

1904.

QUEENSLAND.

REPORT OF THE DEPARTMENT OF AGRICULTURE  
FOR THE YEAR 1903-1904.

Presented to both Houses of Parliament by Command.

TO THE HONOURABLE THE SECRETARY FOR AGRICULTURE.

Brisbane, 15th July, 1904.

SIR,—I have the honour to submit the Report of this Department for the year ended the 30th June, 1904.

The change in the constitution of the Department effected on the first of January last, by which the office of the Chief Inspector of Stock ceased to exist as a separate branch of the Department, has worked satisfactorily, without inconvenience to the public and to the avoidance of the duplication of work. A consequence of the alteration was the retirement, on the 30th of June last, of Mr. P. R. Gordon, the Chief Inspector of Stock, who for so many years has been identified with every movement for the benefit and advancement of the pastoral industry. By his retirement the State has lost an able counsellor.

It has been the custom to delay the publication of this Report until the actual annual expenditure and revenue of the Department is known, so that the figures may be inserted for general information; but, as this statement could not be completed until the 30th September, it has been decided, rather than delay the issue of the Report, to omit these figures.

Another apparent cause for the lateness of the issue is the period covered by the Report. To deal with the year from the 1st of January to the 31st of December would be misleading, inasmuch as the harvest of our principal crops—sugar, wheat, barley, &c.—has not, as a rule, been completed by the last day of the calendar year. The dairy season is in full swing throughout the summer, and to close the Report upon the orthodox date would mean the omission of much information which it ought to contain.

MARKETS.

Attention to markets outside of Queensland, in the Commonwealth and oversea, has been a prominent feature in the transactions of the Department during the year, and especially so since the commencement of 1904. The inquiries made have included many kinds of produce, and though it has not been possible to satisfy all demands, the work of the year has not been without result. In October last, a suggestion was made by Mr. Redwood that, as in his opinion, the malting barley grown in Queensland is of a superior quality for malting, and that as the crop for 1903 was much in excess of home requirements, it would be desirable to ship a parcel of best barley to test the English market. The suggestion was acted upon, and after the preliminaries had been arranged, a consignment of 50 tons was despatched by the s.s. "Sophocles," on the 7th February; the result of the venture has been so successful that the Agent-General cabled that farmers should be encouraged to grow malting barley. The market thus opened is, so far as Queensland is concerned, practically unlimited, and it remains with the growers to take advantage of it, and to keep it by exporting only selected grain. Great Britain, where the bulk of our grain will go, has the choice of the produce of the world, and a reputation once damaged in that market would be hard to regain.

FRUIT.—The interest shown during the year for markets outside of the State for Queensland fruits such as pineapples, bananas, and citrus fruits, has been very marked. With regard to Australia and New Zealand, help has been given by placing at the disposal of growers and others the names and addresses of reputable firms. Experiments, duly referred to by the Instructor in Fruit Culture in his report, have been made in connection with pineapples, with a view to shipment to London, and some trial lots have been sent, in temperatures ranging from 40 degrees to 10 degrees, but the results, so far, are not encouraging. A consignment of citrus fruits is now being arranged for by the Citrus-growers' Association, to test the oversea markets.

CAPE GOOSEBERRIES.—To establish a market for this fruit, the Department purchased 15 tons from the farmers in the Rosewood and Marburg districts, and along the North Coast Railway. This fruit was reduced to pulp and canned. About 4 cwt. was sent to England in the form of jam, also a small lot of pulp, and 14 tons 7 cwt. 1 qr. of pulp were sold in Sydney at a satisfactory price. The firm in London with whom the samples were placed by the Agent-General, stated that the Cape gooseberry was not generally used in Great Britain, but, if exporters were prepared at the outset to accept a lower rate for their fruit pulp, a market might be established.



SOUTHERN MARKETS FOR FRUIT.—Complaints having been made to the Department concerning the market for fruit in Sydney, inquiry was made into the conditions obtaining there.

The points on which information was sought were:—

1. The periods during which the best prices are obtained for fruit.
2. How the prices for Queensland fruits compare with those obtained by their competitors.
3. The reason for such difference in prices, if such exist.
4. The various methods of packing fruits.
5. The methods of packing most acceptable to the trade.
6. Is Queensland at any disadvantage in comparison with her competitors, and how can such disadvantage, if any, be removed?
7. Can we do anything to obtain better prices for pineapples?

The report showed, amongst other matters, that Queensland exporters suffer considerably before their fruit arrives in the markets from the rough handling on the wharves in Sydney. The attention of the shipping companies was drawn to this complaint, and it has, to some extent, been remedied.

It was ascertained that the principal Queensland fruits finding a place in the Sydney markets are—pineapples, bananas, tomatoes, watermelons, and cucumbers. Taking the fruits in the order named, it was found that the pineapple trade is in the hands of a few merchants, who hold the distributing trade for the inland towns. These facts point to a lower price in Sydney for the Queensland grower, who, it is thought, might do much better for himself by transacting business directly with the merchants in the inland towns. Pineapples from Fiji are also on sale in New South Wales, but they do not compete with Queensland fruit. Complaint was made that our exporters pay little or no attention to grading and packing. The banana trade is entirely in the hands of the Chinese merchants, the fruit sold being principally from Cairns and Geraldton. Tomatoes are exported in large quantities to Sydney, but it seems that even with this tender fruit, the exporters are oblivious to their own interests. The charge was made that the fruit is despatched when too ripe, is badly graded, and is, in some instances, of inferior quality. The packing, too, is faulty, the usual cases being too large for a fruit that deteriorates rapidly and is sold in small quantities. It seems that at present an orange case is favoured, whereas a quarter plum case is suggested. The cucumber trade is a growing one, especially with early sorts that reach the markets before the New South Wales crop is in. The fruit should arrive in a green state; if yellowed it is practically unsaleable.

It was observed that large quantities of pineapples and bananas were shipped from Sydney to New Zealand, South Australia, and West Australia, and as Queensland is the principal source of supply for New South Wales, it would appear that our merchants are permitting the New South Wales exporters to control trade that should properly belong to them.

The points to be emphasised in connection with the southern fruit trade are—quality, grading, and packing.

MAIZE.—The low price ruling this season for this grain induced the hope that European markets might be found for some of the surplus produce, but the quotations on the English market precluded any hope of help in that quarter. Inquiries were made as to whether there is a market in India, but it was found that the average price of grain with which horses are fed there is such as to afford no encouragement, and is below the average price of maize in Queensland. Moreover, maize is not looked upon with favour in that country as a feed for horse stock.

TIMBER.—Though not immediately within its province, the Department, upon learning that the South African Government were calling for tenders for large quantities of sleepers for the railways in that country, took action to ascertain the conditions of the contract, and, though the merchants were not successful in securing the contract, subsequent negotiations have resulted in an order for some 30,000 sleepers. When our sleepers are known in South Africa, it is expected a steady and increasing business will result and better prices be obtained. Inquiries for street wood blocks were received from Manila, but our quotations failed to command the business.

COAL.—It is possible from the correspondence that has passed upon this subject, that the coal of Queensland may be placed upon the Manila market, and perhaps on the Continent of Asia.

LEATHER.—The demand for leather, consequent on the war between Russia and Japan, is somewhat heavy. A sample order has been despatched to Hongkong that will, if up to army requirements, lead to good business.

Though the foregoing constitute the principal matters that have been dealt with during the last six months, yet inquiries relating to many other lines have engaged attention.

#### CONFERENCES.

Two conferences have been held during the year—the Agricultural Conference, at Maryborough, and the conference of fruitgrowers, in Brisbane, in connection with the fruit industry and the Diseases in Plants Act.

At the Maryborough conference eighty delegates represented seventy-six societies, on the basis of two delegates for each society having fifty financial members, or over that number, and one representative to each society having a lesser number. The cost of the conference was £270 13s.

The resolutions arrived at were twelve in all, of which no action has been taken or was recommended in connection with the following:—

1. Appointment of an expert in bacon-curing.
2. A herd of Angora goats to be kept by the State.
3. Agricultural interests affecting the small farmer and producer.
4. Tanning materials.—Encouragement to be given towards the growth of.
5. Bulls for dairying purposes.—Adoption of co-operation to procure purebred bulls. The Department to advance the money in the first instance.



The action taken with regard to the remainder of the resolutions was:—

1. Tramways and light railways.—Every facility to be given by the Government for the construction of these lines for the development of agricultural districts. This resolution was conveyed to the Home Secretary's Department.
2. Country roads.—Suggested combination of shire councils to secure competent engineer to advise them on the improvement of country roads. A copy of the resolution, of the papers, and of the discussion thereon was sent to the Home Secretary's Department and to all the shire councils, but no combination such as suggested has resulted so far as is known.
3. Horse-breeding.—Establishment of stud farms. The conference recommended that the opinion of the agricultural societies be obtained relative to a tax on stallions. A copy of the paper upon this subject, and of the resolution referring thereto, were sent to all the agricultural societies, with a request for their opinion thereon. The replies so far show that:—

15 societies favoured a tax.  
32 societies are against a tax.  
2 societies offered no opinion.

No further action has been taken.

4. Roads on repurchased estates.—A copy of the paper on this subject was sent to the Hon. the Minister for Lands.
5. An amendment to the Agricultural Bank Act.—The conference gave support to the Bill for amending the Act presented to Parliament last session by Mr. G. Fox, M.L.A.
6. Dairy Supervision Bill to be administered by the Department of Agriculture.—A Bill upon this subject was prepared for presentation last session to Parliament, but was not further proceeded with. A Bill to provide for this and other matters in connection with dairying has been prepared for laying before the Parliament this session.
7. Motor cars in agricultural districts as feeders for railways.—A copy of this resolution was conveyed to the Railway Department.

The Fruitgrowers' Conference met on the 4th of May last, and was attended by thirty-two delegates, representing forty-seven societies. The condition of representation at this conference was one representative, a fruitgrower, for each society. The subjects for discussion can be summarised thus:—

1. Whether in view of experience "*The Diseases in Plants Act of 1896*" needs amending, and, if so, in what direction?
2. The advancement of the fruit industry by:— (a) The opening up of new markets; (b) improvements in the methods of handling and distributing; (c) the utilisation of surplus fruit; (d) the co-operation of growers in marketing, distributing, and utilising.

The discussion upon these matters occupied the whole of one day, and the resolutions were:—

1. That "*The Diseases in Plants Act of 1896*" should be amended, and administered in the amended form by the Department of Agriculture.
2. That in the best interests of the fruit industry the Department should delegate to the Entomologist the duty of finding the best remedies for the most injurious pests. To cover, if necessary, the inspection of pests and methods in other countries. This to be the work of the officer, and should the Entomologist not be available, that a qualified man be obtained for the purpose.
3. That there be a tax on all fruit gardens and on orchards or fruit farms up to 10 acres. The scale to be 2s. 6d. for half an acre, 5s. for 1 acre, and 2s. 6d. for every other acre.
4. That there be a charge of 1d. per package for inspection of imported fruit.

Each fruit district was asked to communicate to the Department any suggestion in respect to amending the existing Act.

During the discussion on the advancement of the fruit industry, reference was made to the machinery employed in America for fruit-packing, cleaning, and sorting or grading. Action has been taken by the Department to secure from America the latest information on this subject. A suggestion was made that a trade in pineapple-pulp with Europe be opened up; this seems a more probable mode of quitting our surplus pines, especially as results of experiments so far do not encourage shipping as whole fruit.

Co-operation amongst fruitgrowers was advocated, especially as affecting the export trade, and much stress was laid upon the opportunity given by the proposal of the Citrus-growers' Association to get together a large consignment of citrus fruits.

The carriage of fruit by rail was commented upon, and the use of louvre vans, such as are used in New South Wales, was urged in the interest of growers.

One suggestion concerning co-operation and the markets in the Southern States was, that the growers should combine and open up a trade direct with consumers, instead of, as now, through an agent or shopkeeper.

#### AGRICULTURAL EDUCATION.

Much has been written and said concerning instruction in agriculture at State schools, and, with the example of the work done by certain head teachers, it would seem that, with proper encouragement, considerable benefit to the country might result. It is not urged that it would be wise to establish a general system of practical agricultural education at the State schools, but suitable text-books might be supplied on agricultural subjects, and the curriculum adjusted to admit of teaching agriculture; and, provided the head teacher was capable, it would be a distinct advantage to supply seed and tools to practically demonstrate the theory. The tendency, so far as Queensland is concerned, is to induce the people to follow the primary industries; and where can this tendency be better encouraged than with the rising generation? The State farms, with a moderate expenditure in erecting dwelling accommodation, might serve as training ground for youths. Lads with a desire for farming, but whose circumstances do not admit of their obtaining the grounding in agriculture that those who are able to afford it can receive from the Agricultural College, frequently make application to be placed upon farms. Though help is



given to find a suitable situation, these lads have perforce to seek their education in the best way they can, by working for others, sometimes in uncongenial surroundings. It may be argued that our forefathers had not the opportunities afforded by agricultural colleges and schools, and had to learn the rudiments of their calling as best they could, but such an argument has no weight to-day. It is suggested that a certain number of boys, say, from fourteen to sixteen years of age, might be received at the State farms under an engagement or apprenticeship for, say, three years. For the first year no wages to be given, the instruction, board and lodging to be taken as an equivalent for the work done. During the second and third years a certain wage to be paid, small at first, and rising proportionately to ability. Beyond the outlay for buildings, the cost to the State would not be great, and as a set-off against the outlay there would be the advantage of a constant stream of lads well grounded in the rudiments of agriculture. The facilities at the farms would not permit much of the scientific side of agriculture being taught, but the instruction would be intensely practical, and calculated to fit out a youngster for his life work. A rigid examination before being accepted would be necessary, but not an examination of the schools, for there are many who can never pass a class-room examination who yet have in them the makings of excellent farmers. After such a scheme has been tested and found to be of use to the community, the system might be extended by the addition of some elementary scientific instruction, and later enlarged to the higher education, but, as a commencement, it is thought that the "school" should be upon the basis of manual labour only, supplemented by the instruction the manager of the farm and his assistants are able to give. Many a man has to buy experience at a cost that might have been saved had he had the advantages of a sound practical training.

#### SUPERVISION OF EXPORTS.

By the quality of its exports a country is gauged, and as each year passes there seems to be an increasing need for oversight by the Government. Queensland has to establish her footing in the European and other markets with agricultural produce, and it behoves her, in competing against produce from all quarters of the globe, to be careful as to quality and get-up of her exports. A strong reason for the supervision suggested will be found in the *Sydney Mail* of 1st June, where, in an article on trade with Natal, Mr. R. Farrell, writing on the meat industry, says, after dealing with prices:—

"This is no exaggeration; and I greatly regret to state that Australia was not represented, except by the writer, and when asked the reason: 'Why—we cannot depend on your meat (N.S.W.). We like your Queensland beef in handy sizes, no waste; but if some of the people knew it was Australian they would not have it. We don't want anything or anybody Australian.' The whole cause of this hatred is summed up in a very few words. These people have been swindled in business through the great quantity of fraudulent and not up-to-sample or quality of goods imposed upon them under glowing and flaring brands that had no right ever to be allowed out of the colonies, but should have been condemned straight away. Tinned meats are to be seen in auction rooms for anything you dare to offer. In the wholesale and retail grocers' windows you only see well-known American and English brands. Why? Because they are sold under the United States of America Bureau certificate, and are always sought after, and it is found that Australia has no such hall-mark to guarantee her products. And until she adopts this only honest mode of treatment that assures confidence to the purchaser, we shall be treated as we deserve. Maize or mealies are the principal diet of Africa's millions of colonial population. And save beef and mutton, it all comes from the Argentine, the United States of America, or India. I have not yet met our Mr. Valder, the commercial agent, whom I hear spoken of very highly. But from what I have learned here in Durban, in a little over a week, he must have a hard row to hoe. I only this day wrote a letter to the *Natal Mercury*, assuring its many readers that they need have no fear of Australian frozen meat being diseased, as any animal with the slightest signs of blemish or disease was condemned, and the carcass destroyed in the presence of duly qualified inspectors. Here we fail again. Notwithstanding what I have often advocated, we have no 'brand or tag' to show New South Wales has been properly inspected. All other colonies adopt a system of branding or labelling to show it has passed veterinary inspectors."

The following are importations of meats into Natal alone for the past year:—

	Lb.	Lb.	Value.
Hams ... ..	1,095,351	—	—
Lard ... ..	402,569	—	—
Lard oil ... ..	78,920	—	—
Pork and bacon ... ..	1,778,597	3,416,377	£119,677
Beef and veal ... ..	51,111,685	—	1,064,826
Mutton and lamb ... ..	23,662,290	—	492,964
Tinned meats ... ..	574,295	—	—
Butter ... ..	2,121,124	—	306,509
Cheese ... ..	—	—	45,878

Queensland meat is praised, and the cause for it will be found in that here we follow the custom of the United States in attaching tags to the carcasses, showing that they have been inspected and passed for export. The letter of Mr. Farrell has not been inserted to pass any criticism upon the meat trade; that is not needed, for the exporters are jealous of, and are careful to maintain, the high reputation they have gained. There is, however, a sentence in it which emphasises the advisability of Government supervision. The sentence reads:—"These people have been swindled in business through the great quantities of fraudulent and not up-to-date samples or quality of goods imposed upon them under glowing and flaring brands that had no right ever to be allowed out of the colonies, but should have been condemned straight away." Other instances could be quoted, such as the falling off in the export leather trade through adulteration; but sufficient has been quoted to prove that in exports a country must have very clean hands.

Queensland producers are now on the outlook for markets other than those of Australia, and they must learn the lesson of prime quality only, whatever the commodity may be.



## STATE FARMS.

It having appeared that the system upon which these farms were being worked was not satisfactory and not calculated to produce the best results, the managers of Westbrook, Hermitage, and Biggenden, and the Tobacco Expert were called together to discuss the future of the farms and to suggest lines upon which operations should be conducted. The points to which their attention was directed were:—

1. Method of operations.
2. Systems of management.
3. Experiments suitable to the district in which the farm is situated.
4. Experiments manurial or cultural.
5. Avoidance of duplication of work.

The discussion upon these matters resulted in considerable alteration in scope of work and methods. The principal changes are:—

**WESTBROOK.**—The area of this farm has been reduced by the transfer of a considerable portion of it to the Reformatory for Boys. The total area transferred is 123 acres 1 rood, more or less.

2. To abandon the cultivation of cereals and general farming, and to specialise orchard and vineyard work, also the cultivation of such vegetables and small things as are not in general cultivation in Queensland.

3. One breed of poultry and turkeys to be kept.

4. Irrigation to be installed.

**HERMITAGE.**—The cultivation of wheat and experiments of a defined nature to prove the kinds best adapted to the climate of Queensland and with due regard to the milling qualities.

*Stud Wheats.*—The continuation of the experiments to develop new varieties.

*Barley.*—The malting variety to receive special attention, and every effort to be made to improve the quality of this grain in view of an export trade.

*Sorghums, Millets, and Saltbushes* to be grown.

*Grasses.*—Plots of different kinds to be cultivated; particular attention to be given to the native grasses.

*Manurial Experiments.*—To demonstrate the effect of manures upon different crops as an object lesson to those farmers whose land may require the application of them, and to determine the commercial value of applied manures.

*Stock.*—Pigs or breeds of pigs, and a small mob or sheep, to be bred, the latter with the specific idea of raising the best type of lambs suitable for export. One breed of poultry and some turkeys to demonstrate the profitableness of poultry farming as against general farming.

*Vineyard.*—Table varieties only to be retained.

*Orchard.*—To be much reduced in size, and the land devoted to other purposes, as this is practically a duplication of the one at Westbrook.

**BIGGENDEN.**—This farm, being on a newly-settled district, the general farming hitherto followed is to be continued, with the addition of poultry, turkeys, and more pigs.

**GINDIE.**—The experience of past seasons having been against cultivation on a large scale, this farm is to be devoted to cattle and sheep, with special attention to the provision of fodder to provide feed in dry times. The sheep to be carried are to be worked, as in the case of Hermitage, with the idea of raising a breed suitable for producing lambs for export.

**STATE NURSERY, KAMERUNGA.**—This nursery to be continued, so far as the crops and plants to be cultivated are concerned, as heretofore, but the method of distribution of seeds and plants to be altered. In the past they have been practically given away. In the future a charge is to be made for those who require anything from the nursery.

In the foregoing particulars as to the changes that have been and are to be made, it will be noticed that no reference has been made to maize. At the meeting of the managers, this grain was much discussed, and it was decided that, following the experience of the Americans, one variety only should be grown at each farm. The reason for this is, that as maize is so susceptible to hybridisation, there is no hope of improving any one variety, if other varieties were cultivated upon the same farm.

## ADMINISTRATION OF ACTS OF PARLIAMENT.

## "THE DISEASES IN PLANTS ACT OF 1896."

This Act, the objects of which, briefly stated, are:—

1. The freedom of plants from disease, and the consequent improvement of our stocks.

2. The cleanliness of the fruit sold in the markets.

3. The supervision of plants sold from nurseries.

4. The precautions to be taken against the introduction oversea of diseased plants, or of plants likely to be the medium of introducing disease, and, incidentally—

To assist the export of fruit, &c., by inspection, and so facilitate its entry into other countries and States.

The operations have been somewhat extended, though not materially altered, during the past year. The requirements of our banana trade from the northern ports, and the importance of keeping the southern ports open for this fruit, have necessitated further inspection at Geraldton. By an arrangement with the growers, extra inspectors have been appointed, whose salaries are provided for by fees paid by the exporters. At other ports conditions remain the same. The change in the method employed by the Customs in accounting for the import of green fruit, and the many packages of different dimensions in which green fruit are landed in this State, make it somewhat difficult to give an accurate statement of the quantity handled on the wharves, but it may, it is thought, be taken as a fair average that some 300,000 packages of green fruit are imported each year, of which the inspectors in Brisbane inspected



about 216,000 packages and condemned 16,000. The ports of entry for plants being in Brisbane and Cairns only, the greater part of the inspection and fumigation naturally falls on the former place. During the year 502 packages of trees and plants, and 20,104 cases of fruit, have been received at this office for inspection and fumigation, some of the packages of plants being so large that they require two and even three men to handle. In addition to the chamber at this office, chambers have been erected on the wharves by the shipping companies, which are attended to by an inspector under the Act. These chambers have been of great use in facilitating the despatch and lessening the cost of exporting fruit.

#### THE DISEASES IN SHEEP ACTS.

The number of sheep in the State as at 31st December last, adapted to the various pastoral districts, from returns rendered to the Registrar-General under "*The Stock Returns Act of 1893*," show the numbers in those districts as compared with the year 1902, as follows:—

District.	1903.	1902.	Increase.	Decrease.
Burke ... ..	838,489	1,081,857	...	243,368
Burnett ... ..	17,922	27,863	...	9,941
Cook ... ..	2,038	21,310	...	19,272
Darling Downs ... ..	1,194,365	810,790	383,575	...
Gregory North ... ..	825,066	698,210	126,856	...
Gregory South ... ..	191,370	221,772	...	30,402
Kennedy ... ..	177,823	144,830	32,993	...
Leichhardt ... ..	178,866	139,246	39,620	...
Maranoa ... ..	859,742	712,393	147,349	...
Mitchell ... ..	2,609,094	2,087,598	521,496	...
Moreton ... ..	7,240	7,533	...	293
Port Curtis ... ..	10,060	58,561	...	48,501
Warrego ... ..	1,476,884	1,183,802	293,082	...
Wide Bay ... ..	3,085	18,220	...	15,135
Total ... ..	8,392,044	7,213,985	1,544,971	366,912

These figures show an increase of 1,178,059, or 16.33 per cent., as against a decrease of 28.08 per cent. in 1902.

The largest number of sheep in the State in any one year was 21,708,310 in the year 1892, and, compared with the numbers for that year, the decrease in the eleven years has been 61.34 per cent.

The number of sheep introduced by sea and the border during the year was 272,948, and the number that left the State by the same channels was 277,725, which shows that the exports exceeded the imports by 4,777 head.

The number of sheep operated on at the various meat works was:—

Frozen ... ..	54,650
Canned ... ..	11,730
Boiled and extract ... ..	238
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	66,618
Add excess of exports over imports ... ..	4,777
	<hr/>
Total output for the year ... ..	71,395

as against 262,295 in 1902.

The sheep of this State have been particularly free from contagious or infectious diseases, the few cases inquired into by the Department invariably revealing the fact that the mortality had been caused by poisonous plants, or by drought-stricken sheep having suddenly had access to an abundance of grass and herbage.

A number of purebred sheep (both male and female) have been introduced to the State, and it is therefore hoped, with a continuance of the good seasons, similar to that which we are now experiencing, that the present numbers will be greatly increased.

#### THE DISEASES IN STOCK ACTS.

The number of cattle in the State as at 31st December last, arranged into pastoral districts, is:—

District.	1903.	1902.	Increase.	Decrease.
Burke ... ..	594,157	622,598	...	28,441
Burnett ... ..	158,486	176,014	...	17,528
Cook ... ..	248,525	228,120	20,405	...
Darling Downs ... ..	166,354	154,076	12,278	...
Gregory North ... ..	93,785	104,790	...	11,005
Gregory South ... ..	30,662	33,361	...	2,699
Kennedy ... ..	319,924	324,206	...	4,282
Leichhardt ... ..	159,543	179,704	...	20,161
Maranoa ... ..	58,156	70,320	...	12,164
Mitchell ... ..	50,290	47,084	3,206	...
Moreton ... ..	309,234	286,855	22,379	...
Port Curtis ... ..	125,924	117,925	7,999	...
Warrego ... ..	53,321	52,406	915	...
Wide Bay ... ..	113,356	146,012	...	32,656
Total ... ..	2,481,717	2,543,471	67,182	128,936

These figures show a decrease of 61,754, or 2.43 per cent., as compared with a decrease of 32.55 per cent. in 1902.



In 1894 the number of cattle in the State was 7,012,997, and compared with the numbers returned in that year, the decrease in the nine years has been 64.61 per cent.

The decrease in the number of cattle returned at the end of 1903, as compared with the number returned at the end of 1902, may be accounted for by the fact that in the latter year the numbers returned were, to a great extent, by approximation, the then existing drought preventing musters; also that a number of cattle were lost in the early part of 1903, prior to the good rains which have since fallen. The returns for 1903 may be taken as fairly accurate, as a large proportion of the owners have rendered their returns after completing musters.

The number of cattle introduced by sea and the border during the year was 56,175, and the number exported from the State during the same period was 78,988, showing an excess of exports over imports of 22,813 head.

The number of cattle operated on at the various works was:—

Frozen	...	...	...	...	...	107,488
Canned	...	...	...	...	...	15,546
Boiled and extract	...	...	...	...	...	1,824
						<u>124,858</u>
Excess of exports over imports	...	...	...	...	...	22,813
Total output for the year	...	...	...	...	...	<u>147,671</u>

as compared with 202,510 for the year 1902.

Tick fever, as expected, made its reappearance during the year, but as owners on the coast have become alive to the benefits of periodical dipping, the spread of pathogenic (or disease-producing) ticks has been considerably checked.

In this connection, it might also be pointed out that the local authorities are now taking this matter up, and, with the power conferred on them under "*The Local Authorities Act of 1902*," it is hoped that their combined action will greatly assist the Department in keeping down the pest by insisting on the regular dipping of infested stock.

A large number of dips are being erected by private enterprise in the infested areas, and when they have been erected by individuals or companies, it has been found that, by making a reasonable charge for the dipping, the cost of erection has speedily been overtaken. The Department is at all times ready to forward plan of dip, together with directions for preparing the mixture known as the "Departmental Mixture," referred to in the last annual report, and which has been proved effective when prepared in accordance with the directions.

There are also a number of effective proprietary dips at present on the market, but, as pointed out last year, sufficient care is not always taken by owners to carefully prepare either the departmental or proprietary mixtures, and, when such is the case, failure is inevitable, the mixture either being too strong, and hurtful to the cattle, or too weak, and harmless to the ticks.

A number of cases of pleuro-pneumonia in cattle, especially travelling cattle, have been reported to the Department, which was naturally expected, in consequence of the change in the season, and the number of cattle travelling. Owners should take particular care to see that travelling cattle are carefully inoculated against this disease before starting same on the roads, and thus avoid many of the losses recently chronicled.

Poisonous plants have also been reported as causing deaths amongst cattle, but same was not unexpected, and, as pointed out in a former report, new herbage following a protracted drought is always, more or less, likely to occasion deaths, if not by poisoning, by acute indigestion.

The following table shows the number of horses in the State at the end of last year, as compared with 1902:—

District.	1903.	1902.	Increase.	Decrease.
Burke	36,191	36,165	26	...
Burnett	16,892	14,954	1,938	...
Cook	31,042	27,097	3,945	...
Darling Downs	44,080	43,881	199	...
Gregory North	14,834	16,791	...	1,957
Gregory South	6,239	7,110	...	871
Kennedy	70,917	65,512	5,405	...
Leichhardt	31,343	33,150	...	1,807
Maranoa	13,818	12,903	915	...
Mitchell	19,927	19,057	870	...
Moreton	59,870	57,002	2,868	...
Port Curtis	21,518	24,228	...	2,710
Warrego	11,691	11,842	...	151
Wide Bay	23,622	29,430	...	5,808
Total	401,984	399,122	16,166	13,304

These figures show an increase of 2,862, or 0.72 per cent., as against a decrease of 13.63 per cent. in 1902.

The number imported by sea and land was 3,600, and the number similarly exported was 12,248.

Markets are now being established for the export of horses to India, South Africa, and Mauritius, but it is regretted that more care is not taken in breeding a class of horse suitable for such markets—viz., a well-set-up animal, suitable for hard work and weight-carrying purposes.



## THE BRANDS ACTS.

The number of brands registered during the year was 615, and the total number registered up to the end of the year 42,684.

The total number transferred was 10,866, of which 776 were transferred during the year. During the same period 73 brands were cancelled, and 176 cancelled brands were reallocated.

Very few owners care to take advantage of the Amending Act of 1898, in so far as it relates to earmarks, the owners stating that the system is far too complicated and cumbersome to be effective. The portion of that Act, which refers to the use of symbol or one-piece brands is availed of more for horse-breeders, many cattle-owners preferring, since cattle-stealing has become so rife, to adhere to their plain three-piece brand; in fact, in more than one case, the Department has been asked to permit the use of the three-piece brand on one side of the beast and the symbol brand on the other side, thus showing that in these times the owner thinks it advisable to ensure the identity of the beast rather than worry over the loss caused to the hide by branding.

## THE MARSUPIALS DESTRUCTION ACTS.

Legislation was first introduced on this subject in 1877, and has been in force from that date to the present time, with the exception of the years 1891 and 1892. In the table, as shown hereunder, will be found particulars of all scalps destroyed in respect of which bonus has been paid:—

## PARTICULARS OF DESTRUCTION.

Year.	Kangaroos and Wallaroos.	Wallabies.	Bandicoots, Paddamelons, and Kangaroo Rats.	Dingoes.	Total.	Bonus Paid.	Government Endowment.
1877-1878-1879...	1,171,427	595,531	...	...	1,766,958	£ 31,056 0 5	£ 21,967 15 8
1880-1881 ...	...	No Returns.	...	...	...	...	...
1882 ...	424,651	551,276	...	...	975,927	19,272 2 0	4,429 4 5
1883 ...	361,450	684,554	...	...	1,046,004	24,550 4 6	18,322 14 9
1884 ...	380,625	570,290	...	...	950,915	24,140 4 9	12,912 2 8
1885 ...	312,139	486,913	2,113	74	801,239	21,846 12 10	11,088 8 2
1886 ...	284,897	449,656	13,207	9,833	757,593	*20,500 0 0	11,143 18 3
1887 ...	175,363	316,946	8,925	11,525	512,759	17,542 18 4	12,844 14 0
1888 ...	275,729	445,080	24,377	19,552	764,738	27,235 11 2	13,193 4 0
1889 ...	312,476	353,994	27,424	19,570	713,464	26,741 1 11	14,617 9 10
1890 to 1 Feb., 1891	259,208	375,269	38,776	14,220	687,473	21,596 4 3	{ 17,697 2 0 7,231 13 3
1891-1892 ...	...	No Act	in force.	...	...	...	...
1893-1894-1895...	...	No Returns	furnished.	...	...	...	...
1896 ...	288,658	522,653	24,449	16,782	852,542	Estimated at } 106,450 0 0	} 16,959 4 1
1897 ...	717,717	601,307	177,811	26,000	1,522,835		
1 Jan. to 30 June, 1898	290,163	298,078	6,505	11,090	605,836		
1898-1899 ...	823,700	851,022	36,138	24,447	1,735,307	44,392 0 8	13,030 8 9
1899-1900 ...	634,223	620,109	29,912	20,331	1,304,575	35,318 16 10	15,155 10 6
1900-1901 ...	413,992	816,300	40,517	24,939	1,295,748	33,118 13 0	15,329 12 2
1901-1902 ...	281,445	751,061	30,684	21,289	1,084,479	29,613 13 7	11,163 1 7
1902-1903 ...	282,770	636,856	48,768	18,148	986,542	22,922 0 10	11,775 15 8
Total ...	7,690,633	9,926,895	509,606	237,800	18,364,934	£506,296 5 1	£228,861 19 9

\* Estimated.

From the above table it will be seen that the total amount paid away as bonus for the destruction of marsupials and dingoes since the inception of legislation has been £506,296 5s. 1d., on which Government endowment has been granted to the extent of £228,861 19s. 9d. For the year ending 30th June, 1903, the amount distributed as bonus to scalpers in respect of marsupials destroyed was £22,922 0s. 10d., and the Government endowment granted thereon amounted to £11,775 15s. 8d. For the same period the number of scalps paid for was 986,542, representing a decrease on the previous year of 97,937 scalps. No returns have, however, been submitted by the Bowen Board, whose operations for the previous year represented a total destruction of 22,853 scalps.

There has been a decrease in the number of wallabies and dingoes destroyed; under the former heading of 114,205 scalps, and under the latter of 3,141 scalps. There has been a very decided increase in the destruction of the smaller marsupials, and a slight improvement in the same direction with respect to kangaroos.

The Aramac Board leads in the number of kangaroo scalps paid for, with a total of 44,075, and the operations of the Barcoo, Belyando, Hughenden, and Windorah Boards each show a return of over 20,000 scalps of kangaroos destroyed. The Darling Downs, Western Downs, and Waggamba Boards account for the bulk of destruction of wallabies, with a total for the three boards of 355,109 out of a total for the State of 636,856 scalps.

Amongst the smaller marsupials, the Darling Downs is also responsible for the greatest destruction—viz., 11,261—the Warrego Board following with a return of 9,988. The Dawson Board leads in the number of dingo scalps accounted for, with a total of 1,709, but the Leichhardt East, Gogango, Burnett, and Warrego Boards each account for over 1,000 scalps.

The late drought proved a great destroying agency for marsupials, and when it is considered that the activity of the various boards has not been lessened to any great extent during the past few years, it is to be hoped that the marsupial pest is a diminishing factor in the troubles of the stockowner. During the year, however, the question of adopting vigorous measures for the destruction of the dingo and wild dog has again received consideration, and the stockowners are devoting renewed energies to obviate the increase of a danger which they view with alarm.

## THE LIVE STOCK AND MEAT EXPORT ACT.

The protracted droughts of the past have been the means of not only closing, but keeping closed, many of the large meat export establishments of Queensland, but several of the works are now



commencing, or have commenced, operations, and it is hoped that the good season now being experienced will be followed by others, and enable all the works to recommence, continue operations, and retain the export trade that has been established.

*Pigs.*—The number of pigs in the State as at 31st December, 1903, arranged into pastoral districts, was as follows:—

District.	Number.
Burke ... ..	1,153
Burnett ... ..	3,065
Cook ... ..	3,351
Darling Downs ... ..	23,571
Gregory North ... ..	142
Gregory South ... ..	153
Kennedy ... ..	10,751
Leichhardt ... ..	2,839
Maranoa ... ..	1,953
Mitchell ... ..	634
Moreton ... ..	51,674
Port Curtis ... ..	6,046
Warrego ... ..	730
Wide Bay ... ..	11,491
Total ... ..	117,553

This table shows an increase of 40,351, or 52.27 per cent., on the previous year. Of the above, the export works treated 42,095, in the following manner:—

Cured ... ..	35,826
Pork ... ..	6,257
Boiled ... ..	12
	42,095

“THE SLAUGHTERING ACT OF 1898.”

This Act has been extended to the whole of the State, which will give the police greater powers than they have under the old slaughtering Acts—now somewhat obsolete.

The inspection work under the 1898 Act has been the means of at least greatly improving the sanitary and hygienic conditions of the various slaughtering and butchering establishments situated in the areas to which its provisions have operated.

WOOL.

By the courtesy of the Wool-selling Brokers' Association, it has been ascertained that during the period from the 1st July, 1903, to the 3rd of June last, 26,549 bales of wool were catalogued for sale by auction, of which 21,697 were so sold, or were disposed of privately. The exports for the last two years, the produce of the State, were:—

1902.—29,655,078 lb., value £1,304,200
1903.—34,728,823 lb., value £1,867,674

The average export values, as declared for Customs purposes, were:—

1902.—Greasy, 8d. per lb.; clean, 14½d. per lb.
1903.—Greasy, 8½d. per lb.; clean, 16½d. per lb.

AGRICULTURE.

If the prosperity of a country is to be gauged by the extent of her agriculture, it may be said that Queensland has recovered from her experience of drought, and that she is on the high road to prosperity. In 1899 there were 420,746 acres under crop, in 1902 275,383 acres, and last year the area had expanded to 566,589 acres, an increase in five years of 145,843 acres. The Registrar-General in 1899 tabulated the extent and number of the holdings in the State, and though the figures have not been compiled between that year and 1903, the following table, taken from his report, will be of interest as showing the details of cultivation in this State:—

Year.	5 ACRES AND UNDER.		ABOVE 5 ACRES AND NOT EXCEEDING 20 ACRES.		ABOVE 20 ACRES AND NOT EXCEEDING 500 ACRES.		ABOVE 500 ACRES.	
	Owners.	Area.	Owners.	Area.	Owners.	Area.	Owners.	Area.
1898 ... ..	2,892	7,840	4,832	58,717	4,032	128,294	1,800	214,436
1903 ... ..	3,106	8,336	5,358	63,848	4,619	149,966	3,374	399,513

There were 36,948 males and 6,643 females engaged in farming and dairying in 1903, as against 30,916 males and 5,390 females in 1902, and the value of the machinery used during the two years is set down as:—

	Farming.	Dairying.	Irrigation.	Total.
	£	£	£	£
1902 ... ..	653,232	86,418	87,234	826,884
1903 ... ..	724,449	104,758	98,521	927,728
Increase ... ..	£71,217	£18,340	£11,287	£100,844



WHEAT.—Never before in the history of Queensland have the statistics of the Government Statistician shown such an area under this cereal, or recorded a harvest like that which was reaped in 1903. The opportunity presented by the action of the Department in obtaining seed in addition to the small quantity that remained in the State after the drought, enabled the farmers to lay down 138,096 acres for grain, and to harvest 2,436,799 bushels of grain, an increase over 1901—the last year we had a crop—of 50,864 acres and 744,577 bushels. The anticipations before the crop neared ripening were not realised, owing to the excessive rains that fell, and to a visitation of caterpillars which did much damage, devastating many fields. In September last heavy rain, accompanied by wind and cold weather, fell upon the Downs and in the western country, followed by frost. In the latter days of October, also, heavy hailstorms were experienced on the Downs. In this region, especially in the Toowoomba and Pittsworth districts, much damage was done by the caterpillars. Notwithstanding, however, these drawbacks, the average return of grain to the acre—17.65 bushels—has only been exceeded twice in the last ten years—viz., in 1894, when it was 18.80 to the acre, and in 1901, when an average of 19.40 bushels were reaped. As a wheat-growing country Queensland can well take its place among the other States of the Commonwealth, as will be seen by the following averages of crops for 1903:—

Queensland	...	...	...	17.65	bushels.
New South Wales	...	...	...	17.05	"
Victoria	...	...	...	14.59	"
South Australia	...	...	...	8.29	"
West Australia	...	...	...	13.09	"
Tasmania	...	...	...	21.44	"

The cultivation of wheat for grain is steadily advancing, as the following table for five years shows:—

Year.		Acreage.	Yield.	Average per Acre.
			Bushels.	Bushels.
1899	...	52,527	614,414	11.70
1900	...	79,304	1,194,088	15.06
1901	...	87,232	1,692,222	19.40
1902	...	1,880	6,165	3.28
1903	...	138,096	2,436,799	17.65

The Downs proper had the largest area under crop—viz., 107,115 acres, for an average of 18.86 bushels to the acre. The area covered by the Toowoomba petty sessions district yielded an average of 16.84 bushels from 29,833 acres, followed by Allora with an average of 19.44 bushels from 29,583 acres. Roma produced an average of 12.82 bushels from 22,123 acres, and Warwick an average of 21.59 bushels from 20,776 acres.

Rust was prevalent to some considerable extent, the percentage to the whole area reaped for grain being, according to the returns, 26 per cent.

Of the grain area affected with rust in 1899 the percentage to the area reaped was 10.68

"	"	1900	"	"	.10
"	"	1901	"	"	11.55
"	"	1902	"	"	.27
"	"	1903	"	"	26.09

The experiments carried on at the State Farm, Hermitage, during several years to produce types of wheat suitable to the State, have advanced so far that it has been considered safe to extend the experiments by placing small quantities with different farmers. The conditions which have been arranged through the agricultural societies are, that the Department shall receive twice the quantity it has given away, the object being to further extend the operations next year. The experiments at Hermitage are a direct result of the several conferences held in the different States on rust in wheat, and the result of the experiment, after passing from the immediate control of the Department, will be looked forward to with much interest.

It has been estimated approximately by the Government Statistician that, upon the basis of the present population of the State, Queensland requires annually 3,476,000 bushels of wheat to provide breadstuffs, so that upon these figures, and upon the average return for the last ten years of, say, 16½ bushels to the acre, there is room for an increase in area exceeding that of 1903 over 1901 before the local supply is equal to the home consumption.

Circulars were sent to growers, and of the replies received the following summary has been made:—

#### WHEAT.

##### *Order of Preference for Varieties grown during 1903.*

Allora District: Budd's Early, Allora Spring, Marshall's No. 3, Manitoba, Indian Pearl, Ward's Prolific, Steinwedel, Talavera, Baltic Red, Defiance, Newman's Early, Gluyas, Petatz Surprise.

Toowoomba: Budd's Early, Marshall's No. 3, Allora Spring, Baltic Red, Dart's Imperial, Defiance, Manitoba, Purple Straw, Newman's Early, Carmichael, Indian Pearl, Indian Club, Gluyas, Smart's Early, Talavera, Ward's Prolific, Indian Spring, White Tuscan, and Canning Downs.

Warwick: Budd's Early, Allora Spring, Manitoba, Marshall's No. 3, Indian Club, Carmichael, and Belotourka.

Roma and Yeulba: Marshall's No. 3, Ward's Prolific, Dart's Imperial, Allora Spring, Steinwedel, Newman's Early, Purple Straw, Petatz Surprise, Gluyas, Baltic Red, Australian Wonder, Leatherhead, and Carmichael.

Dalby: Dart's Imperial, Marshall's No. 3, Baltic Red, Talavera, Allora Spring, Budd's Early, Petatz Surprise, and Smart's Early.

Killarney: Budd's Early, Marshall's No. 3, Gluyas, Carmichael's, Manitoba, and Ward's Prolific.



Crow's Nest and Highfields: Allora Spring, Budd's Early, Marshall's No. 3, Dart's Imperial, Smart's Early.

Mitchell: Steinwedel, Dart's Imperial, Ward's Prolific, Allora Spring, Marshall's No. 3, Leatherhead.

Goondiwindi, Texas, and Inglewood: Marshall's No. 3, Dart's Imperial, Purple Straw.

Nanango: Budd's Early, Marshall's No. 3, Allora Spring, Dart's Imperial, Petatz Surprise, Gluyas, Steinwedel.

Central District: Allora Spring and Budd's Early.

#### *Soils.*

Allora: For the most part the soil in which the wheat was sown was a rich black loam, which had been cropped with wheat, in some instances, as long as thirty and thirty-five years.

Toowoomba: Principally heavy black soil; forest land, plain, and scrub. Some of the lands on which the most favoured wheats did well have been cropped for thirty years. The crops taken off have, in most cases, been solely wheat or barley, but in others maize and lucerne were grown alternately with wheat.

Warwick: Black loamy, plain; brown, thick forest; sandy-sandstone subsoil, loamy-clay subsoil; blacksoil, forest; black and brown, scrub; light loam, clay subsoil. The lands have been under crop with wheat for thirty years, and in some instances thirty-five years with barley. In one case, at Freestone Creek (Mr. John Doran), the land has been forty years under wheat—unmanured.

Roma and Yeulba: The wheats appear to have thriven equally well on black soils with clay subsoil; chocolate and sandy loams with heavy subsoils. Marshall's No. 3 and Ward's Prolific gave good returns, better than any other variety, on sandy soil, from 6 inches to 3 feet in depth, with a porous red clay subsoil, and also on another soil described by the farmer as "sand," presumably a sandy loam. Most of the farms were originally either open black or chocolate soil plains, brigalow scrubs, or box-tree flats. On the heavy black soils, most of the varieties named did well. Some of these lands have been cropped with wheat continuously for from seven to twelve years, and bear good crops every year without the help of manure.

Dalby: The soil is either rich black, black loamy, plain; red, forest; brigalow scrub, dark loam, light-black, and chocolate; light-black with heavy clay subsoil, sandy loam. Most of the land had only been under crop for from one to four years; one farm nineteen years—all with wheat and maize.

Killarney: The soils in this district range from black soil, forest land, to light mixed. The scrub land is rich black soil with a subsoil of light clay. The land has been continuously cropped with wheat, maize, or barley, from three to nine years.

Crow's Nest and Highfields: The soils of this district are clayey loam, scrub (six years under maize); sandy black soil (four years under maize); black, scrub (twenty-four years with maize); red, scrub (five years maize); chocolate, forest (six years maize).

Mitchell: The soils are—red with clay subsoil, forest; brown, scrub and plain; loamy red, forest; sandy, forest; sandy loam, box forest. The land has been cropped from two to nine years, generally with wheat.

Goondiwindi, Texas, and Inglewood: The Purple Straw wheat was grown on both red and black soils, originally coolibah country. Half the land was new ground, the other half had produced wheat for five previous years.

Marshall's No. 3 was sown on rich sandy loam, originally open forest. In one case the ground was new; in the other, crops of maize, tobacco, and wheat had been raised for five years.

Nanango: The soils are dark-red, with clay subsoil; black, with black clay subsoil; brown or red volcanic, and light-chocolate. Some of the land was new, the rest had been cropped for from four to ten years with wheat and maize.

Central District: Black and chocolate plains; loamy black, open downs (from two to ten years under wheat and maize).

#### *Ploughing.*

Allora: Depth of ploughing, 3 to 4 inches.

Toowoomba: Depth of ploughing, 5 inches and under 9 inches.

Warwick: Depth of ploughing, 2 to 5 inches.

Roma and Yeulba: Depth of ploughing. This varies in many instances; the general depth is from 3 to 5 inches, deep ploughing proving a failure in the Roma district. One farmer, if not more, only scarified the land to a depth of 2 inches, and the crops of Marshall's No. 3, Sullivan's Early, and Ward's Prolific, only reached 8 bushels per acre. A depth of 3 inches, however, returned 33 bushels of Steinwedel.

Dalby: Depth of ploughing, 3, 4, 5, and 6 inches.

Killarney: Depth of ploughing, 3 to 6 inches. Much land was, however, only cultivated with a disc harrow.

Crow's Nest and Highfields: Depth of ploughing, 3 to 4 inches.

Mitchell: Depth of ploughing, 3 to 6 inches.

Goondiwindi, Texas, and Inglewood: Depth of ploughing, from 5 to 7 inches.

Nanango: Depth of ploughing, 3 to 4 to 7 inches.

Central District: Depth of ploughing, 4 to 8 inches.

#### *Time of Sowing.*

Allora: Generally from May to June. Some sown in July and as late as August.

Toowoomba: From March to June, some in July and August.

Warwick: May and June.



Roma and Yeulba: April, May, and June generally.  
 Dalby: May considered the best time. June, July, and even as late as August.  
 Killarney: April, May, June. May is considered the best month.  
 Crow's Nest and Highfields: June and July generally.  
 Mitchell: April to June.  
 Goondiwindi, Texas, and Inglewood: June and July.  
 Nanango: May, June, and July. May is, however, considered the proper month.  
 Central District: April, May, and June.

#### Season.

Allora: Generally fair. Occasionally too wet.  
 Toowoomba: Considered by most to have been too wet, and by others to have been good.  
 Warwick: Too wet.  
 Roma and Yeulba: Appears to have been good on the whole, without too much rain.  
 Dalby: Too much rain.  
 Killarney: Too much rain.  
 Crow's Nest and Highfields: Wet, but fairly good.  
 Mitchell: Good.  
 Goondiwindi, Texas, Inglewood: Very wet.  
 Nanango: Considered by most to have been too wet.  
 Central District: Very dry.

#### Yield.

Allora: The yields ranged up to 24 bushels per acre. Many farmers had not yet threshed. In cases where no yield was obtained, rust and caterpillars were the main factors. The average yield per acre of twenty-one farmers who gave returns was a little over 17 bushels per acre.

Toowoomba: Not taken out, so many not having threshed. Returns, so far, run from 6 bushels to 30 bushels per acre.

Warwick: From 8 to 40 bushels per acre. Average on eight farms 25 bushels. The rest had not threshed.

Roma and Yeulba: Roma—The yield, owing to rainy weather and other causes, ran from 9 to 40 bushels per acre, the average being about 18 bushels. The varieties deemed most suitable by the majority of the farmers were—Marshall's No. 3, Ward's Prolific, and Dart's Imperial. Yeulba—Yield ranged from 8 to 32 bushels per acre; average about 18 bushels. Allora Spring, Steinwedel, and Baltic Red did best.

Dalby: The yields per acre have ranged from 6 to 32 bushels per acre. The average of seven farms returned is 22 bushels per acre.

Killarney: Average, 28 bushels per acre; lowest, 16 bushels; highest (Gluyas), 50 bushels.

Crow's Nest: The yield ranged up to 28 bushels per acre, the average of six farms being about 14 bushels per acre.

Mitchell: The yield has been from 8 to 34 bushels per acre. In the case of the 8-bushel yield a hailstorm damaged the crop.

Goondiwindi, Texas, and Inglewood: Goondiwindi—One (destroyed by flood), 9 bushels per acre; two, 32 to 40 bushels per acre. Texas—One (all damaged by rain), nil; two (rust), 4 bushels per acre; three (Dart's Imperial), 6 bushels per acre, (Marshall's No. 3) 8 bushels per acre; four, imported wheats, 5 bushels per acre (damaged by rain). Inglewood—One farm (forest) 16 to 18 bushels per acre; one farm (scrub) 8 bushels per acre; one (all damaged by rain), nil.

Nanango: Highest yield, 20 bushels; lowest, 4 bushels; average, 13 bushels per acre.

Central Districts: No reports were received.

An analysis of the imported seed wheats will be found in the report of the Agricultural Chemist, appended hereto.

An item of note in connection with what may be called the revival of the wheat industry after the drought, has been the interest shown by some of the State schoolmasters in this cereal and in agriculture generally. The interest has not been confined to theoretical teaching, but has been enthusiastically practical. The masters referred to have, where practicable, taken their elder pupils to the State or other farms to add to the knowledge of themselves and their pupils, and have further improved the opportunity by sowing, reaping, and harvesting plots of land within the grounds of their schools. An instance is obtained from the action of Mr. Morris, the head teacher of the State school, Spring Creek, Clifton, who, as the result of his work and that of his pupils, made a report to the Department of Public Instruction, of which the following is an extract:—

#### PRACTICAL LESSONS IN WHEAT CULTURE.

##### Conclusions.

1. Good milling wheat can be successfully grown on the rich black soil of the Downs. Gradually, however, farmers are putting this high-class land to more remunerative purposes than wheat-growing.
2. The success or otherwise of the crop depended largely on the species of wheat sown. Rust proved the most formidable enemy.
3. Of the newly imported South Australian wheats, "Gluyas" was pre-eminently the best, the straw was clean to the last—it lodged, yet elbowed well. "Carmichael," a velvety wheat, proved a very fair rust-resisting variety. In looking over the results tabulated below, one is not surprised at hearing of farmers having to put the firestick to some of their crops. A pinched wheat giving 8 or 9 bushels to the acre will scarcely pay expenses. Had the season been dry, the imported wheats might, on the whole, have fared better.



*Local Wheats.*

4. "Allora Spring" did not, this season, sustain its high reputation—the straw was rusty and the grain pinched. "Budd's Early" gave a grain of excellent quality and of fair quantity; our yield of 19 bushels to the acre appears to be below, rather than above, the average expected. "Indian Pearl," growing a very short straw and yielding grain weighing 67 lb. to the bushel, will certainly gain in favour on black soil country.

*Crossbred Wheats.*

5. Farmers who visited the school plots were astonished at the general excellence of the crossbred wheats obtained from Hermitage State Farm, and many inquiries for seed were made. The straw was fairly free from rust, stood well comparatively, and the grain was exceedingly plump.

*Foreign Wheats.*

6. The foreign wheats introduced by Mr. Kennedy, Allora, arrived too late in the year for a thorough test; of the hard wheats, "French Hard Mediah," and the "American Goose Wheat" were highly successful; both were bearded, rust-resisting, and great yielders. Harvesting, on account of length of straw, would, however, be difficult.

7. Through country schools, interest in land production may be evoked and sustained; results obtained at the Agricultural College and State farms may be disseminated; actual experiments may, in many places, be successfully carried out.

*Tabulated Results.*

The attached notes on milling quality of samples submitted are by Mr. T. Kennedy, of Allora:—

*Local Wheats.*

Budd's Early: Straw,  $3\frac{5}{8}$  feet, fairly clean; number of bushels per acre, 19; weight per bushel, 64 lb. Rust-resisting, good yielder, prime milling, safe wheat to grow.

Allora Spring: Straw, 4 feet; rusty, due possibly to the very wet season; number of bushels per acre, 17; weight per bushel, 56 lb. Good milling, reliable wheat to grow, especially for late sowing.

Indian Pearl: Straw,  $2\frac{1}{2}$  feet; no rust; only two rows sown; weight per bushel, 67 lb. Macaroni wheat, good milling for mixing with softer wheat, rust-resisting.

Indian Club: Straw, 3 feet; leaf very rusty, stem fairly clean; number of bushels per acre, 21; weight per bushel, 60 lb. Macaroni wheat, fairly good milling.

Marshall's No. 8: Straw,  $4\frac{2}{3}$  feet; great stooler, rust-resistant; number of bushels per acre, 23; weight per bushel,  $60\frac{3}{4}$  lb. Prime milling.

*South Australian.*

Gluyas: Straw, 4 feet; clean; number of bushels per acre, 32; weight per bushel,  $63\frac{1}{2}$  lb. When fully matured, hard but prime milling.

Carmichael: Straw,  $4\frac{2}{5}$  feet; fairly rust-proof; number of bushels per acre,  $24\frac{1}{5}$ ; weight per bushel, 60 lb. Hard; prime milling.

Baroota Wonder: Straw, 4 feet; great stooler, lodged badly, rather rusty; number of bushels per acre,  $14\frac{1}{2}$ ; weight per bushel, 60 lb. Good milling.

Hamblyn's Prolific: Straw,  $4\frac{1}{2}$  feet; extremely rusty; number of bushels per acre,  $14\frac{1}{2}$ ; weight per bushel, 60 lb. Good milling.

Dart's Imperial: Straw,  $4\frac{2}{3}$  feet; rusty, many "white heads," ear like Indian Pearl; number of bushels per acre,  $9\frac{1}{2}$ ; weight per bushel, 45 lb. Cannot pass an opinion on sample.

Petatz Surprise: Straw,  $4\frac{1}{2}$  feet; great stooler, but very rusty; number of bushels per acre,  $8\frac{1}{2}$ ; weight per bushel,  $60\frac{3}{4}$  lb. Hard, prime milling.

