigo (141 lb.) were distributed in five taluks of the Kurnool district. Practically the only demonstration carried out in the II Circle (Nellore, Kistna and Guntūr districts) was the sale to ryots of some 2,500 lb. of daincha seed and some 70 lb. of wild indigo seed. Some attempt was also made to grow daincha seed departmentally.

85. In the IV Circle, which is a large producer of daincha seed and exports the same to other circles, the Deputy Director of Agriculture notes that ryots have learned to collect daincha seed in Kallakurichi and Villupuram taluks of South Arcot district, kolinji seed in Chunampet and Nelvoy tracts of Chingleput district and sunn-hemp seed in Tiruvallur and Ponneri taluks of Chingleput.

86. In the V Circle "the progress of work," in the words of the Assistant Director of Agriculture, "has surpassed expectations." He notes that 116,950 lb. of wild indigo seed must have been available in the district, of which a good deal, though not by any means the bulk, was brought in all the way from Rāmnād, also that the seed is ordinarily sold in village fairs. The success attained with daincha in this circle was even more tangible, Atur taluk alone (Salem district) having supplied nearly 36,000 lb. for export to other places, apart from the quantity used for raising manure crops in the taluk itself.

87. From the VI Circle, the Assistant Director writes: "Until 1918, the VI Circle was the source of supplying wild indigo seed to other circles; but now with the spread of Cambodia cotton on the slopes of hills and the cutting of leaves for green-manuring, not to speak of the high wages demanded by women coolies for collecting the seed, it has become scarce. During the year, 18,133 lb. of wild indigo seed were purchased, of which 15,667 lb. were transferred to VII Circle." The Assistant Director of Agriculture writes only from the point of view of a buyer and seller of wild indigo seed; for it is evident that the ryots of Rāmnād district collected a great deal of seed for themselves and also for export to other places as noticed above in the report from the V Circle.

88. On the subject of green-manure seed, a single discordant note the reason of which it is not hard to conjecture is struck in Malabar, for the Assistant Director of Agriculture, VII Circle, writes: "Kolinji, daincha and sunn-hemp were tried in Malabar for green-manure but none of them has yet become popular. It is experienced that daincha becomes too woody by the time the paddy season commences, and the ryots are therefore advised to cut the crop and stack it or to use it as bedding for cattle."

89. *Fish guano and fish manure*.—Most of the fish guano and fish manure used on the Government farms as well as most of that distributed to ryots by sale was purchased in the first instance on the West Coast by the Assistant Director of Agriculture, VII Circle, and stocked in local depots in the various circles. The Assistant Director last named reports that the total quantity contracted for by him in 1919-20 mainly as an agent for other circles, was 1,357 tons fish guano and 104 tons sardines against 722 tons of fish guano and 63 tons of sardines in 1917-18. It has been noticed that for sometime past there has been considerable adulteration of fish guano owing to the increased demand for purposes of export as well as for supply within India to planters and ryots and endeavours are being made to secure pure stuff through the Fisheries department, and also to check abuses through the action of local boards in their capacity as licensors of guano factories.

90. *Tanjore Manure Mixture*.—To increase food production in the Tanjore Delta, the following mixture was introduced into the Tanjore district in 1918-19 on the results of the Manganallur experiments; fish guano 25 per cent, castor cake 23.3 per cent, neem cake 10 per cent, bone-meal 21.7 per cent, char-dust 10 per cent, and mineral phosphate 10 per cent. Ingredients for making 500 tons of the mixture were stored at important places so that the public might know what the mixture was made of and how the mixing was done; 227 tons of the manure, sufficient for 1,700 acres were sold to 369 ryots of 237 villages; of this 36 tons were sold in Madura. The problem appears to be to interest the big landholders of Tanjore district in such agricultural improvements; at present the majority of them seem to care only for a dead rent and not for development of the land.

91. *Oil-cake*.—In the III Circle, 7,681 lb. castor cake, 4,300 lb. castor sediment and 4,100 lb. neem cake were sold in Cumbum and Mārkapur taluks for manuring paddy crops. In the IV Circle, 30 candies (500 lb. each) of pūngam cake were procured from the taluks of North Arcot district bordering on the Chittoor district and distributed to the members of Perananallur Co-operative Society, North Arcot district. Arrangements were also made to stock 300 candies of castor cake and 140 candies of pūngam cake for sale to co-operative societies and to ryots.