Newman's Early: Straw,  $3\frac{3}{4}$  feet; very rusty, better if sown earlier; number of bushels per acre,  $8\frac{1}{2}$ ; weight per bushel, 52 lb. Hard, good milling.

Smart's Early: Straw, 4 feet; rusty; number of bushels per acre,  $8\frac{1}{2}$ ; weight per bushel, 55 lb. Good milling, but very risky for farmers to grow.

Leather Head: Straw, 4 feet; very rusty; number of bushels per acre,  $9\frac{1}{2}$ ; weight per bushel, 49 lb. Grain so pinched, cannot pass opinion.

From Hermitage State Farm.—Farrer's Crossbred R.: Straw,  $4\frac{1}{2}$  feet; great stooler; very little rust; 39 bushels per acre; weight, 66 lb. Hard, good milling.

Farrer's Crossbred, 85 A.I.B.I.: Straw, 4 feet; little rust; 29 bushels per acre; 63 lb. weight. Hard, good milling.

Farrer's Crossbred, "Bobs": Straw, 5 feet; clean, some "white heads"; 19 bushels per acre; 62 lb. weight. Hard, good milling.

Farrer's Crossbred, 84 B.Y.: Straw, 4 feet; very little rust; 36 bushels per acre; weight,  $65\frac{1}{2}$  lb. Hard, good milling.

Yandilla Improved Indian: Straw, 4 feet; stands well, fairly clean; 29 bushels per acre; weight,  $63\frac{3}{4}$  lb. Macaroni, good for mixing.

*Seed Imported by Mr. Kennedy.*

French Hard Mediah: Straw,  $5\frac{1}{2}$  feet; strong pithy wheat, rust-resisting, bearded; 39 bushels per acre; weight,  $65\frac{1}{2}$  lb. Macaroni wheat, very hard; will make a strong flour, with yellow caste.

Leek's Rust Proof: Straw,  $3\frac{1}{2}$  feet; very rusty; 7 bushels per acre; weight,  $46\frac{1}{2}$  lb. Cannot pass an opinion.

Odessa Ulka: Straw, 4 feet; very rusty; weight, 60 lb. Good milling; make strong flour.

American Goose: Straw,  $3\frac{5}{8}$  feet, bearded; no rust; only two rows sown; weight, 64 lb. Similar to "French Hard Mediah."



The ground containing "French White Early," "Odessa Azina," "Sullivan's Prolific," "Darling's Choice," and "Steinweidel" was not large enough to give reliable data concerning yield.

There were seventeen mills at work during 1903, of which six were in Brisbane and its neighbourhood, three at Toowoomba, and eight elsewhere. The number of hands employed was 149, the output of flour was of the value of £280,996, of meal £1,330, and of bran and pollard of the value of £39,139. Some of these mills, however, treated but a small quantity of wheat. Though the requirements of Europe, so far as wheat is concerned, does not at the present time concern this State, where the supply does not equal the demand, information concerning the needs of Europe may, perhaps, find a place in this Report. It has been estimated that the crops in the wheat-growing countries of Europe in 1903—viz., the United Kingdom, France, Italy, Austria, Hungary, Germany, Russia, and the Iberian Peninsula—totalled 172,250,000 quarters of 480 lb. (or 8 bushels at the Queensland standard), of which Great Britain produced 6,750,000 quarters. The requirements of Europe upon a population basis were estimated at 195,000,000 quarters, leaving a balance of 22,750,000 quarters to be provided by America, Asia, or Australia. Great Britain is estimated to need 30,000,000 quarters; therefore, upon the production given above, her shortage is equal to 23,250,000 quarters. In Australia, the wheat market opened in Melbourne for delivery in December at 3s. 2½d. to 3s. 5d. per bushel. For delivery in January it was 3s. 2d. to 3s. 2½d. The market values for milling wheat during the six months ending the 30th June last have averaged:—

	New South Wales. Per Bushel.		Victoria. Per Bushel.		Queensland. Per Bushel.	
	From—	To—	From—	To—	From—	To—
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
January ... ..	2 8	3 1	2 8	3 0	2 8	3 0½
February ... ..	2 8	3 4	2 8	3 3	2 7	3 3½
March ... ..	2 8	3 2	2 8	3 1	2 6	3 1
April ... ..	2 8	3 0	2 8	3 0	2 6	3 0
May ... ..	2 4	3 0½	2 2	3 0	2 4	2 10
June ... ..	2 8	3 1	2 8	3 0	2 2	2 11

Manitoba wheat was sold in Brisbane during April as high as 4s. 4d. per bushel.

An advance in handling the crop over the old method of storing on the farms is to be found in the storage-sheds erected by the Railway Department at convenient points, the forerunner, it may be, of the elevator system, which is in such favour in the grain-producing States of the United States of America and Canada.

MALTING BARLEY.—Of the total area sown, 86 per cent. was reaped for grain, and it is thought that this percentage would have been still higher had it not been for the wet weather at harvesting time, which probably caused the loss of many thousand bushels of grain. As with wheat, the Toowoomba, Warwick, Killarney, Allora, and Highfields had the largest area under crop, the figures for malting grain being:—

	Acres.
Toowoomba ... ..	6,522
Allora ... ..	4,003
Warwick ... ..	3,147
Killarney ... ..	1,085
Highfields ... ..	1,030

the total return for the whole State being 382,082 bushels of grain, of an average of 22.81 bushels to the acre. For the last five years the figures have been:—

	Acres.	Yield.	Average.
		Bushels.	
1899 ... ..	6,011	100,027	16.64
1900 ... ..	6,302	107,910	17.12
1901 ... ..	6,818	193,538	28.39
1902 ... ..	163	1,749	10.73
1903 ... ..	16,750	382,082	22.81

It had been hoped that the full results of the venture in placing our malting barley upon the English market would have been available before this Report was printed, but from the reports received it is clear that Queensland has nothing to fear in competition with other malting barleys in the European markets. The difficulty that will have to be overcome is in the time of shipping, and the suggestion has been received from the Agent-General that the barley might be sent by sailing vessel, to arrive in September, October, and November. The report states that sales are made as early as June for arrival in October and November. Sir Horace Tozer, in his comments on this subject, stated that we are, so far, getting a capital advertisement, and introducing a new product or resource of our State, and the result will be to create a real in place of a speculation value. For present purposes, farmers may be advised that malting barley, up to the standard of that sent, arriving in London between November and March, will realise about 37s. 6d. a quarter (448-lb.), the same figure as Californian Chevalier. Messrs. Wolley, Watney, and Richardson suggest that the type of seed to be grown here shall be of the same kind as that from which the barley sent to England was grown, or, better still, to use the true Chevalier type. They emphasise their dislike to the Goldthorpe, Burton brewing, or Standwell types, because they are not liked by the best brewers and maltsters. Attention is drawn also to the great care needed when threshing. The machines should not be set too closely, as the skin is thereby broken or knocked off, and they point out that in some of the samples sent there were skinned corns. The result of this skinning is that mould is produced and the beer is damaged. It is better, it is said, to leave the awns on than to cut them off



short. This firm advises, also, that if any blending is done, great care must be exercised. Barley of the same characteristics only must be mixed. It will not do to mix the white and the yellow, or the old and the new crop. Weevils are also to be guarded against, for barley weevilled on arrival would not be accepted by any buyer.

Messrs Gilstrap, Earp, and Co. are of opinion that if the body of these barleys and the quality can generally be maintained, they should always find a market in competition with Montana Chevalier, Chilians' Chevalier, Californian Saales, or Bohemian. English Chevaliers, grown on the best British barley-lands, in very favourable seasons, are the only barleys that this firm would consider superior.

Messrs. Montgomery, Jones, and Co., of Liverpool, consider the samples of a very useful quality, and no doubt will be appreciated by buyers.

With these opinions from some of the leading firms in Great Britain, the Queensland growers ought to feel satisfied that they have at their disposal, if proper attention is paid to quality, a market that will absorb, at fair prices, a much greater quantity of malting barley than has been grown in this State, or will be grown for many years to come. For the last ten years the average annual requirements of malt in this State have been about 176,888 bushels, and, as our production of the equivalent in barley is considerably above this, it needs no further argument to prove the necessity for keeping the market that is now opening for us. The statistics of the malt made here during the last five years are:—

				Made from Imported Barley.	Made from Queensland Barley.	Total Malt Made.
				Bushels.	Bushels.	Bushels.
1899	...	...	...	42,851	19,420	62,271
1900	...	...	...	15,337	57,393	72,730
1901	...	...	...	1,000	69,000	70,000
1902	...	...	...	9,500	75,500	85,000
1903	...	...	...	67,500	...	67,500

The earlier papers relating to the consignment of barley to London have already been presented to Parliament.

DAIRYING.—The statistics of the manufacture of dairy produce for any one year are no index of the export trade, because the export season does not coincide with the statistical year, which ends on the 31st December. The quantity of milk dealt with for butter in 1903 was 18,750,604 gallons, as against 13,787,175 gallons in 1902, an increase of 4,963,429 gallons. For cheese the figures were 1,394,780 gallons in 1903, and 931,205 gallons in 1902. From the quantities manipulated in 1904, 7,717,325 lb. of butter and 1,479,651 lb. of cheese were made. Taking the quantity of milk handled in a district as an indication of its suitability for dairying, it will be found that of those districts wherein over 750,000 gallons of milk were handled last year, Gatton comes at the head of the list. The order was:—

	Gallons.
Gatton district	1,283,759
Beaudesert district	1,189,656
Marburg district	1,084,047
Toowoomba district	1,087,990
Dugandan district	1,071,929
Harrisville district	957,659
Ipswich district	807,517

The averages for the year showed that it took 1.37 gallons of milk for 1 lb. of cream, 1.78 lb. of cream to a pound of butter, and 2.43 gallons of milk to produce a pound of butter.

In considering the figures here given, it must be remembered that the first three months of 1903 were influenced by the drought of 1902, for, though feed was plentiful during that time, the cattle had not recovered, and the supply of milk had not reached its normal flow.

The export trade has greatly benefited by the opportunities of direct communication by means of the Aberdeen line of steamers.

The exports for the past five calendar years have been—

	Tons.	Value.
1899	517	49,429
1900	620	51,662
1901	931 $\frac{3}{4}$	86,150
1902	246 $\frac{1}{2}$	24,610
1903	546	49,804

The figures for 1903 really represent two months' export at the commencement of a season following a drought. For the first three months of this year (1904) 1,125 tons of butter, of the value of £90,916, were exported beyond the Commonwealth, and during the months of April and May a further quantity of 746 tons were exported. By boxes, the butter shipped from Brisbane, southward and oversea, from August, 1903, to May, 1904, inclusive, were:—

August—1903	...	500 boxes
September	...	650 "
October	...	1,142 "
November	...	3,678 "
December	...	13,618 "
January—1904	...	18,845 "
February	...	15,562 "
March	...	15,281 "
April	...	12,299 "
May	...	17,541 "
		<u>99,116</u> "



The dairy herds are being constantly improved, and the inquiries for purebred bulls are frequent. During the year 15 bulls have been sold from the College, and sent to all parts of the State, and the demand for fashionable stock exceeds the supply. The herd is to be improved by the importation of fresh blood from Great Britain.

Pigs are so closely connected with dairying that they may be included under the same heading. There were last year 117,553 pigs in the State, as against 77,202 in 1902, but though there was an increase of 40,000 head, the number slaughtered was much less. In 1902, 88,416 pigs were killed for a production of 6,512,925 lb. of bacon and hams, 329,564 lb. of fresh pork, and 512,109 lb. of salt pork; but in 1903 the number had fallen to 54,712 for a yield of 4,145,900 lb. of bacon and hams, 408,734 lb. of fresh pork, and 531,755 lb. of salt pork. The Brisbane district is the chief centre of the bacon industry, and accounts for fully 68 per cent. of the pigs slaughtered.

The demand for pigs of good breed is very brisk at present, and, for fashionable kinds, the Department can only take orders for delivery some months ahead.

The dairy factories working during 1903 numbered 98, and the value of the land, premises, and machinery was estimated to be £94,424.

TABLE SHOWING THE AVERAGE VALUE PER HUNDREDWEIGHT OF BUTTER IMPORTED INTO GREAT BRITAIN FROM 1897 TO 1902, INCLUSIVE.

Country.	1897.		1898.		1899.		1900.		1901.		1902.	
	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
Denmark	101	1	100	6	105	8	108	1	112	1	109	3
Russia	97	8	97	8	98	8	93	6	87	6	89	8
France	104	0	104	9	107	10	110	11	109	5	107	10
Holland	97	2	98	9	99	7	100	0	101	2	100	5
Sweden	101	4	101	10	101	6	103	5	104	2	103	11
United States	82	2	85	6	88	6	88	5	91	10	92	10
Belgium	99	7	95	9	91	6	93	3	97	9	99	1
Germany	101	8	103	10	101	0	105	11	111	4	110	3
Norway	98	0	100	1	99	5	100	9	107	10	106	0
Argentina	96	11	97	0	99	9	96	0	99	9	101	4
Italy	102	4	108	8	...	...	98	4	113	2	100	0
Other Foreign Countries	102	6	75	3	83	10	93	0	86	11	84	6
Average for Foreign Countries	99	11	100	6	103	1	105	0	105	9	104	4
Canada	81	4	84	5	89	1	92	8	93	6	94	4
Australia	96	5	97	7	99	3	97	9	98	11	100	0
New Zealand	95	11	96	7	97	4	95	8	97	11	99	0
British East Indies	52	1	55	4	58	4	66	8	87	3	66	10
Other British Possessions	97	9	101	2	97	5	96	11	125	0	108	3
Average for British Possessions	91	10	92	1	94	9	96	1	96	10	96	6
Average for all Countries	98	11	99	6	101	7	103	4	104	3	103	3

POULTRY.—The appointment of a travelling instructor in connection with the keeping of poultry has been very successful in awakening an interest in this branch of farming, and has been the means of teaching people that there is money in it. Mr. Fern, who was selected for this work, commenced lecturing in January last, at Danderoo, and has since lectured at Killarney, Yangan, Clifton, Allora, Toowoomba, Aubigny, Pittsworth, Warwick, Dalby, Laidley, Rosewood, Ipswich, Boonah, Nundah, Wellington Point, Beaudesert, Nerang, Southport, Beenleigh, Zillmere, North Pine, Montville, Gympie, Tiaro, Kilkivan, Maryborough, Biggenden, Childers, Bundaberg, Gladstone, Rockhampton, Bowen, Townsville, Ayr, Ingham, Halifax, Cairns, Atherton, Mackay, and other places. At least two days were allowed for each place, the interval being utilised for personal instruction and advice; this part of the work being perhaps more valuable than the lectures, for it reached those who were prepared to be educated, and who would most probably profit by the instruction. The lectures were illustrated by limelight views, numbering over one hundred, showing the different types of poultry, ducks, geese, and turkeys; improved kinds of houses and yards; breeding pens; methods of killing, plucking, and packing for market; the packing of eggs, and of incubation in its different stages, from the time the eggs are placed in the incubator until hatching. The range of instruction included in the lectures covered choice of kind suitable for market or for general purposes, feeding from time of hatching onwards, selection for market, the separation at the proper time of the cockerel and the hens, culling of bad sorts, housing and yarding, packing for export or for cold storage, the grading of eggs, &c.

Poultry-keeping may be thought little of by those who have not considered the value of this branch of farming. In the United States the production of fowls and eggs for market is of the enormous value of £39,000,000. The eggs exported in 1901 were of the value of £140,881, and in 1902, £110,141, the greatest quantity going to the United Kingdom. In Denmark, the export of eggs is very great; in 1902, 21,500,000 score of eggs were exported, as against 19,000,000 score in 1901, of which the bulk was taken by the United Kingdom. Other countries could likewise be cited in a similar manner, but these will suffice to show the trade that is to be done if proper attention be given, and, if the trade is good enough in those countries, why should it not be so in Queensland, where the climate is so suitable to this kind of stock? It is but of late years that statistics relating to poultry have been considered worthy of the attention of the Registrar-General, but from them it will be found that upon holdings where farming operations are carried on, there were of fowls, ducks, geese, turkeys, &c., in—

1901	...	715,943	head.
1902	...	471,024	„
1903	...	640,747	„

The decrease in 1902 can be accounted for by the drought, but upon the 1901 figures it will be seen that if a suitable reduction be made for young birds that are not yet profitable, the poultry kept by the people of Queensland works out at about one head per head of population.



The production of eggs during the years mentioned were in—

1901	...	...	...	...	2,595,779 dozen.
1902	...	...	...	...	1,498,821 "
1903	...	...	...	...	1,891,481 "

The market value of poultry in the United Kingdom, given on the market reports, was, in—

Month.	Fowls.		Turkeys.			
	From—	To—	Hens.		Gobblers.	
			From—	To—	From—	To—
	Each	Each				
1903.	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>
June	2 6	5 6	...	No quotation.	...	...
July	1 9	4 3	...	No quotation.	...	...
August	1 8	4 0	...	No quotation.	...	...
September	1 6	4 3	4 6	6 0	6 0	10 0
October	1 8	3 6	4 0	6 0	6 0	10 6
November	1 8	4 6	4 0	6 0	6 6	12 6
December	1 9	5 0	4 6	10 6	7 6	25 0
1904.						
January	1 9	4 6	4 6	6 0	6 6	10 0
February	1 9	4 6	4 0	6 0	6 6	10 0
March	2 3	5 0	4 6	6 0	6 6	10 0
April	2 6	5 0	4 9	6 0	8 0	10 6
May	2 3	5 6	4 0	6 0	6 0	8 6

As a further step towards advancing this industry, an egg-laying competition, to last for twelve months, from the first of July, is now proceeding at the Agricultural College, particulars of which will be found in that report.

SUGAR.—Though the yield for 1903 did not equal that of 1901, the year preceding the drought, there was an appreciable advance in the tonnage of sugar manufactured over 1902. The figures, from the returns of the Government Statistician, for the past five years, are:—

	Tons of Sugar.	Tons of Sugar to each Acre Crushed.	Tons of Cane to 1 ton of Sugar.
1899	123,289	1.55	9.54
1900	92,554	1.28	9.44
1901	120,858	1.55	9.76
1902	76,626	1.30	9.38
1903	91,828	1.52	8.97

The total area under cane in 1903 was 111,516 acres, but of this only 60,375 acres were put through the mills, an area exceeding that of 1902 by 1,273 acres only. The difference between the area cultivated and crushed can be accounted for as "stand-over cane," which fluctuates considerably in each year.

In 1899	there was a difference of 31,222 acres.
" 1900	" " 35,884 "
" 1901	" " 33,871 "
" 1902	" " 26,236 "
" 1903	" " 51,141 "

The following table, showing the area harvested by white labour during the years 1902 and 1903, may be of interest now that the recruiting of coloured labour has come to an end:—

Federal District.	1902.		1903.	
	Area Crushed for Sugar.	Weight of Cane Harvested.	Area Crushed for Cane.	Weight of Cane Harvested.
	Acres.	Tons.	Acres.	Tons.
No. 1, North of the 19th Parallel, at 5s. per ton	1,017	15,327	2,455	36,521
No. 2, 19th to 23rd Parallel, at 4s. "	7,070	65,634	7,850	100,733
No. 3, 23rd to 26th Parallel, at 4s. 4d. "	2,813	13,192	4,848	38,977
No. 4, South of 26th Parallel, at 4s. "	476	4,479	1,927	35,886
Total	11,376	98,632	17,080	212,117

The amount of bonuses earned in each year was £24,510 and £50,454 respectively.

Pride of place with regard to the area under cultivation still remains with Mackay, with 23,473 acres of sugar-cane, followed by Bundaberg and Gin Gin with 21,877 acres, Ingham and Mourilyan with 20,171 acres, Cairns and Douglas with 17,141 acres, and Childers, Maryborough, and Tiaro with 15,207 acres. From these figures there is a drop to 5,481 acres in the Ayr district, and from that area there is a steady decline until the lowest, Marburg and Rosewood, with 27 acres, is reached. Compared with 1902, no district shows a decrease of area under cane, and on the total area was an increase of 26,178 acres.

Of the cane cut for crushing, the average per acre for the State was 13.65 tons. By districts the area covered by the Logan, Maroochy, and Nerang districts obtained first place on an average of 18.18 tons to the acre.



In the manufacture of sugar, forty-two out of the sixty mills in the State were working during 1903; the value of the machinery, land, and premises utilised for the production of the year's crop of 91,828 tons of sugar being estimated at £1,840,359. To arrive at the estimated total capital upon present valuation, invested in machinery, land, and premises, there must be added £296,323 for those mills that were not working. These amounts added together give the respectable sum of £2,136,682. This valuation is less than that for 1902, when it stood at £2,583,689—the decrease being £447,007.

From a calculation by the Government Statistician, based upon the mean population for a series of years, it appears that the two sugar-producing States—Queensland and New South Wales—are the largest sugar-eaters per head of population in the Commonwealth. Queensland is credited with 114 lb., New South Wales 105 lb., Western Australia 103 lb., South Australia 101 lb., Victoria 96 lb., and Tasmania 92 lb. Using these figures in another form, it will be found that the Commonwealth absorbed in 1903, 178,604 tons of sugar, of which Queensland and New South Wales produced 113,614 tons, leaving a deficiency of 64,990 tons to be made up by importing. In 1903 the net imports to the Commonwealth were 89,922 tons. The present season promises well, and a return of something over 140,000 tons of sugar may be anticipated.

The central sugar-mills having been transferred to the Treasury, the information given in preceding years concerning these mills is omitted.

Maize does not show the vitality and improvement that can be noticed with other crops. It is not that we over-produce, because we import year by year, nor is it that the use of it is going out of fashion; but the fact remains that the average of production per acre is steadily decreasing. During the past five years the returns have been:—

					Acres.	Bushels.	Average per Acre.
							Bushels.
1899	...	...	...	...	110,489	1,965,598	17.79
1900	...	...	...	...	127,974	2,456,647	19.20
1901	...	...	...	...	116,983	2,569,118	21.96
1902	...	...	...	...	89,923	1,033,329	11.49
1903	...	...	...	...	133,099	1,923,623	14.45

And the imports for the same period were—

					Bushels.	Value.
1899	...	...	...	...	501,179	£89,256
1900	...	...	...	...	247,449	£42,388
1901	...	...	...	...	131,601	£23,307
1902	...	...	...	...	1,133,371	£219,168
1903	...	...	...	...	87,202	£15,074

Although the area under crop last year expanded, the average return is exceedingly low for a fair year, and fails entirely in comparison with the returns of earlier years, when 80 to 100 bushels were known. The highest average yield per acre of the year—36.34 bushels—was secured in the Herberton district, and the lowest in the Warwick district, 3.22 bushels to the acre. The Gatton district carried the largest area with 12,021 acres, followed by Laidley with 9,176 acres, Allora with 8,692 acres, and Bundaberg with 8,035 acres. No other district covered an area exceeding 8,000 acres. The districts showing a decrease were—Marburg, which had 545 acres less than in the preceding year; Warwick, 5,731 acres; and Cairns, 124 acres.

**SISAL HEMP.**—So much has been written in the Press concerning the action of the Department in advocating the cultivation of sisal hemp, and in distributing plants to farmers and intending growers, that some information concerning the industry and the trade resulting from it may have the effect of convincing those who are as yet wavering in their opinions concerning it. Although the fibre has been employed for domestic uses for over eight centuries, yet it is only within the last twenty years that the trade has assumed an importance which places the sisal-growing industry in the forefront of agriculture in many parts of the tropical world. For the manufacture of binder twine and for other purposes the United States of America imported, in 1902, 89,583 tons of sisal hemp, of the value of £2,496,036. Compared with the imports of the previous year, this shows an increase of 19,507 tons in quantity and £830,969 in value. The increase in value here shown is stated, in the report from which these figures are taken, to have arisen from the decided advance which took place in the average import price—viz., from £23 15s. per ton in 1901 to £27 18s. 4d. per ton in 1902, since which time a further advance has taken place, bringing the market value of best samples up to £32 and even to £34 per ton.

Fears have been expressed that the plant might become a pest, but seeing that it has been grown for centuries in countries more tropical than Queensland, and that its cultivation has formed and still forms, in a more extended degree, the staple industry of those countries, and also that it has been introduced into most of the West Indian Islands, and only a few years ago into Hawaii by the United States Department of Agriculture, such fears would appear to be groundless.

As a matter of fact, two or three varieties of the *Agave*, and of their congeners the *Furcraea*, have been growing for years in many districts of this State, and nowhere has it shown any tendency to spread.

The great value of the plant is shown by its adaptability to soils on which no other payable crop can be grown, by its endurance of drought, and by the fact that it can be harvested at any time most convenient to the grower.

Samples of fibre, hand-manufactured at H.M. Penal Establishment at St. Helena, have been forwarded to fibre-brokers and to rope-manufacturers in Melbourne, and have been highly approved of, the value being placed at from £32 to £35 per ton.

As the machinery needed for the extraction of the fibre (less motive power of from 1½ to 2 h.p. engine) is comparatively inexpensive, ranging from £16 10s. in Mauritius to £24 in Mexico, and £32 for the latest machine in England, no difficulty is to be apprehended in obtaining the means for preparing the crop for export. The number of plants distributed during the last year was 46,800.



ARROWROOT.—Among the subsidiary crops arrowroot has been grown for many years, and, notwithstanding the difficulties in obtaining a foothold in the British market, it is still holding its own in the Queensland trade. By the Food and Drugs Act of Great Britain, arrowroot, to be sold in the market under that title, must be the product of *Maranta Arundinacea*, whereas the variety that is favoured by the grower here is the *Canna edulis*, the probable reason being that the lastnamed gives a larger return per acre. The *Maranta*, it is understood, gives a much finer and whiter article, but it is not so profitable. The law in England is enforced strictly, and anyone selling the product of *Canna edulis* as arrowroot, and without a qualifying prefix, is liable to prosecution; indeed, such a case occurred a few years ago, when a grocer was prosecuted for selling Queensland arrowroot as arrowroot simply. This strict reading of the law would seem to be unfair, especially as the Colonial Botanist says that there are several varieties of *Maranta*, and that, consequently, it is possible that the Food and Drugs Act is often violated in the spirit if not in the letter. Inquiries are now in process to ascertain whether the *Canna edulis* cannot be accepted as arrowroot in the English market, and if this application is successful, it should have a beneficial effect upon the area under cultivation here.

The area under and yield of arrowroot during the past five years has been—

					Acres.		Production. Tons.
1899	...	...	...	...	431	...	4,669
1900	...	...	...	...	401	...	4,419
1901	...	...	...	...	399	...	4,069
1902	...	...	...	...	296	...	1,461
1903	...	...	...	...	363	...	4,735

Queensland arrowroot finds a home in four districts only; one acre each being under cultivation in the Herberton and Cook districts, 40 in Mourilyan, and 321 acres in the Moreton district. In the manufacture of the commercial article thirty-eight hands are employed, of which twenty-nine were so employed in the Nerang district.

CASSAVA.—Although cassava has, as yet, not been largely grown with a view to the production of cassava starch, there are indications that this tuber is receiving attention from farmers who realise that subsidiary crops such as cotton, sisal hemp, coffee, banana fibre, chicory, and cassava must be produced. It was long ago proved that the soil and climate of Queensland are eminently adapted to the production of heavy crops of cassava roots, and since the cost of cultivation and manufacture of the starch amounts to only £8 per ton, whilst the selling price of cassava starch is from £15 to £20 per ton, wholesale, in London, there should be a wide field for enterprise in this direction. Considerable areas of cassava are now being grown in the Burnett and more northern districts of the State, but, as yet, no plant has been laid down for the manufacture of the product. The cost of production of an acre of cassava is about 5s. per ton, and 10 tons is not considered a large return per acre. The Florida (United States of America) factories pay 18s. per ton for tubers in the field. Six tons of cassava tubers will yield 1 ton of air-dried starch, the tubers containing about 29 per cent. of starch. About 60 per cent. of the total starch is recovered. There are certain by-products of commercial value in connection with the manufacture, known as "bitty," or residue starch. This, when dried to a content of 15 per cent. of moisture, amounts to a return of 1½ tons of dry material to each ton of starch. Bitty is a valuable foodstuff for cattle or pigs, and readily sells at £3 per ton. Glucose is also made from cassava pulp. The chief requirements for ensuring the success of the industry are the following:—

1. Capital for installing the best plant for dealing with the tubers.
2. Lands of light texture, in a district of moderate rainfall, capable of being cultivated by horse-implements, within easy reach of a factory.
3. A good water supply, with a system of sand filtration.

These conditions obtain in many districts in Queensland, and there should be a good opening for the establishment of a starch factory in a country where the highest known yield of tuber have been obtainable, even as high as 15 tons per acre. Cassava is the cheapest known form of starch, costing one-fourth of the price of maize starch.

The latest machinery for cassava starch production, devised by Professor Archbold, was described and illustrated in the *Queensland Agricultural Journal*, in May, 1903.

TOBACCO.—The area under this crop, which is practically confined to the Inglewood and Texas districts, advanced from 722 acres in 1902 to 772 acres in 1903, but the production fell from 1,818 cwt. to 617 cwt. During the year the blue mould attacked the tobacco. Farmers planted again and again, only to see their plants wither under this pest. Remedies for general application have not yet been discovered, but experiments in this direction are to be taken in hand at once, under the supervision of the Tobacco Expert, Mr. Nevill. In another part of this Report reference has been made to a vanishing industry in this State—wine-making—and it would seem that the manufacture of tobacco is about to be included in the same category, and that, instead of being the means of employment to many people, the users of tobacco in this State are to be dependent upon the Southern States, to the benefit of the residents therein. The combination of the manufacturing companies has had the effect of closing factories in Queensland, and, instead of an open market, growers will have to be content with the price the syndicate are willing to give; unless, indeed, a market is found outside the Commonwealth; but for this the time is hardly ripe, the production not being sufficient. The proof of this assertion is found in the quantity of tobacco manufactured in the State.

In 1901 tobacco, in different forms, was manufactured to the value of	£85,681
" 1902	29,588
" 1903	28,151

The excise paid during the same period was:—

1901	£32,480
1902	28,152
1903	16,834



In 1901, smoking tobacco to the value of £75,960 was made within the State; in 1903 it had come down to £27,822. In 1901 cigarettes were made to the value of £9,135; in 1903 the manufacture of this commodity is represented by nil.

The figures here given cannot be contraverted, and it is a pity that our industry, which has passed the stage of being regarded as a luxury, and is now classed with the necessities, should be passing out of the industries of the State, although the consumption shows no signs of diminishing. In 1901, 962,312 lb. were imported for home consumption; in 1902, 1,123,865 lb.; and in 1903, 1,254,241 lb.

**COTTON.**—The birth of the third revival of interest in the cotton industry may be dated from the drought of 1902, although during the years immediately preceding, isolated instances of the cultivation of cotton came to the notice of the Department. Upon the advice of the Agricultural Adviser, and in order to encourage the tendency to give this crop another trial in this State, a quantity of seed that was lying on the premises of the Queensland Cotton Company, Ltd., at Ipswich, was secured and distributed, principally along the railway line in the Central district. Apart from the present revival, the history of cotton in this State may be divided into two distinct periods—from 1860 to 1874—during which time it existed in an artificial state, fed by a bonus, varying from £10 to £2 10s., upon each bale of ginned cotton of a weight of 400 lb. The close of this period was due to two causes—the cessation of the American Civil War and the withdrawal of the bonus.

The second period lasted from 1880 to 1897, during the existence of the Queensland Cotton Company. Though there was no direct bonus, the industry was indirectly helped by the payment of £5,000 for the first 5,000 yards of material manufactured.

Coincident almost with the revival of the interest in the industry was the action of the British Cotton-growing Association towards encouraging the cultivation of cotton in British colonies. At the instance of this association, Mr. J. Bottomley has visited Queensland to inquire into the possibilities in this State. Every facility has been given to him to enable him to prosecute his inquiries, and until he became acquainted with Queensland conditions, was accompanied by Mr. D. Jones, of this Department, who has had considerable practical experience in connection with cotton. During his inquiries Mr. Bottomley visited Beenleigh, Nerang, Beaudesert, Boonah, Ipswich, Lowood, Marburg, Rosewood, Laidley, Helidon, Toowoomba, Dalby, Roma, Charleville, Mitchell, Wallumbilla, and the districts on the North Coast Railway.

Before leaving for Fiji, he rendered a report upon his visit, in which it is stated that the object of his visit had been attained, and that it might reasonably be concluded that the way had been prepared for the revival of the cotton industry, mutually beneficial to the Manchester merchant and to the Queensland cotton-grower. In another report, signed by Mr. Jones, it is emphatically asserted that "from the evidences disclosed with regard to conditions of soil and climate, Queensland (or at all events the regions described in the report) is well suited for the immediate settlement of thousands of cotton-growers, who, in a short time, can make a good living from the industry."

In consequence of this report, steps have been taken to obtain from America 3 tons of cotton seed of the best varieties to satisfy the requirements of those who may need a supply. This seed on arrival, about August, will be sold to growers at the actual cost. To ensure a supply of the best quality and kinds, the Department of Agriculture in the United States has been asked to permit the officers attached to it, who are authorities upon cotton, to supervise the selection of the seed.

Mr. McLean, when advising the distribution of cotton seed, gave the opinion that cotton would not assume the position of a staple industry, but that it would find an important place among the subsidiary crops. He pointed out that as a result of the rest that was given to the land by the drought, crops would be prolific when the change came, that prices would be low, and that it would be wise to encourage an alternative crop, such as cotton, as a means for overcoming difficulties that would surely be experienced.

What the Agricultural Adviser predicted has come to pass—there is a plethora of produce, and values are very low. Cotton now is a very different crop to what it was in the sixties, when it was valued for its lint only. Every part of the crop is marketable, and, with the chance of a good European market, it should be worth cultivating for a subsidiary crop.

The acreage under cotton has varied greatly during the different periods. The first record, that of 1860, shows 14 acres; from that, the area under this plant rose and fell until the maximum of 14,674 acres was reached in 1870. In 1887 and 1888 no cotton was planted in the State, but in the following year a second beginning was made with 1 acre; the area then increased until in 1892 there were 717 acres under crop. In 1899, it had again disappeared from the statistics, to be revived for the third time with 8 acres. Last year the acreage was but 2 acres.

**CANARY SEED.**—A subsidiary crop that might be worthy of attention in the temperate parts of this State. Inquiries have been made relative to the conditions of cultivation in the Southern States. In Victoria it is cultivated to a limited extent only, notwithstanding that there is a fair demand for the seed at a payable price. In New South Wales, also, but little attention is paid to it, the area under crop being, this season, but 34 acres. Against this may be placed the imports into the Commonwealth. The exact figures cannot be ascertained, for the reason that in the statistics of the Commonwealth hemp and rape seed are included under the same heading, but it may be fairly estimated that the imports into Australia approximate 1,219 tons per annum, of a value of about £20,000. The imports into New Zealand may be taken at a value of £2,000, and the United Kingdom requires annually 7,780 tons of seed, at a value of £80,000.

The value of the seed in the United Kingdom at the present time is 8s. per bushel of 60 lb., and in Australia from 6s. to 10s. a bushel, taking 40 bushels to the ton. The yield for Queensland may be placed at from 22 to 24 bushels to the acre.

This grass, the Agent-General writes, was at one time largely grown in the Isle of Thanet, but it has now almost dropped out of cultivation in England, and the market has mainly to rely upon countries bordering on the Mediterranean. The custom was to sow it on good land, in rows drilled about 1 foot apart, using about 50 lb. of seed to the acre. The seed clings tightly to the husk, and the sheaves were left in the sun for some time before threshing. The yield, after threshing, was from 28 to 40 bushels to the acre. Canary seed cannot stand the frost, and requires a strong soil, rich in superphosphates. Clay soil should be avoided.



Messrs. Carter and Co., the well-known seedsmen of High Holborn, London, are large buyers of this seed, and desire to encourage the cultivation of this plant in British countries, and are willing to assist with experiment parcels such cultivators as are willing to conduct experiments. They consider that Queensland is well adapted to it.

The inquiries naturally included the methods of harvesting, but excepting that primitive methods such as the flail, treading out the seed with animals, &c., are used in the Mediterranean countries, they did not result in much information likely to be of use to the small grower. The leading manufacturers of agricultural machinery in Great Britain have not placed any machine on the market within the means of the small grower. Threshing machines have been and can be used with special attachments for treating the seed. During the last harvest canary seed grown on the Downs was successfully treated by an ordinary threshing machine with some slight adjustment.

The countries whence Great Britain imported her canary seed during 1902 were—Germany, Holland, France, Portugal, Spain, Italy, Bulgaria, Roumania, Turkey, European and Asiatic Egypt, Morocco, Channel Islands, and Gibraltar. The greatest quantity—11,876 cwt.—came from Morocco, followed by European Turkey with 47,130 cwt.

COFFEE.—The area under coffee last year was practically the same as that of 1902—viz., 394 acres in 1903 and 396 acres in 1902, a difference of 2 acres. This industry is apparently stationary, with a downward tendency, and the reason for it formed the subject of inquiry by the Agricultural Adviser when in the North. The causes assigned by those from whom inquiries were made for abandonment of plantations that had been laid down with high hope of success, included:—

- (a) The large area under coffee in South America, and the reduction in the value of coffee.
- (b) Inability to compete with countries where labour is more plentiful and cheaper.
- (c) Scarcity of labour.
- (d) Customs tariff.

Another reason that was not given, but which has probably some bearing on the case, is that men of limited means and but little knowledge of coffee cultivation have spent their capital, and have been unable to carry on until they have gained the necessary experience, and until the plantations come into bearing—four years, under normal conditions.

It may be expected, however, that the turning point has now been reached, and that those who are still cultivating their properties, have profited by the instruction given by Mr. Newport, who controverts the opinions given locally, and believes in the future of the industry in this State.

The main causes attributed by him to the decrease in area are:—

1. The drop in the price of coffee at a time when our plantations were giving the first returns.
2. The unfavourable seasons of late years.
3. Areas laid down in coffee under unsuitable conditions, and excess of area over capital available, leading to the abandonment of many acres that had been included in the statistics.
4. Customs tariff.

Mr. Newport states that Queensland coffee has much improved in quality, and though the price is lower, it is in no way due to the quality, which compares very favourably with that of other countries. A considerable quantity of Queensland coffee now goes direct to Sydney instead of through Brisbane as heretofore. The ruling price at that port—7½d. per lb. for clean coffee for a fair average sample—is equal to about £75 a ton, which gives a fair return per acre. Mr. Newport points out that though circumstances have been against a rapid expansion, the adverse conditions are passing away, and that better results are now at hand.

The establishment of a tropical industry under modern conditions in a sparsely-settled State such as this is, is naturally a slow process, but the basis upon which the plantations are now being worked will bring the industry to the front. The question of grading for market is of great importance; it has received the attention of the Department, and has formed the subject of a report from the Instructor in Coffee Culture, which is to the effect that uniform grading is badly needed.

If the coffee were graded and classed before being placed upon the market, it would place the Queensland article beyond competition with coffee imported from oversea into the southern markets.

VINES AND FRUIT.—Excepting oranges, the area of which decreased from 3,141 acres under crop in 1902 to 2,936 acres last year, the area under the other fruit crops, the statistics of which are collected, increased in fair proportion. The figures for the two years are:—

	1902. Acres.	1903. Acres.
Vines bearing ... ..	1,302	1,486
Vines not bearing ... ..	257	583
Bananas ... ..	5,266	6,577
Pineapples ... ..	1,101	1,493
Oranges ... ..	3,141	2,936
Other crops ... ..	3,004	5,201
Gardens and orchards ... ..	3,515	4,430

These figures show that the orchardist and horticulturist have faith in Queensland as a fruit-growing country notwithstanding the many pests that have to be fought, and the praises that visitors from the southern States bestow upon our coast country would seem to confirm the opinion of the growers. It is not only the country between here and Gympie that is suitable for fruit-growing, but there are many thousands of acres elsewhere in the State that need but population of the right kind to establish a reputation equal to that held by the Blackall. With, however, the establishment of special kinds of fruit beyond our consumption, the necessity will arise for broader markets, and particularly so with perishable fruit and certain kinds of vegetables. The southern markets are at our command, because the fruit here matures earlier, but, when the glut comes, prices do not always pay. Much experimenting will have to be



done, and many failures will be experienced, before we can land our perishable fruits in the European markets, but with perseverance there seems to be no reason why it should not be done. Meat and butter, both very perishable, are now carried without trouble, but the knowledge of the right temperature and of the other surroundings was not gained without loss to the pioneers. The fruit export trade needs careful investigation here and abroad, so that the growers may learn how to conform to the custom and wishes of the buyers in the market in which they hope to sell. Now we follow our own customs, and do not think it right if objection is made to the form in which we prepare our fruit for market. It would, it is thought, be profitable for the growers to send an experienced man to the different markets to watch the sales, learn the customs of the trade and other surrounding circumstances, which, if known to the exporter, would increase the profit or lessen the loss. The disposition of a crop of fruit and the prevention of waste are very important considerations for the grower, for upon the economic and profitable disposition of the product depends the financial success. There will always be more or less inferior fruit in our crops, which should never be placed upon the market to compete with the high-class fruit. Such a practice is one of the principal causes of a glut in the market, with a consequent depression of the higher class, as well as of the lower-class fruit, and the disappearance of the margin of profit. The area under vines shows an appreciable increase over 1902, but the area has not yet equalled that of 1901, when there were 1,691 acres under vines in bearing, and 299 acres that were not bearing. The losses by the drought were very great in the vineyard, and the effects cannot be remedied in one year, and this is made more patent by a comparison of the returns for the two years. Notwithstanding that the area of bearing vines in 1903 exceeded the preceding year by 184 acres, the yield was only 2,362,520 lb. of grapes gathered, as against 2,284,404 lb. in 1902, and the average yield was less in 1903 by 165 lb. to the acre.

—						No. of Makers.	Quantity of Wine Made.	Brandy Distilled.
							Gallons.	Gallons.
1899	...	...	...	...	...	512	131,045	615
1900	...	...	...	...	...	556	132,489	1,055
1901	...	...	...	...	...	538	148,835	1,112
1902	...	...	...	...	...	391	100,852	2,199
1903	...	...	...	...	...	251	38,558	692

Though perhaps the consumption of wine at the present time is less than it would be in prosperous times, the reduction in this respect would not warrant the serious falling off in this branch of our agricultural industries. Excluding the imports from Europe, the value of the imports from the southern States of the Commonwealth was, in 1903, £17,340; in 1902, £21,915; and in 1901, £10,514. Queensland can produce the raw material for certain kinds of wine as good as, if not better than, that of the other States, and it behoves our vignerons to bestir themselves to regain the trade in a beverage that could well replace the harder drinks that we are accustomed to use. The four principal vine-growing districts are—Roma, with 395 acres; Brisbane, with 279 acres; Toowoomba, with 209 acres; and South Brisbane, with 133 acres; and of these the Brisbane district, in 1903, returned 2,310 lb. to the acre, principally, it is assumed, of table grapes.

The area under bananas increased by 1,311 acres—from 5,266 acres in 1902 to 6,577 acres in 1903—and of the increase 1,075 acres were in the Mourilyan district, which carries 54 per cent. of the total area. The total production, however, notwithstanding the increased area, shows a reduction of 47,437 bunches, the figures for the two years being 1,160,015 bunches and 1,112,578 bunches respectively. The trade in this fruit forms the principal article of export at Geraldton and Cairns, and it has been necessary to increase the number of inspectors at the former place to safeguard the southern trade. Though every effort is made to induce the shippers to send but the best fruits to market, these efforts are severely handicapped by the treatment this delicate fruit receives on board ship and on the wharves. There is room for much improvement in this connection, and as the trade is of some considerable value to the shipping companies, it is thought that it would be to their interest to devise better means of handling, so that the fruit could reach its destination in better form. In one case during last year some thousands of bunches out of one ship were condemned in a southern port and destroyed, and it was ascertained on investigation that the principal cause was owing to the rough weather during the voyage, which necessitated the holds being closed down during the greater part of the voyage. A free circulation of air, so necessary to this delicate fruit, was thus excluded. The loss on this consignment to the growers was something considerable.

The area under pineapples increased from 1,101 acres in 1902 to 1,493 in 1903, an addition in area of 392 acres. Of this fruit the Brisbane district carries the largest area—viz., 601 acres—followed by the Logan with 206 acres. During the year many experiments have been made to test the keeping qualities of this fruit in view of an export trade, but though they have been successful up to a certain point, the carriage oversea in the cold room has not yet been accomplished. Attention has been given to the canning factories in the direction of canning, and a trade with the western States is in a fair way of being established; but competition with the Straits Settlements, which enjoys the advantage of being a free port, and a goodly supply of cheap labour, has to be overcome. Inquiries have been made as to the system of manufacture in vogue at Singapore, and the results of those inquiries have been placed at the service of those interested.

Though the area under oranges has fallen from 3,141 acres in 1902 to 2,936 acres in 1903, it is not to be assumed it is thought that the cultivation of this fruit is going out of favour. The citrus fruits are very susceptible of situation, and the drought of 1902 probably accounted for many of the acres that have gone out of cultivation.

The Maroochy district carried the largest area—viz., 673 acres—followed by Maryborough, with 346 acres; Cardwell, with 161 acres; and Gatton, with 143 acres. The total production was 1,150,514 dozen in 1903, as against 1,191,242 dozen in 1902, a reduction of 40,728 dozen.



VEGETABLES.—In continuation of the information given last year the following table will show the area and production during the last three years of the principal vegetables:—

	1901.		1902.		1903.	
	Area.	Production.	Area.	Production.	Area.	Production.
	Acres.		Acres.		Acres.	
Cabbages ... ..	672	269,630 doz.	286	100,920 doz.	556	212,538 doz.
Tomatoes ... ..	260	25,622 bush.	234	22,649 bush.	343	36,873 bush.
Cucumbers ... ..	198	100,887 doz.	183	44,485 doz.	233	91,386 doz.
Yams ... ..	81	61 tons	88	74 tons	96	82 tons
Beans ... ..	56	5,458 bush.	58	4,872 bush.	55	5,335 bush.
Turnips ... ..	331	2,645 tons	34	85 tons	289	2,763 tons
Peas ... ..	82	5,276 bush.	26	1,215 bush.	75	6,423 bush.
Onions ... ..	179	9,148 cwt.	22	1,036 cwt.	147	10,026 cwt.

TABLE A.  
IMPORTS OF FOOD STUFFS—THE PRODUCTS OF AGRICULTURE.

	1899.	1900.	1901.	1902.	1903.
	£	£	£	£	£
Grain and products thereof ... ..	640,765	589,948	457,044	846,621	829,232
Fruit and products thereof ... ..	150,130	155,609	160,413	186,521	} 318,667
Vegetables (fresh and preserved) ... ..	102,818	95,922	124,296	203,640	
Other products ... ..	163,698	184,148	170,388	628,531	403,632
	£1,057,411	£1,025,627	£912,141	£1,863,313	£1,551,531

TABLE B.  
TABLE showing the PERCENTAGE OF INCREASE of the PRINCIPAL CROPS during 1903 as compared with 1902.

Product.	1902.	1903.	Increase per cent.
<b>Grain—</b>			
Wheat ... ..	6,165 bush.	2,436,799 bush.	Exceeding 100
Oats ... ..	520 "	70,713 "	" 100
<b>Barley—</b>			
Malting ... ..	1,740 "	382,082 "	" 100
Other ... ..	1,846 "	128,475 "	" 100
Maize ... ..	1,033,329 "	1,923,623 "	86.15
Rye ... ..	238 "	6,482 "	Exceeding 100
Rice ... ..	1,093 "	1,322 "	20.95
<b>Potatoes—</b>			
English ... ..	3,257 tons	17,649 tons	Exceeding 100
Sweet ... ..	7,165 "	13,412 "	87.18
Sugar ... ..	641,927 "	823,875 "	28.34
Arrowroot (commercial) ... ..	1,641 "	4,735 "	Exceeding 100
Tobacco (cured leaf) ... ..	1,818 cwt.	617 cwt	...
Coffee ... ..	113,301 lb.	83,632 lb.	...
Pumpkins and melons ... ..	6,087 tons	62,102 tons	Exceeding 100
<b>Hay, Wheat ... ..</b>	1,049 "	10,665 "	" 100
Oats ... ..	3,915 "	32,910 "	" 100
Barley ... ..	60 "	1,283 "	" 100
Rye ... ..	208 "	1,354 "	" 100
Lucerne ... ..	16,146 "	86,664 "	" 100
Panicum ... ..	1,714 "	2,961 "	72.75
<b>Vines—</b>			
Wine made ..... ..	100,852 gals.	38,558 gals.	...
Grapes gathered ... ..	2,284,404 lb.	2,362,520 lb.	3.41
Bananas ... ..	1,160,015 bunches	1,112,578 bunches	...
Pineapples ... ..	260,444 doz.	340,832 doz.	30.86
Oranges ... ..	1,191,242 "	1,150,514 "	...

TABLE C.  
TABLE showing the VALUE of AGRICULTURAL EXPORTS, the PRODUCE and MANUFACTURE of this STATE during the YEARS 1901, 1902, and 1903.

Exports.	Value.		
	1901.	1902.	1903.
	£	£	£
Sugar, molasses, and syrups ... ..	792,329	948,951	653,856
Grain ... ..	3,013	26,890	12,474
Hay and chaff ... ..	2,646	1,270	681
Dairy and auxiliary industries ... ..	129,724	67,921	70,439
Fruit ... ..	102,630	124,760	} 146,970
Produce of root crops ... ..	4,857	4,681	
Vegetables ... ..	5,875	3,338	
Other ... ..	13,878	49,670	71,855
<b>Total ... ..</b>	<b>£1,054,952</b>	<b>£1,227,481</b>	<b>£956,275</b>



TABLE D.

TABLE showing the RELATIVE VALUES of EXPORTS, the PRODUCE of the STATE during the YEARS 1901, 1902, and 1903.  
(From the Returns of the Registrar-General.)

	1901.		1902.		1903.	
	Value.	Percentage of Total.	Value.	Percentage of Total.	Value.	Percentage of Total.
	£		£		£	
Agricultural ... ..	1,054,952	11.71	1,227,481	14.06	956,275	10.52
Pastoral ... ..	4,750,353	52.72	3,934,174	45.05	4,221,780	46.46
Mineral ... ..	2,933,147	32.56	3,164,332	36.24	3,498,930	38.50
Other ... ..	271,244	3.01	406,071	4.65	410,889	4.52
Total ... ..	£9,009,696	100.00	£8,732,058	100.00	£9,087,874	100.00

Appended are Reports from—

- The Principal of the Queensland Agricultural College.
- The Manager of the State Farm, Westbrook.
- The Manager of the State Farm, Hermitage.
- The Manager of the State Farm, Biggenden.
- The Manager of the State Farm, Gindie.
- The Manager of the State Nursery, Kamerunga.
- The Instructor in Fruit Culture.
- The Instructor in Coffee Culture.
- The Tobacco Expert.
- The Colonial Botanist.
- The Entomologist and Vegetable Pathologist.
- The Director of the Botanic Gardens and Government Domain.
- Trustees of the Queensland Museum.
- The Chemistry Division.
- The Secretary, Meat and Dairy Board.

The Report required by "The Sugar Experiment Stations Act of 1900" is in course of preparation, and will be tabled in both Houses at an early date.

I have, &c.,

ERNEST G. E. SCRIVEN,  
Under Secretary.

#### REPORT OF THE PRINCIPAL, QUEENSLAND AGRICULTURAL COLLEGE.

SIR,—I have the honour to submit the following Report on the work and teaching of the Queensland Agricultural College, for the year ending 30th June, 1904, together with extracts from the reports submitted to me by officers who are called upon to preside over different departments.

In submitting this Report, I wish to give the greatest credit to the officers above referred to for the able assistance rendered, not only for the work done in the departments for which they are responsible, but also for assistance given in other branches of work, and I take this opportunity of placing on record my appreciation of such work. During the year under review, changes have taken place in the staff. Mr. A. Watt, late farm foreman, retired from his position under the age limit, and was transferred to the position of chief steward, his place on the farm being filled by Mr. D. Macpherson. Mr. Quinell, lecturer on veterinary science, has been succeeded by Mr. Cory, Veterinary Surgeon to the Department of Agriculture. Mr. J. Bailey has continued his lectures on "Botany"; Dr. Macdonald, on "First Aid"; Messrs. Rainford and Voller gave instruction in "Fruit and Vine Culture"; and Mr. Fern delivered a lecture on "Poultry-raising." These officers of the Department have been of considerable assistance in aiding us to bring about success, and I take this opportunity of conveying to them my very many thanks. With the staff now teaching here, parents may be assured that the success or otherwise of young men graduating through the College remains with themselves. As stated in previous reports, it is not within our scope of teaching to turn out scientific men, but young men well-equipped with a thorough knowledge of every branch of farming. In the first place, the soils are dealt with in a practical, scientific, and experimental manner, also the best methods of cultivation. The following subjects also receive attention:—The cultivation, production, and conservation of fodder crops; cultivation and growth of cereal crops; selection, testing, and methods of planting seeds; saving of grains and crops; the saving and application of manures, their uses and misuses. Root crops of every description are grown and dealt with; drainage and irrigation are taught, both in the class-room and in practice. The above matters are dealt with in such a way as to make them acceptable to the students, the practical work being backed up by lectures both in the laboratory and class-room; this form of teaching is found to be productive of the best results. In the laboratory, the students are largely occupied in the study of the general principles, and the application of science to the solution of the present problems confronting farmers. The advanced students devote a great deal of time to the analysis of the soil, manures, methods of farming to prevent loss of fertilising material, loss of moisture by evaporation. The general principles of farming, together with the advantages to be derived from the use of modern appliances, deep and shallow cultivation, methods of seeding, planting, and harvesting the various farm crops, have been taught, both in a technical form in the class-rooms, and in a practical way in the fields. While, with our present classes, it is thought very desirable to teach much of the art of farming, in similar institutions, where the number of students is greater, the practical work must, more or less, give way to that of the class-room; this matter I consider to be of a serious nature, regarding the future success of young men who will have to compete with men of more practical experience.



The class and practical work is so divided here that students are apportioned a due amount of each, and must therefore be fully equipped with the necessary knowledge to make them well fitted for the land, and to take a leading part in developing the agricultural resources of this State. The dairying department is, as usual, the most popular branch of College work; this is attributable to the fact that the advanced students give more attention to the branches of farming in which the most profitable results are shown. Every branch of this work, with the exception of bacteriology, is being carefully taught, and we have recently included a special course of dairy chemistry. The work is begun by teaching the selection, mating, breeding, feeding, milking, and handling of the animals; then the treatment of the milk, testing of milk, cream, and butter; manufacture of butter and cheese; working of engines, boiler, pump, refrigerator, and all other dairy appliances. It may be said that really good all-round progress has been made in every branch of the dairy work. In the written examination, some of the papers have shown somewhat low marks, but, notwithstanding this fact, the practical work is of a high standard, and many of the students would do credit in comparison with the best factory managers in the State. Pig-raising and bacon-curing have come in for more than the usual share of attention, and better progress has been made than in past years. The merits and demerits of the various breeds, together with the breeding, cross-breeding, feeding, and rearing, have had careful attention; and bacon-curing, on a scale within the reach of the farmer, has been taught. Poultry-keeping and bee-keeping have been made more attractive by adding to our stock. These two branches of farming are every year coming more into favour with the rising generation, not as a hobby, but because there is money to be made from the business if carried on in conjunction with other branches of farming. The College Poultry Expert devotes a good deal of time to teaching students the best methods to follow to bring about successful results, both in raising birds for laying purposes or for the export trade.

Sheep-breeding: A number of crossbred sheep are raised each year for educational purposes, especially as regards the value of the different breeds for export. Lessons are given in the handling, breeding, and shearing.

In the horticultural department, the work in the vegetable garden has been carried out with the utmost care, both as regards the growth of vegetables of numerous varieties, the application and use of manures, and the need for deep cultivation. In the orchard, the methods of planting and pruning, the destruction of insects, &c., have been carefully demonstrated. The same may be said with reference to the vineyards.

Blacksmithing and carpentry have much attraction for young men, and in these branches of the College teaching very good progress has been made. Each of the above departments will be dealt with more fully under their respective headings.

STUDENTS IN ATTENDANCE.—During the term, January to June, 1903, 54 students were enrolled, 16 left at the close of the term, and at the beginning of and during the first term of the year under review (July-December, 1903), 25 joined, making a total enrolment for the term of 63. We lost 26 students at the close of 1903, and have since gained 13, making an enrolment of 50 for the term just concluded. Of the new students who joined during the twelve months—38 in number—10 were adults and 4 bursars; entrance examinations were held, therefore, in the case of 24 only. Mr. Pitt, the English and mathematical master, who conducts the entrance examinations, reports that some of the students who joined in July last proved to be an exceptionally good lot, and good results have been obtained from them. The great trouble in this, as in former years, has been the want of elementary knowledge on the part of many who join. Mr. Pitt states that the conduct of the students while in the class-room has been invariably good, and he adds: "I do not know when, during my seven years at the College, there has been less cause for complaint on this score." During the term just concluded, an opportunity of giving the surveying class an example of practical levelling was afforded by the necessity of laying-out the work in connection with the drainage of the Tarampa Swamp. Five students took part with Mr. Pitt in this work, and, since the excavation has been going on, the duty of measuring up the quantity of earth removed each week by the various gangs has been entrusted wholly to these students, with satisfactory results. Mr. Gurney, chemist to the College, reports that very good progress has been made by many of the students, whose educational attainments are of such a standard as to enable them to grasp the knowledge that is imparted; and also that the behaviour of the students during class hours has been exceptionally good. In addition to the class work, analytical work has been performed by Mr. Gurney upon the following samples forwarded from the head office:—Water, 1 sample; soils, 8 samples; barley, 5 samples. The samples of barley were forwarded for the purpose of comparing the composition of the barleys upon the London market with that of two Toowoomba samples. The following are the analyses:—

ANALYSES OF BARLEY.

	Californian Brewing Barley.	Hungarian Chevalier Barley.	English-grown Chevalier.	Chevalier Barley (Screened), Toowoomba.	Chevalier Barley (Unscreened), Toowoomba.
Moisture ... ..	10.031	10.602	10.362	10.698	10.885
Fat ... ..	1.491	1.521	1.522	1.363	1.154
Proteid matters* ...	11.787	11.500	11.212	11.106	11.000
Carbohydrates, &c.	68.656	69.847	69.871	70.756	70.029
Woody fibre ... ..	5.321	4.028	4.835	3.436	4.240
Ash ... ..	2.714	2.502	2.192	2.641	2.692
	100.000	100.000	100.000	100.000	100.000
Containing Nitrogen*	1.886	1.840	1.794	1.777	1.760

From these analyses it will be seen that the two samples from Toowoomba compare favourably with the Hungarian Chevalier and the English Chevalier, containing, as they do, a little more starch and a little less proteid matter than the London samples. In these respects, also, they are superior to the Californian barley.

Further analytical work has been conducted upon the following samples, the information gained from these analyses being required at the College:—Butters, 5 samples; grasses, 2 samples; lucerne, 1 sample; sunflower seed, 1 sample; carrots, 1 sample; water, 1 sample; soils, 6 samples.

The examination of the farm soils was undertaken for the purpose of making comparisons between plots which had not been irrigated with Lockyer Creek water, and a plot which had six months before been irrigated with this water. An examination of the water was also made, but, owing to the larger amount of water in the creek, due to the rain, the mineral content was much lower than that shown in previous analyses; this sample, therefore, could not be taken as thoroughly typical of the water used for irrigation. Again, as above stated, it was six months after irrigation that the samples of soil were obtained, and heavy falls of rain had taken place in the interval. As no increase in the characteristic mineral matter of the water was found in the irrigated soil, it is thought that, if there had ever been any accumulation of injurious matter in the soil from the water, such accumulation had been washed away by the frequent and heavy rains; for, upon analysis, the irrigated soil, in comparison with the non-irrigated plots, showed no increase in chlorine and magnesia, two of the most prominent constituents of the mineral matter of the water. In



connection with this matter, it is suggested that these analyses will form a useful basis to work upon in the future, if samples of the soil be taken at the time of irrigation. The following are the analyses of the soils:—

ANALYSES OF COLLEGE SOILS.

	Soil No. 1.	Soil No. 2.	Soil No. 3.	Soil No. 4.	Sub-soil No. 5.	Sub-soil No. 6.
Reaction of Soil.	Faintly Acid.	Very Faintly Acid.	Faintly Acid.	Faintly Acid.	Faintly Acid.	Faintly Acid.
Fertilising substances of fine soil soluble in hot hydrochloric acid—	Per cent.	Per cent.	Per cent.	Per cent.		
Lime (CaO) ... ..	.683	.998	.618	.800	...	...
Magnesia (MgO) ... ..	.673	.487	.495	.485	...	...
Potash (K <sub>2</sub> O) ... ..	.275	.268	.272	.254	...	...
Phosphoric Acid (P <sub>2</sub> O <sub>5</sub> ) ... ..	.286	.264	.321	.305	...	...
Nitrogen ... ..	.185	.196	.189	.224	...	...
(equal to Ammonia) ... ..	.224	.238	.229	.272	...	...
Chlorine ... ..	.0051	.0047	.0049	.0047	.0047	.0047

Samples Nos. 1, 2, 3 were from plots which had not been irrigated. Soil No. 2 had a growing crop of lucerne upon it; Nos. 2 and 3 are likely to come under irrigation in the future.

No. 4 soil had been irrigated, and had a growing lucerne crop upon it. No. 5 sub-soil of 4 from 12 to 18 inches; No. 6 sub-soil of 4 from 18 to 24 inches.

The analytical work which is now occupying Mr. Gurney's attention between lectures is the analyses of samples of flour forwarded from Warwick millers, and also the examination of some samples of milk from the College dairy.

**THE FARM.**—The season has been exceptionally favourable for the growth of many crops, and the yields in most cases have been unusually high. The total rainfall for the year amounted to 35.36 inches, as follows:—

1903.				Inches.	1904.				Inches.
July	...	...	...	4.15	January	...	...	...	2.15
August	...	...	...	2.50	February	...	...	...	1.20
September	...	...	...	3.56	March	...	...	...	4.17
October	...	...	...	4.71	April	...	...	...	2.59
November	...	...	...	5.05	May	...	...	...	3.79
December	...	...	...	1.04	June	...	...	...	0.45
					Total				35.362

During the year under review, an area of 327 acres on the farm was cultivated and planted with different crops. The greater portion of the above was ploughed twice, and, in some cases, three times. The whole of the land planted with root crops was subsoiled to a depth of from 12 to 15 inches. Twenty-eight farm horses were kept in constant work. The whole of the work (with the exception of that at harvesting time) was carried out by three farm labourers, with the assistance of students. In this respect, I may mention that the area under cultivation is too great for the present authorised labour to cope with. I may point out that the object for which so large an area has been put under the plough is to get the land in such a condition that it may be planted with lucerne, artificial grasses, and clovers; this work will be carried out during the present year. In connection with the educational part of the work, I am pleased to be able to state that better progress has been made by the students than in any previous year since my tenure of office at the College. It is also encouraging to be able to say that, with few exceptions, the students were anxious to gain as much knowledge as possible, and when important work, such as planting and harvesting the different crops, was being carried on, they (the students) worked long hours in helping to complete the work.

**Wheat Crops.**—All our stud wheats were an utter failure as regards grain production. The Baltic Red did remarkably well, and produced a heavy crop of hay, as may be seen from the figures submitted. This wheat was quite free from rust, and grew to a height of over 6 feet. The crop, although suitable for grain, was cut for hay, with the exception of a small area held over for the purpose of saving the grain for seed. The average yield of grain was about 28 bushels per acre. The following is a list of stud wheats, together with particulars as to their habits and growth:—

**Fill Bag.**—A late wheat, long ears, open awns, height 5 feet 8 inches, rank growth, flaggy, and very rusty.

**Gluyas.**—Early wheat, light straw, free from flag, height 4 feet 6 inches, plant delicate, small yield of straw, very rusty.

**Carmichael.**—Early crop, even growth, short light ears, straw free from flag, light yielder, height 4 feet 4 inches, rusty.

**Defiance.**—Even crop, height 5 feet 8 inches, heavy yield of straw, very rusty.

**Marshall's No. 3.**—Heavy even crop, straw flaggy, height 5 feet 4 inches, rusty.

**Early Para.**—Even crop, light straw, free from flag, short light ears, height 4 feet 6 inches, badly affected with rust, cut for hay (30-10-03), yield 2 tons 5 cwt.

**Petal's Surprise.**—Very delicate plant, light crop, severely attacked by rust.

**Marshall's No. 1.**—Heavy even crop, straw free from flag, height 4 feet 5 inches, rusty.

**White Tuscan.**—Late crop, height 4 feet 7 inches, heavy yield of straw, very rusty.

**Leather Head.**—Heavy even crop, very unhealthy plant, straw rank and flaggy.

**Steinwedel.**—Very heavy even crop, height 5 feet 6 inches, straw rank and flaggy, very rusty, cut for hay (30-10-03), yield 2 tons 10 cwt.

**Hamlyn's Prolific.**—Early crop, height 4 feet 6 inches, light and uneven crop, much affected with rust, yield of hay 1 ton 13 cwt.

**Australian Wonder.**—Quick grower, very heavy even crop, height 5 feet 3 inches, thick rank straw, flaggy, and very rusty.

**Baroota Wonder.**—Long heavy straw, late crop, fine long ears, flaggy and rusty.

**Silver King.**—Height 4 feet 6 inches, early crop, fine straw, light and delicate, yield of hay 1 ton 16 cwt.



The above wheats were grown in acre plots, and records of their growth and habits kept. The following wheats were grown in small areas, and were more or less affected with rust:—Allora Spring, Budd's Early, Smart's Early, Dart's Imperial, Newmaris, Manitoba, and Morocco. Each year for the past six years a large variety of wheats has been experimented with on different parts of the farm, and up to the present we have been successful with two varieties only—Belatourka and Baltic Red.

*Oats.*—From the figures given, it may be observed that the oat crop thrives, and yields a heavy crop of hay, and, during favourable seasons, such as the past, a heavy crop of grain; it may be considered to be one of our most profitable crops, especially if judgment be exercised in selecting the soil upon which to produce it.

*Malting Barley.*—This crop shows good yields each year, with a very fair sample of grain. This year the grain has been discoloured by the rains which fell during the time of harvesting.

*Cape Barley.*—This crop grew rather rank, with the result that the yield was not up to that of past seasons. This is one of the best and cheapest crops to raise for feeding the animals kept on the place. It is unnecessary to deal with each crop separately, because the areas and yields are given under the heading of "Crops Removed and Harvested."

While in Victoria last year, I secured a large variety of potatoes, with which we have since been carrying out experiments, and selecting and saving those that are best adapted to our soils and climate.

The following grasses were grown:—Rye (3 varieties), Rib, Red Natal, Prairie, *Paspalum dilatatum*, and Cocksfoot. With the exception of the *Paspalum*, Prairie, and Cocksfoot, none of the above thrive well with us. I have found the *Paspalum* this year, as in the past, to produce more food and to carry more stock than any other grass.

*Rape.*—This crop is a first-class winter fodder, and should be grown more extensively by our farmers; the crop is a heavy yielder, and may be grazed or hand-fed to animals.

*Flax.*—This grows remarkably well in Queensland, and samples grown at the College, and shown in Melbourne last year, were pronounced by good judges to be of a very superior quality. Large profits are made from this crop, both in Victoria and New Zealand.

*Sisal Hemp.*—This crop has been grown at the College for the past six years, but, owing to the want of appliances with which to prepare it for market, it has been considered to be of no commercial value. This crop does not spread out, nor is there any difficulty in keeping it clean.

Experiments have been carried out in connection with manures, deep and shallow cultivation, deep and shallow seeding, thick and thin seeding, and rotation of crops.

The following Millets have been grown:—Yellow French, Hungarian, Chinese Red, Broom; also, many varieties of Sorghum and Kafir Corn.

*Root Crops.*—Sufficient root crops have been grown to feed 200 pigs for nine months of the year, besides a large quantity fed to other animals kept on the place. The mangold is the best crop of this class, not because of the extraordinarily heavy yields, or the feeding value, but because of the keeping qualities. The next best root crop is the field carrot, which possesses good feeding value, is a heavy yielder, and possesses good keeping qualities. For return per acre, see figures under heading of "Crops Removed." The following crops were grown:—Mangolds, Long Red and Yellow Globe; swedes, beets, carrots, artichokes, and field carrots.

Experiments have been carried out for the purpose of determining the value of the different grasses and clovers, and their adaptability to our soils and climate. The following were planted:—Red, White, and Scarlet Clovers and Cow Grass. None of the clovers will withstand the dry weather; although they do not entirely die out, they make no growth with us.

*Maize.*—The following varieties of maize were sown:—Snowflake, Argentine, White Iowa, Silvermine, Mastodon, Hawkesbury, Champion, Hickory King.

*Potatoes.*—We harvested 9 acres for a yield of 36 tons 6 cwt., the sample being of excellent quality. The varieties were Blueskins, Brownell's Beauty, and Early Rose. The Brownell's Beauty, for a summer crop, is the highest yielder, the yield being 20 per cent. higher than the other varieties. The imported varieties (notwithstanding the fact that they were not planted until 2nd September, 1903, five weeks later than the latest ordinary time for planting) showed good results, and furnished useful information regarding the varieties best adapted to our soil, and also for early and late planting. The following is the average yield per acre:—

Variety.	Yield per Acre.	Remarks.
Up to Date ... ..	5½ tons	Good sample
Carmen's .. ..	8 "	Very good sample
Sutton's Flourball .. ..	6 "	Good sample
Peach Bloom... ..	5 "	" "
Ld. Brittany... ..	5 "	" "
Brown's River .. ..	4 "	Fair sample
Old Pinkeye .. ..	5 "	Good sample
Flat Top .. ..	4 "	Fair sample
Magnum Bonum .. ..	8 "	Very good sample
Vicar .. ..	5 "	Good sample
Barton's Red... ..	4 "	Fair sample
Beauty of Hebron .. ..	5 "	Good sample
White Elephant .. ..	2 "	Poor sample
Acme .. ..	2 "	" "
Snowflake .. ..	2 "	" "
Excelsior .. ..	2 "	" "
American Red .. ..	2 "	" "

The varieties marked "poor," when planted in March or August, are all good, but, if planted out of season, they run to tops. The varieties marked "good" and "fair" will evidently come in for a later or intermediate planting, and give good results in yield and price by coming in between the ordinary crops. A large area of potatoes is being planted this year, advantage being taken of the quantity of seed on hand and the low market rates. In connection with the planting, various experiments are being carried out: Ploughing in



v. drilling; cut v. whole sets; tests with one, two, and three eyes; rough and badly-shaped potatoes, &c. Small plots are being treated with different manures. The following varieties have been planted:—

	Queensland Seed.	Imported Seed.
Avoca	The Bruce	Up to Date
White Rough	Red Russet	Carmen's
Fiddler's Reading Giant	Crompton's Surprise	Sutton's Flourball
Snowflake	Duck Molloy's Champion	Peach Bloom
Chancellor	Manhattan	Ld. Brittany
Magnum Bonum	Up to Date	Brown's River
Lord Tennyson	Sussex Champion	Old Pinkeye
Cambridge Kidney	Early Puritan	Flat Top
Adison's Duck	Blueskins	Magnum Bonum
School Master	Early Rose	Vicar
Robin Adair	Brownell's Beauty	Barton's Red

VARIETIES OF POTATOES HARVESTED, 30TH JUNE, 1904.

Name.	Description and Remarks.	Approximate Yield per Acre.
Sutton's Flourball...	Colour pink, very good	8 tons
Snowflake ...	White, early potato, excellent	10 "
Vicar... ..	Red potato, medium yield	4 "
Carmen's ...	Coloured, do.	4 "
White Elephant ...	Medium yield, does better as summer crop	4 "
American Red ...	Poor yield, potatoes small	
Barton's Red ...		
Excelsior ...	Colour red, medium yield	4 "
Flat Top ...	" pink do.	4 "
Acme ...	" white, good	8 "
Up to Date... ..	" white, very good	9 "
Ld. Brittany ...	" white, excellent	10 "
Brown's River ...	" red, poor yield, better in summer	
Magnum Bonum ...	" white	6 "
Beauty of Hebron...	" pink	5 "
Peach Bloom ...	Coarse potato, yields well	
Pinkeye ...	Poor yield, does well in summer.	
All the above are from imported seed. The following are from Queensland seed:—		
Avoca ...	Colour pink, good	8 tons
White Roughs ...	Very good	9 "
Fiddler's Giant ...	Colour white, poor yield	
Chancellor ...	" white, very good	9 "
Lord Tennyson ...	Poor yield	
Cambridge Kidney ...	Colour white, fair yield	5 "
Adrian Drake ...	" red, good	7 "
Schoolmaster ...	" white, very good	10 "
Robin Adair ...	" pink do.	9 "
De Bruce ...	" white do.	9 "
Red Russet ...	Very poor yield	
Crompton's Surprise ...	Colour red, medium yield	4 "
Duck Molloy ...	" red, good	6 "
Sussex Champion ...	" buff, very good	9 "
Early Puritan ...	" white do.	4 "
Manhattan ...	" red, excellent	10 "

CROPS STANDING, 30TH JUNE, 1904.

	A.	R.	P.
Orchard ...	5	1	21
Vineyard ...	2	2	17
Vegetables ...	4	2	18
Paspalum grass ...	11	3	17
Lucerne ...	79	2	32
Lucerne and wheat ...	17	1	6
Wheat (experimental plots) ..	19	0	0
Wheat ...	26	2	0
Oats ...	25	0	0
Cape barley ...	13	3	17
Malting barley ...	15	0	0
Rye ...	3	2	0
Potatoes ...	3	1	6
Maize and pumpkins ...	23	0	0
Pumpkins ...	10	0	0
Kafir corn ...	5	3	0
Amber cane ...	7	3	0
Sorghum ...	1	0	0
Carrots ...	3	2	0
Mangolds ...	3	3	0
Swedes ...	2	3	0
Field peas ...	1	1	38
Cocksfoot grass ...	0	2	0
Rye grass ...	0	2	0
Experimental plots ...	3	1	12
	289	3	24
Fallow ...	57	3	8
Total area cultivated ...	347	2	32

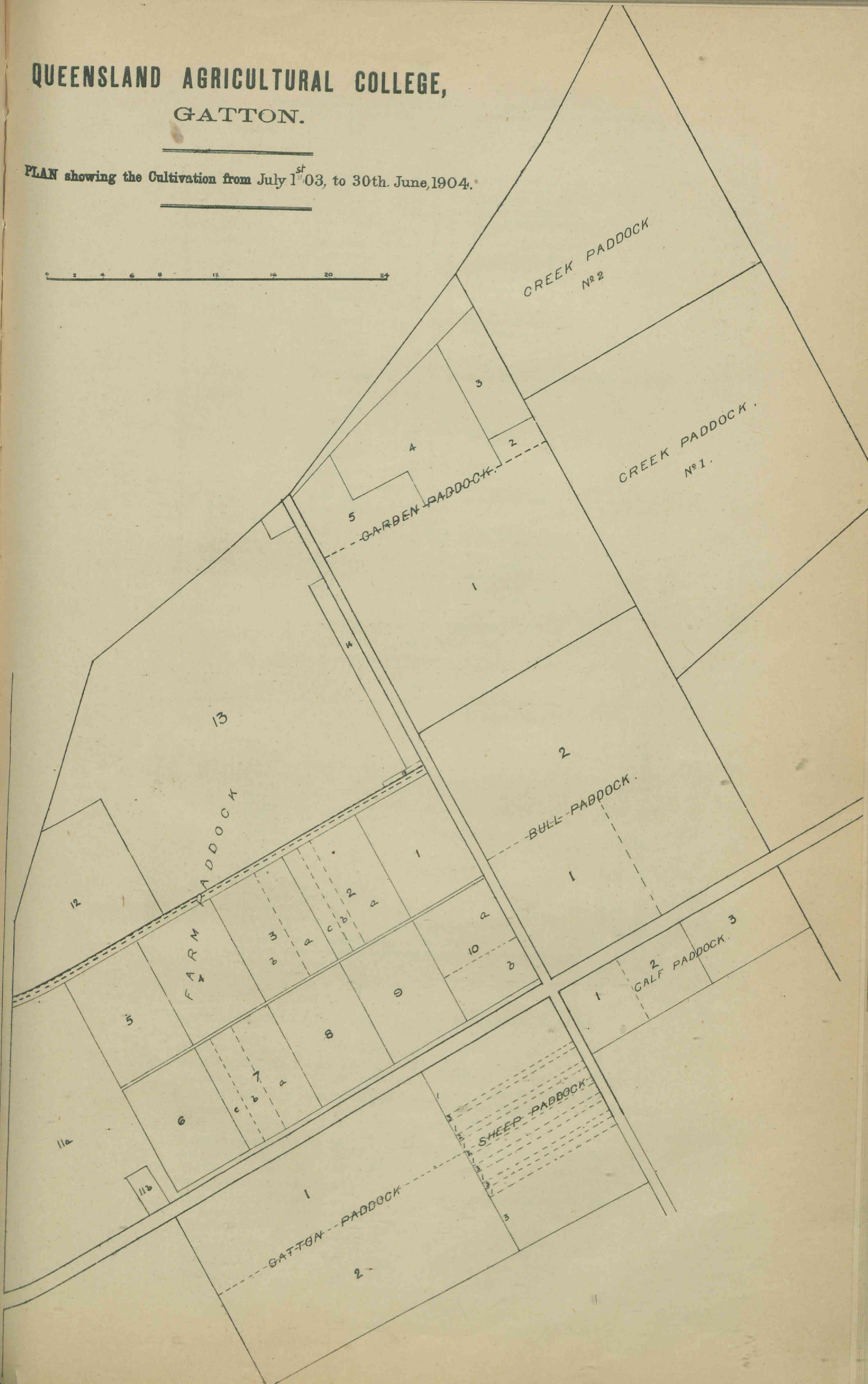
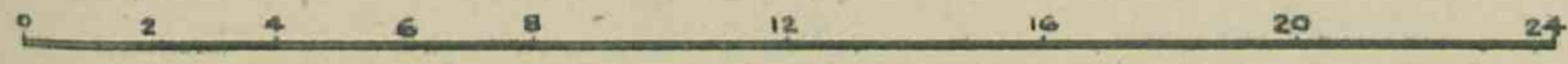
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# QUEENSLAND AGRICULTURAL COLLEGE, GATTON.

PLAN showing the Cultivation from July 1<sup>st</sup> 03, to 30th. June, 1904.





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CROPS REMOVED, 1ST JULY, 1903—14TH APRIL, 1904.

Section.	Paddock.	Crop.	Area.			Return.
			A.	R.	P.	
13	Farm	Lucerne	16	0	0	Ploughed out
2	Creek, No. 2	Wheat	17	1	6	72 tons wheaten hay
2	"	"	14	0	0	Crop spoilt by rain
2	"	"	12	2	0	29 tons wheaten hay
1	Farm	Exp. wheat	1	2	0	Crop spoilt by rain
3	Bull	"	17	2	0	"
3	Creek, No. 3	Oats	7	0	0	14 tons 7 cwt. hay
3	"	"	9	0	0	18 tons 9 cwt. hay
2	Sheep	"	9	0	0	18 tons 9 cwt. hay
3	"	C. barley	5	0	0	12 tons green barley
12	Farm	"	8	3	17	140 bushels
1	Creek, No. 1	M. barley	15	0	0	364 bushels
1	Farm	Rye	3	2	0	5 tons 15 cwt. hay
1	Creek, No. 3	Potatoes	3	1	6	10 tons 10 cwt.
1	Gatton	Maize	23	0	0	245 bushels
3	Farm	Pumpkins				46 tons
4	"	Pumpkins	5	0	0	17 tons
2	Gatton	"	5	0	0	17 tons
		Amber cane	7	0	0	Seed destroyed by parrots and crop used for fodder
10	Farm	"	0	3	0	"
10	"	Kafir corn	0	3	0	"
10	"	Sorghum	1	0	0	"
6	"	Carrots	3	0	0	66 tons
9	"	"	0	2	0	11 tons
6	"	Mangolds	1	2	0	48 tons
9	"	"	2	1	0	72 tons
6	"	Swedes	0	2	0	8 tons
9	"	"	2	1	0	26 tons
1	Sheep	Field peas	1	1	38	9 cwt. 1 qr peas
14	Farm	Exp. seeds	1	2	21	
1	Garden	"	1	2	31	
7	Farm	Oats	5	0	0	10 tons 5 cwt. hay
4	Creek, No. 1	"	3	0	26	6 tons 3 cwt. hay
2	Calf, No. 1	"	4	0	0	8 tons 4 cwt. hay
3	Garden	Maize	8	0	31	347 bushels
16	Farm	Potatoes	9	0	0	36 tons 6 cwt.
17	"	Maize	4	0	0	160 bushels
19	"	Panicum	3	0	0	4 tons 8 cwt. hay

Plots numbered in accordance with last year's report.

CROPS ON FARM, 30TH APRIL, 1904.  
Farm Paddock.

Section.	Crop.	Area.		
		A.	R.	P.
1	Cape barley	5	0	0
2	Rape	3	0	15
2	Flax	0	3	25
2	Varieties sorghums	1	0	0
3	Potatoes	2	0	0
3	Wheat	3	0	0
4	Wheat	5	0	0
5	Maize	5	0	0
6	Fallow	5	0	0
7	Turnips	5	0	0
7	Mangolds	2	1	10
8	Fallow	1	0	30
9	Kafir corn	5	0	0
10	Fallow	5	0	0
10	Rye	3	0	0
11	Sorghums (stand-over crop)	2	0	0
11	Lucerne	15	0	0
11	Paspalum grass	0	1	30
12	Cape barley	8	3	17
13	Lucerne, being ploughed out, and fallow	39	2	13
14	Fallow, with remains of experimental crops	1	2	21
15	Paspalum grass	0	0	23
TOTAL		114	2	24

Creek Paddock, No. 1.—115a. 2r. 24p.				Calf Paddock.—8a. 3r. 30p.					
Plot.		A.	R.	P.	Plot.		A.	R.	P.
	Fallow	38	2	26	1.	Pumpkins	2	1	22
Creek Paddock, No. 2.—29a 2r.				Calf Paddock.—8a. 3r. 30p.					
	Lucerne	29	2	0	2.	Oats	2	2	0
Creek Paddock, No. 2.—30a. 1r. 6p.				Calf Paddock.—8a. 3r. 30p.					
1.	Potatoes	22	0	0	3.	Fallow	4	0	8
2.	Fallow	8	1	6	Sheep Paddock.—15a. 1r. 38p.				
Bull Paddock.—35a. 2r. 32p.				Calf Paddock.—8a. 3r. 30p.					
1.	Paspalum grass	9	2	34	1.	Maize and Pumpkins	8	1	34
2.	Fallow	25	3	38	2.	Panicum	1	0	0
Garden Paddock.—38a. 3r. 26p.				Calf Paddock.—8a. 3r. 30p.					
1.	Fallow, and lucerne overgrown with grass, to be ploughed out	24	1	17	1.	Lucerne	12	3	0
2.	Vines	0	2	17	2.	Fallow	15	2	14
3.	Orchard	2	3	11	Cultivation on Hill.—4a. 2r. 10p.				
4.	Vegetables	7	1	26	1.	Orchard	2	2	10
5.	Fallow	3	2	35	2.	Vines	2	0	0
Total Area under Cultivation							346	0	6



## SUMMARY OF CROPS, MAY, 1904.

					A.	R.	P.						A.	R.	P.
Cape barley	...	...	...	...	13	3	17	Rye	...	...	...	...	3	0	0
Rape	...	...	...	...	3	0	15	Lucerne	...	...	...	...	57	1	0
Flax	...	...	...	...	0	3	25	Paspalum grass	...	...	...	...	10	1	7
Sorghums	...	...	...	...	3	0	0	Fallow, with remains of experimental crops	...	...	...	...	1	2	21
Potatoes	...	...	...	...	24	0	0	Vines	...	...	...	...	2	2	17
Wheat	...	...	...	...	8	0	0	Orchard	...	...	...	...	5	1	21
Maize	...	...	...	...	5	0	0	Vegetables	...	...	...	...	7	1	36
Maize and pumpkins	...	...	...	...	8	1	34	Pumpkins	...	...	...	...	2	1	22
Fallow and old lucerne	...	...	...	...	177	1	31	Oats	...	...	...	...	2	2	0
Turnips	...	...	...	...	2	2	0	Panicum	...	...	...	...	1	0	0
Mangolds	...	...	...	...	1	1	10								
Kafir corn	...	...	...	...	5	0	0	Total Area under Cultivation	...	...	...	...	346	0	6

The difference in area between the land under cultivation last year and during the present year (1 acre 2 roods 26 perches) is due to a clerical error in last year's report, whereby the area was stated to be larger than was actually the case in the "Gatton Paddock."

**THE DAIRY.**—The interest in the work in this department has been well maintained. Mr. McGrath, the instructor, has had his time fully occupied, his duties extending from the early morning until late in the evening. The number of regular students who desire a special course increases each term. The privilege conceded to students completing their full College course of devoting the last six months to tuition in one department is availed of by a large number, who spend their last term of studentship on the dairy work. During the year under review, eighteen students have taken a special course, exclusive of those who go through the general routine of College work, and are from time to time assigned to this department. Of the eighteen students, some were here for a short course of instruction, extending from fourteen days to five months. These students, of course, had had previous knowledge of dairying, hence their short course of instruction. Those who left the dairy in their first term are now engaged in mixed farming in various parts of the State. The work in the factory comprises the treatment of milk previous to its manipulation for manufacturing purposes; cooling, aeration, and pasteurisation of milk and cream; management of the cream separator; testing milk and cream, Babcock and Gerber methods; care and handling of cream; ripening of cream; butter-making, packing, and preparation for export; cheese-making, Canadian, Cheddar, and Stilton methods; the use of the acid test as applied to milk and cream; determination of the presence of preservatives, boracic and salicylic acids and formalin in milk and cream; the care and management of dairy machinery; and that, next to cleanliness, kindness is the most important rule in handling a dairy herd. The cleanly manner in which the sheds and dairy buildings are kept has commanded much favourable comment from persons who have visited the place, lime and limewater being in constant use.

The high standard of the dairy herd has been well maintained, not only as show-ring animals, but also as milk-producers. At the last Brisbane show, we gained about thirty prizes for twenty-three entries. At the Toowoomba show, we were again successful in obtaining first and champion prizes. Experiments have been made in connection with the breeding and mating of the various breeds, in most cases with good results. These experiments have proved, as others have done in the past, that, when departing from any defined breed, if the Ayrshire sire be mated with the ordinary grade Shorthorn, or even the gross "beefy" Shorthorn, the best results will be produced, not only for milkers, but also as regards size and constitution. This class of animal is noted for its capabilities for the production of milk for a considerable period, and for its power to withstand hardships, and as a good forager. The stock from a Guernsey sire mated with an ordinary cow of no defined breed are a promising lot, being very fine lengthy beasts, showing great milking propensities. Three young heifers will be in the milking yards within the next few months; this, after all, will be the best test of the value of these animals. The Holstein grades are now in milk, and are a fine vigorous lot, healthy, large milk-producers, and large food-consumers; these may be claimed to be general purpose animals. Too much importance must not be placed on results obtained here as regards this class of animal, particularly in the case of many parts of Queensland, where holdings are small and pastures rich. The Jersey, crossed judiciously with animals of good average size, will produce a cow superior to the purebreds of that particular breed. From the foregoing it must not be taken that I am favouring any one particular breed, because it is a given law that good and bad animals are to be found among all breeds, and the person who favours one must be ignorant of the merits of other defined breeds. In studying the individuality of the cows comprising the dairy herd, it was necessary to record the yields of milk and butter obtained. The records show that the amount of milk produced by individual cows per annum varies from 7,948 lb. to 1,844 lb., and the yield of butter from 356.27 to 88.81 lb. As the animals whose yields are quoted in the table herewith were subjected to similar conditions as regards food and treatment, &c., it may be safely said that the variations in the yields are attributable to the individuality of the animals: some are milk and butter-fat producers, while others do not possess the power of converting the food consumed into milk and butter-fat. The food consumed by the cows giving the low returns was fed at a loss, and their names no longer appear in the ledger. To carry on dairy farming successfully, it is imperative to cull the herd intelligently, and, to enable us to do so, records of each individual animal must be kept; the time devoted to this purpose will be profitably spent. The accompanying extracts from the "Herd Ledger" represents the yield from the individual cows of different breeds, also the yields of crossbreds and grades. The returns from the cows giving the highest yields of milk and butter-fat are given, as also are the returns from the poorest class of dairy cow, so that a comparison may be made. A perusal of the returns will disclose the fact that milking a poor dairy cow entails a loss to the dairy farmer. It matters not whether the herd is composed of purebreds, crossbreds, or grades, culling is absolutely necessary. It is not the average of the herd that should concern us so much as the discovery of the profitless milch cow that is being fed and cared for at a loss. The foundation of a herd should be good milkers, irrespective of breed, followed by the judicious mating of animals from which a herd is to be built up. A reference to the annual yield will show that the following results were obtained:—

Laverock.—In milk for a period of 272 days, produced 283.86 lb. of commercial butter—a daily average of 1.04 lb. throughout the milking period.

Stumpy.—In milk for 301 days, produced 356.27 lb. of commercial butter, representing a daily yield of 1.17 lb. throughout the milking period.

The figures for one month's return credit Laverock with 60.96 lb. of commercial butter, and Stumpy with 53.89 lb. These two cows produced conjointly 114.85 lb. of commercial butter in one month, while other animals failed to reach these figures for the whole season. The value of a good cow becomes apparent when her returns are compared with those of the inferior animals.



TABLE SHOWING YIELD OF MILK AND BUTTER FOR ONE FULL MILKING PERIOD.

Name of Cow.	Milking Period.	Milk Yield.	Commercial Butter.
AYRSHIRES.			
		Lb.	Lb.
Laverock ... ..	From 19-8-03 to 17-5-04 ...	5,420	283.86
Linnet ... ..	From 17-5-01 to 21-5-02 ...	8,651	350.77
Lottie ... ..	From 28-8-03 to 31-3-04 ...	4,084	188.67
Lass ... ..	From 31-7-02 to 3 10-03 ...	6,239	257.60
Ruby ... ..	From 24-7-02 to 30-11-03	7,615	329.16
SHORTHORNS.			
Guinea ... ..	From 9-6-02 to 10-4-03 ...	4,513	180.29
Winnie ... ..	From 17-6-02 to 14-5-03 ...	4,454	182.92
Nestor ... ..	From 31-7-02 to 12-10-03	7,820	349.52
Violet ... ..	From 9-10-01 to 13-11-02	7,393	304.35
Dott ... ..	From 31-5-01 to 12 4-02 ...	5,072	206.14
Kit ... ..	From 28-9-00 to 28-9-01 ...	6,402	272.82
JERSEYS.			
Stumpy ... ..	From 4-6-03 to 6-3-04 ...	6,933	356.27
Carrie... ..	From 15-9-02 to 30-9-03 ...	5,581	272.67
Eileen ... ..	From 4-11-02 to 18-1-04 ...	4,199	236.67
Ivy ... ..	From 28-8-00 to 22-5-01 ...	3,486	168.36
HOLSTEINS.			
Dairymaid ... ..	From 15-3-00 to 30-12-00	7,308	261.92
Damsel ... ..	From 19-1-01 to 14-11-01	7,948	288.69
SOUTH COAST.			
Fancy ... ..	From 21-3-00 to 15-6-01 ...	9,094	390.78
Grace ... ..	From 15-6-01 to 20-3-02 ...	5,159	205.31
Topsy ... ..	From 3-10-01 to 15-4-03 ...	8,880	361.98
AYRSHIRE SHORTHORN.			
Nancy ... ..	From 12-4-03 to 8-4-04 ...	6,273	294.26
No. 48 ... ..	From 8-4-03 to 28-12-03	4,109	192.86
Tussle ... ..	From 10-3-03 to 30-11-03	3,463	153.52
GRADE SHORTHORN.			
Lemon ... ..	From 18-6-02 to 22-5-03 ...	5,028	211.72
Rowley ... ..	From 22-4-02 to 31-2-03 ...	4,629	194.31
Vera ... ..	From 7-3-03 to 11-12-03	3,489	149.66
HOLSTEIN SHORTHORN.			
Magpie ... ..	From 14-5-03 to 21-2-04 ...	5,465	234.39
Reanie ... ..	From 7-3-02 to 18-5-03 ...	7,064	309.30
GRADE JERSEYS.			
Brindle ... ..	From 6-6-02 to 30-4-03 ...	4,581	208.53
Witch ... ..	From 13-5-02 to 20-5-03 ...	4,923	206.53
GUERNSEYS.			
Lady Rose ... ..	From 26-2-02 to 15-12-02	3,189	162.55

A MONTH'S RECORD OF MILK AND COMMERCIAL BUTTER PRODUCED BY INDIVIDUAL COWS.

Name of Cow.	Breed.	No. of Days in Milk before Special Feeding Commenced.	Milk Yield.	Commercial Butter.
			Lb.	Lb.
Laverock ... ..	Ayrshire ... ..	73	1,134	60.96
Stumpy ... ..	Jersey ... ..	87	1,119	53.89
Fancy ... ..	South Coast ... ..	150	957	49.3
Rose ... ..	Shorthorn ... ..	42	989	39.87
Dairymaid ... ..	Holstein ... ..	89	1,042	36.17
Mona ... ..	Holstein Shorthorn ... ..	83	1,082	39.99

TABLE SHOWING YIELD FOR FULL MILKING PERIOD.

No. of Cow.	Breed.	Milking Period.	Milk Yield.	Commercial Butter.
			Lb.	Lb.
No. 1 ... ..	Devon ... ..	7 months ...	3,336	144.1
No. 2 ... ..	South Coast ... ..	6 " ...	2,546	96.37
No. 3 ... ..	Devon ... ..	7 " ...	2,479	109.23
No. 4 ... ..	Ayrshire ... ..	6 " ...	2,380	98.08
No. 5 ... ..	Shorthorn ... ..	7 " ...	2,404	98.13
No. 6 ... ..	Grade Jersey ... ..	7 " ...	1,975	99.61
No. 7 ... ..	Devon ... ..	6 " ...	1,844	81.81

The cows have from time to time been fed on green maize, sorghum, Cape barley, wheat, lucerne, and *Paspalum dilatatum* grass, but at no time was the milk-flow more liberal than when they were pastured on a good growth of natural pasture. Cows like a variety, and on good pasture land, in a favourable season, such is obtainable. It is necessary to provide succulent and nutritious food to supplement the natural pasturage when the latter goes off owing to a hot dry spell in the summer months, and for winter feeding also. The cows have had access to salt, which is placed in all the paddocks. A good supply of fresh water is provided



in troughs convenient to the stock. The necessity for sheltering cows in milk during the winter is recognised, and they are rugged nightly and turned into a well-sheltered paddock. Experience has taught that, in the economic production of butter-fat, it is necessary to provide night shelter during the winter months.

During the year fifteen stud bulls were disposed of for the sum of £157 10s., and sent to different parts of the State.

Appended are the results of an experiment in feeding white carrots to milch cows:—

#### WHITE CARROTS AS A FODDER FOR DAIRY CATTLE.

An area of 3½ acres of the above crop was planted at the College last season, which is now returning a yield of 40 tons to the acre. The roots have been fed, with good results, to horses, milch cows, and pigs. An analysis of the carrots shows 84.4 per cent. of moisture and 15.6 per cent. of solid matter. The roots keep well, especially when left in the ground. It was found that swede turnips decayed rapidly when the hot weather came on, whereas the carrots and mangolds suffered little. The following are the particulars with regard to feeding to milch cows:—Four cows were kept apart and a weighed quantity of carrots was fed to them, a record being kept of the milk and butter-fat yields. For a period of eight days previous to feeding on the carrots, the cows were grazed on natural pasturage, and a record of the yield was kept. For a further period of eight days they were allowed the same pasturage, and had a daily allowance of carrots, as particularised in Table I. For another period of eight days they were fed exclusively on carrots, and were kept in a small enclosure where only rough dry grass was to be had. From the tables forwarded herewith, it will be seen that when carrots were fed as an additional ration to natural pasturage an increased yield was diminished. The carrots were eaten greedily, seemed to act as a tonic, and improved the coat and condition of the animals.

TABLE I.

Showing DAILY YIELDS of MILK and COMMERCIAL BUTTER as computed by BABCOCK TEST, also TOTAL YIELDS of MILK and BUTTER, for a period of EIGHT DAYS, during which time the COWS were fed on NATURAL PASTURE only.

No. of Cow.	1.			2.			3.			4.			5.		
	Lb. Milk.	Per cent. Butter Fat.	Commercial Butter.	Lb. Milk.	Per cent. Butter Fat.	Commercial Butter.	Lb. Milk.	Per cent. Butter Fat.	Commercial Butter.	Lb. Milk.	Per cent. Butter Fat.	Commercial Butter.	Lb. Milk.	Per cent. Butter Fat.	Commercial Butter.
1	27	3.8	1.14	27	3.7	1.11	26	3.6	1.04	28	3.8	1.19	29	3.7	1.20
2	31	3.6	1.24	33	3.8	1.40	30	3.7	1.24	31	3.6	1.24	33	3.7	1.34
3	28	3.9	1.22	29	3.9	1.26	30	3.8	1.27	29	3.8	1.23	29	3.9	1.26
4	34	3.5	1.33	33	3.6	1.33	34	3.6	1.37	35	3.7	1.45	34	3.8	1.44
Total daily yields	120	...	4.93	122	...	5.10	120	...	4.92	123	...	5.11	125	...	5.26

No. of Cow.	6.			7.			8.			Total Yields for period of Eight Days.	
	Lb. Milk.	Per cent. Butter Fat.	Commercial Butter.	Lb. Milk.	Per cent. Butter Fat.	Commercial Butter.	Lb. Milk.	Per cent. Butter Fat.	Commercial Butter.	Lb. Milk.	Commercial Butter.
1	28	3.7	1.18	28	3.8	1.19	29	3.6	1.23	222	9.28
2	31	3.8	1.31	32	3.7	1.32	33	3.6	1.33	254	10.44
3	28	3.9	1.22	30	3.8	1.27	29	3.7	1.20	232	9.93
4	36	3.9	1.56	35	3.8	1.48	35	3.6	1.52	276	11.48
Total daily yields	123	...	5.27	125	...	5.26	126	...	5.28	984	41.13

TABLE II.

Showing DAILY YIELDS of MILK and COMMERCIAL BUTTER as computed by BABCOCK TEST, also TOTAL YIELDS of MILK and BUTTER, for a period of EIGHT DAYS, during which time the COWS were allowed to run on same pasture ground, and received a SUPPLEMENTARY RATION of WHITE CARROTS.

No. of Cow.	1.			2.			3.			4.			5.		
	Lb. Milk.	Per cent. Butter Fat.	Commercial Butter.	Lb. Milk.	Per cent. Butter Fat.	Commercial Butter.	Lb. Milk.	Per cent. Butter Fat.	Commercial Butter.	Lb. Milk.	Per cent. Butter Fat.	Commercial Butter.	Lb. Milk.	Per cent. Butter Fat.	Commercial Butter.
1	26	3.7	1.07	28	3.9	1.22	29	3.8	1.23	29	3.8	1.23	30	3.7	1.24
2	32	3.8	1.36	32	3.7	1.32	33	3.9	1.44	33	4.0	1.40	34	3.8	1.44
3	27	4.0	1.23	29	3.8	1.23	31	3.9	1.35	30	3.8	1.27	31	3.7	1.28
4	38	3.6	1.53	36	3.5	1.41	36	3.5	1.41	37	3.6	1.49	39	3.7	1.57
Total daily yields	123	...	5.19	125	...	5.18	129	...	5.43	129	...	5.39	133	...	5.53

No. of Cow.	6.			7.			8.			Total Yields for period of Eight Days.	
	Lb. Milk.	Per cent. Butter Fat.	Commercial Butter.	Lb. Milk.	Per cent. Butter Fat.	Commercial Butter.	Lb. Milk.	Per cent. Butter Fat.	Commercial Butter.	Lb. Milk.	Commercial Butter.
1	31	3.8	1.31	30	3.7	1.24	31	3.6	1.24	234	9.78
2	35	3.7	1.45	34	3.7	1.40	33	3.8	1.40	266	11.21
3	32	3.8	1.36	31	3.9	1.35	32	4.0	1.43	243	10.50
4	39	3.6	1.57	38	3.7	1.57	39	3.7	1.61	301	12.16
Total daily yields	137	...	5.69	133	...	5.66	135	...	5.68	1,044	43.65



TABLE III.

Showing DAILY YIELDS of MILK and COMMERCIAL BUTTER as computed by BABCOCK TEST, also TOTAL YIELDS of MILK and BUTTER, for a period of EIGHT DAYS, during which time the COWS were fed a DAILY RATION of CARROTS, but were not allowed to run on natural pastures.

No. of Cow.	1.			2.			3.			4.			5.		
	Lb. Milk.	Per cent. Butter Fat.	Commercial Butter.	Lb. Milk.	Per cent. Butter Fat.	Commercial Butter.	Lb. Milk.	Per cent. Butter Fat.	Commercial Butter.	Lb. Milk.	Per cent. Butter Fat.	Commercial Butter.	Lb. Milk.	Per cent. Butter Fat.	Commercial Butter.
1	27	3.7	1.11	27	3.6	1.08	28	3.8	1.19	28	3.7	1.18	27	3.7	1.11
2	32	3.6	1.29	31	3.6	1.31	31	3.7	1.24	31	3.8	1.31	33	3.8	1.40
3	27	3.9	1.17	28	3.8	1.19	29	3.9	1.26	29	3.7	1.20	28	3.7	1.18
4	36	3.6	1.45	37	3.6	1.49	36	3.7	1.49	35	3.6	1.52	34	3.7	1.40
Total daily yields	122	...	5.02	123	...	5.07	123	...	5.18	123	...	5.21	122	...	5.09

No. of Cow.	6.			7.			8.			Total Yields for period of Eight Days.	
	Lb. Milk.	Per cent. Butter Fat.	Commercial Butter.	Lb. Milk.	Per cent. Butter Fat.	Commercial Butter.	Lb. Milk.	Per cent. Butter Fat.	Commercial Butter.	Lb. Milk.	Commercial Butter.
1	28	3.6	1.12	28	3.7	1.18	28	3.6	1.12	221	9.09
2	32	3.7	1.32	33	3.8	1.40	32	3.7	1.32	254	10.59
3	30	3.6	1.20	29	3.8	1.23	30	3.7	1.24	230	9.67
4	36	3.6	1.45	35	3.5	1.37	36	3.6	1.45	285	11.62
Total daily yields	126	...	5.09	125	...	5.18	126	...	5.13	990	40.97

FODDER TABLE to be read in conjunction with TABLE II. (MILK YIELDS, &amp;c.)

No. of Cow.	1st Day.	2nd Day.	3rd Day.	4th Day.	5th Day.	6th Day.	7th Day.	8th Day.	Total Consumed.
	Carrots Consumed.	Carrots Consumed.	Carrots Consumed.	Carrots Consumed.	Carrots Consumed.	Carrots Consumed.	Carrots Consumed.	Carrots Consumed.	
	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.
1	35	40	40	40	40	40	40	50	325
2	34	38	42	40	40	42	40	40	316
3	40	40	40	40	36	40	42	40	318
4	40	40	45	45	40	40	40	40	330
Total ...	149	158	167	165	156	162	162	170	1,289

FODDER TABLE to be read in conjunction with TABLE III. (MILK YIELDS, &amp;c.)

1	65	60	70	70	70	70	70	75	550
2	60	60	65	70	70	65	70	70	530
3	70	75	70	70	70	70	70	70	565
4	75	75	75	70	70	70	70	70	575
Total ...	270	270	280	280	280	275	280	285	2,220

**PIGGERY.**—We have very considerably increased and improved our herd of pigs. The demand for our stock for stud purposes is four times greater than the available supply. The herd kept averages from 150 to 200 head. Stud stock are sent to almost every part of the State. The neighbours in the vicinity of the College are now taking advantage of the opportunity of having sows served by our boars, thereby improving to a considerable extent the herds in the district. Experiments have been carried out in crossing and mating the different breeds and crossbreeds, and in almost every case we find the Middle Yorkshire crossed with the Berkshire to be the most profitable pigs, because of their early maturity, the good quality of their bacon, and the fact that they are small food-consumers, prolific breeders, and good mothers. Hitherto we have been mating the Tamworth boar with the Berkshire sow, and the results were not satisfactory; we are now crossing the opposite way—viz., the Berkshire boar with the Tamworth sow—and expect to get better results. The growing pigs have been fed on root crops and the waste products of the farm and garden, together with waste from the kitchen. The young pigs and breeding sows are kept on separated milk mixed with cooked roots and waste products from different departments; this means that the cost of raising the pigs is very small. Bacon-curing is carried on at certain seasons of the year, sufficient being made to supply our own requirements, and teach the students the method of curing. Pig-raising in all its branches forms a part of the College tuition.

**SHEEP-BREEDING.**—A few hundred sheep are kept at the College for educational purposes. Cross-breeding, for the purpose of producing a lamb suitable for export, is our object. So far, we have produced very good results by mating the Shropshire ram with merino ewes; this cross gives a good-sized, strong, healthy lamb, and mutton of a high standard as regards quality. The Romney Marsh and Lincoln rams are also brought into use for crossing with the first cross from the product of the Shropshire and merino cross. Care in handling and breeding sheep is taught the students. Our herd is most useful as scavengers for the farm, because they eat up weeds and vegetation which would otherwise be a source of trouble to keep down, and a loss to the farmer. The females are kept over and the males used up in the College dining-hall.

**VEGETABLE GARDEN.**—This department has always commanded a good deal of attraction, not only for visitors, but also for students. During the year 70 tons of barnyard manure, besides other fertilisers, have been used in connection with the production of vegetables, and it may be said that the lessons learnt in this respect are invaluable. A very large variety of vegetables is grown, and such as are not used up at the College are disposed of to Government institutions.

**ORCHARDS AND VINEYARDS.**—The work of pruning, spraying, and training the trees was carried out under Mr. Voller's directions. The return of fruit was rather unsatisfactory, owing to the ravages of the fruit fly, which took hold of the stone fruits at an early stage of their growth, and destroyed almost the whole crop. The peach crop was heavy, but, with the exception of a small quantity for jam-making purposes, the



whole crop was lost. Remlet Early resisted the fruit fly best. Plums: The crop from the Kelsey was very good, being of a large size, but turned very dark when touched by the fly. Burbank carried a good crop of fruit, and resisted the fly well. Pears: There was a very fair crop of this fruit from the Garber's Hybrid, Smith's Hybrid, Le Conte, and Keiffer's Hybrid. Apples: The trees are too young to produce much fruit, but the few produced were of the best quality. Apricots and nectarines produced but little fruit. Figs yielded a heavy crop. The vines were pruned and cared for in the manner directed by Mr. Rainford. The vines situated near Lockyer Creek returned a very fair crop; those near the Principal's house showed unusual results. Mr. Carew, the officer in charge of the garden, orchards, and vineyards, reports good progress as regards the work of students, and also good conduct.

**COTTON** (sown 20th October, 1903).—Of the nine varieties of cotton seed sown, Jones's Big Boll and Bradley did the best, growing into fine large bushes, well covered with pods. In addition to this, the pods which matured did so in showery weather, and were almost completely spoiled, and, as our wet season comes in here at about the time for cotton picking, the same thing would always occur unless in a dry year. The varieties Parker, Iruitt, Christopher, Russell, Doughty, and Culpepper did not do so well, the bushes being small with but few pods; these were affected in the same way as the firstnamed. (All the above were Upland cottons.) Seabrook (Sea Island) grew well, but was much later in coming into maturity, being quite green when the frosts came on and checked its growth early in June. It did not produce many pods, but, of the few gathered, the staple was of a quality superior to that of the Upland cotton.

**POULTRY**.—In connection with this branch of College education, it is pleasing to note that much more interest has been evinced in the business of poultry-raising than in past years, and that, by means of the College poultry-yards, the birds in many parts of Queensland have been considerably improved. During the year 109 birds were disposed of for breeding purposes, for the sum of £73, and 103 settings of eggs for £53 10s.; besides these, a large number of culls and eggs were used in the dining-hall. We have in our yards at the present time 320 birds, as against 190 on the 30th of June last year. Most of the stock, although perhaps not show birds, are of the class likely to improve Queensland poultry. The demand for the most favoured breeds is much greater than the supply. Mr. Hindes has carried out several experiments regarding the utility of the incubators, cost of running, &c. Many of our birds won prizes at the last show of the National Association in Brisbane.

**Laying Competition**.—Sixteen new pens have been erected to enable us to successfully control the laying competition, commencing on 1st July, this year. We have sixteen entries, seven of which are from New South Wales. This competition will be watched with keen interest, and will no doubt be the means of improving the laying strain of birds in this State, and, from an educational point of view, will benefit the College and the students within its walls very considerably. Our thanks are due to Mr. John Jackson, of Jackson and Co., Brisbane, for having donated £1 ls. towards the prize money.

**APIARY**.—The care and handling of the bees is controlled by the Poultry Expert (Mr. Hindes), who also imparts a knowledge of same to the students. We have thirty hives, and from these 3,119 lb. of honey has been saved, together with 98 lb. of comb, the total value being about £30. From the above figures it may be observed that a reasonable profit may be made from bee-farming carried on in conjunction with other branches of farming.

**BUTCHERING**.—We kill our own meat at the College, thereby having an opportunity of teaching the students how to slaughter, cut up, and save meat.

**CARPENTRY AND IMPROVEMENTS**.—This branch of the work has its claim for most young men desirous of learning how to handle tools, and each lad in his turn is taught such work. During the year a great deal of work has been done in this department, not only in the form of repairing, but also in the erection of buildings. A new hayshed, 75 feet by 51 feet by 17 feet, has been built; a storage compartment for implements, sixteen new poultry pens and yards for the laying competitions were erected; also a calf-shed, potato-shed, 20 chains wire fencing, and four grass-sheds. New gates were made and hung. Farm wagons, drays, and implements were repaired, and general repairs were effected in the case of the College buildings.

**BLACKSMITHING**.—The work in this department is what may be considered that of a "village blacksmith," with the exception that attention to engines, boilers, pumps, &c., forms part of the work. Thirty-five horses have to be attended to, shod, and their hoofs kept in good order. Many of our students can shoe a horse in a manner equal to that of a tradesman, and also carry out repairs that are necessary in connection with farm implements. This department also has much attraction for young men.

**EXAMINATIONS**.—For the first time during the history of the College, the examinations in connection with various subjects were carried out by persons outside the staff. I strongly approve of such work being done by persons in no way connected with the teaching at the College; it is more satisfactory to ourselves, the students, and their parents. In connection with the theoretical work, I would like to point out, and with the greatest respect for the examiners, that in many cases lads who obtained low marks possess a greater knowledge of College work than many who obtained higher marks. I want to point this matter out, because, to arrive at the full value of the students' attainments, the practical work must be considered in conjunction with the theoretical. The following are the results of the examination for the first term of the year, together with those of the annual examination held in June last, also the examiners' comments thereon:—

QUEENSLAND AGRICULTURAL COLLEGE.

GRADE SHEET.—DECEMBER, 1903.