92. *Sericulture*.—In October 1919, the services of Mr. K. T. Achayya, Assistant Director of Agriculture, Kashmir, were secured as Sericultural Expert for the Madras Presidency. A scheme for opening sericultural farms at Kollegal, Coonoor and elsewhere, at a cost of Rs. 1,50,000 was submitted to Government but has been held over for want of funds. Meanwhile the expert has been devoting his attention to the study of local conditions prevailing in Kollegal which is his headquarters and he as well as his Sub-Assistant, has been demonstrating improved methods of rearing silk-worms and reeling silk.

93. *Implements*.—At the suggestion of the Deputy Director of Agriculture, V and VII Circles, an indent was sent to Messrs. F. and J. Howard (Limited), for twelve two-furrow disc ploughs and 100 Vitis ploughs as a trial consignment for the use of the department and for sale to ryots. The former arrived at the time of submitting this report (September 1920). Some Victory Ploughs, stocked by the General Electric Company, Madras, were supplied for trial to the Government farms at Coimbatore, Hagari, Anakāpalle, Kovilpatti and Palur. Four motor tractors were in use in the department during the year under report, viz., two Fordson tractors of 12 to 22 H.P. each, one Cleveland tractor of 12 to 20 H.P., and one 24 H.P. tractor fitted with an Overland car engine. The last named tractor was tried at the Bantanahal sheep farm from September 1918 to April 1919 but owing to its high speed (12 miles an hour) it was brought back to the workshops for reducing the gear. The three remaining tractors were purchased in September 1919. The cost of ploughing an acre of land with the Cleveland tractor on the Guindy racecourse, including standing charges, but excluding transport and railway freight, was found to be Rs. 6-9-6. This tractor was subsequently lent to the Rev. Mr. Bawden for trial at the Kaval Criminal Settlement, Nellore district. One Fordson tractor has been in use at Kovilpatti and has been occasionally hired to ryots for ploughing their land. The other Fordson tractor with an Oliver disc plough did good work on the red soils of the Coimbatore Central Farm, but it was found not equal to the task of ploughing black soils deeply and not suitable for ploughing black cotton soils in the

season, the purpose for which it was originally intended. Moreover the cost of fuel—a good deal of kerosene oil being required—precluded its regular use. One of the demonstrations with this tractor was given in the presence of His Excellency Lord Willingdon on 18th September 1919. Numerous inquiries regarding motor tractors were received from well-to-do ryots, but for want of sufficient experience, the department was not in a position to give definite advice. The Agricultural Engineer will be asked to devote special attention in future to motor ploughing.

94. *Cattle Shows and Agricultural Exhibitions.*—The Eleventh Pony and Cattle Show was held at Tiruppur on 12th June 1919 and the two following days. The show was opened by Mr. Macqueen, I.C.S., Collector and President of the Association. His Excellency Lord Willingdon visited the show on 14th June and distributed the prizes, including his own prize of Rs. 50 for the best cow and calf on milk. The quality of cattle brought to the show was judged to be better than in previous years. Two gold medals of the value of Rs. 30 each were sanctioned by Government for being awarded to the best bull and the best cow. No show was held at Ongole during the year 1919-20. An Agricultural Exhibition was organized during the Kirtigai festival at Tiruvannāmalai (North Arcot district) from 2nd to 7th December 1919 under the auspices of the Tiruvannāmalai Taluk Co-operative Union. A similar exhibition was held at the Madurantakam Taluk Co-operative Conference on 8th November 1919. A Conference of the Gazetted officers of the Co-operative and Agricultural departments was held at Coimbatore on 17th December 1919, at which it was resolved, inter alia, (a) to issue the Agricultural Calendar in future with the joint collaboration of the Agricultural, Co-operative and Veterinary departments, (b) to promote the joint sale of agricultural produce, and (c) to collaborate for the organization of societies for preparing agricultural produce for the market.