Student.	Agriculture.	Arithmetic.	Botany.	Chemistry, Theory.	Chemistry, Practical.	Dairying, Theory.	Gardening, Theory.	Bookkeeping.	Elementary Science.	English.	Pig-raising and Bacon-curing.	Veterinary Science.	Mensuration.	Poultry & Bee Raising.	Surveying.	Technical Drawing.	Cattle Breeding.	Blacksmithing.	Carpentering.	Farming, Practical.	Dairying, Practical.	Gardening, Practical.	Conduct.	Diary.
G. Abraham	92	50	52	51	65	93					90	72	71	65	86			60	80	65	90	85		
F. Butler				63	59													80	70	85	90	90		
F. Calcino				72	66	75					85									82	77	92	100	
J. Curtis *	80	36	65	75	90	97					95	72	85	60	93	75	80	82	95	90	100			
S. Corser*																								
A. Davies				50	55															60	58	72	95	
J. Devereux																				80			100	
L. Fudge	86	30	38	60	57	86					71	72	80	90	79					80	70	90		
W. Mahony																				65	75	45	70	85
D. McDonald																				80	80	80	75	
P. McLean																				80	85	89	95	
J. Nuttall	95	24	32	37	48	94					84	45	70	35	80					68	62	90	85	
C. O'Connell																				65	50	75	80	70
P. Price					52																80	60	80	
M. Shield	92	78	65	56	70	89					69	87	62	60	74	80				80	83	90	97	
D. Shine	56	11	10	14	55	80					82	46	63	5	88	65	80	75	50			85		

\* Withdrew in early part of term.



QUEENSLAND AGRICULTURAL COLLEGE—continued.  
GRADE SHEET.—DECEMBER, 1903—continued.

Student.	Agriculture.	Arithmetic.	Botany.	Chemistry, Theory.	Chemistry, Practical.	Dairying, Theory.	Gardening, Theory.	Bookkeeping.	Elementary Science, English.	Pig-raising, and Bacon-curing.	Veterinary Science, Measurement.	Poultry and Bee-raising.	Surveying.	Technical Drawing.	Cattle Breeding.	Blacksmithing.	Carpentering.	Farming, Practical.	Dairying, Practical.	Gardening, Practical.	Conduct.	Diary.
F. Alcock	70		16	30	50	42	65	79		60	42	26	58		63			65	68	84	75	15
Reg. Baker	45		14	15	18	50	90	56		73	42	18	61		61			70			90	45
A. Blomfield	55		37	83	40	33	92	91		86	56	82	70		65			70	59	87	100	64
H. Chambers	60		23	31	37	35	89	56		62	60	49	71		51			60	60	81	100	61
L. Corser																		75			94	
H. Dalrymple																		70			95	
J. Macansh																		85			90	
G. Robertson	45		26	24	35	60	95			80	60	15	60		80			70	58	88	70	0
A. Smart	90		30	56	40	38	65	89		60	75	64	65		56			70	65	84	100	78
R. Smythe																		68	55		85	68
L. Walker																		56		87	86	
Ray. Baker																			78		100	
R. Bently																		65	50	60	63	98
D. Binnie	69	86	65			56												65	60	70	88	90
B. Bone	56	30	53			46			57	61	56	63	67		69	70	50	72	45	100	85	
T. Butler									41	71	48	22	57		54	70	50	60	44	100	72	
J. Burston											70							75	70	46	28	76
O. Byrne	70																	60	50		81	60
C. Cameron	58	66	39			58					75							70	70	65	87	100
J. Cummins	86	59	4			5			30	35	21	35			70	70	40	46	40		70	71
R. England									13	49	35							50			100	55
C. Handley	60	49	54			48												80	80	75	50	83
R. Harvey	66	32	31			43			29	45	44	31	59		64	65	50	54	46	62	100	76
W. Heness	49	18				15			40	59	43	23	62		56	65	40	58	39	70	100	68
H. Hillcoat									13	33	3	51			44	65	60	50	34		60	37
A. Jardine	65	20	9			56			11	17								70	60	38	100	56
J. Laidlaw	71	31	34			48			38	60	60	42	64		69	70	50	62	72	71	100	76
H. Lamont*									31	29	46	56	36		66	75		78	77	90	100	35
A. Lapworth																						
A. Lynch	63	69	35			43																
R. Macdonald	49	17	20			35			35	47	45	12	50		53	65	50	53	44	60	95	72
H. May	77	46	67			60			49	50	24	57			61	75		62	62	71	86	19
J. McCreedy	99	74	47			58			63	68	75	74	55		73			65	64	62	95	70
A. McNab	72	80	25			57			68	90	48	51	52		53			58		56	95	72
K. Moffat	90	80	85			80			42	58	58	27	54		70			60	65	65	100	78
J. Muir									88	81	70	59	79		90	75	70	85	75		100	88
J. M.-Prior	65	36	10			48									80			64	73		90	
G. Neilson									32	47	43	17	56		62	75		50		58	100	69
G. Newman*									3	6								45		51	90	20
W. Patrick	74	76	35			38																
E. Peirce	84	17	27			30			21	53	36	8	50		60			70	66	55		90
F. Poeppel	82	77	8			54			25	79	51	62	50		75	70		65	36	67	50	40
E. Rosendahl	79	75	95			62			38	74	44	42	59		70			60	33	54	65	42
W. Ruddle									85	95	63	53	59		72	70		70	64	74	100	88
A. Stewart																			72	73		100
C. Thorn																			65	42		100
R. Scott																			60	40	52	85
																			80		91	100

\* Withdrew in early part of term.

† Elementary.

## AGRICULTURE—FIRST YEAR, DECEMBER, 1903.

Paper set and examined by Principal.

Time allowed—3 hours.

- (a) What is the object of cultivation? (b) Do you consider deep cultivation necessary? (c) Is it advisable to bring a deep subsoil to the surface?
- (a) Of what do soils consist? (b) What constituents of soils form the organic parts? (c) The inorganic parts?
- (a) Name a few soils which you consider to be the most fertile. (b) What classes of soil do you consider to be most capable of retaining moisture?
- (a) What is meant by the rotation of crops? (b) What system would you adopt on carrying out same?
- (a) Write what you know about manures. (b) What condition of the soil would induce you to apply manures?
- State what you know about the cultivation, planting, and harvesting of the following crops:—  
(a) Cereals. (b) Root crops. (c) Leguminous crops.
- (a) Give approximate cost of producing some of the crops grown on the College farm. (b) Give approximate cost and particulars of cattle-proof fence, as described in the Principal's lecture.
- Give approximately the loss in weight in curing and saving the following hay crops:—Wheat, oats, panicum, and lucerne (*i.e.*, the difference between the weight of the crop when first cut and when ready for stacking).
- State what you consider to be a reasonable ration for a working horse—viz., pounds of bran, chaff, and corn for each feed.

## AGRICULTURE—SECOND AND THIRD YEAR STUDENTS, DECEMBER, 1903.

Paper set and examined by Principal.

Time allowed—3 hours.

- (a) Of what do soils consist? (b) What constituents of the soil form the inorganic part? (c) The organic?
- (a) Name a few soils which you consider to be the most fertile. (b) What soils do you consider most capable of absorbing and retaining moisture?
- (a) What does drainage do for the land? (b) What class of soil needs drainage most? (c) What effect has stagnant water on the soil and crops?
- What is meant by nitrification of soil? By what means is it brought about?
- (a) Do you approve of a system of deep ploughing; if so, why? (b) Do you recommend bringing a deep subsoil to the surface?



6. (a) What is meant by rotation of crops? (b) What means would you adopt to carry out same? (c) State how the fertility of the soil may be increased by natural means.
7. (a) State what you know about manures. (b) What condition of the soil would induce you to apply manures? (c) How would you be guided regarding the manures required by various soils?
8. State briefly what you know about the cultivation, planting, and harvesting of the various crops grown on the College farm.
9. Give an approximate cost of producing some of the principal crops grown on the College farm.
10. Give particulars and cost of erecting a suitable fence for the retention of horses and cattle.

DAIRYING—FIRST YEAR, DECEMBER, 1903.

Examiner: J. Mahon, Principal.

Time allowed—3 hours.

1. State how you would be guided in the selection of a dairy farm. Give the requisites necessary to bring about success.
2. How would you proceed to build up a dairy herd? Give typical form and characteristics of a dairy animal. Name the various breeds suitable for dairy purposes.
3. What quantity of milk per day per cow is considered to be a profitable return? What is considered to be a good percentage of butter fat (Babcock test)?
4. State what you know about the selection, care, and management of dairy cattle.
5. What are the most economical foods for milk production?
6. What do you know about the handling and rearing of calves? What system would you adopt of feeding calves? At what age should calves be weaned?
7. Name the crops that are suitable for conversion into ensilage. Do you consider ensilage, when fed alone, to be a good ration for milch cows?
8. State what you know about the conservation of fodder crops in the form of ensilage.
9. How would you be guided in selecting a suitable site on which to erect dairy buildings?
10. What, in your opinion, are the future prospects for the dairying industry in Queensland?
11. Write an essay on proper care and treatment of milk after being drawn from the cow.
12. Give instructions on the working and care of cream separator.
13. Having in view the supplying of cream to a butter factory, state how you would treat the cream before forwarding to factory.
14. Write an essay on churning.
15. The yield of milk and the average test for November last of the following cows being given, place them in order of merit as butter producers—Mona, 1,061 lb. milk, test, 3.2; Bonnie, 783 lb., test, 4.3; Ream, 958 lb., test, 3.6; Dott, 841 lb., test, 4.0.
16. State what you know about cheese-making.
17. Write what you know about the method of working the Babcock milk-tester.

DAIRYING—SECOND AND THIRD YEAR, DECEMBER, 1903.

Examiner: J. Mahon, Principal.

Time allowed—3 hours.

1. Give composition of "whole milk" (with brief notes on each constituent), separated milk, cream, and ripened cheese.
2. Explain from a cream-producer's point of view the chief points to be observed in supplying cream to a factory for conversion into butter for export.
3. Explain the best method of ripening cream, and state how such treatment benefits the product.
4. Write an essay on churning, working, and packing butter.
5. Write an essay on cheese-making, and state what you know as to the results of recent experiments on the ripening of cheese at low temperatures (35 degrees to 40 degrees Fahr.).
6. What reaction will milk give shortly after being drawn from the cow—acid, alkaline, or neutral? State the average per cent. of acid in milk (properly handled) when delivered at factories, also the percentage of acid in cream when ready for churning, as determined by the acid test.
7. Explain "acid test as applied to milk and cream."
8. The following quantities of cream being given, also butter-fat readings, find the average per cent. butter-fat reading; also total amount of commercial butter, allowing 12 per cent. for foreign matter:—
 

100 lb. cream, testing 36 per cent. butter-fat.	
250 " " " "	42 per cent. "
325 " " " "	34 per cent. "
420 " " " "	40 per cent. "

9. Give, in your opinion, the most important matters to be considered in the selection of a dairy farm.
10. (a) Give typical form and characteristics of a good dairy animal. (b) Qualities that distinguish the different breeds.
11. What system of cross-breeding do you recommend for the purpose of improving the breeds of ordinary dairy animals that are to be seen in possession of the majority of dairymen in Queensland?
12. What are the best lines to follow in rearing calves, system of feeding, housing, and general treatment of milch cows.
13. (a) Name the best and most profitable silage crops. (b) At what stage of growth should crops be siloed? (c) At what stage of growth is maize (as a fodder) at its best? (d) What chemical change takes place in the stuff during the process of siloing?

DAIRYING EXAMINATION—FIRST-YEAR STUDENTS ONLY.

Examiner: G. S. Thomson, F.R.S., Ed. N.D.D.

Time allowed—2 hours.

*Breeds.*—I. (a) What are the merits of the Guernsey, Ayrshire, and Holstein breeds of cows, and also the following crosses—Shorthorn-Ayrshire, Shorthorn-Jersey, and Shorthorn-Guernsey? (b) In purchasing cows at public auction sales, what characteristics would you look for in the stock as a guide to success?

*Feeding.*—II. (a) How would you make sour and sweet ensilage from natural foliage mixed with rank fibrous fodder crops? (b) What proof have you that food influences the flavour and yield of milk? (c) Give a short account of the mangold crop.

*Separating Milk.*—III. What precautions are necessary to prevent loss of fat in separating milk, and injury to the keeping qualities of milk and butter?



IV. State causes of variation in the yield and quality of milk from the cow, the percentage of fat in cream, and in the weight of butter.

V. What factors govern good ripening of cream, and, if a bacterial taint was detected, what instructions would you give to the farmer, cream-carrier, and butter-maker to prevent its recurrence?

REMARKS.—The average of first-year students is good, but a number of poor papers were written.

EXAMINATION IN DAIRYING—SECOND AND THIRD YEAR, AND SPECIAL STUDENTS ONLY.

Examiner: G. S. Thomson, F.R.S., Ed. N.D.D.

Time allowed—3 hours.

No. 1. *Milking*.—Explain very carefully the influence of careless milking upon the dairy cow and her progeny, milk and cream supply, and the flavour, texture, and keeping properties of butter and cheese.

*Breeds and Breeding*.—(a) Write a short history of the Shorthorn breed. What is the explanation of the term "Durham" as applied to the Shorthorn, and state the difference between the Bates, Booth, and Cruickshank strains of Shorthorn cattle. (b) What are the good and bad features of inbreeding and crossing dairy cattle, and state precautions you would adopt to obtain the best results? (c) Give the distinguishing features of the Devon, Kerry, and Dexter Kerry breeds, and what difference exists between the Jersey and Alderney cows. (d) What is the meaning of the terms—"extreme dairy type," "dual purpose," "dairy type," "dairy temperament" or "tendencies," "beef type," and "beefy tendencies" in cows? Give illustrations. (e) Upon what knowledge would you object to black points in a Shorthorn of reputed worth, and would you have reason to doubt the purity of an Ayrshire, Jersey, and Holstein if the former were coloured black in patches and the latter entirely red? (f) Mention the evil accruing from serving a heifer with the bull when too young, and allowing the mother to suckle the calf when being used for milking. State a suitable age, and under what conditions and circumstances would you make any alteration in the time of serving?

No. 2. *Feeding*.—(a) What influence has food upon the melting point of butter? Give food rations, naming components and weight of each likely to produce a soft texture and a firm body in butter. (b) Has Queensland butter a low melting point, and, if so, state the cause, and explain how you would treat the butter in the factory to avoid damage to its valuable properties?

No. 3. *Butter-making*.—(a) What precautions would you adopt in the ripening of cream, churning, washing the butter, working the butter to reduce the percentage of moisture in the finished product? (b) What effect would brining butter grains and light dry salting have on the flavour, texture, colour, keeping qualities, and weight of butter? (c) Does unsalted butter contain on an average more water than salted, and would the steel trier guide you in estimating roughly the degree of moisture? Give reasons for your answer.

*Cheese-making*.—(a) What difference would you make in the treatment of milk from limey soils and boggy soils in the manufacture of cheese? How is fast milk dealt with? (b) State briefly the cause of the following defects in cheese—discolouration, weak and pasty, open bodied, holey, bleeding or leaking, and bitterness.

DAIRYING EXAMINATION RESULTS—FIRST-YEAR STUDENTS.

					Percentage of Marks.						Percentage of Marks.
K. D. Moffat	...	...	...	...	75	— Morse	...	...	...	...	48
H. B. May	...	...	...	...		C. D. Handley	...	...	...	...	
— McLay	...	...	...	...	65	D. J. Binnie	...	...	...	...	45
J. Cummins	...	...	...	...	60	B. Bone	...	...	...	...	
A. Jardine	...	...	...	...		58	J. M. McCreedy	...	...	...	...
A. McNab	...	...	...	...	57	T. Clark	...	...	...	...	43
R. Harvey	...	...	...	...	51	James Clark	...	...	...	...	42
E. J. Robinson	...	...	...	...	50	Fred. Poeppel	...	...	...	...	41
R. McDonald	...	...	...	...		J. C. Dixon	...	...	...	...	40
E. M. Rogers-Tillstone	...	...	...	...	49	E. Casey	...	...	...	...	22
W. Patrick	...	...	...	...	48	C. Cameron	...	...	...	...	20
Murray-Prior	...	...	...	...							

The average of first-year students is good, but a number of poor papers were written.

G. S. THOMSON.

DAIRYING EXAMINATION RESULTS—SECOND AND THIRD YEAR SPECIAL STUDENTS.

					Percentage of Marks.						Percentage of Marks.
J. H. McLean	...	...	...	...	60	J. W. Nuttall	...	...	...	...	51
J. H. Curtis	...	...	...	...	58	A. R. Smart	...	...	...	...	48
H. Dalrymple	...	...	...	...		P. C. Price	...	...	...	...	42
H. O. Chambers	...	...	...	...	56	W. J. Mahony	...	...	...	...	
G. H. Abraham	...	...	...	...	55	A. Blomfield	...	...	...	...	41
E. L. Alcock	...	...	...	...	53	J. Devereux	...	...	...	...	40
L. R. Fudge	...	...	...	...	52	H. A. Bates	...	...	...	...	38

On the whole, the work done by the students is fairly satisfactory.

G. S. THOMSON.

38 Town Hall, Brisbane, 15th June, 1904.

Sir,—In handing you the results of the examination of the Agricultural College pupils on matters appertaining to farming, I have the honour to report that the senior boys, without exception, displayed a very satisfactory knowledge of practical farming.

G. H. Abraham made no attempt to answer one or two sub-questions. Notwithstanding the fact that his paper was not the highest in detailed examination, it stands first of the seniors for general excellence.

The papers of the junior boys were meritorious beyond my expectations, inasmuch as I had made the questions rather stiff, in keeping away as much as possible from text-book questions.

The Under Secretary, Department of Agriculture.

I have, &c.,  
A. MOFFAT.

FIRST-YEAR STUDENTS.

1. What changes are effected in the soil by tillage?
2. What class of soil is described as "wet and cold?" and why so described?
3. How is such soil treated to render it more fitted for plant growth?
4. Name some classes of soil popularly spoken of as "warm and dry" or "kindly and free."
5. Explain what advantage there is in deep tillage.



6. What does shallow cultivation result in?
7. What object have you in view (independent of killing weeds) when you scuffle and hoe between the rows to keep the soil in good tilth during the early stages of plant growth?
8. Lime supplied to land is sometimes called "the key of the cupboard," and by some people it is said to be "the spur to the lazy horse." Explain the analogy, and state the class of soil most benefited by the application of lime.
9. What sort of land is most in need of drainage?
10. Give a brief outline of the different systems of drainage.
11. State at least two objects generally aimed at by fallowing.
12. What is gained by rotation of crops?
13. Name any three crops that may, with advantage, follow one another in succession on same piece of land.
14. At what stage should lucerne be mown for hay?
15. What indication would guide you in determining the proper stage of ripeness at which oats should be cut down for hay?
16. Describe what the maize crop should be like when suitable for converting into ensilage?
17. How are the waste products of the farm utilised?
18. Here is a 10-acre cultivation paddock ready for ploughing. You are to grow maize on it, and leave the land as you started—that is to say, ready for the plough again for the succeeding crop. State every operation required in a normal season, and the cost thereof, in detail. Reckon up what you realise for the crop of maize, and strike a balance.

Data to guide you in calculating to be as follows:—Seed maize is 5s. per bushel; one man's wage is 3s. 6d. per day without rations; one man and one horse 6s. per day without rations; one man and two horses 7s. 6d. per day without rations. Crop when sold is 1s. 3d. per bushel, delivered at Gatton. The yield of maize is 40 bushels per acre.

#### SECOND AND THIRD YEAR STUDENTS.

1. Regarding the soils mentioned below, what crops would thrive? What fertilisers would most likely improve? What mechanical operations would be helpful?—  
(a) Clayey soil; (b) sandy soil; (c) loamy soil; (d) calcareous soil.
2. State at least two objects generally aimed at by fallowing.
3. Do you consider naked fallowing or green crop fallowing most beneficial in a hot climate? Give reasons for your answer, whatever it may be.
4. Explain the benefits derived from deep tillage.
5. State some disadvantages arising from shallow cultivation.
6. When the farmer sets about to get land drained there is one very essential point in his drainage scheme that must first be considered and settled—to insure ultimate success. What is it?
7. What have you to consider in deciding how wide apart the drains should be?
8. State some beneficial effects of thorough drainage.
9. Explain briefly a few different systems of drainage.
10. In referring to irrigation, tell what you know about:—(a) Methods of distributing water; (b) schemes whereby an abundant supply of water can be impounded; (c) quantity required per acre; (d) quality.
11. Regarding farmyard manure:—(a) How is it treated while being stored up? (b) What change takes place during storage, rendering it fit for applying to crops? (c) State some profitable way of disposing of liquid manure.
12. Name some crops likely to benefit from manures under-noted:—(a) Farmyard manure; (b) green crop; (c) lime; (d) bones.
13. Name any four crops that may with advantage follow one another in succession on same piece of land.
14. In selecting land suitable for cultivation, state what you would be guided by in the way of timbers, grasses, or other indications of sweet, kindly, rich, and free soil.
15. Taking an average season, in what month would you sow or plant the undernoted crops:—  
(a) Wheat; (b) lucerne; (c) turnips; (d) maize (early); (e) maize (late); (f) potatoes (summer planting); (g) potatoes (winter planting).
16. In deep tillage, why is subsoiling preferable to ordinary ploughing of equal depth?
17. In harrowing land to pulverise the soil, would you have the horses go at a slow pace or briskly? Give a reason for your reply, whatever it may be.
18. After heavy rain, how would you determine when the soil had recovered the proper state of dryness to enable you to work the land?
19. State the nature of damage done when the soil is worked in too wet a state.
20. At what stage should maize be cut down for ensilage?
21. At what stage should lucerne be cut for ensilage?
22. What profit or loss will there be in growing potatoes on 10 acres, accepting the following data as your guide in making calculations:—Seed potatoes, cost £7 per ton; one man's wages (without rations), 3s. 6d. per day; one man and one horse (without rations), 6s. per day; one man and two horses (without rations), 7s. 6d. per day. Yield of marketable potatoes, 4 tons per acre. Price of potatoes, delivered at Gatton, £3 per ton. Give every operation in detail, and cost thereof.

#### BOOKKEEPING—FIRST YEAR, JUNE, 1904.

1. Explain the terms "Real," "Personal," and "Nominal" Accounts.
2. Enter the following transactions in the ledger, close accounts, ascertain the amount of profit or loss, also capital, and make out the final balance-sheet:—

						£	s.	d.
<i>Liabilities.</i>								
Jan. 1—Due to A. Stewart	...	...	...	...	...	2	5	6
"    G. Brown	...	...	...	...	...	1	8	0
<i>Assets.</i>								
Cash in bank	...	...	...	...	...	150	0	0
"    on hand	...	...	...	...	...	5	7	6
Due by Creamery Co.	...	...	...	...	...	18	0	0
Valuation land, stock, plant, &c.	...	...	...	...	...	800	0	0



Assets—continued.

	£	s.	d.
Jan. 2—Settle Stewart's and Brown's accounts.			
„ 4—Creamery Co., settle by cheque (banked) ... ..	18	0	0
„ 7—Supplied Creamery Co. for week ... ..	4	2	0
„ 10—Buy for cash, Jersey bull ... ..	10	10	0
„ 12—Buy from Stewart, plough ... ..	4	10	0
„ 13—Sell for cash, 6 store pigs at 25s. ... ..	7	10	0
„ 14—Supplied Creamery Co. ... ..	4	10	0
„ 18—Sell Stewart 5 tons lucerne hay, at 22s. per ton ... ..	5	10	0
„ 21—Supplied Creamery Co. ... ..	4	11	0
„ 22—Bought from Stewart 10 bus. seed maize, at 3s. 6d. ... ..	1	15	0
„ 28—Supplied Creamery Co. ... ..	4	12	0
„ 31—Paid wages for month ... ..	6	10	0
„ 31—Cash sales of milk for month ... ..	1	11	0
„ 31—Private expenditure for month ... ..	2	11	0
„ 31—Owe Stewart for groceries (private use) ... ..	2	8	0
„ 31—Owe Brown for meat (private use) ... ..	1	11	0
„ 31—Supplied Creamery Co. (from 28th) ... ..	1	19	0
Feb. 1—Bought draught horse for cash... ..	13	0	0
„ 3—Paid blacksmith for shoeing and repairs ... ..	1	5	0
„ 4—Creamery Co. settle their account (banked).			
„ 5—Paid for material for new hayshed—Iron ... ..	£25	0	0
„ „ „ Timber ... ..	20	0	0
			45 0 0
„ 7—Sold old plough for cash... ..	1	0	0
„ 7—Supplied Creamery Co. ... ..	5	2	0
„ 8—Sold Brown 6 cows (culls), at £5 per head ... ..	30	0	0
„ 9—Cash receipts for agistment ... ..	1	15	0
„ 14—Supplied Creamery Co. ... ..	4	19	0
„ 17—Bought 8 bullocks, at £5 10s. per head (paid cheque) ... ..	44	0	0
„ 18—Sold Ayrshire bull for cash ... ..	10	0	0
„ 21—Supplied Creamery Co. ... ..	4	15	0
„ 25—Paid for fencing, 20 chains, at 12s. ... ..	12	0	0
„ 28—Supplied Creamery Co. ... ..	4	16	0
„ 28—Paid wages for month ... ..	6	10	0
„ 28—Paid contractors for erection hayshed ... ..	18	0	0
„ 28—Owe Stewart for groceries (private use) ... ..	2	7	0
„ 28—Owe Brown for meat (private use) ... ..	1	15	0
„ 28—Private expenditure during month ... ..	5	15	0
„ 28—Valuation land, stock, &c. ... ..	900	0	0

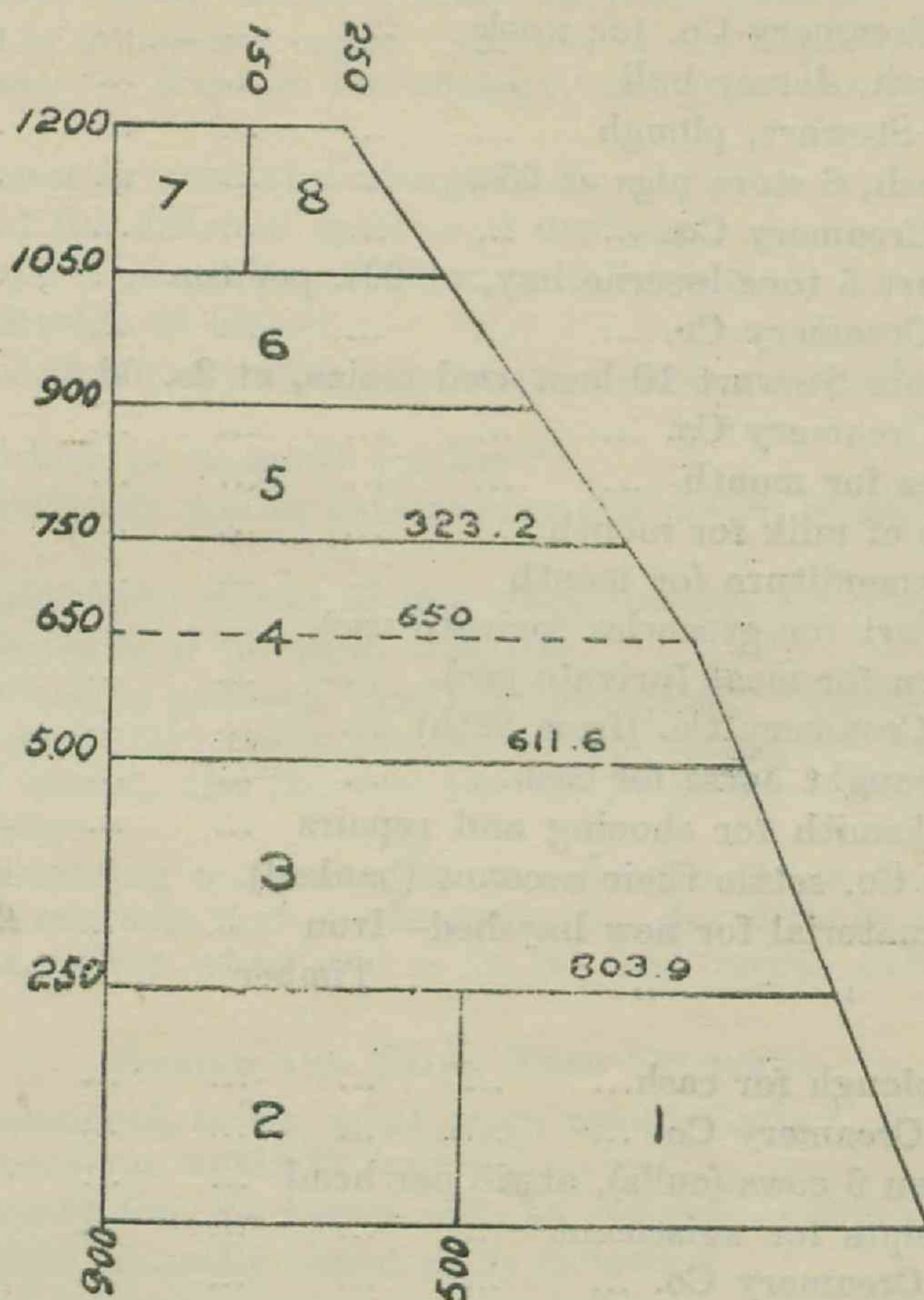
MENSURATION—FIRST YEAR, JUNE, 1904.

1. From a rectangular paddock, the width of which is 1124 links, it is required to cut off  $7\frac{3}{4}$  acres : what length must be cut off?
2. Calculate the area of a triangular field whose three sides measure respectively 2564, 2345, and 2139 links.
3. From field notes, draw plan, as nearly to scale as possible, and compute area of block :—

Stn 3	Δ	
	500	
250	300	
150	100	
Stn 2	Δ	
	Δ	
	1050	500 to Stn 3
300	800	50
	500	300
150	400	
	200	250
Stn 1	100	Δ



4. Make out field notes for survey of block given below, and compute areas of the various plots into which it is subdivided:—



ARITHMETIC—FIRST YEAR, JUNE, 1904.

1. Reduce 2 roods 17 po. 15 yds. 1 ft. 18 in. to the decimal of an acre.
2. A farmer sends consignments of produce to his agent, as follows:—Lucerne chaff, 10 tons 18 cwt. 3 qrs., sold at £3 15s. per ton; maize, 4 tons 10 cwt. 3 qrs. 21 lb., sold at 4s. per bushel; potatoes, 13 tons 7 cwt., £3 2s. 6d. per ton. Expenses, £5 15s. 7d. for freight and sundries; commission, 5%. How much will the farmer receive?
3. A dealer buys 104 bushels of corn at 2s. 3d., 128 bushels at 2s. 5d., and 144 bushels at 3s. 3d. per bushel in each case. His expenses amount to £5 4s. 9d. He sells the whole quantity in one lot at 3s. 2d. per bushel. Find his gain, and gain per cent.
4. Find simple interest on £325 3s. 9d. for 3 years 73 days at  $3\frac{3}{4}$  per cent.
5. Which is the best dairy cow? Give yield of commercial butter in each case—

			Lb. n milk.	Test
Beauty	Morning	...	16.3	4.1 % butter fat.
	Evening	...	15.1	3.9
Nellie	Morning	...	18.2	3.6
	Evening	...	17.9	3.7
Daisy	Morning	...	16.8	3.9
	Evening	...	14.9	4.3

6. How many vines 6 x 9 feet apart can be planted on an area of 1 acre 2 roods 24 poles?
7. What is the true discount on a bill for £357 17s. 6d. drawn February 18th at 3 months, and discounted March 9th at 5 per cent.?
8. Find compound interest on £2,500 at 5 per cent. for 3 years.
9. A bankrupt fails for £12,500, and his estate realises only £3,906 5s. What dividend does he pay? and what does a creditor receive whose claim is £798 10s.?
10. What is the alteration in income made by transferring £10,000 stock from the 3 per cents at 92 to the 4 per cents at 110?
11. At  $7\frac{1}{2}$  per cent., for what sum should goods be insured, which are worth £5,263, so that in case of loss the owner may recover both the value of the goods and the premium?

SURVEYING—SECOND YEAR, JUNE, 1904.

1. From the following bearings and distances compute latitudes and departures, close block, balance, take out double longitudes, and calculate area of block:—

Bearings.	Distances.
00° 18'	2646.2
14° 51'	1984
49° 25'	1098.1
45° 12'	654.5
149° 56'	3904.8
238°	4454

2. From the following level readings, taken with a view to determining the quantity of excavation in a proposed cutting, take out reduced levels, find number of cubic yards of earth to be removed, and the cost at 1s. per cubic yard. The width of the roadway is to be 12 feet, and the slope of the sides of cutting 1 horizontal to 1 vertical:—

Back sight.	Intermediate.	Fore sight.	Distance. Ft.
13.8	...	...	0
...	9.6	...	33
...	4.2	...	66
12.6	...	.80	99
...	6.4	...	132
...	2.6	...	165
...	1.2	...	198
...	1.0	...	231
!!!	!!!	.60	264



## THEORETICAL CHEMISTRY—SECOND YEAR.

J. C. Brünnich.

1. Explain the terms—humus, nitrification, gluten, feeding value.
  2. Give a short sketch of some of the most important chemical changes taking place during plant life, from the germination of a seed to the growth of a plant.
  3. What are the advantages of liming land; in what cases do you recommend the use of quicklime, and when the use of gypsum?
  4. Enumerate the most important artificial manures, their composition, their sources, and mode of manufacture.
  5. Which are the most important points on which a miller bases the value of wheats for flour-making?
  6. What do you understand under feeding ratio, and what ratio do you recommend for (a) dairy cow, (b) working horse?
  7. How can you prevent the loss of ammonia in farmyard manure, more particularly in its liquid portion?
  8. What causes firing of haystacks, and how may it be prevented?
  9. What are proteids; what are they composed of? Enumerate the most important vegetable and animal proteids?
- REMARKS.—Illustrate by giving chemical formulas wherever possible.

## THEORETICAL CHEMISTRY—FIRST YEAR.

J. C. Brünnich.

1. Explain the terms—atom, molecule, osmosis, hygroscopic, base, acid, acid salt.
2. 25° Fahrenheit equal how many degrees Celsius, and 72° Celsius equal how many degrees Fahrenheit?
3. Give two processes of preparing oxygen, illustrating the processes with chemical formulas.
4. Describe the process of combustion in the burning of wood and the flame of a candle.
5. In what forms is nitrogen found in nature, and which of its compounds are the most important to plant and animal life?
6. Enumerate the various phosphates of lime, giving their chemical properties and composition; describe how they are found in nature, and how they are prepared.
7. Which chemical elements are necessary to plant life?
8. Describe the principles of refrigeration.
9. Is hydrocyanic acid found in plant life?
10. Describe the manufacture of sulphuric acid, and also its most important uses.
11. Give instances of chemical and mechanical changes; explain the difference between the two.

## BOOKKEEPING—SECOND YEAR, NOVEMBER, 1903.

Enter the following transactions in the ledger, close accounts, ascertain the amount of profit or loss, also capital, and make out the final balance-sheet:—

Jan. 1—		<i>Liabilities.</i>	£	s.	d.
Bank overdraft	...	...	256	8	6
Due to A. Williams	...	...	75	0	0
„ J. Thompson	...	...	5	3	6
„ C. Watson	...	...	3	15	0
Bill payable (due Feb. 18)	...	...	35	0	0
		<i>Assets.</i>			
Cash on hand	...	...	8	7	6
Due by J. Henderson	...	...	45	0	0
„ E. Johnson	...	...	84	0	0
Bill receivable (due Jan. 28)	...	...	100	0	0
Valuation—farm, stock, etc.	...	...	1,056	0	0
Jan. 2. Buy for cash from F. Jones 20 head of store cattle at £6 per head	...	...	120	0	0
And am allowed discount	...	...	3	0	0
„ 4. Pay droving expenses on above	...	...	4	0	0
„ 4. Drew for private expenses	...	...	10	0	0
„ 5. Sell D. Henderson 200 bus. wheat at 4s., 10 tons chaff at 30s.	...	...	55	0	0
„ 10. Attend a meeting of E. Johnson's creditors, and agree to accept a composition of 15s. in the £.	...	...			
„ 12. Consign Henry & Co., for sale, 10 tons of lucerne chaff.	...	...			
„ 18. Buy, for cash, cornsheller	...	...	5	10	0
„ 20. Henry & Co. advise chaff sold at 30s. per ton, expenses being £2 10s., and commission at the rate of 5 per cent.	...	...			
„ 27. Sell for cash, draught horse	...	...	12	10	0
Allowing discount	...	...	0	12	6
„ 28. Advised by bank that bill due this day has been paid and amount placed to my credit	...	...	100	0	0
„ 31. Pay for wages	...	...	7	10	0
„ 31. Thompson's account (groceries)	...	...	4	18	0
„ 31. Watson's account (meat)	...	...	2	19	6
„ 31. Cash collections for agistment	...	...	1	15	0
„ 31. „ „ butter and eggs	...	...	4	18	0
Feb. 3. Sell F. Smith, by sample, 8 tons chaff at 35s.	...	...	14	0	0
„ 6. Henderson settles his account, by cheque £35; by bill at 3 months, £65	...	...	100	0	0
„ 10. Settle in full Thompson's account	...	...	10	1	6
„ 10. „ „ Watson's	...	...	6	14	6
„ 11. Smith forwards cheque for chaff, but for 2 tons not up to sample pays at the rate of 25s. per ton	...	...	13	0	0
„ 12. Discount Henderson's bill at bank, charged 12s. 6d. discount.	...	...			
„ 13. Sell for cash 2 acres of land at £15 per acre (for proposed creamery)	...	...	30	0	0
„ 15. Henry and Co. settle account by cheque	...	...	11	15	0
„ 17. Bank advises Henry and Co.'s cheque dishonoured.	...	...			
„ 18. Bill payable met at bank	...	...	35	0	0



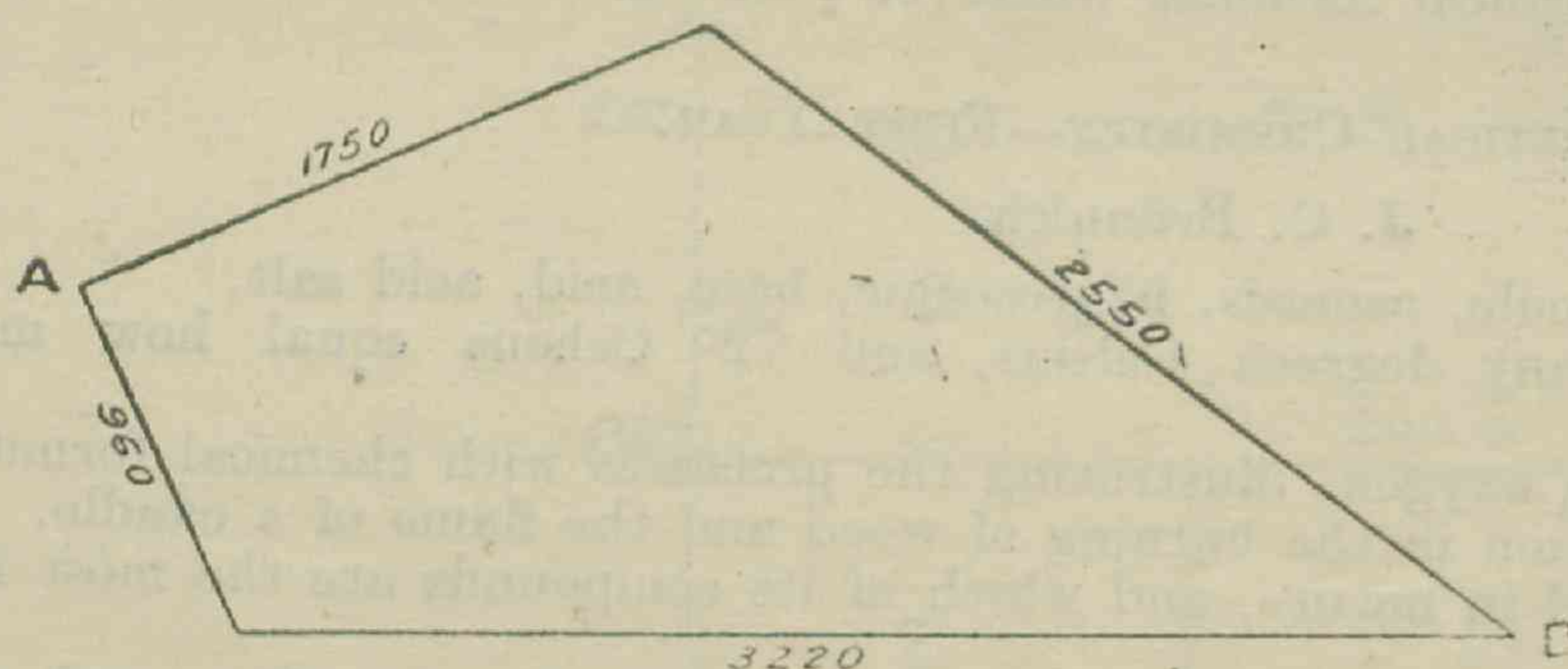
## Assets—continued.

	£	s.	d.
Feb. 20. Paid cash for sundry farm seeds ... ..	4	10	0
„ 25. Accept Williams' draft at 1 month for his account ... ..	75	0	0
„ 27. Receive first and final dividend of 15s. in the £ in Johnson's account ... ..	63	0	0
„ 27. Pay cash for horses shod and repairs to implements ... ..	2	10	0
„ 28. Pay contractor for fencing ... ..	10	0	0
„ 28. Thompson's account for groceries ... ..	4	12	0
„ 28. Watson's account for meat ... ..	3	7	6
„ 28. Pay wages ... ..	6	0	0
„ 28. Cash sales butter and eggs, for month ... ..	2	11	0
„ 28. Drew for private expenses ... ..	6	15	0
„ 28. Valuation—land, stock, &c. ... ..	1,150	0	0

## MENSURATION—SECOND YEAR, NOVEMBER, 1903.

1. To the top of a mountain, the height of which has been ascertained to be 6,725 feet above sea-level, the angle of elevation taken at the seashore is found to be  $11^{\circ} 59'$ ; find distance in miles of the mountain from point of observation.

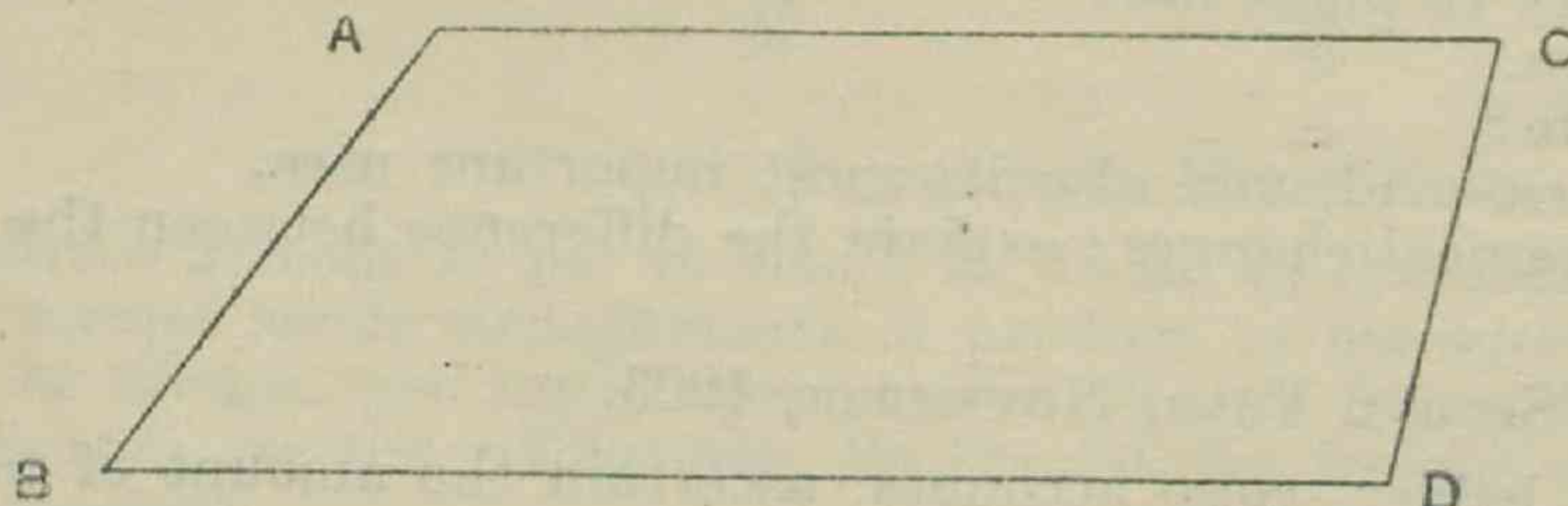
2.



Tie-line at A, taken  
50 links from corner,  
= 69.9 links,  
at B = 31.5 "

From data, compute area of block.

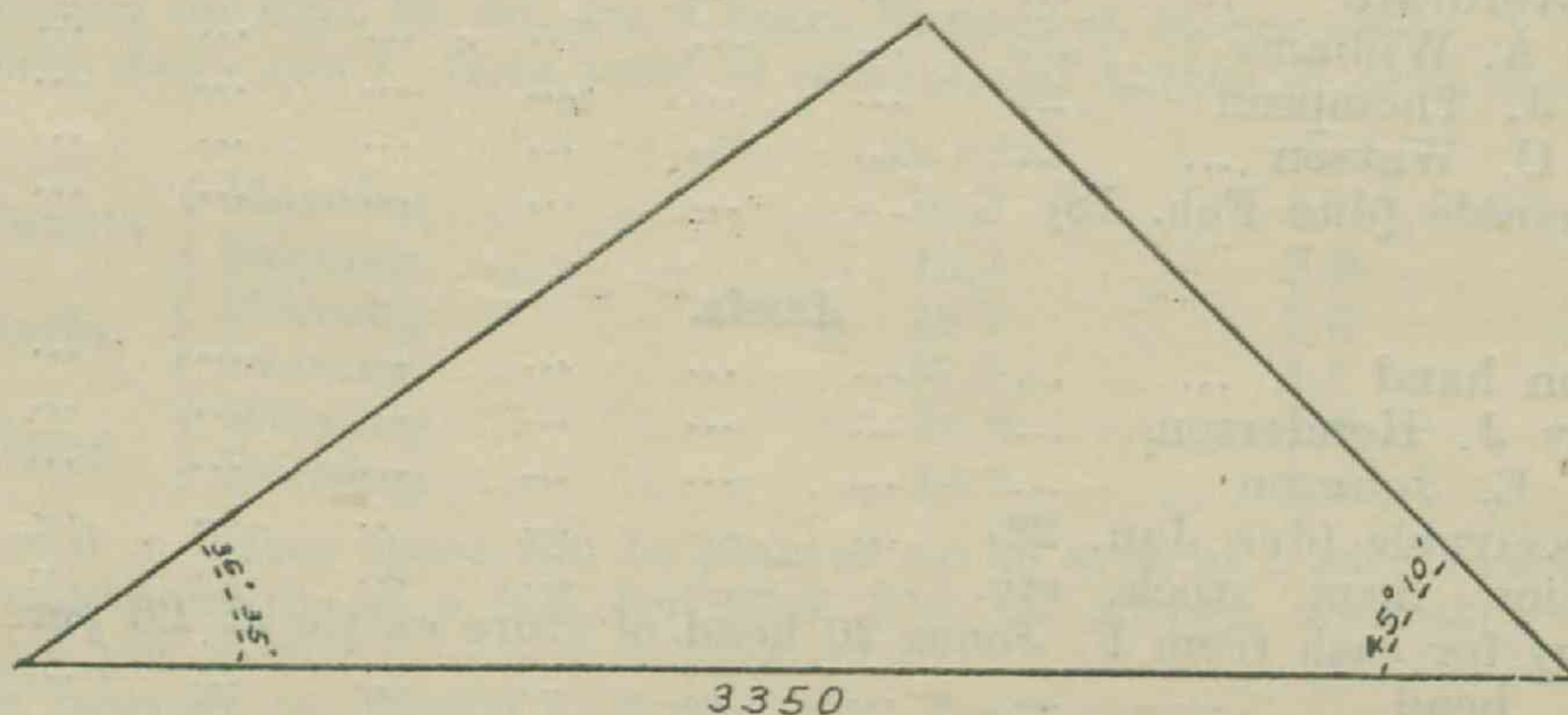
3.



Angle at B =  $53^{\circ} 26'$   
" " D =  $103^{\circ} 20'$   
Length of BD = 2970 links,  
" " BA = 1245 "  
AC parallel to BD.

From data, compute lengths of AC, DC, and area of block.

4. In triangle given below, compute from data lengths of remaining sides, also area.



5. Find number of cubic yards of excavation required for a rectangular tank of the following dimensions:—Length, 50 ft.; width, 40 ft.; depth, 8 ft. Slope of two sides and one end, 1 horizontal to 1 vertical; of the other end, 4 horizontal to 1 vertical.

6. The dimensions of a building are  $50 \times 40$  ft.; what rainfall thereon will be required to fill four 1,000-gallon tanks? (1 gallon = 277.27 cubic inches.)

7. Find weight of hay in a circular stack, the upper portion of which is conical: girth at base, 54 ft.; at eaves, 60 ft.; vertical height of eaves above ground, 16 ft.; total height of stack, 28 ft. Allow 5 lbs. of hay to the cubic foot.

8. It is proposed to build an hexagonal silo, with a side of 10 ft., to hold 120 tons; what must be the height (to nearest foot) of the structure? Allow 45 lbs. of ensilage to the cubic foot.

9. Find number of cubic yards of excavation in a circular well, the diameter of which is 5 ft., and depth 60 ft. How many gallons of water will it hold when full?

## ARITHMETIC—FIRST YEAR, NOVEMBER, 1903.

1. Find value of  $1\frac{5}{8}$  of £7 6s. 8½d. —  $1\frac{2}{3}$  of £5 4s. 6d.

2. Simplify—

$$17\frac{1}{35} - \frac{3}{7} - \frac{4}{21} - 1\frac{7}{15} + 3\frac{8}{105}$$

3. Express 7 fur. 20 po. 4 yds. 2 ft. 9 in. as the decimal of 1 mile.

4. A farmer consigns the following produce to his agent:—

Chaff, 7 tons 6 cwt. 2 qrs. 7 lbs.; sold at £1 12s. 6d. per ton.

Potatoes, 5 tons 7 cwt. 2 qrs. 14 lbs.; sold at £3 per ton.

The expenses amount to £5 13s., commission at the rate of 5 per cent. Find net return to the producer.

5. Calculate gross return in above consignments by decimal method.

6. A bankrupt owes £11,573 6s. 8d.; his assets amount to £9,005 10s. How much can he pay in the £?

7. If the carriage of 60 cwt. for 20 miles cost £14 10s., what weight will be carried 30 miles for £5 8s. 9d.?



8. A dealer buys 1,000 bushels of maize at 2s. 7d. per bushel; his expenses amount to £4 3s. 4d.; he sells at 3s. 3½d. per bushel. Find his gain per cent.
9. If a person lose 12 per cent. by selling sugar at 2¼d. per lb., at what price per cwt. must he sell to gain 8 per cent.?
10. Find cost of insuring a vessel and cargo, whose value is £2,156 10s., at 3½ per cent.
11. If a square of land, measuring 50 yds. 10¾ in. each way, is worth £542 ½/17, what is the value of a square measuring 62 yds. 1 ft. each way?
12. For what sum should a cargo worth £5,263 be insured at 7½ per cent., so that the owner may recover, in case of loss, the value both of cargo and premium?

QUEENSLAND AGRICULTURAL COLLEGE.  
TERM GRADE SHEET.—JUNE, 1904.

Division.	Agriculture, Theory.	Arithmetic.	Botany.	Chemistry, Theory.	Chemistry, Practical.	Dairying, Theory.	Gardening, Theory.	Bookkeeping.	Elementary Science.	English.	Pig-raising and Bacon-curing.	Veterinary Science.	Mensuration.	Poultry & Bee Raising.	Surveying.	Technical Drawing.	Blacksmithing.	Carpentering.	Dairying, Practical.	Farming, Practical.	Gardening, Practical.	Conduct.	Diary.	
THIRD.	G. Abraham	95	96	76	55	86					90	61	76				90		68	70	91	100		
	E. Alcock				53						68						90	70	63	70		90		
	J. Curtis				58						96							90	85	90		100		
	J. Devereux				40						92							95		61	100		100	
	L. Fudge				52						93							95		69	85		100	
	W. Mahony				42						60							60	58	70	87	96		
	P. McLean				60						95							95		81	85		100	
	J. Nuttall	98		45	51	83					89	44		69				90		62	80		85	
	P. Price				42						84							90	60	60	80		80	
SECOND.	R. Baker	78	22	31	25	38	76				73	52			68		100	90		70		90	0	
	A. Blomfield	93	66	59	68	41	87				85	51		75	85		80		62	70	92	100	27	
	H. Chambers	84	20	48	42	56	73				86	51		71	65		80	60	66	70		100	0	
	H. Dalrymple				58						94							90		70	90		60	
	A. Smart	91	59	61	58	48	84					80		69	50			90		58	80	93	100	25
FIRST.	L. Andersen																		72			100		
	J. G. Barnett																			85		100		
	D. Binnie	96	66	62	50	45	83	98			90	37	82	72			90	80	60	85	90	100	88	
	B. Bone	95	43	56	42	45	61	82			70	45	46	67			80	70	57	75	80	100	73	
	O. Byrne						91				95			75				85	80	61	80	90	100	
	C. Cameron	68				20	67	60			87			54			90	60	52	60		100	71	
	E. Casey	37				22	47				65			52			80	60		50		100	69	
	J. Clark	44	3	0	5	42	39	25			56	8	0	53			70		40	60	57	50	68	
	T. Clarke	48	6	18	15	43	53	25			55	12	23	58			75		57	65		100	67	
	J. Cummins	86	61	30	32	60	61	81			90	32	59	68			90	50	48	50	84	90	85	
	J. Dixon	79	47	69	41	40	79	68			95	69	46	74			80		59	65	78	100	85	
	N. Dixon		40					78				57					80		40	65	68	100	30	
	R. England																90			85	90	100		
	C. Handley	81	14			46	47	39			80	10	43	56			75		45	60		85	32	
	R. Harvey	81	20	43	40	57	72	44			69	29	9	62			70	50	58	75	76	100		
	A. Jardine	86	10	18	41	60	84	61			74	30	22	68			75	60	30	45	87	55	65	
	A. Lapworth																			77			100	
	A. Lynch*																							
	R. Macdonald	61	0			50	56	43			83	7	0	62				80		60	85	78	85	68
	H. May	88	49	78	47	75	93	93			90	72	70	70			70	60	60	65		100	69	
	J. McCready	87	78	31	70	44	89	63			84	42	70	65			75	70	50	60	83	85	68	
	J. McLay	80	58	13	35	65	70	99			88	7	67	68			80		60	90	91	100	37	
	A. McNab	83	77	30	48	58	78	80			90	36	69	62			70		59	85		100	75	
	K. Moffat	99	94	92	80	75	94	99			100	75	91	72			85	80	79	95	83	100	85	
	I. Morse	85	61	11	53	48	87	73			83	19	37	63			85	70	60	50	80	90	68	
	J. Murray-Prior	86				48	54	74			90			57				80		60	80		100	
	K. Molony																	70			60	80	100	
G. Neilson																	60			50	54	80	52	
J. Noakes*																								
W. Patrick	83	74	14	17	49	50	63			86	12	67	59			70		59	60	63	100	72		
E. Peirce										87							85	60	41	75	77	90		
F. Poeppel	69	73	0	42	41	37	93			92	22	62	70			85	50		50	60	85	36		
P. Pointon																			40			100		
E. Robinson	80	36		25	51	56	70			71	12	39	67				50	40	58	69	100	80		
E. Rogers-Tillstone					50					45	17		55					45	30	83	40			
E. Rosendahl			61																72	90		100		

\* Left at mid-term.

EX-STUDENTS.—Regarding the work of ex-students, I have kept a record of the movements of those who spent a year and a half, or over, at the institution, and at least 75 per cent. of them are working their own farms, or managing for their parents or others. I keep up communication with many, who inform me that they are most prosperous in their undertakings. I wish to point out that it is not at the present time that we are likely to reap a benefit from students who have graduated through this institution, because of the fact that many of them, after spending three years here, are rather young to control and handle men whom they may have to employ; although they may possess attainments for carrying out the work of a well-trained agriculturist, they are lacking in age at which young men might reasonably be expected to possess firmness; of course, there are exceptions to the rule.

CONDUCT OF STUDENTS.—The conduct of the students has been most exemplary, and no exception could be taken to the behaviour of the lads, with the exception of a little boyishness, which might happen at times. At no time during my stay at the College has discipline been so carefully adhered to. The officers in charge of their respective departments report in a similar way.

MELBOURNE SHOW.—During the year I visited Melbourne, in charge of an exhibit of Queensland produce, and, with the assistance of Mr. Graham, of the Lands Department; Mr. A. H. McShane (President of the Drayton and Toowoomba Agricultural Society); and ex-student W. Chataway, made the display an unqualified success. So pleased were the members who represented Queensland in the Senate and Federal Parliament of the Commonwealth at the exhibit, that they did us the honour to entertain us at a dinner at the Victorian Parliament House, a compliment which was fully appreciated. Enough has been said as regards the success of the display made, but I would like to add that, in my opinion, if Queensland had spent thousands of pounds in advertising the resources of the State, it would not have had the same good effect as that which was brought about by the above display of products. Already a large number of Victorian farmers have settled, and intend to encourage others to do likewise. A good display of College productions was made at the National Association's Exhibition last year.



**CORRESPONDENCE.**—The correspondence has largely increased since last year, and Mr. Pitt, who is also called upon to do his share of the teaching, is overtaxed to keep the work in hand; indeed, were he not to work overtime late and early, the work could not be carried out by him. During the year the letter-book shows that 3,000 typewritten folios were copied; these were on various subjects in connection with agriculture, dairying, &c. This correspondence, together with the bookkeeping, involves a very large amount of work. Each year the demand for information is on the increase on matters relating to the farm and dairy. About 4,000 articles of postal matter have been despatched from the office during the twelve months.

**VISITORS.**—During the year 1903-04, 1,913 persons visited the College, including 891 visitors to the Principal's private house. Of the above number, many were persons from various parts of the world. At least 75 per cent. were farmers, or persons who had come a considerable distance to obtain knowledge to aid them in the working of their own business. Six large parties of farmers visited the institution, and all were loud in their praise of what they had seen and the knowledge they had obtained.

**CHURCH.**—In the matter of attendance at church service once on each Sunday, which is the College rule, I find it one of the most difficult tasks which I have to perform. Twenty-five per cent. of the young men admitted into this institution have a great distaste for church service. This is a matter which is much to be regretted. At the same time, I think the fault may be traced to the door of the parents, who have been careless in the matter in their own homes.

**SOCIAL LIFE.**—The social life at the college has been well maintained. The junior and the senior students have their own clubs—cricket, football, tennis, and dramatic—also debating classes. Socials and entertainments have been held during the year, also the annual sports.

**INCREASED VALUE OF COLLEGE LANDS AND LIVE STOCK.**—It may be mentioned that the value of the College lands has, during the past five or six years, increased in value by fully 50 per cent., while the live stock kept on the place—including dairy cattle, sheep, pigs, and poultry—have increased in value and number by over 70 per cent. This may be considered a valuable asset to the State.

In considering this Report, I want to state that the work carried on during the year has been dealt with in as brief a manner as possible, or, in other words, just a general outline of the work performed has been given.

I strongly recommend, as I have done in the past, that experimental work be carried on on a more extensive scale. This can only be done in a creditable manner by placing the work under the daily supervision of one person, whose duty it shall be to keep correct records as the work is being performed. This work cannot be done successfully unless the required labour be authorised. My best thanks are due to the officers of your Department, with whom I have had occasion to contact in connection with College work.

JOHN MAHON, Principal.

#### REPORT OF THE MANAGER OF THE STATE FARM, WESTBROOK.

SIR,—I have the honour to submit my Report of the work upon this farm.

The rainfall for the eleven months is as follows:—

Month.	No. of Wet Days.	Rainfall in Inches.	Month.	No. of Wet Days.	Rainfall in Inches.
July ...	8	2·885	December ...	6	3·750
August ...	12	1·630	January ...	6	1·460
September ...	10	3·875	February ...	7	2·990
October ...	10	4·027	March ...	9	3·490
November ...	10	5·108	April ...	13	1·650
			May ...	13	3·180
			Totals ...	104	34·045

**CEREALS.**—The results of the imported wheats have already been given in an article in the May number of the *Agricultural Journal*.

I might here call attention to the unprecedented rainfall during the growing months of these crops, which lessened the harvest. Caterpillars also were in a large measure accountable for much loss. These pests started their ravages in October, and completely destroyed all the barley crops which were sown, as follows:—

Variety.	When Sown.	Area.	Result.
Cape ...	26 February	4 acres	Cut for green feed
Nepaul (skinless) ...	25 March	1½ "	Destroyed by caterpillars
Sea of Azov ...	30 May	4 "	" "
Halletts' Pedigree ...	30 "	4 "	" "

A block of three-quarters of an acre was sown with Thousandfold Rye, which did splendidly. Had this crop not been required for thatching, the yield of grain would have been heavy, as a small portion of a little over a quarter of an acre was left to ripen, and yielded 4½ bags.

**MAIZE.**—Three-quarters of an acre each of the following varieties were planted in succession:—

Variety.	When Sown.	Remarks.
Star Leeming	30 October	Very early, yielding well
Riley's Favourite	30 "	Moderate yield
Golden Beauty	30 "	Poor yield
Piasa Queen	30 "	Poor yield
Sydney Red Nibbed	6 November	Fair yield
Hawkesbury Champion	6 "	Moderate yield
Bolderman	6 "	Moderate yield
Piasa Queen	6 "	Poor yield
Golden Beauty	6 "	Moderate yield
Legal Tender	6 "	Poor yield
Star Leeming	6 "	Moderate yield
Early Hogan	6 "	Fair yield
Longfellow Dent	28 December to 4 January	Sown too late; insufficient rain; cut down for green feed and making ensilage
Snowflake		
Hickory King		



**SORGHUMS AND MILLETS.**—Twelve varieties of these fodder plants were sown on the 6th of November; but, whilst the yield was heavy, both of fodder and seed, the varieties have become so much hybridised that it would have been inadvisable to save any of the seed for distribution. The whole crop was put into the silo. A block of 3 acres of Amber Cane has also been made into silage. The following are the varieties grown:—

Japanese Millet.	Amber Cane.
Red Kafir Corn.	White Kafir Corn.
Broom Millet.	French Millet.
Planter's Friend (Imphe).	Yellow Millet.
Early Orange Cane.	Hungarian Millet (Setaria).
Soudanese Millet (Pencillaria).	Milo Maize.

**POTATOES.**—A few rows of Early Rose and Brownell's Beauty were planted on the 14th of September, which did fairly well. The average yield per acre was  $2\frac{3}{4}$  tons of the former and  $2\frac{1}{2}$  tons of the latter. Enough seed was saved for an autumn planting. As a rule, the spring planting of potatoes never does so well here as the summer or autumn planting. The following varieties are now on trial:—Early Rose, Brownell's Beauty, Snowflake, Suffolk Champion, Up-to-date, Beauty of Hebron, and Harbinger. Although planted late in March, the season has been so favourable that they have made splendid growth, and towards the end of May the earlier kinds are producing a good yield of well-ripened tubers.

**GRASSES, &c.**—Four acres of lucerne sown last May (1903) have done well. Three cuttings were taken off; besides, the horses were grazed on it. The *Paspalum dilatatum*, planted about the same time ( $2\frac{1}{2}$  acres), has become thoroughly established, and is growing rampantly. These two crops, together with about 120 acres of cultivated land and 140 acres of grass land, have, from time to time, been transferred to the Reformatory. Another 4 acres have recently been planted with paspalum, and 4 acres of lucerne have been sown. Small plots of red and white clover, alsike, and buckwheat were also sown. The latter was drilled in on the 27th of February, and thoroughly ripened its seed by the 20th of May, when it was reaped.

**Cucurbitaceae.**—Notwithstanding the abundant rainfall, pumpkins have been more or less a failure throughout the whole district. Of the varieties under crop here Silver Nugget has undoubtedly done the best. I claim this to be the best table variety I have yet grown. The crop this year keeps up its reputation of last year. The other varieties grown are—Crown, Yokohama, Turk's Cap, and Ironbark. Squashes were represented by the Hubbard, Rice Marrow, Yellow Custard, White Custard, and Fordhook. Ten varieties of melons and four varieties of cucumbers, besides several gourds, were grown.

**ROOTS.**—A block of half an acre was occupied by mangel wurzels, the computed yield of which was 18 tons of enormous roots. Some of these were sold at 10s. per load on the field to dairymen, and the balance was given to the horses, which got quite fond of them. Swedes and white turnips also yielded very satisfactorily. Artichokes (Jerusalem) resulted in a very fine crop, 20 tons per acre being the computed yield. This tuber is one of the best crops to grow where pigs are kept, as they can be let into the paddock to do their own digging. If the tubers are dug long before being used they wither.

Present crops of mangels and swedes, sown 19th April, occupy one-quarter acre each, and are growing vigorously.

**BRASSICÆ.**—The marketing of cabbages and cauliflowers, &c., continued up to September of last year. This season we have a splendid block of about 2 acres, which looks remarkably well. The following are the varieties, which include several new ones:—

**Cabbages:** Succession, Autumn King, Roundhead, Ballhead, Stonehead, Surehead, Allhead, Holland's Glory, Rossette Colewort, and Miniature Marrow. The latter variety is very suitable for small gardens, as it can be planted as close as the large kinds of lettuce. It is the daintiest little cabbage in cultivation. Planted 9th April, was cut on the 24th May.

**Cauliflowers:** White Queen, New Metropole, Veitch's Autumn Giant, Snowball, Gilt Edge, and New Century.

**Brussels Sprouts:** Exhibition and Matchless.

**Borecole or Kale:** Sutton's A1, Drumhead, Variegated, and Jersey.

On the 16th March 2 acres of rape were drilled in, the drills being  $3\frac{1}{2}$  feet apart. The crop has been twice scuffled, and the plants are now nearly meeting in the rows. Experiments will be carried out with the object of ascertaining how many times the crop can be cut, and to find out total yields in consequence.

**PULSE.**—An acre of land was divided last year in equal portions, and sown with Heligoland horse beans, Broad Windsor, and long-pod garden beans; Yorkshire Hero, Stratagem, and Daisy peas. All cropped heavily, but owing to the nature of the season at harvest time, the seed was discoloured, and much of it was lost. At the present time I have  $1\frac{1}{4}$  acres of Yorkshire Hero (garden), and three-quarter acre of Blue Peter (field) peas under crop.

A sowing of the following beans was made on the 21st October, and a second sowing a fortnight later:—Yosemite Mammoth, Flageolet, and Brupee's Stringless Greenpod. The two first are the best of their class (butter beans), but the latter is longest in season, being early, and is never stringy. Both tall and dwarf Lima Beans did well in both series. Three acres of Black Cowpeas yielded an immense quantity of good fodder and ten sacks of seed. Tonga Beans are very late this season, and are not expected to ripen seed.

**ONIONS.**—Two rows, each  $2\frac{1}{2}$  chains long, were on trial, with the following varieties:—

No. 1. Extra Early Yellow Globe.—A splendid light-yellow-skinned; early variety of large size.

No. 2. Silver King.—A fine, large, flat, white bulb; mild flavour; keeps well.

No. 3. Giant Rocca.—A very large bulb; rather coarse.

No. 4. Mammoth Tripoli.—Very large, flat, white onion.

No. 5. Brown Spanish.—Reliable; good general cropper.

No. 6. Silver Queen.—Pickling; small bulb.

All the above did extremely well, and the yellow-skinned varieties are keeping well up to date. Some of the bulbs have been transplanted for seed. Most of the varieties, two rows of each 11 chains long, were again sown on the 19th April, and are nicely up.



**ASPARAGUS.**—The plantation is half an acre in extent, part of which was laid down in August, 1903, and part the year previous. The varieties consist of Conover's Colossal, Argentuel Purple, Snowhead, and Sutton's Giant French. Each kind has made robust growth.

**COTTON.**—The following varieties were again sown, but up to the present have failed to produce any bolls:—Christopher, Russel, Jones's Big Boll, Parker's, Culpepper, Trent, Caravonica, and Kidney.

**MISCELLANEOUS SOWINGS.**—The following are under experiment in smaller areas:—Artichoke: Purple Globe and Green Globe. Carrot: Altringham, Early Horn, Intermediate, Sinclair's Champion, and St. Valery. Celery. Capsicum: Elephant's Trunk, Sweet Spanish, Long Yellow, Cayenne, Celestial, and Crimson Bouquet. Cress: Egg Plant. Endive: Kohl-rabi. Herbs: mustard, lettuce, parsnips, radish, spinach, rhubarb, salsify, shallots, sunflower, *Polygonum saccaliensis*, Cineraria (insect powder plant), sisal hemp, Tagosaste (tree lucerne), saltbush, *Atriplex mummularia*, and *Semibaccata*. Tomatoes: Peachblow, Dwarf Champion, Duke of York, Trophy, Perfection, and Hathaway's Excelsior.

**ORCHARD.**—The orchard trees have made very strong growth, and will require an extra amount of pruning. Scale (*Lecaneum olea*) has made its appearance (pretty strong in places) on the olives and quinces. Plum rust was very bad during the summer, and will necessitate the whole orchard being sprayed during winter and spring. The attack of the fruit fly this year was disastrous. Every endeavour to minimise the evil was made by picking and boiling the earlier fruits, and no falls were allowed to remain on the ground, with little apparent success.

The first fruits to ripen were the Mascadine, Sardinian, and Oullin's Early Peach; apricots; and the Cherry, Pissardi, and Evans' Early, plums. These were marketed free from fly. Stone fruits generally set a magnificent crop, but the crops of apricots, peaches, and Japan plums were nearly ruined by the fly. Heavy crops of prunes and almonds suffered from premature ripening, owing to rust denuding the trees of foliage just at the time it was most needed. The Angelina Burdette plum did not set a large crop, but the fruit was first class, this being one of the varieties which the fly does not seem to attack to any serious extent. The olives are loaded with drupes, and we are picking and sending the crop to St. Helena to be crushed into oil, there being no appliances for the purpose on the farm. One variety of persimmon is worthy of mention. It is called "Nightingale's Seedless." The small tree, only 4 feet high, was loaded with large well-ripened fruit. Apples generally cropped well, but pears were very much below the average.

**VINEYARD.**—The effects of the rains have been disastrous amongst the finest table grapes. Black Spot made its appearance early in the season on the Gordo Blanco, Almeria, Teneron, Dattier de Beyrout, Henab Turki, Admirale de Courtillier, Sultana, Raisin des Dames, Chrystal, and many others of this class. The vines must be decorticated, and thoroughly swabbed with a sulphuric acid wash next spring. Although these vines were sprayed with Bordeaux Mixture before the disease was noticed, it had no appreciable effect on its ravages. The promise of very heavy crops of grapes on these particular vines was utterly destroyed, and, in many cases, the vines have made little or no wood suitable for cuttings intended for distribution. We have, however, a large collection of very fine table grapes, which were quite immune from attack, and set excellent crops, which were disposed of at 4s. per case of 25 lb. of fruit. These, notably Chasselas Dore, Chasselas Negropout, Royal Ascot, Madaline Royal, Muscat Beaume, Gros Colman, Cinsaut, Black Hamburg, Ferdinand de Lesseps, Goethe, Morocco Prince, and others have made vigorous growth. The wine varieties, of which we have a large collection, have made clean vigorous wood. The following have borne heavy crops:—Mataro, Shiraz, Aramon, Alicante Bouschet, Pedro Ximines, Sercial, Dolcetto, Mondeuse, Malvasia, Marsanne, Rousanne, Chardonay, Merlot, and Grand Noir, about 8 tons of which were sold at £5 per ton.

**IMPROVEMENTS.**—One and three-quarters of a mile of new trellis were erected in the new portion of the vineyard last August. Two iron boilers of 100 gallons each have been set in brick and cement.

The implement shed has been enclosed with wire-netted gates.

With a view to putting down a small irrigation plant, the bore near the manager's house has been tested, with the following result:—A 6-h.p. engine was hired to work the pump, and the water as it was lifted was turned on to the cabbage flat. At the commencement, the water in the bore, which is 102 feet deep from the top of the casing, stood at 51 feet; after 7 hours' continuous pumping the column of water was 45 feet from the bottom. After very careful measurements it was computed that over 8,000 gallons had been lifted during the time (seven hours), and only lowered the well 6 feet. According to this result it would be well worth while putting down a larger pump, and placing an engine in position at once to assist in such experimental work as is contemplated in the future.

**STOCK.**—Horses are the only live stock kept on the farm at present. Last August an epidemic started amongst them and carried off four of the heavy draughts. Three fresh horses were purchased. Since the curtailment of the area to be worked was decided upon, three draught horses, with harness, have been sent to the Hermitage State Farm. The following implements have also been transferred to the Hermitage:—One Massey Harris seed drill, 1 reaper and binder, 1 ensilage elevator, 1 Mitchell 3-furrow plough, and 1 spading harrow to Peel Island.

**EXHIBITIONS.**—The largest and most comprehensive collection of garden and farm products ever got together by this farm was staged at the Royal Society's show, held in Toowoomba in August last. A fortnight later a similar exhibit was staged, in conjunction with the "Hermitage" collection, at the National Society's show at Bowen Park. An exhibit of sixty varieties of Farrer's hybrid wheats was also shown at Toowoomba on the occasion of the Drayton and Toowoomba Agricultural and Horticultural Association's show.

**FORECAST.**—As a result of the deliberations of the State Farm Managers' Conference, the area of this farm has been further curtailed by transferring the larger portion of the cultivated land to the Reformatory, and the experiments with cereals have been discontinued and relegated to the Hermitage. It is proposed in the future to more closely attend to the operations connected with experiments in fruit-culture, vegetable-growing, economic plants, fodder plants, grasses, and the growing of pedigree corn.

**ORCHARD.**—The immediate objects to be arrived at in the orchard in the first instance is the "dwarfing" of certain trees by the adoption of a system of branch-pruning together with judicious root-pruning in winter, to be followed by continuous summer pruning. Much extra labour will be required in this direction, but both labour and expense will be minimised in connection with netting and spraying the trees and the gathering of the fruit. Whilst this experiment is in progress, endeavours will be made to get together a collection of various stocks, and establish them in a nursery, with the object of selecting those having the closest affinity with the variety to be grafted, and, at the same time, having the power to check the flow of sap to the head of the tree. There are some serious objections to the dwarfing system, some of which, and probably the worst of them, may be overcome. It has been stated that dwarfing stocks are not needed in Queensland, since the heat is so excessive as to impose a severe strain on orchard trees, and they are by this means alone



matured and dwarfed to the extent that more rather than less vigour is sought when cultivated for profit. In answer to this statement I give some measurements of *average* sized trees, of different varieties, growing here, which have been bearing for the last three years. The soil is a volcanic loam overlaying rotten rock; very shallow at the south end, where the olives and almonds are growing. The area is 20 acres; it was subsoiled in August, 1897, and the trees planted immediately after.

Number of Trees Grown.	Variety of Tree Measured.	Height of Stem.	Height of Branches.	Spread of Branches.	Girth of Stem 1 ft. above Ground.
		Ft. in.	Ft. in.	Ft. in.	Ft. in.
26	Almonds ... ..	2 0	20 0	14 0	2 0
30	Olives ... ..	2 0	16 0	18 0	2 9
34	Figs (Adriatic) ... ..	1 6	12 0	17 0	2 9
94	Apples (Munroe's Favourite) ... ..	2 0	12 6	10 0	1 4
168	Apricots (Moorpark) ... ..	2 0	12 0	15 6	1 8
168	Peach (Globe) ... ..	2 0	15 0	16 0	1 9
	„ (Foster) ... ..	2 0	12 6	16 0	1 9
56	Jap Plums (Burbank) ... ..	2 0	7 0	8 0	1 2
	„ (Oct. Purple) ... ..	2 0	12 0	11 0	1 2
224	Pears (Bartlett) ... ..	2 0	12 6	7 0	1 1
	Europe—Plums (Prune) ... ..	2 0	13 0	10 0	1 2
	„ Reine Claude de Bavy ... ..	2 0	12 0	9 0	1 2
	„ Aug. Burdette ... ..	2 0	10 0	9 6	1 2
	„ Lutherboro ... ..	2 0	16 0	11 0	1 2

It will thus be seen that some orchard trees grow as vigorously here as in any part of the world, and where such vigour is produced, it should go to prove that if such trees are to be covered with netting to prevent fly-attack they must be "dwarfed," otherwise the work of covering would be impracticable. Experiments will be continued in connection with pests. Amongst others, an experiment, initiated by Mr. S. C. Voller—that of poisoning such baits as the fly is most partial to—will be followed up. An experiment was tried last season with coloured balls of wadding steeped in honey-sweetened fruit-juices, to entice the fly to lay its eggs thereupon, but was not successful.

VINEYARD.—It is intended to rearrange the vineyard. The rows of trellised vines were originally planted from north to south, in the same direction as the incline. A beginning will be made by laying out a new plantation with lines running across the hill. When this portion becomes thoroughly established, one-third of the present vineyard is to be uprooted, and the ground replanted in the same manner with rooted vines, which are to be propagated in the nursery. The following year one-half of the balance is to be treated likewise, and in the third year the remainder of the old vineyard should be finished; all the lines running east and west, instead of north and south. This alteration is thought to be desirable for the following reasons:—

1. At present a larger portion of soil is being washed downhill during every rainfall than would be otherwise if the vineyard could be cultivated across the incline instead of along with it.
2. Every summer considerable loss has been experienced by the action of the direct rays of the sun on the fruit east and west of the rows.
3. The prevailing winds and hailstorms have been noticed to come from the south-east and north-west, leaving the present lines thus unprotected from their violence, and thus causing great damage.
4. If the rows are replanted east and west the above contingencies will be obviated.

NURSERY.—A portion of land is to be set apart for the purpose of propagating stocks for fruit trees and grapes for experiment. Different varieties of phylloxera-proof stocks will be used.

VEGETABLES, &c.—In connection with this branch, variety tests will be continued, and some of the least-known vegetables will be experimented upon with the object of bringing intense methods of cultivation before the notice of the public, and to popularise certain vegetables not commonly used.

Fodder plants and grasses will be grown with the object of determining their food value and weight of yield.

MAIZE.—The cultivation of maize will be restricted to one variety for spring planting and one for summer planting. By careful selection and a proper method of cultivation and isolation a good pedigree corn can be procured. Particulars of these operations will be published as the work proceeds.

POULTRY.—This industry is to be entered upon by breeding one variety of fowl and one variety of turkeys. The fowlhouse is to be placed near the orchard, and it is expected by making a fowlrun of the latter the birds will be of great assistance in reducing many insect pests.

EDUCATIONAL.—It is pleasing to note that there is an increasing interest displayed by the head teachers of State schools in the district. Applications for seeds and cuttings, varieties of wheat, fodder plants, &c., and information sought on agricultural and horticultural matters are more numerous than ever.

I have made arrangements with Mr. Stevens, head teacher of the adjacent State school, Bunker's Hill, for practical lessons in pruning, grafting, &c., being given to pupils and ex-pupils, as well as others who accompany them to the farm at such times as the work is being executed.

CHARLES ROSS, Manager.



## REPORT OF THE MANAGER OF THE STATE FARM, HERMITAGE.

SIR,—I have the honour to submit the Annual Report for the year ending the 30th June last.

WHEAT.—Owing to the importations of seed wheat from South Australia at the beginning of last season and the distribution of a number of varieties new to Queensland, it was considered necessary that a test should be made of all the varieties on this farm, under practically the same conditions.

With the exception of Budd's Early, grown on the more suitable lands of New Hermitage, with the results as stated under the heading of "Tests with Fertilisers," all the wheats were more or less affected by rust.

The excessive rainfall, following on after a forced fallow occasioned by the drought, caused over succulence and created an ideal host for the growth and development of spores.

No sheep being procurable, the mowing machine was run lightly over the growing crops, taking care not to injure the immature ears. When practicable, crops were allowed to mature, but if conditions pointed to a probable loss of marketable grain, such were cut and saved. Excessively rusty portions were burnt.

The caterpillar plague was a serious drawback to the results.

Appended is a summary. Sowing commenced 16th May, harvested 30th November:—

Area.	Name of Variety.	Yield per Acre.	Remarks.
5 ac.	Dart's Imperial ... ..	...	Cut for hay, failure for grain
5 ac.	Smart's Early ... ..	...	" "
5 ac.	Petatz Surprise ... ..	...	" "
5 ac.	Gluyar's ... ..	23 $\frac{3}{80}$	Promising variety
5 ac.	Carmichael ... ..	15 $\frac{8}{80}$	Worth trying again
5 ac.	Baroota Wonder ... ..	17 $\frac{1}{80}$	" "
3.61 ac.	Marshall's No. 3 ... ..	15 $\frac{7}{80}$	
5 ac.	Newman's Early ... ..	...	Failure, crop burnt
5 ac.	Leatherhead ... ..	...	" "
5 ac.	Hamblyn's Prolific ... ..	...	" "
3.20 ac.	Allora Spring ... ..	...	" "
1 ac.	Fillbag ... ..	...	Cut for hay, failure for grain
1 ac.	Tuscan ... ..	...	" "
1 ac.	Steinwedel... ..	...	Failure, crop burnt
1 ac.	Silver King ... ..	...	" "
1 ac.	Early Para... ..	...	" "
1 ac.	Marshall's No. 1 ... ..	...	" "
1 ac.	Australian Wonder ... ..	...	" "
1 ac.	Warwick ... ..	...	" "

In addition to above, various sowings were made to test the adaptability to the district, and if successful, to provide seed for distribution:—

Marshall's No. 8.—Sown 9th April. Area 5 acres. Matured fair grain in patches. Was cut on green side and stacked. Unthreshed.

Bobs.—Sown 13th May. Area 5 acres. This wheat gave good results in New South Wales, but failed to withstand rust sufficiently to ensure payable crop. Treated as above.

Federation.—Sown 14th May. Area 5 acres. Same remarks as for Bobs.

Sullivan's Early Prolific.—Sown 14th May. Area 5 acres. This variety is in reality Steinwedel under another name. Proved very susceptible to rust. Treated as above.

Indian Fife.—Sown 29th May. Area 3 acres. Failed on account of rust.

Yandilla.—Sown 23rd May. Area 3.32 acres. Short light-stalked Indian variety, suitable for light lands. Yield 19 $\frac{3}{4}$  bushels to acre.

Yandilla No. 3.—Sown 22nd June. Area 1 $\frac{1}{2}$  acres. Similar remarks as for Yandilla. Yield 16 bushels to acre.

Australian Wonder.—Sown 30th May. Area 3 acres. Ward's Prolific type, hardy, fair rust-resistant. Yield 24 $\frac{1}{6}$  bushels to acre.

Hermitage No. 1.—Selected strain from Farrer's crossbreds. Attractive, somewhat slender straw, light semi-erect flag; bald and good type of ear with short, plump, good quality grain. Yield 25 $\frac{1}{6}$  bushels to acre. Good rust-resistant.

Hermitage No. 2.—Same remarks as for No. 1. Grain not so short. Yield 23 $\frac{2}{3}$  bushels.

Hermitage No. 3.—Similar remarks as for No. 1. Yield approximately 23 bushels.

NOTE.—Areas, Hermitage Nos. 1 and 2, 3 acres each; sown 29th May.

Battlefield.—Area  $\frac{3}{4}$  acre. Sown 30th May. One of the best of the Tuscan. Yield 21 bushels.

Manitoba.—Area 1 acre. Sown 30th May. Yield 15 bushels.

Marshall's No. 3.—Area  $\frac{3}{4}$  acre. Failed.

EXPERIMENTS WITH FERTILISERS.—As the various fertilisers were applied to this land in 1902, and no crop resulted owing to the drought, further application this season was considered unnecessary.

Variety of wheat, Budd's Early (imported from South Australia), drilled in at the rate of  $\frac{3}{4}$  bushels to acre on 9th June. Harvested 1st December.



Spring rust made its appearance during the first week in October, when growth was rank and succulent. Early in November, summer rust appeared, and made sufficient headway to cause premature ripening of crop. Tests in duplicate. Results as appended:—

Block and Section.	Fertilisers per Half-acre.		Yield per Acre.	
	With Seed.	As Top Dressing.	Straw.	Grain in Bushels.
1 A	No Manure ... ..	...	T. C. Q. L.	
1 B	Ditto ... ..	...	2 0 0 22	28 $\frac{12}{60}$
			1 18 0 12	26 $\frac{22}{60}$
2 A	12 lb. Sulph. of Ammonia ...	23 lb. Sulph. of Ammonia		
2 B	21 lb. Sulph. of Potash ...	ditto ... ..	2 2 1 26	26 $\frac{44}{60}$
	Ditto ... ..		2 1 3 26	26 $\frac{22}{60}$
3 A	127 $\frac{1}{2}$ lb. Superphosphate No. 1			
3 B	21 lb. Sulph. of Potash ...	...	2 6 0 18	27 $\frac{22}{60}$
	Ditto ... ..	...	1 15 2 10	27 $\frac{10}{60}$
4 A	127 $\frac{1}{2}$ lb. Superphos. ... ..	ditto		
4 B	12 lb. Sulph. of Ammonia ...	ditto ... ..	2 5 1 26	28 $\frac{22}{60}$
	Ditto ... ..		1 14 1 4	28
5 A	127 $\frac{1}{2}$ lb. Superphos. ... ..	ditto		
5 C	12 lb. Sulph. of Ammonia ...	ditto ... ..	2 1 0 2	26 $\frac{22}{60}$
	21 lb. Sulph. of Potash ...	ditto ... ..	1 10 0 0	25 $\frac{4}{60}$
	Ditto ... ..			
6 A	63 $\frac{1}{2}$ lb. Superphos. ... ..	11 $\frac{1}{2}$ lb. Sulph. of Ammonia		
6 C	6 lb. Sulph. of Ammonia ...	ditto ... ..	2 1 2 22	29 $\frac{22}{60}$
	10 lb. Sulph. of Potash ...	ditto ... ..	1 10 1 0	25 $\frac{10}{60}$
	Ditto ... ..			
7 A	127 $\frac{1}{2}$ lb. Superphos. ... ..	23 lb. Nitrate of Soda		
7 C	21 lb. Sulph. of Potash ...	ditto ... ..	1 18 3 22	27 $\frac{10}{60}$
	23 Nitrate of Soda ... ..	ditto ... ..	1 15 0 16	24 $\frac{10}{60}$
	Ditto ... ..			
8 A	150 lb. Thomas' Phosphate ...	ditto		
8 C	21 lb. Sulph. of Potash ...	ditto ... ..	2 0 1 14	27 $\frac{22}{60}$
	23 lb. Nitrate of Soda ... ..	ditto ... ..	1 13 0 24	28 $\frac{22}{60}$
	Ditto ... ..			
9 B	102 lb. Meat Works Manure	17 $\frac{1}{2}$ lb. Nitrate of Soda		
9 C	21 lb. Sulph. of Potash ...	ditto ... ..	1 18 0 6	25 $\frac{54}{60}$
	Ditto ... ..	ditto ... ..	1 13 1 0	26 $\frac{22}{60}$
10 B	127 $\frac{1}{2}$ lb. Superphos. ... ..			
10 C	21 lb. Sulph. of Potash ...	...	1 12 2 6	26 $\frac{2}{60}$
	56 lb. Dried Blood ... ..	...	1 17 2 16	28 $\frac{22}{60}$
	Ditto ... ..			
11 B	150 lb. Thomas' Phosphate ...	23 lb. Sulph. of Ammonia		
11 C	84 lb. Kainit ... ..	...	1 4 1 12	27 $\frac{22}{60}$
	12 lb. Sulph. of Ammonia ...	...	1 9 1 26	24 $\frac{2}{60}$
	Ditto ... ..			
12 B	75 lb. Thomas' Phosphate ...	11 $\frac{1}{2}$ lb. Sulph. of Ammonia		
12 C	42 lb. Kainit ... ..	...	2 0 4 2	25 $\frac{14}{60}$
	6 lb. Sulph. of Ammonia ...	...	1 10 2 16	26 $\frac{22}{60}$
	Ditto ... ..			

EXPERIMENTS WITH BUNT-INFECTED SEED.—This experiment has been carried out for Mr. Farrer, of the New South Wales Department of Agriculture, in connection with a series of tests with the same varieties in New South Wales, Victoria, and South Australia, with the object in view of the making of new varieties of wheat, which will be valuable on account of the amount of resistance they offer to the infection of bunt, under different climates and conditions.

Details of the results obtained by Mr. Farrer in the Southern States have not come to hand yet. Results obtained here, as follow:—

Name or Signs Denoting Variety.	Number of Seeds Sown.	Number of Seeds Germinated.	Number of Bunt Plants.	Number of Plants Free from Bunt.
"Bobs" ... ..	100	59	48	11
Docker (63 D) ... ..	101	76	64	12
Blue Federation (53 E) ... ..	101	42	14	23
Federation 52 (C)—99 (C) W	101	82	47	35
F (R 2) A Russian wheat (12 Z)	106	79	64	15
Hudson's Early Purple Straw	103	71	48	23
81 (K 1) B—No. 81 K 1	101	79	25	54
81 (K 2) B—No. 81 K 2	101	79	47	32
Nonpareil ... ..	102	75	64	11
Levens 59 (d) ... ..	101	62	33	29
Steinwedel ... ..	99	76	72	4
Tardent's Blue ... ..	102	68	48	20
White Tuscan ... ..	102	76	76	Nil
Yandilla ... ..	101	60	44	16
52 (B) No. 52 (B) ... ..	105	76	76	Nil
12 (y) F (R 3) A Russian wheat	101	76	54	22

STUD WHEATS.—Owing to the drought in 1902, this branch received a set-back, but during 1903 considerable time and attention have been systematically given to the development and improvement of selected types. One hundred different strains, made up of crossbreds, sports, and varieties, were sown, principally in areas of one-twentieth of an acre.



The season, as it turned out, was such as to determine the rust-resisting qualities, and, in many instances, the differences were most marked, and have borne out previous selections and brought into prominence those varieties most fitted to survive.

SEASON 1904.—At the Conference of State Farm Managers, the various branches of work for each individual establishment were decided upon.

As the future policy of this farm has been regulated to prevent overlapping of experiment work with other farms, and as the system already initiated has been extended and fresh additions made in the interests of agriculturists, I beg to append a short epitome of the decisions arrived at and the steps already taken to carry them into effect.

The farm is to be for experiment purposes, the growth of crops for home use, and the production of new kinds of picked seed of approved varieties for distribution.

The present arrangements for this year's work are as follows:—The farm has been measured and divided off into blocks of 1 acre (with few exceptions), leaving ample room to allow of keeping varieties distinct and the use of machines in harvesting. A selection has been made of some fifty odd approved strains and varieties from wheats sown last year. These have been drilled in, and, in most instances, have germinated well. In order that several of the best of the wheats may be tested on soil representative of a large area of wheat-growing land in the district, and, further, that as this change from the heavier soils of the farm is expected to be beneficial, an area of 10 acres of land has been rented for a term from Mr. A. Morrice, of Canning Downs, and the wheats sown.

SEED WHEAT DISTRIBUTION.—The increase during season 1903 of some varieties of wheats possessing desirable characteristics, has given us sufficient seed for distribution. In most cases this has been arranged through existing agricultural societies or farmers' associations, whose wishes have been met by distributing graded seed to persons recommended, on the understanding that each person participating has to return double the quantity of pure seed of each variety from the resulting crop. A system of inspection of land and record of matters concerning the welfare of crops, has also been instituted. The following societies and associations have taken the matter up, and where different classes of soil are met with, farmers situated on such have been selected in order that the wheats may receive as wide a test as possible:—Amby Farmers' Association, Hodgson Farmers' Association, Western Pastoral and Agricultural Association, Wallumbilla Farmers' Association, Northern Downs Pastoral and Agricultural Association, Pittsworth Pastoral, Agricultural, and Horticultural Association; Central Downs Agricultural and Horticultural Association, Eastern Downs Horticultural and Agricultural Association.

SUB-EXPERIMENT STATIONS.—To determine the most likely varieties for distribution next year, small stations have been established in the districts represented above, so that individual varieties adapting themselves in a more pronounced manner to any particular locality will serve to indicate the best lines for future extension. Seed to be supplied from the increase of stud wheats at this farm.

OTHER WHEATS.—Further trials are being made of a few of the recently-imported South Australian wheats, as it is anticipated that, when acclimatised, a more satisfactory indication of the most reliable kinds may be available.

Varieties sown consist of Gluyas, Carmichael, Baroota Wonder, Petatz Surprise. An acre each of Manitoba-grown Red Fife and Mould's wheats have also been sown. The latter is a good type of wheat, resists rust well, and was hand-selected from out of a field of Mould's barley, the seed being a recent importation from England. Some 10 acres of Hermitage No. 2 have been sown to provide seed for future distribution. A few pounds each of several crossbred wheats have been received from the New South Wales Department of Agriculture, and have been brought into existence by Mr. Wm. Farrer. Several samples of wheats are being tried on a small scale, some being received from Mr. Thos. Kennedy, of Allora, and comprise—Russian Ulka, Corn Wheat, and Hard Medeah. A few promising "sports" are also receiving a further trial.

Small plots of the undermentioned varieties of oats were sown on 12th June:—

Name of Variety.	Straw.		
	Fine	Medium to coarse	Coarse
Red rust-proof	...	...	...
Algerian	...	...	...
Skinless	...	...	...
Dun	...	...	...
Black Winter	...	...	...
White Tartarian	...	...	...
American Banner	...	...	...
Carter's Royal Cluster	...	...	...
Clydesdale	...	...	...
Swedish	...	...	...
Peerless White Bonanza	...	...	...
Abundance	...	...	...
Danish Island	...	...	...
Egyptian	...	...	...
Golden Giant	...	...	...
Hopetoun	...	...	...
Lincoln	...	...	...
Pioneer	...	...	...
Tartar King	...	...	...
Waverley	...	...	...
Welcome	...	...	...
Wide Awake	...	...	...

With the exception of White Tartarian, Tartar King, and Golden Giant, which are "side-bearing," the remainder belong to the "tree" class of oat.

Owing to the attack of caterpillars, it was not possible to state definitely what success some of these varieties may have attained as grain-producers.

A comparison of results extending over a few seasons will doubtless bring to light any superior qualities.

For earliness and excellence for hay-making, the first three mentioned are to be commended, whilst the Dun Oat, although a little later, has excellent characteristics for the same purpose. Height attained, 4 feet to 4 feet 6 inches.

Amongst varieties under the heading of "Medium to Coarse," the White Tartarian appeared to excel, and should prove an excellent variety for chaffing purposes. Height, 5 feet to 5 feet 6 inches.

The coarse varieties made very strong growth, and averaged about 6 feet in height. Peerless White Bonanza, Hopetoun, Lincoln, Pioneer, and Waverley proved more susceptible to oat rust than the remainder; varieties with fine straw and carrying a medium amount of flag being the most exempt.



**OATS.**—A field crop of 21 acres of Algerian Oats was sown on 25th June, using at the rate of 2 bushels to the acre. This crop did remarkably well, and presented a very handsome appearance till the caterpillars attacked it. Although deprived of the flag over a large portion, excellent hay was made from portions untouched, and the quality of damaged hay was very good also, as the weather was favourable on the whole.

**BARLEY.**—These crops promised well, but came in for a very severe handling from the plague of caterpillars, quite half being lost.

Hallet's Improved Chevalier.—Area, 6 1-5th acre. Sown 15th May. Harvested 12th November. Yield 20 1-10th bushels per acre.

Sea of Azov.—A malting Cape. Area, 5 acres. Sown 14th May. Harvested 13th November. Yield, 16 bushels to acre.

Moulds.—Area,  $\frac{3}{4}$  acre. Sown 22nd June. Harvested 24th December. This is one of the Cape barley types, and a recent importation. A heavy stooler, and should be a useful variety for feeding off.

Nepaul.—Area, 4 acres. Sown 5th March. Used for grazing purposes, for which it is well adapted.

**BARLEYS, 1903.**—Apart from field crops for seed purposes already accounted for, the undermentioned varieties were grown on small plots to test relative merits, and have been named in order of excellence. With the exception of last two, the samples were of good quality:—Chilian Chevalier, Kinver's Chevalier, Golden Grain, Webb's New Golden Giant, Hallet's Chevalier, Carter's Malting, Invincible, Early Purple, Half-awned.

**BARLEY, 1904.**—This season (with the exception of Early Purple and Half-awned, which have been discarded) larger areas have been drilled in on the lighter soils of New Hermitage. Small plots of the following varieties, selected by the Agent-General in England, as representative of various types in favour on the English market last season, have been sown:—Chilian Chevalier, Californian Brewing, Smyrna Ouchac, Ouchac, Hungarian Chevalier, English Chevalier, Tripoli, Oderbruck, Danubian, Saale.

**RYE.**—Three acres were drilled in on 6th March, 1903. Used for grazing purposes till springtime, after that crop was allowed to grow, so as to provide straw for thatching purposes.

Season, 1904.—Four acres of Thousandfold Rye have been drilled in to provide seed, also straw, for thatching purposes.

**MAIZE, 1904.**—Certain lines of work were proposed at the conference, and have since taken more concrete form and adopted as the means of attaining the object in view:—

1. A system of deep ploughing and constant cultivation to be instituted, with a series of convenient-sized blocks set apart for determining the value, if any, of every individual extra cultivation of crop.
2. The evolution of a light-stalked, quick-maturing, and nutritive variety of maize, to combine productiveness with ability to tide over spells of dry weather, such to be attempted by a system of selection in the field of plants possessing necessary characteristics, and followed by a more technical and detailed comparison of results.
3. A comparison of check row and continuous drill planting of maize.
4. A comparison of individual plots set out in check rows, each plot to be sown with a different number of grains to the hill.

The Kansas Sunflower maize has been selected to work upon on account of its character and high nutritive value.

**ROTATION OF CROPS.**—An area is to be devoted to this purpose, to demonstrate the value of a five course rotation, subject to favourable seasons, and commencing with the first mentioned this (1904) season. Wheat or other cereal—Legume, maize, roots, Panicum, or catch crop.

**SORGHUMS AND MILLETS.**—In past seasons a large variety of these have been grown to demonstrate the adaptability of particular kinds. In future, it is proposed to grow new kinds and approved varieties only, except when fodder is required for a particular purpose.

**OTHER FODDERS.**—The value of testing fodders, which have or are likely to prove suitable for stock, is recognised, and will receive additional attention in the future.

**GRASSES.**—This subject, after receiving attention at the conference, is to be revived. The gradual disappearance of some of the most valuable native grasses from continuous stocking in enclosed areas is a matter of national concern.

It has been decided to establish small plots of native and exotic grasses. Up to the present we have received from the Colonial Botanist roots of the following:—

- Anthistiria avenacea*, Oat Grass.
- Andropogon erianthoides*, Satin-top Grass.
- Andropogon sericeus*, Blue Grass.
- Agropyrum scabrum*, Wheat Grass.
- Danthonia semiannularis*, called Oat Grass in New Zealand.
- Dichelaene crinita*, Long-haired Plume Grass.
- Panicum decompositum*, one of the so-called barley grasses.
- Panicum divaricatissimum*, Spider Grass.
- Panicum trachyrrhachis*, Coolibar Grass.
- Pollinia fulva*, Brown-top or Sugar Grass.
- Stipa aristiglumis*.
- Melinis minutiflora*, Brazilian Stink Grass (introduced).

Seed of the following have also been received:—*Astrebula curviflora*, Curly Mitchell Grass; *Astrebula clymoides*, Weeping Mitchell Grass; *Anthistiria membranacea*, Flinders Grass; *Eleusine aegyptica*, Button Grass; and *Panicum decompositum*, one of the so-called barley grasses.

**FERTILISERS, 1904.**—Experiments on the same lines as stated in previous part of Report are being continued this year.

**PIGS.**—Plans for simple and convenient yards have been prepared to accommodate the stud pigs expected from England.

**SHEEP.**—Arrangements for keeping the nucleus of a flock have not been completed yet, but as soon as ready, the instructions of the Minister and Agricultural Adviser will be given effect to.

**POULTRY.**—Similar remarks to those under sheep. One breed of fowls and one breed of turkeys are to be kept.

**IMPROVEMENTS.**—In carrying out the instructions of the Agricultural Adviser, plans for the housing of threshing plant and implements have been prepared, together with additional plans for the accommodation of expected stock.



VINEYARD, 1904.—With the exception of a few rows of vines, the vineyard has been grubbed out.

ORCHARD, 1903.—Taken throughout, the season was favourable for fruit production, but the fruit fly pest was very much in evidence, although the usual precautions were taken.

Over 1,200 cases of fruit were marketed. Prices for first-grade, good quality stuff were good, but for bulk consignments on the open market the reverse of this proved the case, which may be accounted for by the general glut, when buyers are limited, owing to the closing of factories which usually absorb the supply. It seems probable that unless a movement is made for dealing with surplus supplies rapidly by pulping and preserving, the same unsatisfactory conditions will rule again.

ORCHARD, 1904.—The recommendations made at the conference about the curtailment of the orchard by removal of certain trees will be given effect to.

Appended is the rainfall from 1st July, 1903, to 30th June, 1904:—

Month—1903.	No. of Inches.	Month—1904.	No. of Inches.
July ... ..	3.68	January ... ..	0.57
August ... ..	2.63	February ... ..	2.57
September ... ..	2.96	March ... ..	4.45
October ... ..	3.19	April ... ..	1.47
November ... ..	2.77	May ... ..	2.77
December ... ..	2.63	June ... ..	0.41

H. C. QUODLING, Manager.

#### ANNUAL REPORT OF THE MANAGER, STATE FARM, BIGGENDEN.

I have the honour to furnish the following Report on the work carried out on this farm.

As the reports submitted monthly have already covered a large amount of detail work, the following will necessarily partake more of the nature of a synopsis of the year's operations.

The annexed meteorological table shows that an average annual rainfall for the district has been experienced. The only dry month was February, which, I regret to say, seriously affected the yield of the late maize crops. The cereal season was, however, a good one, and the results obtained from the various sowings were, I consider, very satisfactory.

WHEAT EXPERIMENTS.—Wheat-growing for milling purposes is practically a new departure in this district, consequently this experiment, which was carried out in a sufficiently large scale to show definite results, created much interest locally. Sixteen varieties were under observation, each sort occupying one-tenth of an acre. They were sown on the 16th May, and, having no drill, were broadcasted at the rate of a little under a bushel an acre. The following table shows yield per acre, &c.:—

Variety.	When Harvested.	Degree of Rustiness—1-10.	Yield per Acre.	Weight per Bushel.
Indian Fife ... ..	16 October	2	Bushels. 33	Lb. 64
Farrer's 84 BY ... ..	13 "	Free	33	63
Farrer's R ... ..	13 "	Trace	31	64½
Farrer's 84, A1, and B1 ... ..	16 "	Free	29½	63
Yandilla Imp. Indian ... ..	25 "	2	24½	65
Yandilla ... ..	25 "	2	24	64
Petatz' Surprise ... ..	16 "	4	24	64
Gluyas ... ..	16 "	4	23¾	63
Carmichael ... ..	16 "	3	22½	64
Silver King ... ..	28 "	2	24½	64½
Early Para ... ..	12 "	6	21½	63
Hamlyn Prolific ... ..	16 "	6	21	61
Baroota Wonder ... ..	28 "	4	17	59
Leather Head ... ..	30 "	7	11	46
Australian Wonder ... ..	30 "	8	9	44
Tangiers Variety* ... ..	30 "	2		

\* Only a small plot grown; approximate yield, 25 bushels per acre.

Only the three leading varieties will be experimented with this season. Those were sown on the 18th of the present month (May, 1904). A few short rows of the remaining sorts will be propagated, simply to test their powers of rust-resistance.

BARLEYS.—The growing of barley for malting purposes has not yet been entered upon in this part of the State. The object of this experiment was, therefore, to find out whether this crop is suitable to the district, and at the same time to see which variety was likely to do best. Five malting barleys were tried, and, with the exception of two, which were unavoidably sown late, gave a good return, and produced grain of fair quality. Heavy rains fell when in the stook, which somewhat spoiled the sample. The results obtained were as follows:—

Name.	When Sown.	When Harvested.	Yield per Acre.
Sea of Azov ... ..	14th May	3rd November	33 bus.
Hallet's Imp. Chevalier ... ..	14th May	3rd November	30 bus.
Chilian ... ..	16th May	23rd November	24 bus.
Golden Drop ... ..	16th June	23rd November	24 bus.
Windproof ... ..	16th June	23rd November	20 bus.

Successive sowings of the Cape and Nepaul varieties were made, and used during the winter months as green fodder. Both gave heavy yields. The skinless—or Nepaul—sort is much the earlier of the two, but has the disadvantage of being the more subject to rust.

MAIZE.—The field set apart for the experiments in connection with this crop was reserved for several new varieties which were expected to arrive from America. As those were, unfortunately, not likely to come to hand until late in the season, and the weather being favourable for planting, a further sowing was made on the 1st of September of seed specially selected from those varieties grown the previous year.



The yield from the respective sorts were as follows:—

	Harvested.		Yield per Acre.	
Golden King ... ..	23	January	101	bushels, 2 cobs to stalk
Hawkesbury Champion ... ..	23	"	89	" " "
Piasa Queen ... ..	15	"	88	" " "
Leaming ... ..	2	"	87	" " "
Golden Nugget ... ..	25	"	86½	2 cobs
Golden Beauty ... ..	23	"	86½	"
Early Yellow Dent ... ..	10	"	86	"
Riley's Favourite ... ..	5	"	66½	"
Early American... ..	5	"	66	"
Legal Tender ... ..	7	"	64	"
Argentine ... ..	19	"	63	2 cobs
Hawkesbury Champion Hybrid	23	"	53	"

The following varieties came to hand from America on the 14th December, and were planted next day:—Hickory King, Kansas Sunflower, Forsyth's Favourite, Snowflake, and Golden Beauty. The germinating qualities of the lastnamed were not too good. However, the other sorts came up splendidly, and made very good growth. Unfortunately, little or no rain fell during the month of February, when the plants had reached the tasseling stage, but the crop was allowed to mature so as to make certain of preserving seed for further experiment. All varieties have been harvested, but only the Hickory King has been shelled out, this giving a yield of 20 bushels per acre, a far better result than was anticipated.

A second sowing of the American varieties was made on the 16th January. No rain falling during February, however, gave the crop a very severe check, but the following month being more favourable it recovered itself wonderfully, and the result is expected to be considerably better than that secured from the former planting.

A small patch of the Cuzco or Giant American maize was grown, but the term "Giant" seems somewhat of a misnomer. The height of the stalk was only 6 feet, and the cobs were the smallest of any variety grown on the farm.

**FODDER CROPS.**—*Oats*: Two varieties were grown—the Algerian and Tartarian. The Algerian was practically free from rust, and gave a very heavy crop, which was converted into hay of a first-class quality. The Tartarian was rather badly attacked with rust during the earlier period of its growth, but recovered a good deal after coming into ear. It was also cut for hay, and secured in splendid order.

*Sorghums*.—The purpose of this experiment was to find out the variety that would produce the heaviest yield, together with high-feeding quality. The seed sown was that specially selected from last season's crop. The method of planting was in rows, 3 feet apart. The feeding value, by analysis, has not yet been determined. The weight of green material produced by the respective sorts is given below:—

Variety.	Height.		Weight per Acre.		
	Ft.	in.	Tons	cwt.	qr.
Planters' Friend ... ..	8	6	26	19	1
Collier ... ..	8	0	23	15	1
Giant Honduras ... ..	10	0	21	18	0
Teosinte ... ..	6	0	21	8	0
Saccharatum ... ..	10	0	17	9	2
Coleman ... ..	8	0	16	4	0
Folgers' Early ... ..	6	0	15	10	0
White Kafir Corn ... ..	7	0	14	0	3
Early Orange Cane... ..	7	6	14	0	3
Amber Cane ... ..	5	3	10	5	2
Brown Dourra ... ..	4	6	5	8	0
Egyptian ... ..	4	9	5	8	0

*Millets* (Sown 6th January. Field 6).—Each sort was tested, both broadcast and in rows. The crop was intended for hay, but the absence of rain during February so stunted the growth that, with the exception of the Pearl variety, it was allowed to run to seed.

Particulars of growth, &c., are as follows:—

Pearl Millet (*Pennisetum spicatum*).—Good crop. Splendid green-fodder plant, also makes fair sample of hay when sown broadcast.

Hungarian Millet (*Setaria germanica*).—Light crop. Fair yield of seed.

*Setaria italica*.—Same remarks apply as to the Hungarian.

*Panicum Milaceum*.—Entire failure; has been so for the previous two years. Evidently not suitable to the district.

Yellow Millet.—Came up well, but afterwards died out.

Texas Millet.—Produced a fair crop, but very late.

Japanese Millet (*Panicum Crusgalli major*).—Only grew to a height of some 12 inches. Very light crop of seed.

**GRASSES.**—The whole of Field 1 has now been set apart for the testing of grass varieties likely to prove suitable to this district and to the State at large. Special attention is being given to those varieties that are at their best during the winter months. Several promising sorts have been added to the collection during the year. All new grasses are first propagated in small plots. Those showing undesirable qualities are destroyed, while those showing special merit are further tested in larger areas, and also amongst the natural grasses in the stock paddocks. It will, however, take several seasons before reliable data can be furnished with respect to their suitability to the district, feeding value, drought resistance, and best methods of propagation. The varieties experimented with, together with a few observations concerning each, are as follows:—

*Paspalum dilatatum*.—Makes splendid growth where the soil has been cultivated, but has not spread to any extent where planted out in the grass paddocks.

*Paspalum galmarra* (Russell River Grass).—Fine pasture grass, and much easier to establish amongst the natural grasses than the above.

*Paspalum platycaule*.—Died out during the hot, dry weather.

*Panicum spectabile*.—Remarkable grower. Sent out shoots 18 feet long in two months. Has yet to be tested as a winter grass. Would not recommend its being planted near cultivation.

Perennial Rye.—Grew well during the winter, but died down in January and February. Suitable for either hay or pasture.



Italian Rye.—A biennial, suitable for hay, but not for pasture.

Timothy.—A hay and pasture grass. Rather difficult to establish. Growth only fairly satisfactory.

Prairie.—One of the best winter grasses grown on the farm. Seeds very freely. Suitable for hay and pasture.

Meadow Foxtail.—Promises to be a good winter grass. The best of the "Meadow" family grown.

Meadow Fescue.—A rather hardy grass. Should prove valuable as a mixture in laying down pasture.

Evergreen Meadow.—Rather poor growth so far.

Rough Stalked Meadow.—Same remark applies as to above.

Rib Grass.—Grows well, both summer and winter. Not suitable for sandy country.

Cocksfoot.—Only fair growth last season, coming on much better now.

Sheep's Fescue.—Very poor growth. Not worth growing.

Crested Dogtail.—A wiry grass of apparently little or no value.

Sweet Scented Vernal.—Died out during hot summer months.

Guinea Grass (*Panicum maximum*).—Made enormous growth. Only useful as a green fodder, as it will not stand being pastured. Requires using early, as it gets hard and wiry when reaching maturity.

Mitchell Grass (*A. pectinata*).—A very promising grass, possessing great drought-resisting powers.

Mitchell Grass (*A. triticoides*).—Similar to the above, but of somewhat coarser habit.

Mitchell Grass (*A. elymoides*).—A fine pasture grass, having a tendency to creep, and sprout at the joints.

Red Clover.—Did remarkably well, and, contrary to expectation, kept quite fresh and green during the hot summer months. Will be further tested as a hay crop.

White Dutch Clover.—Of a much more dwarf habit than the former. Died down during January and February.

SALTBUSHES.—A plot—one chain long and half a chain wide—of "Old Man" Saltbush, planted out two years ago, continues to make good headway, indicating that the soil and climate of this district are suitable for its successful propagation.

During the year, equal areas of the semibaccata and halmoides varieties have been laid down. The former is of procumbent habit, while the latter only attains a height of 1 or 2 feet. Several other sorts are in the germinating beds ready for transplanting.