95. *Agricultural Demonstration by Co-operative Societies.*—The Deputy Director of Agriculture, III Circle, reports that the society at Kamalapuram distributed nearly one waggon load of fish guano among its members, while the Tenali Co-operative Union similarly distributed 3 tons of the same manure. The co-operative movement probably numbers over a thousand societies in the IV Circle and the Deputy Director of Agriculture of that circle was, as usual, busy among them. He mentions, as results of their co-ordination of activities, (a) the joint purchase of implements, cattle-food seed and manure in the societies generally, (b) the demonstration of agricultural implements on members' lands in the societies at Tiruvannāmalai, Madurantakam, Tiruvallūr, etc., (c) the drawing up of programmes of agricultural work for societies at Rettanai, Kallakurchi, Madurantakam and Tiruvanaikovil, and (d) the cultivation of sugarcane according to improved methods on members' lands at Natrampalli (North Arcot district), Tiruvallūr (Chingleput district) and Kallakurchi (South Arcot district). In the VI Circle, the Madurai-Rāmnād District Agricultural and Industrial Association financed the purchase of 24 tons of fish guano by its members. In the VII Circle, six societies in Malabar and 12 in South Kanara purchased fish manure for their members and two societies in South Kanara purchased iron pans and mills for the manufacture of jaggery, while the society at Ambilath near Kuttuparamba managed its own branch depot for fish manure.

96. *The Coimbatore Marketing Association.*—This Association owes its origin to Mr. Holmes, the Agent of the Bank of Madras, whose attention was drawn, in the course of his work, to the damage which was being done to the name of Cambodia cotton by its admixture with inferior stuff. The Association which was started to remedy this evil prepared 'standards' with the help of Mr. A. Steel, these standards were favourably received by the trade in Bombay and most of the sales during last year's season were based on them. Up to last year, the so-called Cambodia cotton which reached Bombay was taken as equivalent to Broach in quality, but last year the price of Cambodia was much above that of Broach. Mr. Sampson notes that in consequence of the appreciation of these standards by Bombay, buyers now go to the villages themselves and buy their Cambodia cotton, instead of doing business through middlemen at Tiruppur. Proposals for opening a Municipal Cotton Market at Tiruppur were placed before Government at the end of the year under report.

V.—AGRICULTURAL ENGINEERING.

97. Mr. F. T. T. Newland was Government Agricultural Engineer throughout the year, assisted by M.R.Ry. V. Ranga Achariyar Avargal, Assistant Engineer. M.R.Ry. J. Narayanamurti Pantulu, Special Assistant to the Agricultural Engineer, was engaged in an investigation of the scope of expansion of arable areas under well irrigation in Chingleput and South Arcot districts till 30th April 1919 when he was transferred to the Agricultural College, Coimbatore, as Lecturer in Engineering.

98. *Pumping and Boring.*—One-hundred and ten applications for advice were received during the year, of which 51 were for pumping and 44 for boring. In the previous year the number of applications had been 70 (35 for pumping and 24 for boring). Although applications for advice were readily complied with, yet the number of plants erected during the year under report was less by 3 than the corresponding figure of the previous year, the main reason being the continued difficulty which was experienced by ryots in procuring capital and machinery. Of the 18 plants completed during the year 12 were erected with second-hand machinery, only 3 new engines and 5 new pumps being included in the installations. No Government loan for erecting pumping and other installations was sanctioned during the year, the 17 loan applications under disposal during the year having been disposed of as follows:—

- (1) 2 ordered to lie over till the arrival of ploughs,
- (2) 3 rejected,
- (3) 5 pending with the Collectors,
- (4) 3 pending with the Government Agricultural Engineer,
- (5) 4 pending with parties.

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The number of ryots' pumping installations maintained during the year by the department was 144 against 143 in the previous year. Considering that there are not less than 600 pumping installations all over the Presidency, the number entrusted to the department for maintenance is only a small proportion of the total. All these plants received on an aggregate 420 visits from supervisors against 244 in the previous year. Pumping was done with 41 hand drills, 3 power drills (two of the rotary type to operate on rocky soils and one of the percussion type to deal with level and leaky soils) and 3 torpedoing sets. Bore holes were put down to the number of 402 and penetrated a total depth of 15,587 feet as against 375 bore holes and 15,189 feet in 1918-19. Of the borings put down, 292 struck springs of which two (one at Aziznagar Criminal Settlement in South Arcot district, and the other at Srinivasapuram in Udaiyarpalayam taluk, Trichinopoly district) were artesian. In one boring at Nelpathur near Shiyali in Tanjore district, which was made in quest of an artesian spring, a very powerful explosive gas was met with at 88 feet below ground level; the gas was of such a pressure that sand and accumulated water were thrown up 25 feet high. Particulars of these and other interesting borings will be found in the Government Agricultural Engineer's report for the year.