ROOT CROPS.—The experiments carried out in the testing of various root crops have been of much interest, and is likely to prove of great value to those engaged in the dairying and pig-raising industries. The results so far obtained go to show that the climate and soil of this locality is eminently suitable for the successful raising of this class of crop. The mangel-wurzel has come out the best as the root giving the heaviest yield, combined with good keeping qualities. Vilmorin's improved sugar beet, although giving a much lighter crop, grew to perfection. Pigs are very fond of this root in the raw state. The swede turnips also did well, and have the advantage of coming to maturity much earlier than either the mangel or beet. We find, however, that the pigs do not take readily to them, unless they are boiled.

Details as to time of sowing, cultivation, will be found in the *Agricultural Journal* for April, 1904.

The yields obtained per acre from the sorts grown were—

Long Red	...	...	...	73 tons.	Purple Top Swede	...	...	20 tons.
Long Yellow	...	...	...	69 "	Champion Smooth Swede	...	...	20 "
Yellow Globe	...	...	...	69 "	Kohl-rabi	...	...	15 "
Sugar Beet	...	...	...	34 "				

The root crops at present under observation are:—

*Mangels*.—Long Red, L. Yellow, Yellow Globe.

*Sugar Beet*.—Vilmorin's Improved.

*Turnips*.—Skirving's Purple Top, Champion Smooth, Imperial P. Top, Green Top Swede, and Aberdeen Yellow.

*Kohl-rabi*.—Large Purple and Large Green.

*Field Carrots*.—White Belgian and Long Red Surrey.

GREEN FODDER CROPS.—These are being experimented with to determine the crop that will provide the best supply of green material for dairy stock during the winter months. Successive sowings have been made of the following varieties, commencing on the 21st March:—

Nepaul—or Skinless Barley.	Field Peas.
Cape Barley.	Cape Barley and Field Peas.
Thousand-fold Rye.	Rye and Field Peas.
Algerian Oats.	Oats and Field Peas.

All sorts are coming on well, but it is too early yet to express an opinion as to their respective values.

A small area of Dwarf Essex Rape was sown on the 4th April, both broadcast and in rows. This is doing splendid, and gives promise of a heavy yield.

The same remarks apply to two varieties of buckwheat—viz., Silver Hulled and Japanese, sown on the same date.

SWEET POTATOES.—Special attention has been paid to the successful raising and improvement of this crop. Different methods of planting have been tried, in order to find out which would prove the most suitable to the class of soil on this farm. Four varieties are being tested, each on the flat, 3-foot hills (single row), 4 feet 6 inches hills (double row). The crop has not yet arrived at maturity, but the returns so far obtained are slightly in favour of planting on the flat, although last season the 4 feet 6 inches hill gave best results.

GREEN MANURING CROPS.—The following is a list of the leguminous plants grown for the purpose of testing their suitability as green manures:—

*Cowpeas*.—White's Perennial, Black, Large Black Eye, Small Black Eye, Grey, Clay, Large Purple, Small Purple, Piebald, Large White.

*Beans*.—Florida Velvet, Green Mauritius, Black Mauritius, Mottled Mauritius, Small Mauritius, Narico, Tonga, Poor Man's, Red Sword, Madagascar, and Climbing Lima.

The cowpeas were sown on the 26th, and the beans on the 28th September. The position occupied by the respective sorts, as to the amount of vine produced, is practically the same as that recorded the previous year. The true value of this experiment, however, depends upon the chemical analysis of the vines, and the soil in which they are grown. This has not been determined, and until the services of a chemist are available, experiments with green, as well as with other manures, will be largely of a negative character.



**MISCELLANEOUS CROPS.—Cottons.**—The seed was sown 24th September, in rows 5 feet apart, the seedlings being afterwards thinned to a distance of 3 feet. The varieties under observation are:—Jones's Big Boll, Truitt, Braddy, Culpepper, Parker, Christopher, Russell, Doughty, Seabrook, Fijian Hybrid, and Caravonica. With the exception of the latter, which was attacked by a fungus disease in the stem, all sorts made splendid growth. The yield of lint was good, but had rain fallen during February, when the plants were full of boll, the returns would have been exceptionally heavy. The area grown is too small, each variety only occupying a row 1 chain long. To arrive at a correct estimate as to yield per acre, moreover, owing to the interest that is now being taken in connection with cotton-growing, visitors, more especially those who have previously grown the product, are anxious to examine the lint, which ultimately finds the way into their pocket, with the remark: "I'll keep those seeds and plant them." Mr. Bottomley examined the cotton in the field, and expressed himself highly satisfied with the appearance of the plants and the quality of the lint, pronouncing Russell and Jones's Big Boll as producing the best samples. The above remarks only apply to the Upland varieties. The Seabrook and Fijian Hybrid sorts have developed into much larger bushes, are much later in coming into bearing, and although at the time of writing they are full of flower and boll, the season will, I am afraid, be too short to obtain anything like a fair picking.

**Tapioca or Cassava (Sweet?)**—From the few plants grown the previous season, sufficient cuttings were obtained to plant out a fairly large area. The cuttings were planted on 27th August, in rows 6 feet apart, with the same distance between the plants. Not a single miss occurred, showing that the propagation of this crop is an extremely easy matter. The young shoots appeared above the ground in less than three weeks, and since that time has attained a height of 4 feet 6 inches, spreading in the rows so as to completely cover the ground.

A number of cuttings of a variety recently procured from Brazil, and quite distinct to the above, were obtained and planted at the same time. This is of a more tall and less spreading habit, and produces short, thick, purplish-coloured roots. Neither variety has yet reached maturity. Further details in connection with this crop will appear in the *Agricultural Journal* at an early date.

**Sugar Canes.**—Of the thirty varieties grown, only a few have produced cane fit for crushing purposes, showing that even in a favourable season the soil and climatic conditions existing on this farm are unsuitable to the successful raising of this crop.

**Garden Crops.**—A large variety of those were raised for educational purposes, and exhibited at various agricultural shows held in the Burnett and Wide Bay districts.

**ORCHARD AND VINEYARD WORK.**—During the greater part of the year the work in connection with those branches was respectively under the superintendence of the Assistant Instructor in Fruit Culture, Mr. Voller, and the Viticulturist, Mr. Rainford.

With respect to the orchard, there is little to report, as the trees are not yet under bearing. The citrus trees, which made so little growth during the past two seasons, have responded to the altered climatic conditions, a good growth being the result. The Japanese and other plums have also done well, but the peaches are more backward.

The returns from the vineyard can only be put down as fair. This is to be accounted to the adverse conditions experienced the previous year, which affected the fruit-bearing wood. The best returns were obtained from the Mauzac, Madeline Royal, Pedro, Mataro, and Mrs. Pince. Many other sorts promised well, but, owing to the non-setting of the blossom, or what is technically known as "coulure," there was little or no crop. Those most affected were:—Boal, Gordo Blanco, Ferd de Lesseps, and Black Prince. A large number of varieties, new to the district, as well as several seedling grapes, are expected to come into bearing during the coming season. A great many applications were received for cuttings, the demand being greater than the supply.

**LIVE STOCK.—Pigs.**—There has been a great demand for pigs, consequently no difficulty has been experienced in disposing of the progeny of the brood sows. The services of the stud boar have been largely availed of, no fewer than fifty sows having been received for service during the past eleven months. The number of purebred Berkshire pigs at present on hand are:—2 stud Berkshire boars, 2 stud Berkshire breeding sows, 1 young boar, and 2 young sows.

**Stud Bull.**—The Jersey bull, "Lord Harry," was sold on 14th January, and has not yet been replaced. The number of cows received for service for the six months previous totalled twenty-seven.

**Horses.**—There are three draught horses and a saddle mare on the farm. Arrangements are being made to replace two of the draughts that are getting too old for work for younger animals.

**IMPLEMENTS.**—All implements, machinery, &c., are in good repair. The only new addition was a corn-planter with fertiliser attachment.

**VISITORS.**—It is gratifying to be able to report that the number of visitors to the farm is largely on the increase, 1,409 being recorded for the eleven months ending 31st May. Most of these were men interested in agricultural pursuits. A visit of inspection was paid by the Hon. D. H. Dalrymple, M.L.A., and delegates to the Agricultural Conference.

A collection of the products grown on this farm was exhibited at the following shows:—Degilbo, Biggenden, Maryborough, Isis, and Bundaberg. This work necessarily entailed a large amount of extra labour, but it is pleasing to know that the efforts made to make the exhibit as interesting and instructive as possible were appreciated by the respective societies and the general public.

In conclusion, I would beg to give a brief outline of the operations to be undertaken during the coming year.

The general lines of work already detailed will be followed out, the chief aim in view being the improvement of crops by seed selection, cultivation, together with the introduction of new varieties.

The experiments with maize will in future be confined to one or two varieties, it being impossible to grow more in the small area available for this crop, and keep them true to type. The object will be to breed a maize not only prolific but possessing high feeding qualities.

Only a few of the most approved varieties of wheats and barleys will be grown. The hybridising and testing of new sorts will not be entered upon, but left to the farm that is to make a speciality of those crops.

Careful experiments will, however, be carried out in the raising of various fodders and roots likely to be required in the dairying and pig-raising industries. The effect of artificial manures on the growth and feeding value of those crops will also receive attention.

The work in connection with the testing of various pasture grasses and shrubs will be greatly extended. Not only will varieties that have done well in small experimental plots be grown in larger areas, but their value will also be determined in the improving of natural pastures.

Further efforts will be made to improve the sweet potato by such means as selection and cultivation. An attempt will also be made to raise new varieties from seed.

Previous experiments, conducted on a small scale, have shown that broom millet is likely to do well in this district, therefore sufficient fibre will be grown to test its market value.

Cotton-growing will be carried out on a much larger scale than hitherto. Upland, Sea Island, Egyptian, and various hybrids will be grown in order to ascertain the variety most suitable to the climate and soil of this district. Different methods of planting will be adopted to test the effect of such on the time taken to reach maturity.



In the event of a chemist being available to make the necessary analysis, the further testing of plants suitable for green manuring purposes will be undertaken.

Cassava will also be grown in larger quantity. The various sorts will be tried as a pig food against other root crops. The starch contents of the roots will also be determined, and the market value of such ascertained.

Careful records will continue to be kept of the suitability or otherwise to the district of the various kinds of fruit trees and grape vines grown on the farm, also their behaviour under the different systems of pruning adopted. This information will at all times be available to those interested in those branches.

A large number of field and garden crops will be raised, in addition to those already enumerated, for educational purposes, and new varieties experimented with.

I am gratified to learn that the recommendations recently made with reference to increasing the stud stock—dairy cattle, pigs, and fowls—have been approved of. Accommodation for those additions will have to be provided, which will mean additional expenditure, but this, I am pleased to say, will be more than compensated for in the increased usefulness of the farm.

The outlook for the coming year is at the present time very promising.

ABSTRACT of METEOROLOGICAL OBSERVATIONS taken at STATE FARM, BIGGENDEN, for the YEAR ending 30th JUNE, 1904.

Temperature.	1903.						1904.						Averages, &c.
	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	April.	May.	June.	
Extreme maximum ...	78.0	79.5	85.0	88.5	88.0	94.0	96.0	102.0	102.0	91.0	80.5	76.5	Extreme maximum reading, 102.0, on 13th February and 1st March.
Mean maximum ...	70.6	72.0	77.4	79.4	81.5	87.2	88.0	89.9	85.3	78.9	76.0	70.7	Mean maximum temperature, 79.74.
Extreme minimum ...	27.0	29.5	36.0	44.0	48.0	51.0	54.5	45.0	51.0	48.0	31.0	22.0	Extreme minimum reading, 22.0 on 27th June.
Mean minimum ...	43.1	42.5	46.3	51.1	53.4	60.1	60.8	58.8	58.1	55.7	48.6	34.2	Mean minimum temperature, 51.05.
Extreme terrestrial (thermometer on grass)	20.0	22.5	28.0	35.0	36.0	44.5	50.0	43.0	41.0	38.0	28.5	13.5	Extreme terrestrial reading, 13.5, on 26th June.
Mean temperature ...	56.8	57.3	61.8	65.3	67.4	73.3	74.4	74.3	71.7	67.3	62.3	52.5	Mean temperature, 65.36.
Rainfall—Inches ...	3.90	1.62	2.23	2.77	4.37	5.62	7.48	.71	3.16	2.92	2.29	.71	Total rainfall, 37.78 inches.
Number of days on which rain fell	7	7	6	5	6	9	8	3	12	13	9	3	Total number of days rain fell, 88.

G. B. BROOKS, Manager.

REPORT OF THE MANAGER, STATE FARM, GINDIE.

SIR,—In submitting my Annual Report, I regret to have to state that the wheat crop was a failure, owing to the dry season that prevailed in this part of the State. Sowing was commenced on the 1st of May and continued up to the end of June. The varieties and areas were:—

	Acres.
Marshall's No. 3	41.13
Budd's Early	11.21
Dart's Imperial	24.60
Allora Spring	37.16
Thirteen Varieties	11.70
Rye	2.1
Oats	1.0

There was sufficient rain in May to give the seed a good start, but none fell in June, and only 0.87 in July, and 0.97 in August. This would have been sufficient to keep the wheat going if there had been good rains in the previous season to wet the subsoil. For September and October the rainfalls were 1.58 and 1.96. This brought up some of the later-sown wheats that had been buried a fair depth, but as the previous rain had germinated the seed near the surface (which perished with the heat), the portion brought up by the late rain was too thin to be of service. Had it been drilled in, I am of the opinion that there would have been a fair crop.

On 16th September a start was made to plant a few acres with broom millet and a few varieties of sorghum. Both these crops came up very unevenly, but made fair growth until near maturity, when the heat and want of rain gave them a severe check. In November we were favoured with two storms, but the rain fell so rapidly that it did little good except in the hollows, where it lodged for a time. In the places where the broom millet received some benefit from these storms, there was some very fine brush, part of which was forwarded to Brisbane for sale. I am unable to definitely state what the yield per acre would be, owing to the crop being so uneven, and the fact that a portion of it was so discoloured with aphid, which rendered it unfit for sale, but I should think 800 lb. would not be far from the truth.

The 8 acres of maize planted in September did not cob except in a depression that ran through the land on which it was planted. That which did not cob was cut and stacked with the sorghum, and made into ensilage, but as there was not sufficient bulk of these crops to make a stack more than a few feet high, the proportion spoiled on the outside is rather great.

An attempt was also made to find out if fat-hen could be converted into ensilage. A quantity of this weed had to be taken off a portion of land that was required for maize. It was cut with the binder and stacked while fresh. This experiment would have been more successful if the material had been allowed to remain in the paddock for two or three days, to allow some of the moisture to escape. As it was, the temperature rose too high. This might have been prevented if the stack had been heavily weighted. If this experiment is repeated, provision will be made for adding pressure to the stack with wires.

In October 3 acres of cowpeas and 6 acres of panicum were planted. The cowpeas did fairly well until the grasshoppers attacked them, which gave them a severe check. Rain fell shortly afterwards, which revived part of them, and they will yield sufficient seed for next season's sowing.

The panicum did very well, and yielded a nice cutting of hay. In November a further area of 6 acres of maize was planted, also 5½ acres of panicum and three rows of hybrid cotton. The cotton did very badly; it made but little growth, and did not blossom.

There was every prospect of a crop of maize from that planted this month, but the grasshoppers made a clean sweep of it. I endeavoured to drive them from this paddock with smoke, but it was of no use, as the country for miles round was literally alive with them.

The 5½ acres of panicum yielded a very nice cutting of hay.



A few acres of maize were planted in December and January, but had not a chance to get above ground, as the grasshoppers were waiting for it, and only a stalk here and there escaped them.

A few tons of bush hay were cut with the binder. Unfortunately, only a portion of the sheep paddock where the grass grew was clean enough for this purpose. Had it been otherwise, a greater quantity would have been saved, as I have a very high opinion of the hay made from the natural grasses of this district, provided it is cut at the proper time—that is, just as it is coming into bloom.

The time during February and March was occupied principally in ploughing and removing weeds from the different portions of the cultivation paddocks, to enable us to get the land ploughed and worked up fit for wheat.

On the 18th of April a commencement was made to plant  $7\frac{1}{2}$  acres of Algerian Oats. The land on which it was sown was in good condition. It was ploughed, and the seed sown on the sod, after which it received two strokes with the harrow, and was then gone over with a light wooden roller. I am pleased to state that at present date there is every prospect of a splendid crop; in fact, I do not think it would be possible to find a crop looking better.

The lucerne was worked with the spring-tooth harrow, after which the smoothing harrow was put on to collect the weeds. Owing to the heat and want of moisture a number of the young plants died last summer, which left this crop rather thin. A part of it was resown, and came up very well, and at present date there is a fine crop, from 2 to 3 feet high, ready to cut. This demonstrates clearly that in a favourable season good crops of lucerne can be grown. I hope to plant a further area of lucerne next season, as there is land on the farm better adapted for this crop than where it is growing at present.

On 1st May a commencement was made to plant wheat. As the land had worked down very smooth, there was no chance of covering the seed with the harrow, and as using the seed-drill was out of the question I was compelled to go over the land with the spring-tooth harrow and corn cultivator, after which the seed was sown, harrowed, and rolled in the usual way:  $57\frac{1}{2}$  acres of Marshall's No. 3 and 1 acre of oats were put in in this way. The whole of this portion was nicely up when the Agricultural Adviser was here, and he appeared to be well pleased with the healthy look of the crop.

Owing to the rain, the black soil was too sticky to work comfortably, and the opportunity was taken to try some wheat and oats on the sandy country that was cleared for grape vines; 2.33 acres of the former and 5.6 of the latter were planted. This land was covered with a heavy coat of weeds, which were ploughed in and the wheat sown as fast as the ground was ploughed. It was then harrowed and rolled. This seed is all up, but I am not pleased with its appearance. It has a very stunted look in comparison with that which is younger, but was sown on the ordinary farm land.

Twenty-seven acres of Dart's Imperial have also been sown. As this land was fairly rough the seed was sown broadcast, after which it received one stroke with the heavy harrow, followed by the seed-harrow, and afterwards rolled. The greater part of this is up, and looking excellent.

Seventeen and one-sixth acres have been planted with the following varieties:—Manitoba-grown Red Fife, Bobs, Hermitage No. 1, Hermitage No. 2, Battlefield, and Dart's Imperial. This 17 acres has been put in with the spring-tooth harrow with a sowing attachment, which works nicely. There are a few acres yet to sow with wheat, and a considerable area with barley, should the weather permit.

In April a small sowing was made of White Belgium carrots, field swedes, mangolds, a dwarf Essex rape, all of which have made good growth.

The area at present under crop is as under:—

	Acres.
Wheat ... ..	104.6
Oats ... ..	13.8
Lucerne ... ..	3.0

In concluding this part of my Report, I wish to state that at no time during my residence here have the prospects been as hopeful as at present. During June only 43 points of rain have fallen, yet all the crops are looking as well as one could wish. If we are fortunate enough to get a shower in July and August, there is little doubt but what there will be a good crop of wheat.

**CATTLE.**—In June last year the number of head returned was 141; 61 head have been sold during the year. The present number of cattle on hand is 111, including one Ayrshire bull transferred from Westbrook to this farm in July last. Up to the present, there are 13 head of half-bred Ayrshire calves. I have already received offers for some of them as soon as they are weaned.

I may state that all the stock on the farm is in splendid condition, so much so that a number of heifers had to be brought in and attended to twice daily, owing to the large quantity of milk which they had.

Particulars of cattle sold are as under:—

	£	s.	d.
55 head bullocks, at £6 5s. ... ..	342	5	0
4 barren cows, at £5 5s. ... ..	21	0	0
1 heifer, sold to Mr. Cowan, of Westwood (misses when removing cattle from the Dee)	2	0	0
1 mumpy bullock unfit for slaughter ... ..	0	15	0
To service of Ayrshire bull ... ..	0	10	0
Total ... ..	£366	10	0

It is intended in future to make considerable alteration in the working of this farm, and run it on the lines of what a paying homestead should be. This will not prevent the carrying out of any experiments that the Department or the manager may think advisable. The small herd of cattle here has been a source of profit. It is intended to purchase crossbred ewes, for which I am now in treaty. These sheep will be put to Cotswold or Southdown rams, as it is anticipated that by so doing a good-sized early-maturing lamb, that will be fit for the local market or freezing, will be the result; but, whatever the result of this may be, these sheep are bound to be a source of profit. They would not only be very useful at a time like the present in keeping the wheat eaten down, but would also be of great service in keeping the cultivation paddocks clean in the intervals between crops. During the present season it has taken a considerable amount of labour to get rid of grass and weeds to enable us to get the land fit for wheat. By the sale of the increase and a little wool from time to time, these sheep assist materially in keeping down the expenses of the farm; and I am of the opinion that, with the addition of twenty-five head of female cattle to those already on the farm, it will not only be self-supporting, but will show a profit, provided anything like reasonable seasons are experienced for the next two or three years. Then any good that may be done will cost the State very little, if anything.

Some purebred fowls have already been placed on the farm. It is intended also to keep American bronze-wing turkeys, so that anyone in the neighbourhood may procure the eggs if they require them.

During the summer a number of varieties of broom millet, also several kinds of cotton, and a little tobacco, and 1,000 sisal plants will be planted. These will be distributed about the farm, so that the knowledge may be arrived at as to what kind of soil is most suited for them. Should the season be favourable, planting of maize and sorghum will be made, with the object of converting them into fodder, in the shape of hay and ensilage. Crops such as panicum, cowpeas, &c., will also be sown.



Should there be sufficient rain during the coming summer to enable the natural grass to make a good growth, every effort will be made to save as much as possible of it in the shape of hay, and at least one trial will be made to find out if it can be converted into ensilage. Unfortunately a large portion of this farm is too stony to allow the mower or binder to be worked on it, but should the opportunity offer these machines will be worked wherever it is safe to run them.

In conclusion, I may state that the Daniels Bros. have 300 acres of wheat, which is all above ground, and looking well. That, with what is already planted on the farm, makes a total of 404 acres in this immediate neighbourhood, and it is my sincere wish that a bountiful harvest may be the result, and that it may be followed by many others, so that both stock-owners and those engaged in agriculture may have an opportunity to recover from the serious losses occasioned by the late drought.

The rainfall and number of wet days during the year is as follows:—

	No. of Wet Days.	Rainfall.
1903—July ... ..	2	0.510
August ... ..	3	0.970
September ... ..	2	1.580
October ... ..	5	1.965
November ... ..	7	3.610
December ... ..	4	4.230
1904—January ... ..	6	1.460
February ... ..	4	1.400
March ... ..	5	1.830
April ... ..	8	4.810
May ... ..	7	1.650
June ... ..	2	0.430
	55	Total rainfall ... 24.44 inches.

ROBERT JARROTT.

#### REPORT OF THE MANAGER OF THE STATE NURSERY, KAMERUNGA, CAIRNS.

Sir,—I have the honour to submit my Report for the past season.

A very regular season has been experienced; rain has fallen every month, and the mean temperature has been within 69 degrees and 79 degrees Fahr.; the lowest minimum attained was 66.16, the greatest maximum was 97.0, neither extremes being as great as for several seasons past. The terrestrial radiation thermometer did not record anything lower than 40 degrees Fahr. The rainfall, as is usual here, was less during the latter months of the year 1903 and the earlier of the official year, and more during the latter part of the season being reported on (*i.e.*, the first few months of calendar year 1904), the total fall for the ten months being 78.720. The rainfall for the whole season will probably prove less than last year by a good many inches, and the number of wet days be also less, but the rainfall has been more generally beneficial on account of its having been more evenly distributed over the whole year. No floods have been experienced in the district.

This season has been a good one for general growth, and the permanently planted economic trees, as well as plants and shrubs, have one and all exhibited a vitality in the matter both of lateral and vertical growth, and increase of girth, &c., that has not been noticed in one season for many years past.

Several valuable items have come into bearing for the first time this season, and others have shown a general tendency to mature that is pleasing, especially in view of the length of time elapsing between the germination of the seed and the harvesting of first fruits of some of the more valuable economic products. Seedlings have, in some few instances, suffered from the continued damp, but the number of plants and seed successfully propagated and grown has been greater than any previous season. Some wind was experienced from time to time, corresponding with the rough weather on the coast, and although not cyclonic in character, a few of the more brittle trees were blown down or broken. The large weeping-fig in Field 2, Sec. I., which was first damaged in the cyclone "Leonta," was blown entirely down, and one or two ceera rubbers in Field 1, Sec. I., also.

The applications for plants and seeds, &c., which were somewhat less than usual last year, owing to the unfavourable season, have increased again, and the return for the ten months shows an enhanced appreciation by the public of this portion of the nursery's work by a greater quantity of seed and plants distributed than during the twelve months of last year. Applications have been received from, and seed, &c., sent to, all parts of the Commonwealth and adjacent islands, Africa, America, Asia, and Europe.

The following are the totals of distribution:—Seed, 1 cwt. 2 qr. 24 lb. 8 oz.; plants, 2,491; bulbs and rhizomes, 1 cwt. 3 qr. 9 lb.; cuttings, 1,378; grass roots (mainly *Paspalum dilatatum*), 22,452; suckers, 453; sundries, about 1½ cwt. divi divi pods; 96 items to Townsville State school, and 111 items for Melbourne Exhibition.

The amount of correspondence has remained about the same. A trophy from the Nursery was sent to the shows at Port Douglas on the 26th August, 1903, and Cairns on the 4th September, 1903, which were much appreciated. The number of shows attended was less than previous years, owing to the effects of the bad seasons on the finances of the associations. A collection of exhibits, consisting of 111 items, was hastily got together during the year, at very short telegraphic notice, and despatched to Melbourne. A collection of seeds, &c., in bottles, and economic items for practical demonstration educationally, was supplied to the State school, Townsville West.

The general expenditure on the nursery has also been less than last season. The number of visitors has again been on the increase. His Excellency Sir Herbert and Lady Chermside twice visited the nursery, and also a number of distinguished visitors from Queensland and the Southern States. The Agricultural Adviser and the Instructor in Fruit Culture have visited and inspected the nursery during the year, and Mr. Mitchell, of the Brisbane Acclimatisation Society, also visited.

The pump was this season under water, but no damage was done, and it has worked satisfactorily before and since submersion. The boiler, as well as the irrigation plant generally, is in generally good order. The buildings are in a fair state of repair, but require painting very badly, both inside and out. The effect of the recent wet weather is becoming evident.

IMPROVEMENTS.—The fence on the roadside of the horse paddock required replacing, the posts having become white ant eaten and rotten. This was done with the nursery hands, two bean-trees being felled in the adjacent State nursery reserve, fence posts split out, and put in. A shed was built for agricultural implements when not in use, as a lean-to to the stables, in which the tools, &c., had hitherto been kept at much general inconvenience. This was necessary, as no barn exists on the nursery, nor is one, for any other purpose, required.



A new dray-shed was also erected, and the forge and blacksmith shop removed from under the office to new quarters near the stables.

No artificial manure being available this season, as supplied by Dr. Maxwell last year, no special manurial experiments were conducted.

The following, while mentioning some of the special items cultivated under the separate headings, shows the field work done during the past season, and also forecasts the work proposed to be done during the next season.

**CITRUS FRUIT TREES.**—In Field 3, Section 33, II., the list of special citrus trees mentioned in last year's report are generally doing well. The Scarlet and Emperor mandarin, Ellendale Beauty, and Washington navel oranges, have perhaps done best. The variegated lemons have also done very well, and it is anticipated that this will prove a valuable lemon for the tropical climate. The trees were not sufficiently large to take buds from this season. In the citrus nursery, however, stocks have been raised, and it is proposed to bud them this coming season from a number of the better varieties of citrus fruit in the orchard, and a limited quantity of worked plants will subsequently be available. The field in which the citrus orchard is situated was ploughed early in the season, and subsequently kept clean by scuffling every month, until the heavy wet season set in, when the soil, being too heavy to admit of the horse and scarifier going over it, a crop of Mauritius beans was sown between the rows. This is, now that the weather is settled again, being ploughed in, and will materially improve the texture of the soil, it being naturally deficient in humus.

**BANANAS.**—In the same field (Field 3, Section II.) is the banana garden, consisting of some dozen varieties of the *Musa* family, including *Musa textilis*. These are also growing well, having received the same treatment as the citrus fruit trees.

**TROPICAL FRUIT TREES.**—Besides those above mentioned, some thirty-five or more essentially tropical distinct fruit-bearing trees and shrubs are being propagated. These have been collected from tropical countries in all parts of the world, and include some indigenous to North Queensland.

These are not planted together in one orchard, but are spread over the whole nursery, and receive separately the distinct treatment in the direction of cultivation and propagation each may need. Plants or seed of most of these are available. Some have not yet arrived at the fruit-bearing stage, though well established; and besides these are some, mainly from New Guinea, Samoa, and the South Sea Islands, that have been raised from the seed of edible and more or less luscious tropical fruits or nuts, but which, not being yet in flower or fruit, are not botanically named, and therefore cannot be included in these lists.

Among the essentially tropical fruits, apart from those commonly known in North Queensland, that are doing well, requiring only to be better known to be thoroughly appreciated, may be mentioned the Avacado pear, longan, vi-apple, breadfruit, jackfruit, loquat, and locust bean, &c.

**RUBBERS.**—All the rubbers have grown well this season. The most important of these, para rubber (*Hevea brasiliensis*), has made considerable and encouraging growth. The grove of these trees is in Field 2, Section II. A number bore for the first time last season, and were some of the first of this species to produce seed in Australia. Some 200 good healthy young plants produced therefrom are available. This rubber is not usually tapped until it has attained some ten years of age and a girth of 2½ feet or so. Those at the nursery are at present only five years old, but have in this short time attained an average height of 25 feet and a girth of 1 foot 6 inches at 2½ feet from the ground.

It is proposed to lightly tap five or six of the largest trees this coming season, more with the object of ascertaining the quality and percentage of rubber in the latex than the quantity obtainable per tree. Central American rubber (*Castilloa elastica*): These trees have made splendid growth. The height of the largest specimen is 18 feet, with a girth, 2½ feet from the ground, of 1 foot 11 inches—an increase of 6 feet in height and 3 inches in girth during the year. These are also in Field 2, Section II., and are now three years old. A number for the first time—being also the first of the species to bear in this country—blossomed during August and September, and ripened seed during December and January. A small quantity of seed was distributed; but, being of very short vitality, most of it was set. Some 300 plants were raised, and are available for distribution. Three of the largest of these trees have been marked for tapping in the same manner as the Heveas. Assam rubber (*Ficus elastica*): These trees have also done well, and are maturing rapidly. A quantity of plants have been obtained by the "goatee" method, and a number are always available. These trees will also be tapped again this coming season. Ceara rubber (*Manihot Glaziovii*): These have been bearing for some time, and seed and plants are available at any time. Experiments in tapping have not proved very satisfactory, the latex coagulating too rapidly over the wound. Wet weather prevented continued experiments, which are now being carried on again, and will be reported on later. In view of the ready germination of seed, and exceedingly rapid growth of seedlings, in this climate the practicability of treating the young growth by crushing would be well worth the experiment, if a cheap and simple crushing plant could be obtained. West African rubber (*Tabernaemontana crassa*): The trees transplanted last season in Field 2, Section III., are growing well, but bore only a small crop. Beans were grown between the rows during the rainy season, which are now being ploughed in. Experiments will be conducted with these, the rubber of which is obtained from the fruit, also this season. Other varieties are also being propagated, but are not yet old or large enough to make special mention of.

**FIBRES.**—Three cases, containing specimens of the fibres grown at the nursery, were prepared and mounted for the Melbourne Exhibition. Among the fibres grown at this nursery are:—

Ramie, or Rhea Fibre (*Boehmeria nivea*).—One row in Field 2A, Section I., was irrigated this season with very satisfactory results. Stools, containing about twenty-five plants, are available.

Manila Hemp, or Abaca Fibre (*Musa textilis*).—Particularly suitable for northern districts, being of the banana family. Plants available.

Sisal Hemp (*Agave rigida*, var. *sisalana*).—Quantity of plants available. Very strong growth, hardy, and paying crop.

Mauritius Hemp (*Fourcroya gigantea*).—Long leaves (8 to 10 feet). Quantity of plants available.

Bombay Hemp (*Agave vivipara*).—Strong growing, easy of cultivation.

Pita Fibre (*Agave Americana*).

Bow-string Flax (*Sansevieria guineensis*).—Easily cultivated, and fibre easily extracted.

New Zealand Hemp (*Phormium tenax*).

Kitool Fibre (*Arenga saccharifera*).—A palm-tree producing a large quantity of fibre of a black colour used for brushes and brooms.

Pineapple Fibre (*Ananas sativa*).—A silk-like fibre, very fine and soft.

Annatto Fibre (*Bixa orellana*).—Very easily grown from seed, and easily extracted. A strong brown fibre.



COTTON.—The following varieties have been tried during the year:—

1. Eldorado—Did well; good cropper.
2. Truits Big Boll—Did well; good cropper.
3. Lewis' Prize—Did well; good cropper.
4. Russell's Big Boll—Did well.
5. Matafi—Grew the best of any, and bore the heaviest crop.
6. Barbadiensis—Medium crop.
7. Truits—Did very well. Good crop.
8. Jones' Big Boll—Did very well. Good crop.
9. Braddy—Died out after cropping. Apparently requires a drier climate.
10. McLean—Seed received late; not cropped yet.
11. Parker—Did very well.
12. Doughty—Did very well.
13. Culpepper—Did very well.
14. Christopher—Did very well.
15. Russell—Did very well.
16. Seabrook—Plants grew well, but a shy bearer.
17. Caravonica—Did not do as well as hoped and expected.
18. Kidney S.I.—Seems very well suited to climate. Heavy cropper.
19. Egyptian Upland—Seems very well suited to climate. Heavy cropper.

These were planted out in Field 3, Section II., on the plot utilised for artificial manure experiments last year, in September; the bolls ripened in February. Owing to limited area only two or three trees of each could be grown. The Sea Island varieties easily lead in points of growth and crop-bearing under our conditions. The Matafi particularly did very well. All stood the wet season well, except the Braddy. After cropping the plants were lightly pruned back, but not taken out; new wood was immediately formed, and most are now blossoming again for a second crop, which promises to be much larger than the first. It remains to be seen whether the blossoming and bearing will continue more or less throughout the year, or there prove to be two distinct cropping seasons. It is proposed to give special attention to these cotton varieties this season, and to record all returns, &c.

SPICES AND DRUGS.—Cloves: A few plants of this tree from the case received last year are doing very well; they are, however, slow growing. Cinnamon: Several trees are in bearing. Seed in season, and seedlings at any time are available. Two trees were cut back to induce growth suitable for taking bark. Allspice: The plants growing are still small. Seed set on 2nd March is now germinating. Pepper: The vine in the Cocoa Block is now growing well, having been treated with Dr. Maxwell's manure and carefully cultivated; but it is not yet advisable to take cuttings. It is proposed to make experiments in grafting on to the hardier indigenous stocks this season. Cardamoms: These are growing well, and seemingly are acclimatised. The plant has shown no signs of flowering or fruiting yet, however. Vanilla: All the plants polonised, some dropped off, and others set. A few pods, 7 to 8 inches in length, are now on the vines, and will shortly ripen. A valuable return of pods is expected next season.

It is not possible to enumerate each item in this Report, but among those acclimatised, being propagated and available in some form or other, may be mentioned the following:—

- Cinnamomum camphora*—Producing camphor.
- Schinus Molle*—Producing Peruvian mastic.
- Carica papaya*—Producing pepsine.
- Croton tiglium*—Producing croton oil.
- Calophyllum inophyllum*—Producing tacamahaca oil and resin.
- Erythroxylon Coca*—Producing cocaine.
- Illicium anisatum*—Producing aniseed.
- Piper cubeba*—Producing cubebs.
- Cassia fistula*—Producing cassia, drug.
- Garcinia Cochinchinensis*—Producing gamboge.

ECONOMIC PLANTS.—Among the economic plants not falling within the classes above enumerated are the beverages, of which special mention may be made of cocoa (*Theobroma cacao*), a high-priced commodity always commanding a ready sale, and eminently suited to the tropical portions of this State; worthy of more attention. The trees at the nursery are growing well. Seed is obtainable in limited quantities about July, and plants at any time. About 100 are immediately available. The pods ripen well, and the raw product requires no great technical knowledge in curing. Care must be taken with the young plants for the first year or two in protecting them from insect pests and borers.

Kola (*Sterculia acuminata*).—Four trees bore this season for the first time. Eighty-four pods were counted, and some 300 seed obtained. Some branches layered last season have struck and produced independent trees. In all some 220 healthy young plants are now available for distribution. The tree is slow-growing, but the product a very valuable one. It is proposed to deal with the tree separately in an article in the *Journal* during the year. Tea, coffee, chicory, yerba maté, all grow well in this climate, and are worthy of attention. Plants or seed are always available.

Plants and trees that have an economic value in producing oils, gums, and resins, scent, dyes, tannin, &c., which may be obtained from the nursery, cannot, for want of space, be mentioned in full. Among the oils, castor, cocoanut, gingelly, sunflower, ben, and groundnut grow readily in the North. Of the volatile or essential oils, besides those obtained from the spices already mentioned, are citronella and eucalyptus. Of the gums the copal-tree (*Hymenaea courbaril*), producing the copal gum used in the manufacture of the varnish of that name, is readily grown, and a valuable commodity. A limited number of plants are available.

A special list of minor economic products, in most cases needing but little attention in the matter of cultivation and extraction, easily cured and readily saleable commodities, and well worthy of consideration by settlers and agriculturists, has been published in the *Journal*, and will be written about from time to time in separate articles.

ROOT CROPS AND VEGETABLES.—A portion of Field 2, Section III., was last year devoted to root crops. A little over a quarter-acre was subsoiled by hand, and thoroughly worked over and planted with the following:—Yams, 9 rows (six varieties); Bermuda arrowroot, 6 rows; turmeric, 6 rows; sweet potatoes, 5 rows (five varieties); Queensland arrowroot, 3 rows; canaigre, 3 rows; bambarra ground bean, 9 rows; ground nut, 8 rows; ground nut (hilled), 4 rows. The bambarra ground bean (*Voandzeia subterranea*), is a South



African bean, a good food for man or beast. It has adapted itself readily to this country, and would seem a valuable addition to the list of pig foods. In the experiment of hilling the rows of ground nut (*Arachis hypogaea*), the method proved advantageous by producing a 7 per cent. better crop than on the flat, which is the usual method in vogue among cultivators here. It is proposed this season to subsoil in the same manner another portion of the same field. The yams, including sweet potatoes, arrowroots, ground nuts, and beans, are available for distribution, and do very well in this climate. Cassava is a great standby, and as an easily-produced and quick-growing food for poultry, pigs, stock or human beings, it deserves greater attention at the hands of settlers, whether mixed farmers, dairymen, or stock-raisers, than it is receiving. Some plants were successfully raised from seed this season; the plant is, however, best and easiest raised from cuttings, which are at all times available.

Among the more particularly tropical vegetables, okra, egg-plant (Brinjal), Drumstick (fruit of *Moringa pterygosperma*), choko, and breadfruit may be mentioned. The latter bore a large crop this season. Eight varieties of breadfruit are under cultivation, and a few plants of each have been taken by the "goatee" method, and are available.

**FODDERS, MANURIAL PLANTS, &c.—Grasses.**—In Field 2, Section 3, I. The experimental plots of grasses opened last season were continued. Fourteen blocks are now occupied, one with an indigenous plant of the vetch family, that is greedily eaten by stock, but which has not yet been identified botanically. Most of the grasses are doing well, notably *Panicum muticum*, in spite of being in a dry situation. Plants and seed of all are available and applied for, although applications are mainly for *Paspalum dilatatum*, of which a considerable number of plants are yet available.

**Rice.**—Of these the Honolulu, planted on 2nd February, did best, but is not yet in seed. The Japan (Kayashu) did not do so well, though seeding heavily, and showing a short, stout grain that would probably mill well.

**Cowpeas.**—The following varieties were grown during the last season:—Large Purple, Speckled, Cream, Black, Small Purple, Yellow, and White's Perennial. All produced a heavy crop both of green stuff and seed. This is a most useful annual, being valuable as a green manure, green fodder, vegetable, or grain. White's Perennial is the most useful in every way in this climate. It is proposed only to retain a few of the best varieties this season.

**Beans.**—The principal varieties grown are the White and Red Sword Beans, Black, Green, and Mottled Mauritius, Narico, and Florida-Velvet (manurial) beans, Poor Man's, Tonga, and Madagascar (two varieties), and Lima Beans (edible). All did very well this season. It is proposed to retain only the better varieties of these.

Owing to the very limited area under cultivation, it is not possible to do more than supply applicants with enough seed to grow for seed themselves. The Pigeon Pea (*Cajanus indica*) is a most useful plant, either as a green manure, in which respect it is easy of manipulation, or as a food for pigs and poultry, when allowed to seed, for which latter purpose it may be allowed to grow for several years in succession. Seed in limited quantities available.

**Millets.**—Sixteen varieties of sorghum and millets were grown in Field 1, Section II., which had, the year before, cowpeas ploughed in, and also received a dressing of kainit, at the rate of about 3 cwt. per acre. The seed was drilled in on the 14th December, and the results were far in advance of last season. Giant Honduras again did the best, attaining an average height of 15 feet. All bore heavy crops of seed and green stuff. It is intended to retain only the essentially tropical varieties, and those only in a very limited quantity.

**FORESTRY AND SHADE TREES.**—The beds of forestry trees in Field 2, Section II., have been kept going, and a quantity of plants been distributed to private applicants and public bodies, schools, &c., as well as supplied to the forestry branch of the Lands Department, for planting out (chiefly cedar). The following are the beds:—

1. Bamboo. Struck cuttings. One year. About 30 available.
2. *Ficus elastica*. Cuttings planted January, 1904. About 50 available.
3. Bunya Bunya Pine. Seedlings
4. Bunya Bunya Pine. Seedlings
5. Bunya Bunya Pine. Seedlings
6. Doomba-tree. Seedlings
7. Doomba-tree. Seedlings
8. Bunya Bunya Pine. One-year plants. About 100 available.
9. Teak. Seed planted 29th January, 1904. None showing yet.
10. Mango (Strawberry). Seedlings. About 50 available.
11. Cyprus Pine. Seedlings. About 50 available.
12. *Castilloa elastica*. Seedlings. About 300 available.
13. Empty (Cedar plants sent to Atherton).
14. Cedar. Cuttings. Not struck yet.
15. Longan. Seedlings. 100 available.
16. Cedar. Seedlings. Seeds set 30th January, 1904. About 500 available.
17. *Castilloa elastica*. Seedlings. About 300 available.
18. Teak. One-year plants. Only 10 remaining.
19. Carob. One-year plants. About 100 available.
20. Longan. One-year plants. About 50 available.
21. Jack Fruit. Seedlings. About 200 available.
22. Guava (Cherry). One-year plants. About 50 available.
23. Jacaranda. One-year plants. About 25 available.
24. *Ficus elastica*. Worked plants. About 150 available.

Besides these, in other beds, *Prosopis juliflora*, about 60 plants, and plenty of seed available; *Grevillea robusta*, set 18-2-04, about 50 plants available; and a few *Araucaria Cunninghamii*, &c. The Black Pine seed failed to germinate. Other useful trees, as shade for public purposes, are available in lesser numbers, lists of which have been published in the *Journal*. Notes of tropical plants suitable for the tropical portion of the State were published in the *Journal* for May, 1904, and lists of items at the State Nursery,



under the headings of "Tropical Economic Products," "Tropical Fruits," "Tropical Vegetables," "Root Crops and Fodders," "Tropical Timber and Shade Trees suitable for planting in public reserves, parks, roads, and for Arbor Days, &c.," were also sent in for publication.

## SCHEDULE A.

ABSTRACT OF METEOROLOGICAL OBSERVATIONS TAKEN AT KAMERUNGA STATE NURSERY, CAIRNS.  
[Readings at 9.20 a.m., local time.]

Thermometer Readings,	1903.						1904.						Totals and Averages.
	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mch.	Apr.	May.	June.	
Mean maximum ... ..	78.38	79.40	82.25	84.51	85.0	87.32	87.46	87.68	84.41	82.76	...	...	Mean average maximum, 83.91.
Extreme maximum ... ..	84.0	84.0	88.5	90.0	91.0	94.0	92.0	97.0	91.0	89.0	...	...	Extreme maximum, 97.0.
On date ... ..	16th.	8th.	29th.	3rd.	9th.	9th.	24th.	8th.	9th.	9th.	...	...	On 8th February, 1904.
Mean minimum ... ..	61.29	60.80	61.28	63.90	66.75	70.5	69.59	70.24	69.51	67.80	...	...	Mean average minimum, 66.16.
Extreme minimum ... ..	53.0	52.5	50.0	56.0	63.0	62.0	64.0	64.0	64.0	61.5	...	...	Extreme minimum, 50.0.
On date ... ..	27th.	13th.	21st.	12th.	2nd.	1st.	14th.	6th.	27th.	2nd.	...	...	On 21st September, 1903.
Mean temperature ... ..	69.84	70.12	71.76	74.21	75.88	78.91	78.52	78.96	76.96	75.28	...	...	Mean average temperature, 75.04.
Rainfall, inches ... ..	1.100	1.520	.860	1.390	1.940	14.330	7.365	9.390	22.345	15.480	...	...	Total rainfall 1902-3 = 101.040 in.; 1903-4 = 78.20 in. (10 months)
Number of days on which rain fell ... ..	8	9	7	8	14	14	14	13	21	16	...	...	Number of days rain fell, 1902-3 = 145; 1903-4 = 124 (10 months).

HOWARD NEWPORT, Manager.

## REPORT OF THE INSTRUCTOR IN FRUIT CULTURE.

SIR,—In submitting this, my Eighth Annual Report, I am glad to be able to state that the results of the recent disastrous drought, as far as the fruit-growing industry of this State is concerned, are now practically obliterated. Fruit trees of all kinds have stood the severe strain remarkably well, and I doubt if their general condition was ever better than it is at present.

Some of the older trees have succumbed, but their place has been taken by the large number of young trees of all kinds suitable to our climatic conditions that have been planted out during recent years, few of which have suffered any permanent injury.

A favourable winter and spring was followed by a dry summer, and this again was followed by a copious rainfall in autumn in most of the fruit-growing districts. The dry spell in summer, coming as it did at a time when the trees were recovering from the effects of the drought, had the tendency of retarding their recovery, especially when no means of irrigating the trees existed, but, fortunately, rain came before serious permanent injury was done.

Although the important question of irrigation has to a certain degree been placed on one side since the advent of an ample rainfall, I am still strongly of opinion that it is destined to occupy a prominent position in the fruit-growing industry of this State, particularly in districts subject to dry spells of greater or lesser severity, and especially in the case of citrus fruits growing in such districts. Fruitgrowers who have at hand the means of giving their trees an adequate supply of moisture during dry spells, when the trees would otherwise flag, and either fail to set their fruit or carry it when set, can secure themselves against loss from this cause, and will thus have an advantage over their less fortunate neighbours who have no such means at hand.

With judicious irrigation fruit trees can be kept growing right along instead of being subject to periods of active growth, followed by periods of stagnation, thus securing a more even and regular growth, which is conducive to the production of early-maturing and high-class fruit of even quality, a very important consideration in marketing.

Intermittent growth produces uneven fruit, which is often of inferior quality; besides which, fruit grown under such conditions frequently does not possess the carrying or keeping qualities of fruit that has been grown under more favourable conditions. I therefore again beg to draw the attention of fruitgrowers to the importance of conserving water in times of plenty for use in times of scarcity, and feel certain that those who protect their interests in this manner will derive benefit therefrom, and eventually come out on top.

The planting of fruit trees of all kinds has continued to make steady progress during the year; and judging from the large number of young trees still being imported into the State from southern nurseries as well as those being sent out by our local nurseries, this progress will be maintained during the coming season.

In fruit trees the principal extension is in citrus fruits of various kinds, the planting of which is practically confined to our eastern seaboard, and in deciduous trees, principally apples, plums, peaches, and cherries, the planting of which is mainly in the Stanthorpe district, where the soil and climate is the most favourable of that of any part of the State for their development.

It is not only in fruit trees that an increase is taking place, but the area devoted to pineapples, bananas, and grapes, particularly of table varieties, shows a considerable extension.

During the year I have visited most of the principal fruit-growing centres in the State, from Stanthorpe and Nerang in the South to Port Douglas in the North. I have delivered a number of lectures at various places, and have given practical introduction in the handling and packing of different fruits, in the pruning of all kinds of trees, in the selection of soils for fruit-growing, and the preparation of such soils; in the destruction of fruit of all kinds, and advising what fruits to grow. In addition to this, the purely educational point of my work, I have also dealt with the commercial aspect of fruit-growing, and have urged upon growers at the many meetings that I have attended the extreme importance of their realising the necessity of their taking combined action to deal with the profitable disposal of their produce, both in our home and oversea markets, as well as for utilising surplus fruit that cannot be disposed of fresh. This is the most important question that our growers have to face, and I feel certain that unless concerted action is taken to place the industry on a firm business basis, capable of dealing not only with the disposal of our fruits in the fresh state, but of converting any surplus into a marketable form, our markets will be completely glutted, and prices will be reduced to such an extent as to render fruit-growing anything but a profitable occupation.



Already mangoes, pines, and citrus fruits are hard to dispose of during certain seasons at remunerative rates, and strawberries, Cape gooseberries, and table grapes promise to follow suit; and if this is the case, the position will become worse when the large number of citrus trees planted within the last five years, the increased area of table grapes and of pineapples, come into bearing. In my opinion, no time should be lost, but every grower should, for his own protection, form a unit of one powerful co-operative body, worked on thorough up-to-date business lines, and under the best business management, as it is by this means, and this means only, that I see any chance of our fruit-growers obtaining a fair honest remuneration for their labours.

Such an organisation should be capable of dealing not only with the disposal of our various fruits in the fresh state to the other Australian and oversea markets, but should be able to utilise to the best advantage all the surplus of these fruits, which are peculiarly adapted to our climatic conditions—viz., the mango, Seville orange, Cape gooseberry, strawberry, guava, and pineapple.

Already we have made a start in co-operative action by the establishment of the Queensland Citrus-growers' Association, who have already done good work, as had it not been for their efforts in clearing our local markets, same would have been hopelessly glutted, and prices would have ruled even lower than they have done. The time, in my opinion, has come when the work of this association must be largely extended; in fact, as already stated, I feel that it should be converted into a powerful co-operative organisation, capable of dealing commercially with all the fruit products of this State.

I am glad to be able to state that this association has made arrangements for a trial shipment of some 2,000 cases of citrus fruits to be shipped to England early in the coming financial year. I have devoted considerable attention to this shipment, and have endeavoured to impress upon growers the necessity of their taking every possible care in the selection, gathering, and handling of the fruit to be sent, so as to give it every chance to carry in good condition, and should it reach London in such condition, that the quality of the fruit will create a favourable impression on buyers. I look upon this first shipment as a very important one, and will do all that lies in my power to make it a success, as, should it turn out to be so, it will open up a means of disposing of a considerable portion of our surplus in years to come. During the year I have superintended some interesting experiments in the cold storage of pineapples and other fruits, and although the experiments have not been by any means a complete success in the case of pineapples, we have gained considerable experience thereby, and I have still hopes of this work being carried to a successful issue that will enable us to send this fruit to distant markets where it will realise good prices. The cold storage of grapes at Messrs. Trails Limited turned out very successfully, grapes being kept for eleven weeks in perfect order. The cold storage of apples at the same works was also a success, and has shown us the practicability of our keeping our Australian-grown apples from one season to another, and thus enabling us to do without the Californian fruit which has been used to fill the gap between the end of the Tasmanian season and the commencement of our local crop. During the year we have had several object lessons from the Americans in their methods of handling and shipping fruit to distant markets. Oranges and lemons have been landed here in the best of order; and not only these fruits, but peaches, plums, and pears have arrived in nearly perfect condition. The secret of their success has been in the care bestowed on the handling and packing of the fruit, as well as in the use of cases or crates specially devised for carrying the fruit. Should our growers employ similar packages and give the fruit equal care to that bestowed upon it by the Americans, I fail to see any reason why our early grapes should not be sent to southern markets in the best of order, and why many of our more tender tropical fruits should not carry in much better order than is the case at present.

Fruit pests have, as usual, occupied a good deal of my attention, and I am glad to be able to state that, in my opinion, the systematic treatment that they are receiving at the hands of many fruitgrowers has resulted in a diminution of the ravages caused by some of our most serious pests. This is especially the case with scale insects, as I have never seen our citrus fruits freer from these pests and the San José scale, which at one time threatened to ruin the deciduous fruit industry, has not increased to the extent anticipated, and is being kept in check by systematic spraying. The fruit fly—our worst scourge—was very prevalent in our crop of summer fruit, and caused considerable loss, but, at the same time, it did not do its usual amount of damage to citrus fruit. The Yellow Peach Moth, commonly known as the Corn Moth, a pest second only to that of the fruit fly, has, however, been very prevalent in many districts, and has done a lot of harm, but the large sucking moths that caused so much damage in southern orchards last year have been conspicuous by their absence. In their treatment of fruit pests, growers are year by year becoming more alive to the importance of preventing serious outbreaks rather than destroying the pests once they have got complete control, and the result is that pests of all kinds are being more systematically fought, with more satisfactory results. Since my last report, I have rewritten a pamphlet on fruit pests, also a series of six articles on pineapple culture, all of which have appeared in the *Queensland Agricultural Journal*, for which paper I have also written two or three other short articles.

A conference of fruitgrowers was held in Brisbane during May, to discuss questions relating to the administration of "*The Diseases in Plants Act of 1896*," as well as of taking steps to bring about means for the better disposal and utilisation of our fruits. The discussion was confined to the delegates present, who passed a number of resolutions dealing with the Act in question.

The most important question, in my opinion—viz., that dealing with the disposal of our fruit—received scant attention, and nothing practical resulted from the discussion thereon. I hear that the matter will be brought up again shortly, at a meeting of fruitgrowers, when I trust that the first steps will be taken to place this question of vital importance to every fruitgrower on a more satisfactory basis.

A. H. BENSON, Instructor in Fruit Culture.

#### REPORT OF THE INSTRUCTOR IN COFFEE CULTURE, ETC.

SIR,—I have the honour to submit my Report for the past season. My duties as a responsible officer of the Department, resident in the North, have been even more varied than was mentioned in my Report of last season, so that while signing this Report as Instructor in Coffee Culture, it would be misleading to conclude that my work is confined to, or even that my time is principally taken up with, coffee cultural duties. My duties are, perhaps, more varied than of any similar officer of the Department, and for this reason it is not possible in this Report to include them under one heading, and, in a similar manner, the work of the appointment having been altered to such an extent during the past few years by the increase of the duties connected with such matters as the management of the State nursery, the administration of the Diseases in Plants Act, reforestation work, and general tropical agricultural work, that the expediency of changing the appellation of the appointment to one more in accordance with the duties required would merit consideration.

The amount of work in connection with coffee culture has this season been considerably lighter, largely on account of the abandonment by the Department of a large proportion of the usual touring work on the score of expense, while, on the other hand, the duties in connection with other matters have increased to a more than corresponding extent.

The amount of touring work generally has been very much reduced, and amounted to only some sixty-eight days, which, including thirty-one days of sick-leave, amounted to an absence from office of a little



over three months in the year. This touring may be divided up as follows:—In connection with coffee cultural matters, 5 tours, occupying 24 days; State nursery matters, shows, &c., 2 tours, occupying 10 days; botanical work (Bellenden-Ker expedition with Mr. A. Meston), 31 days; and on forestry work, 3 days.

**COFFEE CULTURE.**—The very even temperature experienced this season, with ample and well-distributed rainfall, has been in every way favourable to the cultivation of coffee. Good crops, on the estates receiving attention in the matter of cultivation, have been the rule, due to the increased energy and growth of the trees. The more moist conditions have had the effect of delaying the ripening somewhat, making the harvesting somewhat later than last year. This has been no disadvantage, however, and is more than compensated for by the more uniform ripening, as well as increased size and weight of the sample.

The few trees at the State nursery, Kamerunga, that are being experimented with have done well. Planted in October, 1900, and now, therefore, three years and seven months old, they have deservedly had no attention in the matter of manuring, digging, or pruning, beyond having been topped and kept free from suckers. Weeding has, therefore, been the only form of cultivation allowed them, and, while the locality is favourable, the soil in which they have been planted is not by any means a rich one. These trees have just borne their second crop, and while it is recognised that the bearing of a few trees is no criterion upon which to base the production of an estate, the crops and condition of the trees so treated are interesting to record. The first or maiden crop last year was good, but not heavy, the trees being only two and a-half years old; the crop this season was at the rate of  $1\frac{1}{2}$  tons per acre, and that without effort or detriment to the trees.

In coffee, bearing at this rate, or even one-third of it, when kept clean, the difficulties, as well as heavy cost of picking, is found to largely vanish. That coffee culture, when properly carried on, pays there is no doubt. That it will not stand neglect is, however, also a fact. If all cultural works are eliminated, save only weeding, still a large measure of success may be attained, as is shown by the experiments at the nursery.

The bad times in agriculture generally, during the past few seasons, has been very much against the industry, and a number of estates have for various reasons been abandoned. The difficulty of disposing of small lots of coffee, especially in the parchment state, has undoubtedly largely helped to make growers disgusted or dissatisfied. A coffee estate once opened and arrived at a certain stage of maturity, especially if it has received attention during the growing period, can be brought into cultivation and bearing again. If the trees are living they can, by attention, be made to produce good crop-bearing wood, &c., in far less time than it would take a newly-opened estate to come into bearing. The growers that have held on are, however, in a far better condition, and, having got through the time of depression and difficulty, now have prospects of returns for their time and trouble.

I would continue to advocate attention to curing. The sample generally is noticeably larger and finer this season than last, and the prospects altogether brighter.

**THE DISEASES IN PLANTS ACT.**—The work in the administration of this Act may be divided into three headings—wharf inspection, garden inspection, and the eradication of diseases and pests in plants and fruit.

*Wharf Inspection.*—This work has mainly to deal with bananas and pines exported, and fruit fly and various scale pests affecting them, although including apples, pears, and stone fruit imported, and the various pests and diseases incidental to them also. The work at the wharves has been carried on satisfactorily. During the year the inspectors have been changed, Mr. D. Macpherson having been transferred to Gatton, and Mr. F. G. Connolly from the head office to take his place.

The number of bananas has shown no great increase this season, though the pines have materially increased. The majority of consignments still continue to be sent to New South Wales and Victoria, though latterly the markets of South and West Australia have come into favour, and bid fair to absorb a very material portion of the output.

A very considerable area of land on the Cairns-Mulgrave Tramway Extension, planted last season, is only just coming into full bearing; and at the junction of the Russell and Mulgrave Rivers an area of some 400 acres has been opened up. From this latter area, it being some distance from the tramway feeder lines, the bananas will probably be shipped direct to Townsville by small steamer, there to be transhipped to larger vessels. This will necessitate special arrangements admitting of the inspector proceeding periodically to the spot to carry out the inspections. It is also reported that a number of growers contemplate opening up in that vicinity, but are waiting to see the results of such direct shipping arrangements.

*Garden Inspection.*—All the time that can be spared by the inspector from the wharf is spent in visiting the gardens, finding the growers of brands of fruit that are found to be infected when sent for shipment, and advising them regarding necessary action in the field. This work also includes the inspection from time to time of citrus and general fruit orchards, notifying owners regarding the collection and destruction of fallen and fly-affected fruit, and inspection of the fruit trees for scale and other pests and diseases, and advising and supplying information regarding spraying and general remedial measures.

When necessary and possible, the inspector always also gives demonstration as to pruning, &c. Special attention has been given to this work, it having been found to be of great general good to the industry and advantage to shippers by saving loss by having fruit condemned on the wharves.

*General Eradication of Pests and Diseases, &c.*—The action of the Department in enforcing the regulations of the Act regarding the wild guava pest has added very considerably to the work of this branch. This work will undoubtedly do a great deal of good, but is meeting with considerable opposition, especially from owners of land where the guava has obtained a hold, and its eradication is a difficult and somewhat expensive matter. The argument used by certain individuals, and, I regret to state, also by one of the local authorities, is that as fruit fly exists in the scrubs, it is, therefore, useless to attempt even to ameliorate matters in cultivation, and especially to remove wild guava. Apart from the excuse to avoid a possibly small expenditure in carrying out an obviously advantageous work, the argument is shortsighted and fallacious. Fruit fly in scrub fruit is kept in check by Nature itself, through the comparatively short period during which fruit is available. The fly, however prolific, naturally dies down at the close of the scrub-fruit harvest; only those in a condition to hibernate carry over to the next season. Cultivated or imported fruits that have become wild are later or earlier, as the case may be, and longer in fruit, thus affording the fly greater facilities for propagation, and, by creating a regular chain or succession of fruits in season, indefinitely multiplying the evil. That the attention of the growers themselves to this matter of prevention of egg maturing in fruit is of use is beyond question, and every species of introduced fruit thus attended to will materially reduce the amount of fly in the district. Even should it not be possible to eradicate or exterminate the pest on account of fruit in the scrubs, if it can be reduced and kept down to what may be called the amount sanctioned by Nature, the loss of damage experienced by growers would be reduced to but a very small amount. That orchardists should attend to such matters is admitted by all, local authorities included, but all are apt to be shortsighted in not seeing that it is obviously unfair to such orchardists that, while using their utmost efforts, their work should be annulled by the deliberate propagation of the pests through the unchecked growth of wild guava. It is anticipated that some headway will be made this season in this matter, and hoped that both public bodies and private individuals will be led to see the detriment of the retention of wild guava to themselves and to the district: the obvious alternative to negligence in the matter being the possibility of the declaration of infested areas from which the export of fruit of any kind, to even other parts of the same State, may be prohibited.



In this connection the great hold that pests, or, more properly speaking, noxious weeds, are getting in the North may be referred to. Each district has, perhaps, a pest more prominent than its neighbour; and some of the greater evils, such as prickly-pear, are not as yet at all prominent, and when found, are, I am glad to say, receiving attention. In some localities, however, lantana is getting a hold, and will, later on, prove a troublesome matter, being so easy of propagation. Yellow burr, albeit, one of the lesser of the noxious weeds, has, in two seasons or so, practically killed out the *Sida retusa*, and established itself in serried ranks, 6 feet high, and almost impenetrable, as a way-side weed.

GENERAL CROPS, &c.—The corn crop has been a good one generally, and but little damage from rain has been experienced this season. The production of this one staple in certain districts is so general and the prices have been so favourable that but little attention has hitherto been given to any other tropical product. The price of corn has, however, been lower on the average this season than previously, and attention has been given to means and methods of storing, &c. There is room for improvement and cheapening of methods of shelling, &c., and handling subsequently.

The orange crop has been somewhat better than last year, but fruit fly has, if anything, created greater havoc than ever. The mango crop has been very small. Grass and water have been plentiful, and the value of cattle on the rise. Very keen interest is being taken in the erection of a butter and bacon-curing factory in Cairns, and a great stimulus given to dairying thereby. Stud bulls and milking strains of various breeds of cows are, in consequence, being imported. The breeding of dairying herds is receiving attention, as well as the questions of pasturage, fodders, and grasses. A considerable number of private cattle dips have been built, and the general use of dips is to be anticipated. A number of the smaller cattle stations have changed hands during the year, and, as a general sign of the break up of the hard times, a number of selectors who had left their selections are now going back to live on them. The erection of the bacon-curing factory, in connection with the butter factory, will prove a great incentive to pig-raising, which is already receiving increased attention, as is evinced by applications for information regarding pig foods, such as cassava, &c. Tobacco is receiving more attention also in one or two quarters, as is also fibre production, both of which are worthy of more consideration by farmers and selectors.

THE KAMERUNGA STATE NURSERY.—The management of this institution constitutes a very considerable portion of my work. Experiments with various economic plants and trees are being conducted, some of which are, owing to the slow growth of the trees and plants, of necessity spread over a number of years. A separate report having been submitted on this branch of my work it is not necessary to go into details here. Mr. J. G. Malcolm, the overseer, is in charge of the field works.

FORESTRY WORK.—The reforestation work undertaken last year, having proved perfectly successful in every way, the Forestry Branch of the Lands Department have this season extended their operations. The grant for the work is so very small, however, that the extent dealt with can be but limited. Young cedar plants are being planted out again in the same manner as last season, and the reserve in which the work was started last year will probably be completed this. The planting is now in hand; not being finished, no returns are available for this Report. It is also proposed to put out a number of bunya pine seedlings on the ranges between Atherton and Herberton, and a few plants of Burmese teak also. Mr. W. Stovell is in charge of this work.

The value to the State of such reforestation work is obvious, and a regular sum annually should be set aside for the purpose. Even though such a grant were small, the knowledge that it would be regularly available would admit of a regular scheme being formulated and more and better work done in the time and for the money available. With such a scheme the areas to be dealt with the coming season could be mapped out and beds of seedlings prepared, thus saving a considerable amount in time of collecting. Bamboo, for instance, is available in small quantities in that district, and enough could readily be obtained for seed, to be sown in pots sown from it, that would be available the next season, and in a situation adjacent to, and convenient for, transport to the area to be planted.

HOWARD NEWPORT, Instructor in Coffee Culture, &c.

#### REPORT OF THE TOBACCO EXPERT.

Sir,—I herewith submit a Report of the work done at the Experimental Tobacco Farm, Texas, for the year ending 30th June, 1904, together with general remarks upon the crop within the State.

The blue mould was prevalent throughout the tobacco-growing districts of the State in the early part of the year, and of the early sowings but few plants survived its ravages, and later, except in a few instances, only plants grown from acclimatised seed were able to withstand its effects.

Unfortunately, at the farm we had distributed to growers who desired improved varieties, all of our acclimatised seed, and had only freshly-imported seed to depend on for our crop, with the result of having only a small crop of some two tons, for which we had partly to get of plants grown from other seeds.

I herewith give treatment of seed beds, undertaken at the farm for blue mould, both as a prevention and cure; some eighty beds all told were sown.

Beds 1 and 2; sown 6th July; seed, Lax. Two days before seeding the beds were sprinkled with a solution of sulphate of copper; strength, 2 lb. to 50 gallons of water, 5 gallons to the bed; size, 4 by 20 feet. Plants sprayed with weak solution of formaline. Same transplanted before mould appeared. All died.

Beds 3 and 4; size, 4 by 20 feet; sown 6th July; seed, Lax. Sprinkled as 1 and 2, with strength of 2 lb. to 60 gallons of water, 10 gallons to the bed. Plants appeared 3rd August; mould 18th September. Sprayed plants with formaline; some transplanted before mould appeared. All died.

Beds 4 and 5; 4 by 20 feet; sown 20th July; seed, Lax. Beds sprinkled with Bordeaux mixture; strength, 2/2 to 25 gallons water, 6 gallons to the bed, three days before sowing. Plants showing 3rd August; mould appeared 12th September. Sprayed with formaline. All died.

Beds 7 and 8; 4 by 20 feet; 25th July; seed, Lax. Same treatment as 5 and 6. Same result.

Beds 9 and 10; 4 by 20 feet; 20th July; seed, Hester. Same treatment. Same result.

Beds 11 and 12 feet; 4th August; seed, Hester. Same treatment. Blue mould. Sprayed plants with Bordeaux mixture. All died.

Beds 13 and 14, 15 and 16; treated with sulphate of iron and lime. Did not germinate.

Beds 17, 18, 19, and 20; 4 by 20 feet; Yellow Pryor and Gooch; sown 15th August. Beds treated 1/2-lb. sulphur each two days before sowing. Blue mould. Sprayed with Bordeaux mixture. All died.

Beds 21 to 31 inclusive; a repetition of above, with like results. Spraying diseased plants with Bordeaux mixture or formaline had no effect on the mould.

After the above we ceased to number or to treat the beds specifically. Four beds we built 18 inches off the ground, with same results. Other beds we built fires all round them on chilly nights, and kept them going through the night, so that warm currents would pass over them and prevent chilling, but blue mould was just as bad. All the soils were thoroughly sterilised by burning, and covering used for the beds. A record of the weather was kept, and shows that during the prevalence of the mould the weather for most of the time was cloudy, rainy, and foggy, with cold nights.



From these beds we transplanted some 70,000 plants, which died in the field, except some 3,500, and they were not usually thrifty.

It is proposed this year to carry out further experiments, with the assistance of the Vegetable Pathologist, Mr. Tryon. I shall also endeavour, by selection and survival, to get seed that is immune. The result of this mould the past year has been to curtail the crop of the whole district at least 200 or 300 acres. The crop of the Texas and Inglewood district this year is about 350 tons, and the best cured crop we have had in the past seven years, the weather conditions being peculiarly favourable to open-shed curing.

The seed which has heretofore been planted in this State has greatly deteriorated by injudicious selection and by crossing, and it is important that new seed should be introduced if we are to continue to enjoy our supremacy for the best leaf grown in the Commonwealth.

The manufacturers have at last begun to press this home to the growers, insisting upon it, with the result that there is a large demand for improved varieties. There is also manifest a disposition to take more pains with the crop after harvesting, to try to make a better article, and to some extent this manifests itself in a disposition to partly cure on scaffolds in the open, thus bleaching the green leaves.

This last is by no means objectionable, as some of the very best tobaccos of Virginia are cured entirely in the open air with sun a part of the time. Some have expressed a desire to flue-cure their tobaccos on account of requiring less shed room, as also getting it ready for the market earlier, and I have agreed when such curing-rooms are erected to attend and cure in part for them, to the stage where they can finish it themselves. I have also requested the owners of the property on which the State farm is located to erect a flue-curing room on the farm, but have not their reply. I have asked them to do this, because they now get crop rent from the farm, and that I may teach this method to those who desire it.

The new combination of tobacco manufacturers compose the same firms that have hitherto purchased our leaf, and I have their assurance that they will continue to want our tobacco, and in greatly larger quantities than heretofore. This being the case, if former prices continue to be paid, the outlook for the industry in this State is bright.

We have also grown at the farm this year about fifty bags of white corn.

I think it is desirable to also foster the cigar tobacco industry in our north coast country. Some samples grown in the neighbourhood of St. Lawrence give promise of better things if properly cured and grown, and samples from other districts show decided merit. These cigar tobaccos can be grown by the small farmer in districts removed from the railway, where other farming will not pay, as the tobacco will pay transportation.

Cigar tobacco of good quality will pay to export to the London market.

R. S. NEVILL, Tobacco Expert.

#### REPORT OF THE COLONIAL BOTANIST.

SIR,—I have the honour to submit the following brief summary Report of the work appertaining to the office of Colonial Botanist for the past year.

I am glad to state that there has been no diminution, but rather an increase, in the number of persons who made use of the Department. These persons are not confined to one or two trades or professions, but are from nearly all the various walks of life. It must be acknowledged that plants play a most important part in our everyday life; without them we could not live, as directly or indirectly they furnish us with our almost every need. Thus it may be understood that the botanist is constantly being called into requisition, and it is to be regretted that the funds at his disposal are so very limited.

There has been little added during the past year to that most instructive and attractive feature of the Department, the "Museum of Economic Botany," which contains the finest collection of native timbers in the Commonwealth, over 600 kinds being represented by a plank book-block and veneer of each one. This exhibit is being constantly referred to by those engaged in all branches where this material is used. The paucity of the additions has been caused by lack of funds for furnishing cases for the reception of fresh exhibits; also for procuring additional woods and similar economic articles, of which additional samples might with advantage be obtained.

The herbarium has been added to mostly, as in previous years, by the specimens sent by correspondents for determination, and it is principally from this source that specimens are supplied for making exchanges with foreign departments, from whom I am frequently in receipt of the specimens which increase the exotic portion of our collection. Here again I feel the want of cabinets, none of which have been supplied for years past, and the present accommodation is quite insufficient for the material in hand.

I am thankful that the Minister kindly allowed me to have a quantity of seed gathered of a superior kind of Mitchell Grass, which is met with principally on the country about the Georgina River. I have thus been enabled to forward packets of it to correspondents who have for some years past been continually writing for it. My assistant was recently out collecting roots of some of the superior indigenous species of grasses for planting on one of the State farms. I regret that special provision is not made for collecting seeds of our especially known excellent pasture grasses when they are required by persons within or beyond the State. We have our State farms, and most certainly we should not have to send out a thousand miles to have the seed gathered off the wild plants, when they could be grown at these farms, and when either seeds or roots were required such could be supplied on a very short notice. Thus it is hoped that the experiment started by the Minister on the one farm may spread to all the others supported by the State. I have advocated this being done for many years, and am glad to find at last a beginning is to be made.

As might be expected with the abundant rains, weeds have been prolific, both in pasture and cultivation, and among these fresh species have appeared, which have been duly recorded in my publications. Two, however, deserve more than a passing notice, and I regret that figures of them could not have been given in the *Journal* of the Department, for they should be known far and wide, so that on their appearance in a fresh locality they might at once be identified and destroyed by the settlers. The two plants referred to are:—

*Jatropha gossypifolia*, the "Cotton-leaved Physic-nut" of Brazil, a plant somewhat resembling, though of smaller growth, the castor oil plant. It is said to be overrunning the township of Townsville, and no doubt we shall shortly hear of it poisoning cattle, as it is one of a very poisonous family.

*Acanthospermum hispidum*, or "Star Burr," a South American weed, lately introduced, and now spreading about Townsville. This is an ally of the "Bathurst Burr," and if not destroyed, we may soon find it an equal pest in our pastures. It may be known from all the other burr pests met with in the State by its burrs forming stars in the axis of the leaves.

In the contributions to the Queensland Flora, published from time to time in the *Agricultural Journal*, I have kept posted up all additions to the Queensland Flora, whether indigenous plants, newly come to our knowledge, or stray weeds or other plants, which have become naturalised in any parts of the State. Such notices have always been accompanied with a description of the plant, and a brief notice as to its useful or other character.



A short time ago I furnished the Hon. the Secretary for Lands, through you, with a report on the plants collected by Mr. A. Meston on his recent visit to the Bellenden-Ker Range. This has since been published at the Government Printing Office, therefore details are unnecessary here.

On the subject of our indigenous woods, I feel deeply. We have one of the richest wood-floras, yet we persistently send to Europe those which have only the sawmillers' authority as to the names. This in such samples is worse than useless, as so many of our woods, even of distinct genera, are known to these persons under the same vernacular name. Such carelessness may pass here, but will never be looked over in Europe. The botanist, and he only, must be the one held responsible for the correctness of all samples of our woods when sent to Europe by the Government, for either opening a trade or for test purposes. All our woods should be obtained and authentic samples shown in uniformity with those six hundred and odd now in the Museum of the Department. There should be an eagerness on the part of all Government employees having to do with the indigenous woods to furnish the botanist with all the specimens and information which he may require. I am pleased to say that such is now being done by the Chief Engineer for Railways, and good results must follow. This is different from another department, who, two years ago, sent for determination the twigs only of a species of pine, and although I requested at the time to be furnished with branchlets bearing fruit, as I considered it to be an undescribed species, I have since heard nothing on the subject. I might have expected to have received proper botanical specimens long ere this; but no, this is the apathy displayed about one of our most valuable State properties. One of our leading men a short time ago stated that "Knowledge, knowledge, knowledge was what was wanted," but we seem to say, "Not knowledge; let us rather have ignorance." It seems that what is required is some powerful voice to speak for our invaluable indigenous vegetation, or it will follow the aboriginal, and soon be no more.

As directed, I have kept within the £10 allowed for purchasing books for the Botanical Library, but hope that this sum may soon be increased, as it does not allow even of obtaining the periodicals desired, and there is also binding needed.

As in former years my assistant has paid weekly visits to the Agricultural College, for the purpose of giving botanical lectures to the students.

As customary in these Annual Reports, I have been very brief; in fact, I consider it quite unnecessary to render an elaborate Annual Report, considering that I am reporting every day to one or other on matters appertaining to vegetable life. To reproduce all such, or even a summary, would be but a waste of time, as to many of those who would read it, it would appear only a string of unmeaning names, yet to the persons who have received the information, it has doubtless been of great importance.

F. MANSON BAILEY, Colonial Botanist.

#### REPORT OF THE ENTOMOLOGIST AND VEGETABLE PATHOLOGIST.

SIR,—I have the honour to submit the following Report, relating to the work of the branch of the Department with which I am associated, for the year ending 30th June, 1904.

##### 1. ECONOMIC ENTOMOLOGY.

In addition to the several matters pertaining to the domain of economic entomology that have been summarily dealt with in response to the numerous personal applications that have been received, the following topics relating thereto have formed subjects for report:—

**DECIDUOUS TREES** (Apple, Pear, Peach, Apricot, Almond, Plum, Fig, &c.).—The more generally prevalent of the injurious insects alluded to in previous reports, as attacking these trees, each in several instances, with the addition of the following:—Scarlet Mite (*Bryobia* sp.) on pear-trees, Brisbane; the Wood-borer (*Orthorhinus cylindrirostris*, Fabr.), injuring plum at Killarney; the Red-banded Galeruca (*Monolepta rosea*), figs, Brisbane; the Sida Plant-bug (*Dysdercus sidae*), apricot, Westbrook; and White Ants (*Termitidae*), O'Shannessy River. In connection with these occurrences, attention may be drawn to the insect mentioned as injuring (by puncturing with its proboscis) the apricot (fruit), and spoken of as being "very bad amongst apricots"; as being a new enemy of this fruit; and as being noteworthy in manifesting—in the instance referred to—a habit of feeding upon a plant widely different from those that it usually affects—i.e., sida, malva, and cotton, amongst other members of the natural order Malvaceæ.

**CITRACEOUS TREES** (Orange, Mandarin Orange, Lemon, &c.).—The Scale Insects (*Coccidae*), for the most part specified, in connection with the consideration of the enemies of citraceous trees, in earlier annual reports, and, in addition, the following insect enemies of these plants:—(1) The Smaller Horned Fruit-piercing Green Bug (*Cuspicona forticornis*, Bred.), Redland Bay; (2) the Bark-eating Longicorn Beetle (*Callipyra turrita*), Bowen; (3) the Hornless Fruit-piercing Green Bug (gen. et sp. indetermin.), Bowen; (4) Orange-peel Worm (*Dichocrocis punctiferalis*—*Pyrulidæ*), Downfall Creek and Brisbane; (5) Fruit-damaging Beetle (*Ancylotropis Waterhousei*—*Anthribidæ*), Brisbane; (6) Fruit-fly Maggot (*Tephritis Tryoni*), Brisbane, &c.; (7) Longicorn Beetle Wood-boring Grub, Pomona; (8) Weevil Beetle Wood-boring Grub (*Orthorhinus cylindrirostris*), Pomona; (9) Hairy Green Caterpillar, Herberton. It may be of interest to note in connection with the foregoing that, with the exception of (4), (6), and (8), the insects specified are enemies of citraceous trees previously unrecognised. The action of the species of *Cuspicona* mentioned, as an injurer of fruit, requires, however, to be confirmed by further observations, and the lastmentioned insect cannot be identified till specimens of it are made available for examination. The Longicorn Bark-gnawer (*Callipyra*) appears to have been impelled, in the absence of other sustenance, on emerging from the timber of fallen trees, to have attacked orange-trees, and, accordingly, to be of little significance as an enemy of plants of the kind under consideration. The hornless fruit-piercing grub, however, was reported as doing considerable damage locally at Bowen during the month of February, as the result of its action—in feeding—of inserting its proboscis into the skins of half-grown fruit. The anthribid beetle may hereafter play some part in diminishing the prospective crop, as it was observed excavating a cavity in the young orange fruit shortly after this had formed, and so destroying it. An instance of damage to mandarin oranges—apparently occasioned by some fruit-eating mammal (*Phalangista* or *Pteropus*)—may also be here referred to.

**MANGO**.—Flower-destroying Beetle (*Monolepta rosea*), Brisbane.

**GRAPE VINE**.—Wood-boring Beetle, No. 1 (*Orthorhinus cylindrirostris*), and Wood-boring Beetle, No. 2 (*Orthorhinus Klugii*), Brisbane. White Ants (*Termitidae*), Roma.

**STRAWBERRY**.—Strawberry Aphis, Eudlo and other places.

**COTTON**.—Stem and Boll-borer (*Dichocrocis punctiferalis*), Beenleigh, Brisbane, Biggenden, Childers, and Rockhampton; Banksian Shield Bug (*Tectacoris Banksii*), Beenleigh, Biggenden, and Mackay; Australian Chinch Bug (*Oxycaenum luctuosum*), Beenleigh and Rockhampton.

The boll-borer mentioned has proved highly destructive in some widely-separated localities.

**CASTOR OIL PLANT**.—Stem and Capsule Borer (*Dichocrocis punctiferalis*), Mosman River.

**BANANAS**.—Fruit-puncturing Plant Bug (*Lybas* sp., Fam. *Coreidæ*), near Geraldton.



VEGETABLES, &c.—(1) Pumpkin and other Cucurbitaceous Plants, Leaf-eating Beetle (*Aulacophora olivieri*), Zillmere; (2) Beans (*Phaseolus*), Stem Maggot (*Agromyza phaseoli*), Brisbane and Bundaberg; (3) Sponge Plant (*Luffa*), Soft Scale Insect (*Lecanium nigrum*), Richmond, North Queensland; (4) Cabbage, Leaf-eating Caterpillar (*Euplexia umbraticula*, Walker), Toowoomba; Thrips, Gatton; (5) Potato, Leaf-eating Ladybird (*Epilachna 28-punctata*), Boomba, Tiaro, and other places.

Of the foregoing insects attacking vegetables, the most noteworthy for their depredations have been the leaf-eating ladybird of the potato, that was especially prevalent in September, and the stem maggot of members of the bean tribe. The former has been readily checked by the adoption of the usual measures prescribed by this office; the latter has proved more difficult to cope with. An instance of the occurrence of the cabbage thrips, at Gatton, constitutes a novel occurrence.

CEREAL CROPS.—Grasshoppers occurring in swarms and hordes in the Jondaryan and other districts of the Darling Downs, during the spring months; Caterpillars (*Leucania unipuncta*), Ma Ma Creek (September) and Darling Downs (October); Wire-worm (*Elateridæ*), Mitchell, Hodgson, and Amby; Grasshoppers (*Cyrtacanthacris*, two species, and *Acridium*), destructive to maize in the Degilbo and Bundaberg districts.

The "caterpillar plague" was the occasion of much damage to the cereal crops (wheat especially) in the districts named during September and October, and was the occasion of a visit to some of the localities where destruction was most pronounced, followed by the issue of a special report, that was in great part published by the Press.

The grasshopper "visitation" in some parts of the Darling Downs—first in June and afterwards in October, although not specifically inquired into through lack of opportunity for visiting the areas affected—was the occasion of a report on the general question of dealing with such occurrences, that was submitted to those more immediately concerned. The serious destruction wrought by insects of the same class to the maize plant in the Burnett district, on the other hand, formed an object of a brief local inquiry. In the latter case it was found that the insects originated in the prolific growth of indigenous weeds—Malvaceous plants especially—that everywhere occurred in the vicinity of the scrubs, and were accordingly unassailable by any direct applications. The occurrence of a true wire-worm, in certain circumscribed areas in the districts named, and wherein it has occasioned some considerable damage to young wheat, is a regrettable one, seeing that these soil-frequenting insects are everywhere found most difficult pests to cope with.

SUGAR-CANE.—Flea Beetle (*Chatoenema sp.*), Gin Gin; Shoot Gauger (*Heteronychus sp.*), Mackay; Root-destroying Grubs (*Rhoptea sp.*), Bingera; Leaf Hopper (*Delphax sp.*), Bingera; Grasshoppers (*Pachytylus sp.* and *Acridium sp.*), Bundaberg, Bingera, Gin Gin, and Isis district.

The flea beetle, causing the entire destruction of the foliage of young plants in the Gin Gin district, proved to be a novel enemy of the sugar-cane plant, but one that could be readily assailed by compliance with the procedures that its occurrence suggested. Fortunately, it disappeared shortly after its manifestation, and new growth under favouring climatic conditions obliterated the evidences of its former presence.

The destructive grasshoppers visited some of the districts named in enormous number, with corresponding damage to the sugar-cane being grown there. Fortunately, however, the advent of weather highly favourable to the plant on which they fed and the full influence of certain natural enemies lessened, to some extent, the ultimate loss inseparable from their visitation.

This episode led to special tours of inspection being undertaken, the one to the Isis district being repeated. On these occasions opportunities were availed of for addressing the cane-growers concerned in repressing the pest. Visits of two or three days' duration are not, however, sufficiently extended to admit of the investigations being undertaken that are necessary in order that whatever recommendations are given may be based on the sure grounds afforded by the outcome of experiment. And it has been a matter of regret, therefore, that the exigencies of the Department that had to be complied with prevented the more extended inquiries solicited by the parties interested—in the Isis district especially—being prosecuted. Notwithstanding, it was as satisfactory as it was unexpected, that the visits alluded to led to the discovery of two formidable parasites of grasshoppers, capable of temporarily locally subduing them—the one a Mite (*Podopolipus*), the other an Hymenopter (*Scelis*)—a discovery of far-reaching significance with reference to the question of the subjugation of locusts, both elsewhere in Australia, but in other parts of the world also. These discoveries have been referred to at length by the Press of Queensland.

TIMBER AND WOODEN STRUCTURES.—Damage by Beetle Larvæ (*Anobium* and *Apate sp.*), generally Brisbane.

MISCELLANEOUS.—In connection with the subject of grasshoppers, the method of preparing and exhibiting "locust fungus" has been made a matter for report. A preliminary investigation of the cause of death of certain grasshoppers' eggs submitted by Mr. T. H. Wells, of Childers, has been similarly dealt with. Other matters of report have been:—The occurrence of a true Mealy Bug (*Dactytopius*) on Nut Grass (*Cyperus*) at Brisbane and Bingera; a local prevalence of the White Butterfly (*Pieris teutonia*); the destruction of Ants (*Formicidæ*); the identification of Ticks; the metal-boring habits of insects, with especial references to occurrences in Queensland (in the latter case a comprehensive and lengthy article is being prepared for submission to a United States conference of electrical engineers); the Book-worm (*Anobium paniceum*), and the means to be adopted for its repression, for the information of the Brisbane School of Arts; Fleas and Rats in connection with plague dissemination; and the destruction of Mice on farm lands.

USEFUL INSECTS.—Reports have been made on the rôle of ants in scale insect destruction, with especial reference to the habits of the Green Tree Ant (*Ecophylla smaragdina*), and the Black Tree Ant (*Polyrachis rasteillata*); on the Larvæ of Cleridid Beetles, and their action in destroying wood-boring grubs, such larvæ having been submitted on two separate occasions under the mistaken apprehension that they were harmful insects; on the proposal to introduce into Queensland a so-called Mealy Bug of Nut Grass (*Antonina purpurea*, var.), for the extermination of nut grass.

PRICKLY PEAR DESTRUCTION.—Interest in the pressing question regarding the means to be adopted in dealing with the prickly pear weed has continued, as in previous years, to be shown by the office; and in this connection it may be remarked that, in pursuance of a project suggested by it in 1900, embracing the utilisation of the insect fauna of the plant named for its destruction, was imported from Ceylon a special species of *Pseudococcus*, with the enlightened assistance of the Government Entomologist (Mr. E. Green) of that dependency. Unfortunately, however, only four or five larval examples of the insect named arrived out of a considerable consignment in a living condition, and the efforts taken to secure their continued existence proved futile. The repetition of this action, with a more favourable outcome thereof, is one that it is hoped will soon be chronicled, since assurance has been given by Mr. Green of his readiness to co-operate in the undertaking.

#### THE IMPORTATION AND DISSEMINATION OF DESTRUCTIVE INSECTS.

No instance of the importation and establishment in the State of a destructive insect, during the period embraced in this Report, has come under the notice of this office. At the same time it must be added, however, that it is not charged either with the supervision or conduct of measures calculated to prevent occurrences of this nature; an important branch of work, necessitating much technical information, and thwart with the highest responsibility, and one that is elsewhere regarded by official entomologists as one of the most important functions in connection with their posts.



Its attention, however, has been directed to the fact that the dissemination of injurious insects by local agencies for plant-distribution still, to some extent, is being continuously effected.

In April a lengthy memorandum was submitted, embodying observations in connection with "The Diseases in Plants Act of 1896," and its administration, suggested by incidents that have occurred since the date of its being brought into force.

#### THREATENED IMPORTATION OF PHYLLOXERA.

The persistence and ever widening extent of occurrence of that terrible scourge of the grape vine (*Phylloxera vastatrix*) in Victoria and in districts of that State over against South Australia, whilst it has engendered much anxiety amongst those of the latter province of the Commonwealth whose interests are connected with viticulture, is not less a matter of concern for Queensland. It is with this persuasion that the office has repeatedly impressed on the Department the necessity of opening and inspecting all packages of plants on their arrival from the southern States.

Moreover, the fact that *Phylloxera vastatrix* may be established in a vineyard months before its presence is manifested, and may, meanwhile, be distributed unobserved on grape vines or certain parts thereof derived from such a source; that it may occur on all parts of resistant grape vines, and be disseminated therewith; that its presence under some of its states of existence, and some of its conditions of occurrence, is difficult of detection; that its vitality is singularly persistent; and that, moreover, material harbouring it can alone be freed from its presence by the most searching and potent of treatments, are considerations that suggest that the importation of vine cuttings, even from a State nominally clean, as far as the insect in question is concerned, such as is the province of South Australia, is—by reason of the special liability of its vineyards becoming phylloxera-infested—not altogether unattended with some risk of affecting the introduction and establishment here of the notorious grape vine pest mentioned. Accordingly, notwithstanding it has been recommended that, for the time being, the introduction of vine cuttings from the State named under the exceptional circumstances connected with local demands pertaining to the establishment and extension of vineyards, be admissible under certain prescribed safeguards, respect for the letter of the Regulation under "The Diseases in Plants Act of 1896" embodying this recommendation will be strenuously urged, and any suggestion involving departure from its provisions will be emphatically condemned.

In view of the possibility that exists of the insect in question being introduced on plants other than grape vines, the Interstate Conference on Phylloxera, that sat a few years since in Melbourne, unanimously recommended, at the instance of the writer—one of its members—the adoption of the provisions, relating to importation of living plants of this description originating in Phylloxera-infested countries, of the Berne International Convention. These have since been rigorously enforced in South Australia, and it is a matter for consideration whether Queensland, having interests in common with the State named, so far as regards viticulture, should not do that which it has deemed necessary to provide for the contingency alluded to.

#### INSECTIVOROUS BIRDS.

Field observations, especially such as have been prosecuted in conducting inquiries with reference to manifestations in formidable numbers of both grasshoppers and caterpillars, have impressed on the office more forcibly than ever the prime necessity of adopting every means that it be practicable to devise to stay the destruction of our insectivorous birds, and whenever the urgency of this requirement has been brought to the attention of agriculturists when addressing them on insects of the classes named or on plant-marauders generally, it has met with a most sympathetic approval. In Childers, indeed, a prosecution in the courts apparently followed as one of the outcomes of the representations made on such an occasion.

Moreover, to in some measure meet the necessity that has arisen for the presence in arable lands of such useful birds to replace those that have succumbed to the late drought, the methodical utilisation of domestic poultry in the work has been suggested, and, to some extent, adopted.

The collection of mounted examples of the insectivorous birds represented in the fauna of Southern Queensland has been added to from time to time, and is accordingly approximately complete and available for exhibition.

The question of modifying the duration of the "close season" with respect to two different classes of birds coming within the scope of the Native Birds Protection Acts having been independently raised, that which concerned quails, and involved shortening the period prescribed during which their shooting in Southern Queensland was illegal, by fixing the opening day 1st May instead of 1st June, as at the time prevailed, has been opposed on the ground that quails are amongst the number of our insectivorous birds, and again on the consideration that those individuals that constituted the second of the annual broods were in many cases being tended by the parent birds in mid-May; and it is satisfactory to have been assured that the fact of respect having been given to the representations of the office alluded to, implied in the refusal to alter the regulations necessary to give effect to the proposal submitted, has been met with the approval of many of our sportsmen. The second application—viz., for the extension of the open season for duck-shooting in the Townsville district, and which has been officially acceded to—was one that did not appear to merit opposition.

#### II.—VEGETABLE PATHOLOGY.

The matters that have formed subjects of report, and that are embraced in the above title as applied to changes in plant-life attendant upon fungus-parasitism, as well as to specific constitutional plant derangements, have been most numerous and important. The following amongst these may be mentioned:—

PEACH.—Leaf Rust (*Puccinia pruni*), Darling Downs; Shot Hole Disease, caused by *Clasterosporium carpophilum*, the same; Root Gall, caused by the Nematode Worm (*Heterodera radicola*), Goondiwindi; Leaf Curl, caused by *Ecosacus deformans*, Toowoomba.

With reference to these affections, it may be mentioned that the serious affection named Root Gall, that victimises many kinds of our more valuable economic plants, is becoming widely distributed by nursery stock, as also by such vegetables as potatoes, an occurrence that, whilst greatly to be deplored, is most difficult to obviate by the exercise of official supervision.

PLUM.—Gummosis, North Killarney; premature decay due to physiological causes, Rosewood.

PEAR.—Fusicladium, or Black Spot Disease, and its significance.

CITRACEOUS PLANTS.—Bark Canker, Townsville; Fruit Rot, Brisbane and Rockhampton.

The agents operative, their mode of action, and the conditions favouring this constitute important subjects of inquiry in connection with the investigation of Fruit Rot and its mode of prevention, a matter that has claimed some attention from this office since it has been felt that it is one of much concern to those whose interests centre in the sale of citraceous fruits, oranges especially.

VINE.—Root Gall, caused by *Heterodera radicola*, Goondiwindi; Anthracnose, or Black Spot, caused by *Glæsporium ampelophagum*, Brisbane, Chinchilla, and other localities; Powdery Mildew or Oidium, caused by *Uncinula necator* (conidial stage), Brisbane and elsewhere; Fruit Disease, characterised by the appearance of brown depressed areas on the unripe berries, Brisbane district.

The weather conditions that obtained during the second quarter of the year were especially conducive to the presence of Anthracnose disease, and lead to many inquiries being made as to means for coping with it. This serious malady of the vine has been established in new districts through the agency of cuttings from



disease-affected plants. The preventative treatment already recommended in 1889, when the nature of black spot disease was first announced in Australia, a strong sulphate of iron acid solution has, in most cases, been found to be an efficacious one.

Fig.—Leaf Rust, caused by *Uredo ficus*, Brisbane.

PINEAPPLE.—Gummosis, Tiaro and Maryborough.

STRAWBERRIES.—Leaf Mildew, caused by *Sphaerotheca humuli* (conidial stage); Leaf Stalk Disease, caused by *Botrytis cinera*, Toowoomba.

The former of these has become more generally prevalent in the North Coast district since the period embraced in the last annual report of the office, and has in places proved virulent, one grower estimating a loss of prospective marketable fruit, amounting to nearly 50 per cent. This experience on the part of strawberry-growers lead to a special visit to one of the more important centres where they reside, and the delivery on the occasion of an address setting forth the nature of the malady and the means whereby its presence may be obviated.

VEGETABLES.—(1) Garden Pea, Leaf Mildew, caused by *Erysiphe polygoni* (conidial stage), Brisbane; (2) Cucumber, Leaf Disease, caused by *Plasmopara cubensis*, Wellington Point; cucurbitaceous plants generally—a disease apparently of a constitutional nature; and Root Gall, caused by *Heterodera radicola*, the same; (3) Cabbage, Putrefactive Mildew, caused by *Peronospora parasitica*, Gindie; (4) Potato, Brown Rot, caused by *Bacillus solanacearum*, Brisbane.

COFFEE.—A serious outbreak of Leaf Disease (*Hemileia vastatrix*) in certain estates at the base of the Astrolabe Ranges, British New Guinea, suggested the preparation of a lengthy report, discussing every phase connected with the incident in the light of such information regarding the outbreak as was available as the outcome of special representation made to the officials of that State at the instance of this office. A copy of this was communicated to the Executive of the State referred to. The history connected with the appearance of the malady of coffee named, in British New Guinea, points to the fact that Queensland cannot, in the interest of the coffee-growing industry, safely disregard the restriction on plant importations from countries in which "Leaf Disease" occurs, imposed by authority of the Diseases in Plants Act.

COTTON.—Leaf Disease, apparently due to parasitic bacteria, Biggenden; Bark Disease, Biggenden and Rockhampton; Boll Fungus (*Macrosphorium nigricantium*), Rockhampton; Impaction of Fibre, Rockhampton.

TOBACCO.—Blue Mould Disease, caused—as originally discovered by this office—by *Peronospora (hyoscyami)*, Texas district.

This serious malady of the tobacco plant was reported as being very inimical to the growth thereof in the Texas district during October-December, 1903, and recognition of the desirability of having a satisfactory basis on which to form a recommendation dealing with the procedure to be followed in preventing its occurrence, suggested that authority be granted for a course of comprehensive experiments, to be, preferably, devised, supervised, and reported on by this office, since rigorous attendance to essential technical details was demanded in order that they might be sufficiently demonstrative to point to the exact nature of whatever practical procedure might be suggested by their outcome, and that this might be accurately interpreted.

WHEAT.—In November the conduct of an inquiry was urged, embracing the entire wheat-growing area of the Darling Downs, for the purpose of ascertaining the disease-resisting or disease-escaping qualities of the different varieties of cereals generally, and of individual varieties under different soil and other conditions of environment, on account of the far-reaching importance in relation to future agricultural practice that such a survey would possess, and with the object also of ascertaining the different species of *Puccinia* or Rust Fungi present in the crops, as well as which of these was the most virulent generally, or under the separate circumstances afforded by the kind of wheat or other cereal affected, or the conditions pertaining to its growth. A memorandum embodying criticisms of a report on a wheat disease that had been remarked at West Hall, Warwick, was also tendered.

MISCELLANEOUS.—A report was furnished on a supposed instance of the occurrence of Foul Brood Disease in the Brisbane district; one also in an abnormal colouration manifested by Cattle Ticks (*Rhipicephalus annulatus*), at Ipswich; and another on the purposes subserved by Seed Control Stations, and how effected.

UTILISATION OF DISEASE.—Under the emergent circumstances constituted by the occurrence of grasshoppers in enormous numbers in some of the canefields of the Southern parts of the State, the so-called "Locust Fungus," originally derived from South Africa, was imported in order that an epidemic of disease might be established in their midst. This was courteously furnished by the distinguished Entomologist of Victoria (Mr. C. E. French, F.L.S., &c.), who, fortunately, was in a position to promptly deal with the application made to him, and on its arrival subcultures of the "Fungus" were obligingly prepared by the Director of the Bacteriological Institute (Mr. J. C. Pound). These were distributed in considerable numbers in localities where grasshoppers occurred in various stages of development, accompanied by directions relating to the method of employment of their contents, as well as that of multiplication. However, no benefit from securing their administration of Locust Fungus was realised, instances of its asserted efficacy proving in every instance to be accounted for by the presence of the parasitic mite, *Podopolipus* (a very virulent enemy of grasshoppers), when personally inquired into. The operations alluded to were supplemented by direct consignment of "Fungus" from Mr. French to individual cane-farmers, and in one instance where "Locust Fungus" thus furnished was used, marked positive results in grasshopper destruction were reported to have resulted. A visit to the particular farm whence this report emanated was undertaken, however, at a date too late after the action had taken place to enable the representations being verified. The organism constituting the so-called "Locust Fungus" was found to be that one which Mr. Alpine has identified with *Mucor racemosus*.

#### EDUCATIONAL.

The duty of delivering a course of lectures on Economic Entomology and Vegetable Pathology, at the Agricultural College, has ceased to be assigned to this office, and, consequently, weekly visits to the institution named have been abandoned. Freed from this important service, overtures have been received from the University Extension Council for a short series of addresses on biology being delivered under its auspices.

Addresses have been given at Montville, Gin Gin, Childers, and Beenleigh on special subjects during the year. The preparation of technical articles for the official organ of the Department—the *Queensland Agricultural Journal*—have, through press of work, been almost suspended. However, several of the reports dealing with important public questions, and that have been already referred to, were presented in a form convenient for publication, and were available for such action being taken with respect to them had this been deemed expedient.

#### LIBRARY.

With the exception of Professor G. Neumann's celebrated monograph *Revision de la famille des Ixoides* (Ticks), and a few technical works of periodic issue, accessions to the library attached to the office have for the most part consisted in works considerably donated by scientific institutions and fellow-workers, and many of these have been received in exchange for publications issued in past years. In respect to both it and the official collections it has been regarded as imperative that no monetary expenditure be requisitioned that had not reference to a more or less urgent requirement.

HENRY TRYON, Entomologist and Vegetable Pathologist.



## REPORT OF THE DIRECTOR, BOTANIC GARDENS AND GOVERNMENT DOMAIN.

During the financial year just closed, I have had the difficult task of maintaining the Botanic Gardens on an expenditure less than half that which was provided and considered absolutely essential for the purpose before I first took charge, fifteen years ago. Prior to that time no pretence was made of keeping the whole area of the Gardens in cultivated condition. On the lawns, which for years past have been kept carefully mown, it was the custom to collect periodically good crops of hay; the borders were not cultivated, but were heaped with this hay for the purpose of stifling weeds; the area under plants was about one-half its present extent; the area under bush-house culture was about one-third; and no work, save that necessary for the maintenance of the grounds, fell upon the staff. The officer in charge had the assistance of an overseer, propagator, and ranger; there was an unlimited water supply, and the funds permitted the employment from time to time of extra labour.

By the introduction of machinery and time-saving and systematic methods of work, I proved that it was possible to secure a much greater return for the money, and in the sequel the result has been much the worse for the establishment, and much the worse for myself. The old methods, being less organised, necessitated the existence of a larger staff, which was always available at a pinch, and the expense was borne without a murmur. When, however, I succeed in performing a much larger amount of work with a smaller staff, I find expenditure so reduced that the staff at my disposal becomes quite ridiculous compared with those considered necessary in other establishments of a similar nature.

The nearest city with which a comparison can be instituted is Sydney, the capital of a neighbouring State, which has a population about two and a-half times that of Queensland, and a revenue about three times as great. The State Botanic Gardens at Sydney occupy an area about equal to that of our own. The *personnel* of the staff and their emoluments are thus stated in the State Estimates for last year:—Director, £650; superintendent, £325; botanical assistant, £250; second botanical assistant, £150; junior clerk, £50; storekeeper, £150; collector, £150; bailiff, £120; messenger, £52; junior messenger, £26; office cleaner, £75; gardeners—one at £130, one at £125, one at 8s. 6d. per diem, three at 8s., four at 7s. 6d., twenty-four at 7s., one at 6s. 8d., one carpenter at 10s., one painter at 8s., two carters at 7s., five labourers at 7s., watchmen £340; making a total of salaries, £1,848; and wages, £5,486.

The above comparison is made merely with a view to give a standard which may be used in estimating results. Very good results indeed are achieved in Sydney, and when people of large experience in horticulture come from the sister State, and, like Lady Northcote, a few days ago, become enthusiastic over the beauties of our Gardens, it makes my regret all the deeper that the most earnest efforts to preserve them for the State are so hampered by the want of the barest necessities.

One man has to keep in order 5 acres of these Gardens. This is the area of half a mile of Queen street, including the footpaths, from Creek street to Victoria Bridge. A glance at this stretch of street will convince anyone with the most elementary ideas of garden work that to keep such an area of garden in order with the aid of one man is no easy task; in point of fact an impossible one.

The large gates at Edward street are now thrown open to vehicles all day. This has caused the road to become greatly cut up, and it would soon have become necessary to spend a considerable sum in repairs. I succeeded, however, in procuring, free of cost, sufficient material to reform this road, and about one-half has now been completed, the material to reform the remaining half being stacked until it becomes possible to spare sufficient labour to utilise it.

This material, if purchased, would have cost about £200.

The force at my disposal has demanded a concentration of all effort on the ordinary routine work of the Gardens. This has been unusually heavy. All the shrubberies required a most thorough overhauling after the drought; there was an enormous amount of replanting, thinning out, &c.

The fern island in the centre of the Gardens has been remodelled and replanted; large plantations of ornamental and useful plants have been made, large numbers of plants planted out to enhance the tropical effects of the Gardens, old and useless plants cut out, &c.

The objects which I keep steadily in view in the Gardens are:—

1. To grow and exhibit as many species of plants, native and exotic, as the resources at my command will admit of.
2. To group these in a series of pictures which will appeal to the sense of beauty and harmony.
3. To afford any information possible as to the uses, habitats, and cultivation of such plants.

For some years past I have placed before your Department suggestions for the use of these Gardens as a means of furthering technical education in horticulture. It is unnecessary to recapitulate these; they are in your possession, and have, I believe, met with approval of Ministers, and only await a favourable time for consideration in detail.

The question of forestry has had, as in previous years, my attention. I have undertaken the conduct of a section of the *Agricultural Journal* devoted to a discussion of this subject in all its bearings, and write two articles monthly. Specimens of the timber trees of this and other Australian States and foreign countries are being raised here, and observations made on their behaviour under our climatic conditions.

In making proposals for expenditure for the coming year I have asked for further assistance in the form of labour, and for the repair of the asphalt walks. I may point out in this connection that, in former years, the Department of Public Works executed various works in the Gardens from time to time, but that during the past year there has been practically no expenditure of this nature.

A year ago I constructed a drain from the large lagoon to the river, and during the past year I have altered the contour of the lagoon, greatly increasing its picturesque effect, and have planted it all round with palms and water-loving plants. The drain has since repaid its cost, as it was found possible to drain this lagoon into the river when the water became foul during the summer, instead of filling it with water at considerable cost. Opportunity was taken of the occasion to cover the bottom with a layer of ashes, and no trouble has since arisen in connection with the matter.

As employment has now been found in other directions for the bulk of the "unemployed," only a very small number now attend here, and as these are mainly persons who from various causes are incapable of sustained labour, the assistance received from them is very trifling, and it is problematical if it compensates for the trouble of overseeing their work.

Demands for trees for the State schools by the Department of Public Instruction, and from other public institutions, have been met as in former years.

PHILIP MAC MAHON, Director.

## REPORT OF THE TRUSTEES OF THE QUEENSLAND MUSEUM.

Our Report on the affairs of the Museum for 1903 must, we regret to say, be mainly, at its commencement, a reiteration of our last year's statement, that it is, so far as progress is concerned, in a paralysed condition. The sum allowed us for a year's expenditure, £103 (exclusive of the salaries and sundry allowances of officers), has barely sufficed to keep the Museum clean and its contents from decay. We look anxiously for a maintenance in keeping with the educational capability of the institution, and its rank among the kindred institutions of Australia.

VISITORS.—The wet weather which prevailed during the middle portion of the year, and especially its frequent incidence on Sundays, sensibly lessened the number of visitors. Of these there were registered on week days 38,719, against 35,997 in 1902; on Sundays 29,474, against 32,777 in 1902. The total for 1903 was



thus 68,193, against 68,777 in 1902. The conduct of visitors has been, on the whole, very satisfactory, and many of them seem to take considerable interest in one or other department of the Museum.

**DONATIONS.**—The number of donations was 331. A few of these were welcome additions to the collections, as, for examples, a large number of specimens derived from our aboriginal tribes, and given by Dr. Roth; a fine series of Queensland timbers, given by Mr. Griffiths, of Cairns; several aboriginal skulls and skeletons, contributed by the Commissioner of Police; a foetus of a kangaroo in the womb (rare), by Mr. Wilson; autographs, postage stamps, &c., by Mr. Weedon; indiarubber, and a model of a Tasmanian tin mine, by Messrs. Corrie and Co.; minerals, by Mr. Gwyther, of Warwick; fish, reptiles, insects, &c., were contributed by donors too numerous to be named.

**EXCHANGES.**—The menial work of the Museum being thrown upon the experts of our staff, they have not had leisure to effect exchanges to any great extent, and this prolific source of enrichment has consequently been almost lost. The only exchange of general interest procured for us from Professor Cruikshank a nice series of Egyptian relics in return for birds.

At the close of the last show of the National Association we obtained a portion of the technical exhibits collected for the Government by the Agent-General. These have been placed in position, and form a nucleus of a department of the Museum which we have always been desirous of establishing—a department of industry and commerce.

**PURCHASES.**—Practically none.

**LIBRARY.**—On this we can but repeat the observations made in our last report, but accentuating our regret to see the falling off of our receipts of foreign publications, in consequence of our inability to send anything in return. The library vote of £40 has been almost entirely absorbed by the cost of scientific serials; books on technical and other subjects of importance have been beyond our reach. A revised catalogue of the library is in preparation.

**STAFF.**—Our regular staff of four has done its best to maintain in good condition the large collections in our charge. Research into the natural products of the State there has been practically none, as all have been fully employed in inferior but necessary work, and as we have no means of printing results of research if it were undertaken.

**IMPERIAL WEIGHTS AND MEASURES.**—The balances, weights, and measures, under the gratuitous care of the Director, are in perfect order. The Director reports that he has not been asked to make an official adjustment during the year, though there are towns in the State whose local standards have never been through his hands.

**COPYRIGHT ACT.**—Nineteen certificates of deposit were issued.

A. NORTON, Chairman.

## REPORT OF THE CHEMISTRY DIVISION.

### FEEDSTUFFS AND PRODUCTS.

SIR,—I have the honour to submit the following Report covering the work of the Chemical Division of the past year. Although the direction of the work has continued with me, I wish to explain that Mr. Brünnich has not only had charge of the actual chemical work, he has also, at my request, prepared this Report. Your attention is directed to the increasingly broad scope of the work undertaken, and to the high commercial value of the results rendered by the Laboratory.

WALTER MAXWELL, Director.

The Acting Under Secretary for Agriculture.

The work of this year is largely again a continuation of the work commenced in former years, the report on this work bearing out and confirming in many instances the conclusions drawn in last year's Report.

**MAIZES.**—The analytical work in connection with the examination of maizes for their feed value was continued, and was made doubly valuable by being able to again compare imported with locally-grown maizes, by securing five samples of maizes grown and exhibited in the Bowen district, which include another sample of Queensland-grown Argentine maize, and also the five samples of American seed maizes, imported by the Department of Agriculture for sale to the farmers of the State:—

### ANALYSES OF MAIZE VARIETIES.

Variety.	Grower and Locality.	Moisture.	Proteids.	Fat.	Carbo-hydrates	Ash.
		Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
Golden King ...	G. Gotfridsen, Mount Nutt, Bowen	13.16	12.65	5.24	69.1	1.65
" ...	G. E. Kent, Woodlands, Bowen	12.86	12.11	5.70	72.1	1.86
" ...	G. Heron, Gladstone Park, Bowen	11.92	12.47	5.09	67.7	1.63
Unnamed ...	W. J. Andrews, Don River, Bowen	13.17	11.33	5.38	73.7	1.66
Argentine ...	H. C. Smelhurst, Kiora, Bowen	12.70	11.28	5.83	66.8	1.74
Mean of Bowen Maizes ...		12.76	11.97	5.45	69.9	1.71
Snowflake ...	American Seed Maize—white	12.46	10.06	4.68	79.7	1.43
Hickory King ...	" "	12.25	10.27	4.77	77.2	1.44
Forsythe's Favourite ...	" "	12.27	9.42	4.89	81.0	1.51
Golden Beauty ...	" yellow	11.65	10.69	5.10	74.5	1.49
Kansas Sunflower...	" "	12.23	11.06	4.85	73.6	1.50
Mean of American Seed Maizes ...		12.17	10.30	4.86	77.2	1.47
" Queensland grown varieties (1903) ...		12.00	13.10	5.50	65.80	1.55
" " Argentine " ...		11.28	12.92	5.20	61.00	1.45
" Imported Argentine (1903) ...		12.00	10.69	6.04	63.20	1.66
" United States, exhibited at Chicago ...		10.93	9.88	4.17	71.95	1.46
" " all varieties Bull. 11 and 15 ...		10.9	11.7	6.1	...	1.7

For a better comparison, I repeat some of the figures given in last year's Report. We again find that our Queensland-grown maizes are very much richer in the proteids—the flesh and muscle-forming portion of a foodstuff—than the imported varieties. Although the sample of Argentine maize grown at Bowen does not quite reach in its food value the sample analysed last year, presumably being grown in the semi-tropical climate of Bowen, it is still notably better than the original imported sample.