99. *Testing and Pumping sets.*—Of the 14 pumping sets of the department, 12 were hired by parties, one had to be utilized for driving the workshop machinery and one was fitted with Musto's Patent Drill for pumping by engine power. Six applications for the use of testing engines were pending on 31st March 1919, 36 were received during the year and 33 were disposed of, leaving nine applications pending on 31st March 1920. Besides the 36 applications above referred to, there were 32 applications which could not be complied with for want of testing engines.

100. *Sugarcane crushing and jaggery making plants.*—The factory at Chittvada-gai was closed during the year and that at Pallapalayam near Coimbatore was carried on as usual pending the extension of buildings and the provision of improved plant which Government have been pleased to sanction during the current year. Notwithstanding the higher prices charged during the year under report for crushing canes and for converting juice into jaggery, the ryots state that it paid them better to employ the Government factory than to have the work done with ordinary country mills and country pans.

VI.—PUBLICATION AND SUPPLY OF INFORMATION.

101. *Year book, bulletins and leaflets.*—The year book for 1919 which was widely circulated met with considerable appreciation. It contained articles on (1) Rice at Samalkota; (2) Economic transplanting of paddy; (3) Green leaf manuring of dry paddy land; (4) Flooding and furrow irrigation in Coimbatore; (5) The duty of water in pump irrigation; (6) Fermentation of green manure; (7) The ghi trade; (8) The coconut tracts in Travancore; (9) Pears for jam making; (10) A fungus, *fomes lucidus* (Leys); (11) Flora of Tinnevely district.

102. Bulletins were published on the following subjects: (1) No. 75. A soil survey of the Kistna Delta by Messrs. W. H. Harrison and M. R. Ramaswami Sivan; (2) No. 76. Exhibit of food and industrial products for the Madras Industrial Exhibition by Mr. Ramaswami Sivan; (3) No. 78. Note on tobacco cultivation by Mr. T. H. Barry.

103. The number of leaflets issued during the year was 10, all of which were issued in the vernacular and some also in English. The subjects were: (1) Rice hispa; (2) Hairy caterpillar; (3) Control of paddy pests (in Telugu); (4) Cambodia cotton, by Mr. H. C. Sampson (in Tamil, Telugu and English); (5) Cotton in the Ceded districts; (6) Sugarcane for the ryots of the IV circle; (7) Tapioca; (8) Bud rot of palmyra by Mr. V. Bhogappayya Sastri (in English and Telugu); and (9) How to increase the production of crop by Mr. Balakrishnamurti (in Telugu).

104. The name of the "Agricultural Calendar" was changed into "Villagers' Calendar," as approved in Government Order No. 2100, dated 15th November 1919. Some 79,200 copies of this calendar, in English, Tamil, Telugu and Kanarese, were distributed by the Publicity Office. The Malayalam Calendar will be for the Malayalam year beginning on the 15th September 1920.

VII.—STATISTICS.

105. The new forecast returns and registers of outturn were brought into use during the year under report, and there was an appreciable improvement in the taluk returns. The work of compiling Agricultural Statistics was transferred from the Board of Revenue to the Director of Agriculture as a result of the proposals of the Indian Industries Committee, but the transfer has been held in abeyance pending the examination of taluk and village accounts by the Director of Land Records. The question of making the Railway returns of goods statistics useful for purposes of the Revenue administration as well as for economic purposes engaged the attention of Government during the year.

VIII.—MISCELLANEOUS—ACCOUNTS.

106. The expenditure and receipts for the year under report and the corresponding figures for the previous year are given below:—

	1918-19.	1919-20.
Expenditure	Rs. 10,11,494.	Rs. 13,16,887.
Receipts	" 2,20,694.	" 3,31,377.
Net expenditure	" 7,90,800.	" 9,85,460.

107. The main reasons for the increase of expenditure during the year under report were: (1) the general development of the Department; (2) the distribution on a larger scale of the special manure mixture in the Tanjore Delta; (3) the distribution of Cambodia cotton seed and the increased area of seed farms in the Coimbatore district; (4) the opening of a fish manure depot on the West Coast with a view to meet the manurial requirements of the Presidency; (5) the opening of Planting stations; (6) General increase in the cost of labour and materials on district farms.

108. Better yields and prices of produce on the District Farms, as compared with those of the previous year, and the sale of fish manure and Cambodia cotton seed on a larger scale contributed to the increase on the receipt side.

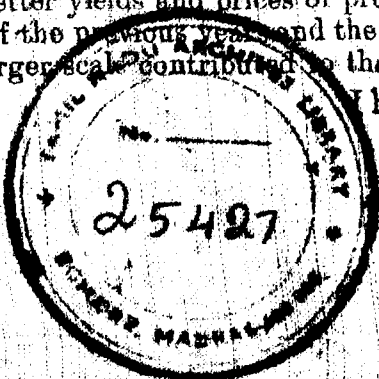
I have the honour to remain,

Sir,

Your most obedient servant,

L. D. SWAMIKANNU,

Acting Director of Agriculture.



Government of Madras

REVENUE (SPECIAL) DEPARTMENT

G.O. No. 1853, 22nd October 1920

Agricultural Department

Report—1919-20—recorded with remarks.

READ—the following paper:—

Letter—from the Hon'ble Diwan Bahadur L. D. SWAMIKANNU PILLAI Avargal, I.S.O., Acting Director of Agriculture, Madras.

To—the Secretary to Government, Revenue (Special) Department.

Dated—the 23rd September 1920.

No.—Nil.

ABSTRACT.—Report on the operations of the Department of Agriculture for the official year 1919-20.

Order—No. 1853, Revenue (Special), dated 22nd October 1920.

Recorded.

2. The department continued shorthanded in the superior ranks during the year under review and only four Deputy Directors were available to hold charge of the seven circles into which the Presidency has been divided. A new Deputy Director was recruited during the year and was posted for training to the Central Farm. The department was also strengthened by the addition of a Sericultural Expert.

3. The improvement of live-stock and the consideration of cognate questions have received a temporary set-back due to the resignation of the Deputy Director of Agriculture, Live-stock. It is hoped to recruit another officer at an early date and to proceed with the schemes of dairying and cattle-breeding already projected. The Government agree that the experiment of importing Ayrshire bulls, referred to in paragraph 58 of the report, has so far been discouraging and the lines on which this experiment should be continued are now under their consideration.

4. The question of attracting more suitable students to the College has been examined by Government and, as already announced, they have decided to separate the two courses of instruction at the College, prescribing a pass in the Intermediate Examination of the University as a qualification for admission to the higher course. The result during the current year has been to attract a considerable number of students with the initial qualifications desired, and the Government trust that this may pave the way to the employment in the department of increasingly useful officers. The establishment of the Agricultural Middle School at Taliparamba has been delayed owing, it is understood, to difficulties regarding the type of building suitable to the purpose. The Government hope that this school may be brought into existence in a few months' time.

5. The Government have read with interest the account given in part III of the Director's report of research and experiments conducted by the department during the year. The account as usual contains a record of solid work done by both the scientific and executive branches of the department. Much work was done during the year on cotton and the Government hope that, as the

result of the recent appointment of Mr. G. R. Hilson as Economic Botanist with special reference to work on cotton, the current year's work will show an increased rate of progress.

6. Of the operations against crop disease, the most important continues to be the application of the Agricultural Pests and Diseases Act in the Coimbatore district in respect of Cambodia cotton. It appears from the report that the arrangements in the year under report did not work altogether smoothly, as was not unnatural in the first year of the application of these measures. It is satisfactory to note the quoted opinion of Mr. Sampson that the measure has fully justified itself in the subsequent year's crop, and it is hoped that the re-application and extension of these measures during the current year will secure still better results.

7. The Government agree with the Director in thinking that perhaps the most successful work done by the department during the year related to manures. It is particularly satisfactory to observe that, as the result of the department's strenuous efforts in connexion with green manures, their production and the collection of seed is in certain tracts passing out of the hands of the department into those of the local cultivator. The Government consider that the officers of the department are to be congratulated on this success.

(True extract)

J. M. TURING,
Tempy. Addl. Secretary to Government.

To the Director of Agriculture.

„ the Registrar of Co-operative Societies.

„ the Home (Miscellaneous) Department.

„ the Home (Education) Department.

„ the Superintendent, Civil Veterinary Department, through Revenue.

„ the Agricultural Adviser to the Government of India (with C.L.).

„ the Government of India, Department of Revenue and Agriculture (with C.L.).

Editors' Table.

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