As already pointed out last year, this feature of our Queensland maizes being so much richer in proteids is of great importance to the consumer, as the nutritive ratio, or the ratio between digestible albuminoids and non-albuminoids, is considerably raised, and making maize thereby a better balanced food. Our maizes containing about 13 per cent. of proteids, which nearly approaches the average amount found in wheats, are



thus a much less fattening and a more muscle-forming food, than maize containing only 10 per cent. of proteids, and may, therefore, for instance, be safely used as a substitute for wheat for poultry feed.

WHEATS.—Of very great importance are the analyses of the seed wheats, purchased on behalf of the Department of Agriculture in South Australia, which were carried out on analogous lines. Samples of wheats grown at various places in the State, from these seed wheats, have been received and are still being collected; the work of analysing them is being proceeded with, and results will be published in the next Report.

This investigation was done without respect to the milling quality of the wheats, as this special work necessitates the use of an experimental mill; the analyses refer to the whole ground wheats.

I will give herewith a short practical summary of these analyses, whereas the full analytical table of analyses of wheats and maize is given at the end of this Report:—

ANALYSES OF SEED WHEATS.

Varieties.	Moisture.	Proteids.	Fats.	Carbo- hydrates.	Ash.
	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
Silver King, S.A. ... ..	9.74	15.33	2.12	65.2	1.35
Baltic Red, or Red Baltimore, Rosalie ...	10.65	12.41	1.50	70.8	1.96
Marshall's No. 1 ... ..	11.10	12.83	2.02	68.8	1.22
Defiance, Rosalie ... ..	10.63	13.75	2.49	63.4	1.98
Steinwedel ... ..	10.93	16.38	2.06	59.6	1.29
Budd's Early, S.A. ... ..	10.75	16.98	2.13	66.2	.98
Marshall's No. 3 ... ..	10.85	14.19	2.10	58.4	1.13
Gluyas, S.A. ... ..	10.75	14.48	2.30	58.8	1.26
Petatz Surprise, S.A. ... ..	10.97	16.73	2.11	56.0	1.23
Carmichael, S.A. ... ..	11.00	12.91	2.22	61.7	1.16
Newman's Early ... ..	11.25	15.90	2.08	66.6	1.32
Smart's Early, S.A. ... ..	11.50	15.95	2.20	64.1	1.20
Baroota Wonder, S.A. ... ..	11.58	15.30	2.46	62.1	1.33
Early Para, S.A. ... ..	11.26	16.05	2.22	59.6	1.35
Leatherhead, S.A. ... ..	11.27	16.24	2.37	62.9	1.25
White Tuscan, S.A. ... ..	11.42	16.38	2.39	64.8	1.27
Allora Spring, S.A. ... ..	11.71	14.95	2.29	72.4	1.33
Warwick, S.A. ... ..	11.54	12.48	2.20	64.9	1.22
Hamblyn's Prolific ... ..	10.99	15.02	2.23	61.2	1.18
Dart's Imperial, S.A. ... ..	11.38	15.04	1.99	63.0	1.24
Fillbag, S.A. ... ..	11.41	12.83	2.28	59.7	1.34
Australian Wonder, S.A. ... ..	11.36	13.11	2.19	62.2	1.21
Means ... ..	11.09	14.79	2.18	62.4	1.31
Average of German Wheats (District and König)	13.37	14.51	1.96	...	2.07
Average of Austrian Wheats (S. Weinzurm)	13.37	14.02	1.98	...	2.09
Average of American Wheats (Bulletins Nos. 11 and 15)	10.5	13.3	2.3	...	2.0

It will be noticed that a considerable variation exists in the proteid contents of the various wheats, varying from a minimum of 12.4 per cent. in Baltic Red to a maximum of 17.0 per cent. in Budd's Early. The mean of all analyses is found to be 14.8 per cent. of proteids, an amount somewhat higher than the amounts found in an average of Continental wheats, and notably higher than the amount contained in American wheats. The fat varies from 1.5 per cent. Baltic Red to 2.5 per cent. Defiance, giving an average of 2.2 per cent., slightly higher than found in Continental wheats, and slightly lower than the fat in the American wheats.

Of course it has to be clearly understood that the analyses were carried out irrespective of the practical milling qualities; in some cases, however, it is possible to conclude from a very low proteid content to expect a low milling quality. It is, for instance, admitted by local millers that Baltic Red produces an exceedingly weak flour, which is to be expected from the low amount of proteids found by analysis. Nevertheless, and quite apart from the milling quality or facility, the contents of proteids actually determine largely the nutritive value of the wheats, principally when they are used as whole wheats or whole wheat meal. Still, a practical testing of our wheats with regard to their milling quality and bread-making quality would be of very great importance, but requires an experimental milling plant and other apparatus, the purchase of which the Department of Agriculture has had for some time under consideration.

In order to make the investigation of all our feedstuffs more complete, and in order to get more particularly some insight in the digestibility of such foodstuffs, the portions soluble in water were determined, and are given with the complete analytical results in the tables appearing at the end of the Report.

As this method is not usually used and given in the results of tabulated analyses of feedstuffs, and are peculiar to our laboratory, I will give a short statement of the procedure by which the water-soluble portions were determined. The nutritive value of a food is considerably influenced by the solubility of its constituents.

The *watery extract* was prepared by treating 25 grms. of the ground seeds or fodders with cold water for twenty-four hours, adding a few drops of chloroform to prevent fermentation. The clear supernatant is decanted, fresh water added, and allowed to stand for another twenty-four hours. The flask containing the mixture is frequently shaken, in order to let the water well act on the meat. The clear liquid is again decanted into a 500 cc. flask, containing already the first lot of the extract. Another 100 or 150 cc. of water is added to the fodder, and digested on the water-bath for two hours; after cooling, the whole is transferred to the 500 cc. flask, and made up to the mark. After well mixing and allowing to stand for another couple of hours, aliquote portions of the filtered watery extract are used for the determination of total soluble extract; by ashing this we obtained soluble ash, and, again, in a separate portion, total nitrogen after Kjeldahl. In the case of wheat meals, the final heating on the water-bath had to be omitted, as it was quite impossible to obtain a clear filtrate after boiling, due to the difference in the nature of the starches.

Of particular practical value is also the determination of *Lecithin*, a fat-like substance, rich in phosphoric acid, found in the crude fat, which body is not generally given in ordinary foodstuff analysis. This compound, which is found in the substances forming the brain, and all human vital secretions, in the yolk of an egg, &c., is of very great importance, being easily digested, and supplying the necessary phosphorus in a readily assimilable form, particularly for brain use. W. Maxwell has made a special study of the tracing of this phosphorus compound in plant and animal life, and has particularly shown that the lecithin in the yolk of the egg becomes reorganised during incubation, and is changed into the mineral phosphates found in the bone of the chicken. The lecithin was determined in accordance to the methods recommended by Schulze, Likiernik, and W. Maxwell, by digesting the ether extracted meals with alcohol on the water-bath, evaporating to dryness, again extracting with ether, and determining the total phosphoric acid in the crude fats obtained in the usual manner.



The *Starch* in all our feedstuffs is determined directly by inverting with diastase, and the value thus obtained is not directly comparable with the amount of non-nitrogenous extractives appearing in other tables on value of fodders.

**SORGHUM POISONING.**—Investigations with regard to the poisonous qualities of the fodder plants, belonging to the sorghum family, at certain periods of their growth, were continued, and samples of various varieties grown at the Mackay Sugar Experiment Station were sent down at regular intervals for analysis, also a sample of *Penicillaria*, Soudanese Millet (*Pennisetum typhoideum*), the seeds of which we received from a farmer, who was anxious to know if this millet was also dangerous, was grown at our experimental plot in the Brisbane Botanical Garden. The result of this work was very instructive, and shows that the higher-cultivated fodder plants of the sorghum family are not so dangerous in their earlier stages as the common variety, usually grown by our Queensland farmers.

It was also again borne out that vigorous growth, particularly on land manured with nitrogenous manure, produces the hydrocyanic or prussic acid yielding glucoside in larger proportion.

The sample of *Penicillaria* grown in the poor sandy experimental plot, without any manure, gave at its first test no indication of hydrocyanic acid, whereas the manured plot we found nearly 1 grain per lb. of the greenstuff, reaching the danger limit. As soon as the crop developed more vigorously, by rainy weather setting in, even in the crop from the unmanured plot small amounts of hydrocyanic acid could be obtained, the quantities diminishing as the crop reached maturity. The experiments of this year thus confirm the results actually found in the previous year by this laboratory, showing that all fodders of the sorghum family are more or less dangerous in the earlier stages of their growth, and particular precautions have to be taken in the use of such fodders, if they are grown on rich soils and under particularly favourable climatic conditions, thus completely corroborating the findings of last year.

PENICILLARIA, SOUDANESE MILLET, GROWN AT EXPERIMENTAL PLAT IN THE BOTANIC GARDEN.

Date.	Age of Crop. Weeks.	UNMANURED.					MANURED WITH NITRATE OF SODA—6 CWT. PER ACRE.				
		Green Crop. Lb. per acre.	Water. In Green Material. Per cent.	Hydrocyanic Acid.			Green Crop. Lb. per acre.	Water. In Green Material. Per cent.	Hydrocyanic Acid.		
				In Green Material. Per cent.	In Green Material. Grains per lb.	Dry Matter. Grains per lb.			In Green Material. Per cent.	In Green Material. Grains per lb.	Dry Matter. Grains per lb.
25-2-04 ... ..	6	1,760	74.8	Nil	Nil	Nil	3,990	85.2	.0102	.71	4.8
11-3-04 ... ..	8	4,025	72.0	.0053	.37	1.3	5,890	82.9	.0090	.63	3.7
28-3-04 ... ..	10	3,980	73.6	.0011	.08	.3	6,420	80.6	.0066	.48	2.4

SORGHUM VARIETIES, GROWN AT MACKAY SUGAR EXPERIMENTAL STATION.

Date.	Age. Weeks.	COLLIER.		COLEMAN.		EARLY ORANGE.		PLANTER'S FRIEND.		FOLGER'S EARLY.		GIANT HONDURAS.		COMMON.			
		Hydrocyanic Acid—Grains per lb.															
		Green.	Dry.	Green.	Dry.	Green.	Dry.	Green.	Dry.	Green.	Dry.	Green.	Dry.	Green.	Dry.	Green.	Dry.
28-10-03 ... ..	9	.64	4.0	.49*	3.5*	.70	4.7	.22*	1.5*	.53*	3.3*	.32*	2.4*				
10-11-03 ... ..	11	.35	2.3	.63	4.4	.49	4.0	.68	5.1	.52	3.6	.69	5.2	.81	6.9		
1-12-03 ... ..	13	.15	.6	.24	1.0	...	...	...	...	.18	.7	...	...	.41	3.3		
17-12-03 ... ..	15	...	...	...	...	.19	.7	.28	.7	...	...	...	...	.38	1.7		

\* Samples marked had fermented during transit.

The highest amounts previously found was 2.4 grains per lb. of the green material, or 13.4 grains per lb. of the dry material in 5-weeks old Planter's Friend. The use of such green fodder would be highly dangerous, but as soon as the amount has fallen under  $\frac{1}{2}$  grain per lb. in the green material the fodder may safely be used.

**CAPE GOOSEBERRY PULP.**—The Cape gooseberry pulp, prepared on behalf of the Department of Agriculture, was submitted for investigation and analysis.

The first sample received was taken right in the beginning of the season, from the first lot of fruit treated; the berries were hardly ripe enough, and I think that a small quantity of water was added to the pulp either before or during its preparation. The addition of any water was strictly forbidden, and the second sample of pulp was considerably better. By comparing the analysis of our Cape gooseberries with the analyses of other fruits, it will be seen that the Cape gooseberries are, with regard to their contents of sugar and food value in general, superior to any other Continental or American fruit generally used for jam-making, without the amounts of free acids being any higher.

Although the amount of free acids in the Cape gooseberries is not any higher than the amount found in other fruits, a distinct action of the pulp on the tinned vessels, in which the pulp is stored, is noticeable; this, of course, applies to all fruit pulps more or less, and for this reason nearly all manufacturers of repute, particularly abroad, use glass vessels for their jams and preserves.

	Cape Gooseberries.		Various Continental and American Fruits from different Sources.			
	First Sample—Date received, 6-10-03.	Second Sample—Date received, 24-11-03.	Strawberries.	Red Currants.	Red Gooseberries.	Raspberries.
Water ... .. Per cent.	88.30	83.50	90.8	85.8	85.6	83.8 to 89.1
Cane Sugar ... ..	1.44	2.86				
Fruit Sugar ... ..	3.13	3.98				
Total Sugar* ... ..	4.57	6.84	5.4	4.8	5.6	1.8 to 3.6
Total Free Acid, as Malic Acid ... ..	1.46	1.52	1.4	2.3	1.4	2.0
Acetic Acid, free ... ..	.0012	.0264				
Acetic, combined ... ..	.0216	.0214				
Malic Acid ... ..	1.64	1.76				
Citric Acid ... ..	.32	.45				
Oxalic Acid ... ..	nil	nil				
Tartaric Acid ... ..	trace	trace				
Albuminoids ... ..	2.06	2.12	1.0	.5	.4	.5 to 1.0
Total Nitrogen ... ..	.343	.354				
Total Ash ... ..	.90	1.04	.6	...	.4	.4 to .6
Cellulose, Pectins, &c. (differ.) ... ..	2.01	4.24	.8	6.6	6.6	6.2 to 9.0



From the foregoing analyses it is quite evident that not only the chemical composition, but also the fine aromatic flavour of the Cape gooseberries, borne out by the predilection shown by the public taste for preserves made from Cape gooseberries, as soon as they become known, makes them a highly satisfactory raw product for making into pulp for export and further manufacture into jams and preserves, so that our Cape gooseberry pulp should be found to be a formidable rival of other fruit pulps in the open market.

**PINEAPPLE DISEASE.**—Part of the new work, mentioned in last year's Report as intended to be undertaken, was carried out by a thorough investigation into the composition of the pineapple plants, their leaves, roots, and fruits, in a healthy as well as in diseased condition, in order to find out if any relation could be established between the composition of the pineapple soils and the nature and composition of the pineapple plant in healthy and diseased forms. Samples of soils were procured in different characteristic localities, the analyses of which were carried out at the laboratory of the Sugar Experiment Station, at Bundaberg, in accordance with Dr. W. Maxwell's special aspartic acid method of available plant foods in soils.

The pineapple disease has already been investigated by officers of this Department as far back as 1892, more particularly from an entomological and pathological point of view, the records of which will be found in the publications of this Department.

When taking our present samples of pineapple plants for analysis from the different localities, we found, due to the effect of planting in rows, in all the lateral suckers an almost entirely superficial root system, the roots of which are generally only from 2 to 3 inches deep, and in no case could roots be found deeper than 6 inches.

In the first and second year after planting, the roots of the scions in the original row may go down to a depth of 10 to 16 inches; as soon as the plants get older the lower roots decay, which is common to many plants. In the case of the actually diseased plants on old established fields, the rhizomes or rootstocks are lying loosely on the ground, which is covered with a dense mass of rotten roots, leaves, and rootstocks, forming an exceedingly sour vegetable mould. It is quite evident that as pineapple plants themselves form such a large amount of humus, the addition of manures, in the form of horse manure, sawdust can only be detrimental, leading to a still greater souring of the soil; and their use, more particularly of sawdust, must be most emphatically condemned. The souring of the soil will be naturally the worst in the case of badly drained lands.

The actual weight of the whole pineapple crop is quite incredibly high, particularly in old fields, and it is almost inconceivable that one field can carry a green crop of 300 tons per acre, containing 252 tons of water, equalling  $2\frac{1}{2}$  inches of rain, 48 tons of dry substance, which contains over half a ton each of nitrogen and potash, and a quarter of a ton of phosphoric acid. The lightest crop weighed 60 tons per acre.

In explanation of the work, as recorded in a complete table on another page, it may be stated that all plants and suckers were removed with their roots and dead leaves from the soil. All plants were cut in two at the point where the green leaves commenced; all the roots, dead leaves, and the rootstock were called *roots*, the green part of the plant *leaves*, and the whole together *plant*.

For the fruit average weights were obtained by weighing several fruits from various parts of the field, and to estimate the weight per acre an actual crop of 1,000 dozens per acre, which is considered a very good yearly crop, was taken for all calculations. Of course it must be understood that in the first and second year after planting such a crop can hardly be expected; a good first-year crop is from 5,000 to 6,000 pines. This crop again shows that in the first years a fruit can almost be expected from every plant or sucker, whereas in later years the proportion between number of pines and suckers becomes more and more unfavourable as the plantation gets older, due to the disadvantages of the system of planting in rows, as compared with the check system used elsewhere. In No. 3, Nundah, we thus find that by taking a crop of 12,000 pines, only one sucker out of twelve bears a fruit per annum.

From an American report we learn that in a pineapple plantation planted on the check system, 18 inches by 18 inches, having thus 19,360 plants per acre, the first year's crop yielded 5,000 pines, and the second year's crop 11,724 pines.

In a report on pineapple cultivation in Guadeloupe (taken from "Culture de la Canne a Sucre a la Guadeloupe," par Ph. Boname, 1888), the crop is estimated at 5,060 plants per acre, yielding the first year the same number of fruits, or a total weight of about 5 tons of fruit and 15 tons of green plants (*tige*) per acre.

The analyses of fruit and fruit ashes agree very closely with our own, as seen from the following comparison:—

ANALYSIS OF PINEAPPLES (FRUIT).

	Average of our own Analysis.	American Analysis.	Guadeloupe Analysis.
	Per cent.	Per cent.	Per cent.
Water ... ..	87.68	89.28	82.90
Dry substance ... ..	11.32	10.72	17.10
Nitrogen =	.104	.062	.072
= Proteids ... ..	.65	.39	.45
Ash ... ..	.43	.35	.57
Containing Phosphor Acid ... ..	.04	...	.04
"    Potash ... ..	.18	...	.28
Fibre ... ..	} 10.24	.41	} 16.08
Fat ... ..		.26	
Other non-nitrogen Substances ... ..		9.31	

On another page we give the tabulated result of the whole investigation, including the analyses of the soil, particulars about the field and crop, &c., and also in the last column the analysis of the Guadeloupe pineapple plants, above mentioned. It will be particularly noticed that the analysis of the ash of the fruit agrees very closely with our own. The ash of the whole plant (*tige*) is rather different from the plant ashes found here, which always consist of more than half of silica, whereas the Guadeloupe plant ash contains only 10 per cent. of silica.

It is not easy to explain this difference, but it is probably partly due to the fact of the plant being analysed quite young, presumably one year's growth, and again to a different method of taking and treating the sample, so that Boname's "*tige*" only includes the green part of the plant. The nearest approach to Boname's analysis of plant ash is the analysis of the ash from the leaves (green suckers) from No. 4, diseased patch, which contains about 27 per cent. of silica.



ANALYSIS OF PINEAPPLES, PLANTS, FRUITS, and PINEAPPLE SOILS.

	No. 1—NUNDAH.				No. 2—NUNDAH.				No. 3—NUNDAH.	
	Rough Leaved.				Smooth Leaved.				Rough Leaved, Healthy.	
	Fruit.	Leaves.	Roots.	Plant.	Fruit.	Leaves.	Roots.	Plant.	Fruit.	Plant.
Original Number of Plants per Acre	No.	...	...	4,840	...	...	...	4,840	...	4,840
Age of Crop	years	...	...	50 years	...	...	...	6 years	...	20 years
Number of Plants per Acre	No.	12,000	...	128,000	12,000	...	...	76,000	12,000	143,000
Weight of Plants and Fruit	lb.	2.7	3.3	1.2	3.5	3.7	4.4	1.5	5.9	2.6
Weight per Acre	lb.	36,000	324,000	124,000	448,000	48,000	336,000	112,000	448,000	36,000
Dry Substance per Acre	lb.	4,068	56,152	26,784	82,936	4,752	44,016	25,648	69,664	5,040
Nitrogen per Acre	lb.	34.6	564	236	800	47.5	582	221	803	41.0
Total Pure Ash per Acre	lb.	142.6	6,000	2,582	8,582	146.8	4,536	2,630	7,166	177.4
Total Potash per Acre	lb.	71.3	629	169	798	58.1	561	200	761	70.6
Total Phosphoric Acid per Acre	lb.	12.6	126	60	186	16.8	272	67	339	20.2
<i>Analyses—</i>										
Moisture	%	88.7	82.7	78.4	81.5	90.1	86.9	77.1	84.5	86.0
Dry Substance	%	11.3	17.3	21.6	18.5	9.9	13.1	22.9	15.5	14.0
Nitrogen	%	.096	.174	.190	.179	.099	.173	.197	.179	.114
Pure Ash	%	.396	1.852	2.082	1.915	.306	1.350	2.348	1.60	.493
Potash	%	.198	.194	.136	.178	.121	.167	.179	.170	.196
Phosphoric Acid	%	.035	.039	.048	.042	.035	.081	.060	.076	.056
<i>Analysis of Pure Ash—</i>										
Silica	%	14.29	64.53	65.95	...	17.70	58.98	69.40	...	15.30
Sulphuric Acid	%	3.81	2.82	1.73	...	5.21	3.15	1.68	...	5.67
Chlorine	%	13.15	4.08	2.73	3.69	7.22	1.73	1.81	1.76	6.39
Phosphoric Acid	%	8.76	2.12	2.32	2.17	11.33	5.97	2.56	4.73	11.44
Iron	%	.55	3.16	3.78	...	1.27	4.94	3.78	...	1.70
Lime	%	5.27	7.47	9.63	...	5.98	5.68	7.75	...	12.06
Magnesia	%	3.78	3.94	4.21	...	13.16	4.65	4.46	...	5.37
Manganese	%	2.46	2.17	2.34	...	.61	.80	.45	...	1.56
Potash	%	50.00	10.49	6.52	9.30	39.38	12.40	7.64	11.61	39.71
Soda	%	1.26	.95	.73	...	1.12	1.73	1.08	...	1.82

AVAILABLE PLANTFOOD ACCORDING TO FINDING OF BUNDABERG LABORATORY.

	%		%		%
Lime	...	.0105	...	.2100	...
Potash	...	.0084	...	.0629	.0465
Phosphoric Acid	...	.0038	...	.0414	.0095
Nitrogen	...	.0870	...	.1350	.0005
Humus	...	3.7000	...	3.7000	.0940
					3.4500

	No. 4—NUNDAH.			No. 5—ASPLEY.		No. 6.—ZILLMERE.		No. 7— NUDGE.	PINEAPPLES FROM GUADELOUPE. Accord. to P. Boname.	
	Rough Leaved, Diseased.			Rough Leaved.		Rough Leaved.		Rough Leaved.	Fruit.	Plant.
	Leaves.	Root.	Plant.	Fruit.	Plant.	Fruit.	Plant.	Plant.	Fruit.	Plant.
Original Number of Plants per Acre	No.	...	4,840	...	4,840	...	4,840	14,420	...	[Tige]. 5,060
Age of Crop	years	...	20 years	...	5 years	...	5 years	11 years	...	1st year
Number of Plants per Acre	No.	...	53,760	12,000	47,870	12,000	70,000	111,280	5,060	5,060
Weight of Plants and Fruit	lb.	1.17	2.17	3.34	1.9	2.9	2.9	5.3	2.2	6.6
Weight per Acre	lb.	62,720	116,480	179,200	36,000	131,400	36,000	224,000	586,880	11,150
Dry Substance per Acre	lb.	10,788	43,214	54,002	4,752	32,794	4,752	48,384	99,770	1,906
Nitrogen per Acre	lb.	83	211	294	34.6	303	40.7	448	951	8.0
Total Pure Ash per Acre	lb.	932	3,745	4,677	173.8	3,966	167.4	3,653	6,830	63.6
Total Potash per Acre	lb.	308	291	599	66.2	429	67.3	354	875	31.4
Total Phosph. Acid per Acre	lb.	60	162	222	12.6	125	19.8	166	417	4.8
<i>Analyses—</i>										
Moisture	%	82.8	62.9	70.0	86.8	75.6	86.8	78.4	83.0	82.9
Dry Substance	%	17.2	37.1	30.0	13.2	24.4	13.2	21.6	17.0	17.1
Nitrogen	%	.133	.181	.163	.096	.225	.113	.200	.162	.072
Pure Ash	%	1.486	3.215	2.600	.483	2.950	.165	1.631	1.163	.570
Potash	%	.491	.250	.332	.184	.319	.187	.247	.149	.282
Phosphoric Acid	%	.095	.139	.123	.035	.093	.055	.074	.071	.043
<i>Analysis of Pure Ash—</i>										
Silica	%	26.93	68.40	...	22.08	66.62	18.95	60.10	68.70	7.10
Sulphuric Acid	%	3.17	1.83	...	...	...	...	...	...	5.60
Chlorine	%	15.84	1.69	4.51	5.73	2.30	8.17	2.26	10.16	13.29
Phosphoric Acid	%	6.37	4.33	4.75	7.18	3.16	11.79	4.52	6.06	7.51
Iron	%	2.49	4.53	...	...	...	...	...	...	1.11
Lime	%	8.18	5.80	...	...	...	...	...	...	6.52
Magnesia	%	6.10	4.70	...	...	...	...	...	...	5.79
Manganese	%	.14	.22	...	...	...	...	...	...	7.80
Potash	%	33.02	7.78	12.80	37.98	10.79	40.27	15.13	...	7.61
Soda	%	1.28	.74	...	...	...	...	...	...	...

AVAILABLE PLANTFOOD ACCORDING TO FINDING OF BUNDABERG LABORATORY.

	%		%		%
Lime	...	.0256	...	.1125	...
Potash	...	.0135	...	.0536	.1252
Phosphoric Acid	...	.0008	...	.0048	.0355
Nitrogen	...	.0990	...	.1380	.0058
Humus	...	5.1500	...	4.625	.122
					1.800



## Particulars on pineapple fields:—

No. 1. Nundah.—This field is situated on the top of a small ridge; the soil is very uniform in colour and texture, and has a good drainage. The field is between fifty to sixty years under pines, which have never been renewed, but only occasionally thinned out. At present no disease is visible, but the owner has noticed the disease in this particular field for thirty-five years. Especially in places where the ashes from a bakery were applied, the disease was very marked and fatal. As manure, farmyard manure is applied, also wood and coal ashes. The use of horse manure was abandoned in favour of cowyard manure.

No. 2. Nundah.—This sample was taken in the immediate neighbourhood of No. 1 sample. The disease generally appears two or three years after planting, particularly in a spot which was previously occupied by two bakeovens, the ashes of which were thrown over the ground. The crop of this field, as of the previous one, was estimated, by comparison with other, at 200 tons per acre.

No. 3. Nundah.—This field, which has been about twenty years under cultivation under pines, is situated on a small ridge. The pines are so far quite free from disease, and have never been renewed. The principal manure used is horse manure, with a slight application of meatworks manure every year. The land appears to have a fair natural drainage; the soil dries quickly after rains. The crop is an exceedingly heavy one; originally planted in rows 9 feet apart, the rows now nearly meet, leaving only a narrow track between the rows. The crop was weighed by cutting a square yard, and was found to reach 300 tons of plants per acre.

No. 4. Nundah (Diseased).—The diseased plants of this sample were taken within a hundred yards of the healthy plants of No. 3. The ground is covered with a dense mass of roots and rootstocks, all lying loosely on the ground, the suckers themselves being very small and sickly-looking. The disease seems to start in the lowest-lying places of the rows, and gradually works forward in each row. The crop was weighed, and yielded 80 tons per acre, chiefly roots.

No. 5. Aspley.—This field, situated on the top of a ridge, has very uniform soil, and seems to have a fair drainage. It has been between eleven to thirteen years under pines. The plants are at present comparatively free from disease, but still the disease exists in patches, chiefly in low-lying portions of the rows, the pineapple plants looking sickly and stunted. Stockyard and stable manure are principally used, occasionally some meatworks manure. Originally planted in rows 9 feet apart and 1 foot space between suckers, at present, after five years' growth, the rows are 6 feet wide. The crop was weighed, giving a total of 60 tons per acre, the lightest of all the crops weighed.

No. 6. Zillmere.—This field is very ununiform in colour and texture of its soil, which is of a loose sandy nature. The field was tile-drained. The plantation is now five years old. Disease appears in patches, and has been noticed for several years. Uses horse manure and sawdust. The crop was estimated at 100 tons per acre.

No. 7. Nudgee.—The land seems fairly uniform, and has a fair natural drainage. The plantation is a heavily-cultivated leasehold, and has been under pines for twelve years. The rows, originally 9 feet apart, are now fully 7 feet wide, and are just being taken out to be replanted. The crop was weighed, yielding a total of 262 tons per acre. The land is heavily manured with horse manure. Disease appears in low-lying patches, and more particularly where much manure was applied. Near the centres of the rows a dense vegetable mass, about 8 inches deep, covered the soil; the roots were all very shallow, barely 3 inches deep, all the rootstocks of the lateral suckers lying practically loose on the soil.

By studying the ash analyses of fruits and plants more closely we find in the first place that the ash of the fruits is exceptionally high in potash, which itself is found in most of the soils to be rather deficient. Pines are also evidently in need of chlorine, which is found in very high amounts in comparison with the quantities usually present in the ashes of other fruits and plants, and this undoubtedly accounts for the better thriving of the pineapples near sea coasts. Again, we notice that the amount of chlorine becomes quite abnormally high in the green parts of the diseased plants (No. 4).

By comparing further the composition of the ashes of the whole plant grown on the three best and also on the three poorest soils we find the following average composition of the ashes:—

	Plants from Best Soils.	Plants from Poorest Soils.
Phosphoric Acid	5.0	3.0
Potash	13.9	11.0
Chlorine	2.3	3.5

It will be seen that the investigation relative to the pineapple disease presents a problem of the greatest difficulty; although a good many points of interest and importance have been elucidated, in connection between relation of composition of soil, chemical nature of fruits and plants, a relation, which, as already stated, is the aim on which the present chemical researches were based, other points of equal importance remain to be cleared up and proved, and this will give cause for further careful inquiries.

TANNING MATERIALS.—Of great commercial value are the analyses of mangrove barks, with regard to their value as tanning materials. Already, at the end of 1900, a sample of mangrove bark, the botanical origin of which could not be ascertained, was received from Cairns to be analysed, and was found to be fairly high in the amount of tannic acid it contained, higher than any of the commercial samples of wattle bark analysed about the same time for a local tanner.

In November, 1903, several samples of mangrove barks were received from Mackay, of which their origin was determined by the Colonial Botanist, F. M. Bailey, as follows:—

Sample 1.—Orange Bark from *Ceriops Condolleana*.

Sample 2.—Large Bull Bark from *Rhizophora mucronata*.

Sample 3.—Mixed Bark: Red from *Bruguiera parviflora*, and Small Bull from *Bruguiera Rheedii*.

	MANGROVE BARKS.				WATTLE BARKS (Commercial Samples).			
	From Mackay.			From Cairns.	Tasmania.	New Zealand.	South Australia.	Victoria.
	Orange.	Bull.	Mixed	Dec., 1900.				
Water ...	11.89	7.73	8.93	9.35	10.34	9.53	9.46	9.18
Total extract (cold)	44.80	55.20	40.84	47.90	40.48	39.80	31.25	42.64
Tannin ...	29.72	32.91	21.86	39.50	29.60	27.65	42.40	31.00
Soluble ash ...	2.12	2.56	2.08	1.70	.96	.84	.64	.96
Catechin, sol. in alcohol and hot water	13.42	3.05	5.70	...	...	...	...	...
Total ash ...	4.17	4.10	4.61	4.78	2.67	2.47	2.33	3.08



Mangrove bark has been used for some considerable time in Germany for tanning purposes, being chiefly imported from the German possessions in East Africa. Such African mangrove barks, containing from 35 to 40 per cent. of tannic acid (catecher-tannic acid), was sold (January, 1900) at prices varying from £5 10s. to £6 ton. The tannin contents of the East African mangrove barks varies considerably, some containing as much as 54 per cent (*Bruguiera gymnorrhiza* L.). The following species, which, as we see, form also part of our Queensland samples, contain tannin as follows:—*Rhizophora mucronata* 48 per cent., and *Ceriops Condolleana* 42 per cent.

All parcels of bark are analysed before being exported, and any sample containing less than 35 per cent. of tannin is not shipped. Mangrove barks are admitted duty free into Germany, if coming from countries included in the most-favoured-nation treatment.

It is not at all unlikely that the composition of the barks will not only vary in different localities, but also in accordance to seasons, and further investigation on this matter would be of great practical value.

*Oil-yielding Seeds.*—Samples of the Earth Nut (*Arachis hypogaea*) were received from the Colonial Botanist, and also samples of a few different varieties of cotton seeds from the Acclimatisation Society, in order to test their value with regard to their yield of oil. They all compare very favourably with similar raw products of other countries:—

ANALYSIS OF EARTH NUT.

	Queensland-grown Fresh Seeds (shelled).	W. T. Brannt.		Best West African Nuts.
		Fresh Nuts.	Old Nuts.	
Moisture ... .. Per cent.	7.32	7.37	2.75	7.5
Crude Oil ... .. "	44.68	37.84	41.63	50.0
Nitrogen = Proteids ... .. "	4.79			
Ash ... .. "	29.94	27.25	27.25	24.5
Starch ... .. "	2.02	2.43	2.50	1.8
Cellulose ... .. "	16.04	25.11	25.87	11.7 } 16.2 4.5 }

ANALYSIS OF COTTON SEEDS (HAND-PULLED).

	Moisture. Per cent.	Crude Fat. Per cent.
Queensland grown. { Mitafifi ... ..	8.04	36.21
{ Russel's Big Boll ... ..	7.22	34.02
{ Eldorado ... ..	6.68	34.89
Egyptian Seed (acc. W. T. Brannt) ... ..	7.54	23.95

SUMMARY.—The following is a short summary of all the analytical work performed during the year, to the end of May, 1904:—

Maizes ... ..	10 samples.
Wheats ... ..	30 "
Fodders ... ..	23 "
Plants and fruits ... ..	22 "
Plant ashes ... ..	55 "
Sugar-canes ... ..	252 "
Fruit pulps ... ..	2 "
Dipping fluids and insecticides ... ..	10 "
Cyanides ... ..	2 "
Barks ... ..	3 "
Water and manure ... ..	2 "
Butter ... ..	3 "
Total ... ..	414 samples.

J. C. BRÜNNICH, Chemist.

SEED WHEATS.

	Silver King, S.A.	Baltic Red or Baltimore Rosalie.	Marshall's No. 1.	Defiance Rosalie.	Steinwedel.	Budd's Early, S.A.	Marshall's No. 3.	Gluyas, S.A.	Petatz Surprise, S.A.	Carmichael, S.A.	Newman's Early.	Per cent. of dry substance.
Moisture ... ..	9.74	10.65	11.10	10.63	10.93	10.75	10.85	10.75	10.97	11.00	11.25	} Analyses of pure ashes.
Nitrogen = Proteids (Nx57) ... ..	2.690	2.179	2.251	2.411	2.875	2.980	2.490	2.540	2.936	2.266	2.790	
Starch ... ..	15.33	12.41	12.83	13.75	16.38	16.98	14.19	14.48	16.73	12.91	15.90	
Cr. Fat ... ..	65.2	70.8	68.8	63.4	59.6	56.2	58.4	58.8	56.0	61.7	56.6	
Lecithin ... ..	2.119	1.501	2.018	2.490	2.060	2.130	2.104	2.301	2.107	2.222	2.082	
Pure Ash ... ..	.587	.399	.352	.383	.579	.341	.521	.424	.400	.433	.475	
Cont. (P <sub>2</sub> O <sub>5</sub> ) Phos. Acid ... ..	1.353	1.962	1.215	1.980	1.291	.978	1.125	1.261	1.231	1.160	1.321	
Potash (K <sub>2</sub> O) ... ..	.526	.944	.481	.935	.475	.348	.388	.493	.432	.417	.491	
Watery Extr.—Total ... ..	.388	.678	.385	.468	.367	.308	.345	.412	.424	.376	.444	
Nitrogen = Proteids ... ..	11.24	10.21	10.07	10.24	10.12	11.49	11.12	11.84	10.91	10.37	10.54	
Sol. Ash ... ..	.489	.470	.481	.501	.542	.557	.503	.510	.433	.386	.418	
	2.79	2.68	2.74	2.86	3.09	3.17	2.87	2.91	2.47	2.20	2.32	
	1.50	1.52	1.32	1.50	1.17	.92	1.00	1.15	1.09	1.02	1.17	
Pure Ash—Colour ... ..	white	black	white	black	white	grey	white	grey	grey	white	white	
Silica (SiO <sub>2</sub> ) ... ..	2.56	1.87	4.61	.40	1.43	2.17	2.01	3.02	1.52	2.16	1.31	
Chlorine (Cl) ... ..	2.74	.13	.24	.39	3.97	2.73	3.09	1.77	3.34	2.17	3.02	
Sulph. Acid (SO <sub>3</sub> ) ... ..	1.37	.52	1.19	.38	1.96	2.92	2.29	2.40	2.47	1.62	1.72	
Phosphor. Ac. (P <sub>2</sub> O <sub>5</sub> ) ... ..	38.85	48.10	39.55	47.26	36.82	35.63	34.44	39.04	35.02	35.94	37.15	
Iron (Fe <sub>2</sub> O <sub>3</sub> ) ... ..	.31	.59	.17	1.07	1.28	.78	.43	.87	.15	.34	.74	
Lime (CaO) ... ..	7.58	1.57	5.97	2.86	3.95	4.67	4.86	5.21	6.98	4.80	5.74	
Magnesia (MgO) ... ..	13.04	10.27	11.47	14.25	14.63	14.38	15.81	7.84	11.67	14.93	10.72	
Potash (K <sub>2</sub> O) ... ..	28.70	34.53	31.70	23.64	28.46	31.50	30.64	32.70	34.46	32.43	33.60	
Soda (Na <sub>2</sub> O) ... ..	4.89	2.23	4.34	9.12	7.22	4.11	5.96	6.48	2.84	4.68	4.79	
Manganese (MnO) ... ..	.87	.68	.90	.58	.26	1.38	1.42	1.02	1.84	1.42	1.45	



## SEED WHEATS—continued.

	Smart's Early, S.A.	Baroota S.A.	Wonder, S.A.	Early Para, S.A.	Leatherhead S.A.	White Tuscan, S.A.	Allora Spring, S.A.	Warwick, S.A.	Hamblyn's Prolific	Dart's S.A.	Imperial, S.A.	Fullbag, S.A.	Australian Wonder, S.A.			
Moisture ... ..	11.50	11.58	11.26	11.27	11.42	11.71	11.54	10.99	11.38	11.41	11.36			Percent of dry substance.		
Nitrogen =	2.800	2.685	2.818	2.849	2.876	2.623	2.190	2.635	2.640	2.252	2.300				Analyses of pure ashes.	
= Proteids (Nx5.7)	15.95	15.30	16.05	16.24	16.38	14.95	12.48	15.02	15.04	12.83	13.11					
Starch ... ..	64.1	62.1	59.6	62.9	64.8	72.4	64.9	61.2	63.0	59.7	62.2					
Cr. Fat ... ..	2.195	2.462	2.220	2.365	2.390	2.292	2.199	2.230	1.991	2.280	2.192					
Lecithin ... ..	.460	.331	.590	.762	.755	1.012	.560	.400	.304	.271	.369					
Pure Ash ... ..	1.202	1.333	1.351	1.250	1.270	1.325	1.221	1.180	1.236	1.343	1.213					
Cont. (P <sub>2</sub> O <sub>5</sub> ) Phos. Acid.	.450	.455	.480	.467	.438	.441	.474	.450	.502	.483	.458					
Potash (K <sub>2</sub> O) ... ..	.371	.401	.390	.313	.350	.347	.404	.300	.342	.234	.283					
Watery Extr.—Total	11.15	10.85	11.63	11.05	11.38	10.24	11.02	10.92	10.85	10.74	11.02					
Nitrogen =	.498	.451	.505	.409	.396	.372	.554	.496	.648	.553	.395					
= Proteids ... ..	2.84	2.57	2.88	2.33	2.26	2.12	3.16	2.83	3.69	3.15	2.25					
Sol. Ash ... ..	1.07	1.15	1.18	.98	1.14	1.00	.84	.83	.66	1.26	1.22					
Pure Ash—Colour	grey	grey	white	white	grey	white	white	d'k grey	lig't grey	grey	white					
Silica (SiO <sub>2</sub> ) ... ..	2.05	3.34	1.01	1.41	1.87	1.91	1.37	1.46	1.25	3.39	1.49					
Chlorine (Cl) ... ..	2.30	2.64	2.80	2.41	2.53	2.64	1.95	2.68	2.21	2.50	2.18					
Sulph. Acid (SO <sub>3</sub> ) ... ..	2.25	1.63	2.01	1.33	1.97	1.85	2.03	1.54	1.26	1.62	1.53					
Phosphor. Ac. (P <sub>2</sub> O <sub>5</sub> )	37.42	34.10	35.55	37.36	34.45	33.30	38.80	38.12	40.62	35.98	35.75					
Iron (Fe <sub>2</sub> O <sub>3</sub> ) ... ..	.86	.14	1.03	1.03	1.19	1.48	.53	.47	.94	.83	.93					
Lime (CaO) ... ..	3.57	4.82	4.61	5.08	4.46	7.42	1.94	3.31	3.91	4.91	6.78					
Magnesia (MgO) ... ..	16.07	17.02	16.53	14.85	15.95	13.83	13.40	14.05	14.32	15.94	12.29					
Potash (K <sub>2</sub> O) ... ..	30.82	30.10	28.85	25.00	27.59	26.20	33.10	25.45	27.67	17.44	23.29					
Soda (Na <sub>2</sub> O) ... ..	3.09	5.18	5.74	9.79	8.83	10.10	.54	6.91	5.24	10.32	8.31					
Manganese (MnO) ... ..	1.80	1.73	1.73	2.25	1.92	1.50	6.37	6.28	3.48	7.80	8.34					

## MAIZES.

	Golden King—G. Gottfridsen, Bowen.	Unnamed—W. J. Andrews, Bowen.	Golden King—G. E. Kent, Bowen.	Golden King—G. Heron, Bowen.	Argentine—H. C. Smelhurst, Bowen.	Argentine—Imported Sample.	Argentine—Queensland Grown.	AMERICAN SEED MAIZES.							
								Snowflake (white).	Hickory King (white).	Forsythe's Favourite (white).	Golden Beauty (yellow).	Kansas Sun-sasawop (yellow).			
Moisture (per cent.) ... ..	13.16	13.17	12.86	11.92	12.70	12.00	11.28	12.46	12.25	12.27	11.65	12.23	Percent of dry substance.		
Nitrogen =	2.025	1.813	1.938	1.995	1.805	1.711	2.068	1.610	1.643	1.508	1.710	1.770		Analysis of pure ash.	
= Proteids (x6.2) ... ..	12.65	11.33	12.11	12.47	11.28	10.69	12.92	10.06	10.27	9.42	10.69	11.06			
Starch ... ..	69.1	73.7	72.1	67.7	66.8	63.2	61.0	79.7	77.2	81.0	74.5	73.6			
Cr. Fat ... ..	5.24	5.382	5.70	5.09	5.83	6.04	5.20	4.68	4.77	4.89	5.10	4.85			
Lecithin ... ..	.251	.318	.271	.268	.341	.339	.482	.233	.302	.266	.222	.174			
Pure Ash ... ..	1.653	1.660	1.857	1.625	1.741	1.657	1.452	1.429	1.436	1.511	1.487	1.499			
Cont. Phosp. Acid	.834	.876	1.008	.871	.900	.796	.742	.758	.763	.797	.746	.774			
Potash ... ..	.398	.397	.466	.354	.428	.413	.337	.299	.323	.336	.514	.408			
Watery Extr.—Total	29.46	27.52	32.30	27.02	33.72	20.38	20.00	26.60	19.83	32.32	26.85	28.70			
Nitrogen =	.363	.444	.281	.358	.337	.302	.315	.280	.239	.223	.214	.255			
= Sol. Proteids ... ..	2.27	2.78	1.76	2.24	2.11	1.89	1.97	1.75	1.49	1.39	1.34	1.59			
Sol. Ash ... ..	1.20	1.38	1.84	1.73	1.65	1.48	1.37	1.43	1.35	1.44	1.40	1.38			
Pure Ash ... ..	...	...	...	...	...	...	...	...	...	...	...	...			
Silica (SiO <sub>2</sub> ) ... ..	.78	.87	1.20	.86	.63	2.39	1.03	1.13	1.03	.76	1.33	.86			
Chlorine (Cl) ... ..	.47	.33	.23	.29	.23	.98	.59	.20	.14	.17	.23	.24			
Sulph. Acid (SO <sub>3</sub> ) ... ..	.14	.22	.03	.05	.26	.50	.08	.35	.36	.21	.13	.15			
Phosphor. Acid (P <sub>2</sub> O <sub>5</sub> )	50.40	52.80	54.30	53.59	51.70	48.04	51.12	53.00	53.18	52.80	50.15	51.65			
Iron (Fe <sub>2</sub> O <sub>3</sub> ) ... ..	.30	.41	.55	.31	.17	2.29	.85	.83	.84	.74	.44	.48			
Lime (CaO) ... ..	7.01	2.44	10.10	5.46	3.65	3.67	4.04	1.29	2.39	1.62	10.33	1.14			
Magnesia (MgO) ... ..	6.91	13.02	3.43	8.57	9.19	13.48	14.71	12.10	10.35	11.93	7.07	7.60			
Potash (K <sub>2</sub> O) ... ..	24.09	23.91	25.08	21.77	24.60	24.90	23.17	20.95	22.51	22.26	21.11	27.20			
Soda (Na <sub>2</sub> O) ... ..	8.92	4.60	4.04	7.42	9.68	3.78	4.77	9.25	8.60	8.97	8.51	10.20			
Manganese (MnO) ... ..	1.94	1.16	1.57	.86	.37	?	?	.46	1.05	.83	.68	.88			

## REPORT OF THE MEAT AND DAIRY PRODUCE ENCOURAGEMENT BOARD.

SIR,—I have the honour to submit a Report on the operations of the Meat and Dairy Produce Encouragement Board for the year ending 30th June, 1904.

## ADVANCES AND REPAYMENTS.

During the year the Board approved of applications for advances for the establishment of butter factories in the Ayr, Rockhampton, and Gracemere districts, from the Northern and Central Dairy Funds respectively, the advance on the firstnamed factory amounting to £631, having been paid over since the end of the year under review. This factory, although on a small scale, marks the extension of the dairy industry on up-to-date lines, in what may be termed the "tropics proper," and no doubt was instrumental in turning the attention of southern dairymen to the suitability of our northern coastal district lands for dairying, which has resulted in a factory being commenced at Cairns, which will embrace the Mareeba and Atherton districts as well as the Cairns district in the sphere of its operations. This factory, although not receiving financial assistance from the fund, is being erected by Mr. James Burns, lately of Richmond River district, New South Wales, upon plans and specifications submitted to the Board and approved of by their surveyor. The Rockhampton factory will, it is believed, come into existence during this year, as will also Messrs.



Archer Brothers' factory at Gracemere. Advice is to hand as this Report is being written, to the effect that the Gladstone district has determined to have a factory, so that should this latter venture, as well as the Rockhampton and Gracemere factories, become actual facts, and seek assistance from the fund, the amount now standing available for the purpose under the Act will be rapidly absorbed.

The total amount of advances remaining on the books on the 30th June, 1904, was:—

				MEAT FUND.		£ s. d.		£ s. d.	
Southern District	...	...	...	...	22,897	11	3		
Central District	...	...	...	...	23,068	6	9		
Northern District	...	...	...	...	23,944	18	0		
Carpentaria District	...	...	...	...	2,900	0	0		
					<hr/>			72,810	16 0
				DAIRY FUND.		£ s. d.		£ s. d.	
Southern District	...	...	...	...	5,161	9	9		
Central District	...	...	...	...	1,000	0	0		
Northern District	...	...	...	...	950	0	0		
Carpentaria District	...	...	...	...	...				
					<hr/>			7,111	9 9
Total					<hr/>			£79,922	5 9

The amount repaid by borrowers, in accordance with the Act, during the year was:—

				MEAT FUND.			Total.		
				Interest.		Redemption		Total.	
				£	s. d.	£	s. d.	£	s. d.
Southern District	...	...	...	968	8 1	2,268	2 9		
Central District	...	...	...	821	3 7	2,131	4 8		
Northern District	...	...	...	805	3 6	2,184	13 0		
Carpentaria District	...	...	...	557	19 2	...			
				<hr/>		<hr/>			
				3,152	14 4	6,584	0 5	£9,736	14 9

				DAIRY FUND.			Total.		
				Interest.		Redemption.		Total.	
				£	s. d.	£	s. d.	£	s. d.
Southern District	...	...	...	63	8 1	144	4 6	207	12 7
Central District	...	...	...	...		...		...	
Northern District	...	...	...	...		...		...	
Carpentaria District	...	...	...	...		...		...	
				<hr/>		<hr/>			
				£63	8 1	£144	4 6	£207	12 7

Further sums of £678 2s. 1d. and £56 19s. 2d. have been received since the 30th June, in reduction of arrears of interest and redemption on loans from the Northern Meat Fund and Southern Dairy Fund respectively.

The improved season has resulted in considerable reductions being made in the arrears due by dairy factory companies, and it is promised that by the end of this year all arrears will be liquidated. The remarks contained in the last Report as to the substitution of the hand-separator for the steam-driven plants have, unfortunately, been emphasised during the last few months, as two other creamery companies (the Wallumbilla and Mount Walker Companies) have notified that they are unable to carry on, and have requested the Board to take over their security and endeavour to realise thereon.

The meat companies have, with two exceptions, met their payments as they became due; the exceptions being the New Broadsound Meat Company, Limited, St. Lawrence; and the Mackay Meat and Dairy Export Company, Limited. In the first of these cases payments amounting to £194 6s. 8d. have been made during the year, and been credited to outstanding redemption. This company is now arranging to repay the arrears due, and it is expected that a cheque will be received at a comparatively early date. In the case of the Mackay company, the Board, after receiving a notification from the company to the effect that they were unable to pay the amount due for interest and redemption, or to keep the works in a proper state of repair and pay insurance premiums, resolved to take possession of their security and place the works in a proper state of repair. This was done on 15th December, 1903, and a caretaker placed in charge of the works, with instructions to carry out the repairs required. The cost of this action to the 30th June amounted to £376 0s. 11d., which amount, together with any subsequent payments, will be a charge against the works. It is proposed to sell this security when a suitable offer is obtainable. At the present time, however, owing to a shortage of cattle available, and the low prices obtainable for preserved meats on the market, it is not likely that such an offer will be received.

All the securities have been inspected by the surveyor to the Board, and, where necessary, specifications of the maintenance and repairs required have been forwarded to the companies for attention. It may be said that generally the larger companies have kept their works in a thorough state of repair, and in many cases have made additions and improvements to the securities held by the Board.

Table "A" annexed shows the position of each advance as on the 30th June, 1904.

#### REFUNDMENTS TO CERTIFICATE HOLDERS.

In August last a further sum of £12,500 was made available out of moneys repaid by borrowers from the Meat Fund in the Southern, Central, and Northern districts respectively, thus enabling further refundment payments to the holders of certificates issued under the provisions of the Act of 1895, at the following rates, viz.:—

Southern District, 3s. in £.  
Central District, 2s. in £.  
Northern District, 2s. in £.

The total amount refunded to certificate holders to the 30th June last being—

				MEAT FUND.		£ s. d.	
Southern District, 6s. in £	...	...	...	...	11,138	19 6	
Central District, 5s. in £	...	...	...	...	8,819	10 6	
Northern District, 8s. in £	...	...	...	...	10,817	13 10	
				<hr/>			
Total					£30,776	3 10	



The amount refunded during the year under review being—

	£	s.	d.
Southern District	5,405	18	7
Central District	3,660	8	4
Northern District	2,923	10	1
Total	£11,989	17	0

The Board has also approved of another refundment being made on the 1st August next at the following rates:—

MEAT FUND.				£	s.	d.
Southern, 2s. in £	4,191	0	0			
Central, 2s. in £	4,250	0	0			
Northern, 2s. in £	2,980	0	0			
Carpentaria, 2s. in £	583	0	0			
Total	£12,004	0	0			

Action is likewise being taken to obtain Parliamentary sanction to the distribution of the balances of the Meat Fund, which are held available for advances for the purpose of the erection of meat works, as the Board is of the opinion that this money will not be required for the purpose for which it was collected, and should, therefore, be returned to those who contributed it to the fund. The amount involved exceeds the sum of £29,000, the district funds contributing to this amount being the Southern (£12,336), Central (£14,332), and Carpentaria (£2,833).

A statement of receipts and expenditure, since the inception of the funds in 1893 to the 30th June last, is attached hereto. Attention is again directed to the fact that the interest allowed on the credit balances of the Meat Fund still more than covers the cost of administration of that fund.

#### VOTE FOR LOANS IN AID OF CO-OPERATIVE AGRICULTURAL PRODUCTION.

By the statement appended it will be noted that the companies who have received advances from this Vote have, where they were in arrears, improved their position considerably during the past twelve months, a fact due to the greatly improved conditions which prevailed. The position of the Dalby Farmers' Flour Milling Company, however, is not satisfactory, and justifies the Board in its ruling that, in future, before applications for advances from this Vote can be entertained, it will be necessary for applicants to satisfy the Board that they have at their command sufficient paid-up capital to provide for the half-cost of the erection and complete equipment of their factories, together with a sum equal to at least two months' working expenses.

During the year no fresh advances were made from this source, but inquiries have been received from the Charleville, Roma, Chinchilla, Warwick, Toowoomba, Pittsworth, Crow's Nest, and Nanango districts as to the terms and conditions upon which advances may be obtained, and it is confidently anticipated that one or more of these inquiries will mature into definite applications for assistance. The Maleny Farmers' Dairy Company, who received approval of an advance of £500 for the erection of a small butter factory at Maleny, near Landsborough, on the Blackall Range, after calling for tenders upon plans and specifications supplied by the Board at their request, withdrew their application, being understood that assistance had been obtained from some other source.

W. CHAS. GREEN, Secretary.



TABLE A.  
ADVANCES FROM MEAT FUND AS ON 30TH JUNE, 1904.

To Whom Advanced.	Amount Authorised.		Amount Advanced.		Repayments to 30th June, 1904.		Balance.		Payments in Arrears to 30th June, 1904.		Remarks.	
	£	s. d.	£	s. d.	Interest.	Redemption.	£	s. d.	Interest.	Redemption.		
<i>Southern District.</i>												
Queensland Meat Export and Agency Company, Ltd., Eagle Farm	13,250	0 0	13,250	0 0	4,539	4 8	3,445	1 2	9,804	18 10		
Borough of South Brisbane and Messrs. Birt and Co., Ltd., South Brisbane	10,000	0 0	10,000	0 0	3,082	11 5	1,699	3 0	8,300	17 0		
Charleville Refrigerating, Preserving, and Boiling Down Company, Ltd.	5,000	0 0	5,000	0 0	1,212	19 8	208	4 7	4,791	15 5		
<i>Central District.</i>												
Broadsound Meat Company, Ltd. ...	6,000	0 0	5,852	15 0	1,743	2 4	194	6 8	5,658	8 4	<i>a</i> Company now arranging for payment of these amounts.	
Gladstone Meat Works of Queensland, Ltd. James Wilson ...	22,000	0 0	21,500	0 0	6,574	3 8	5,590	1 7	15,909	18 5	<i>a</i> No payment yet due.	
	1,500	0 0	1,500	0 0	<i>a</i>		<i>a</i>					
<i>Northern District.</i>												
Queensland Meat Export and Agency Company, Ltd., Townsville	13,250	0 0	13,250	0 0	4,539	4 8	3,445	1 2	9,804	18 10		
Bergl Australia, Ltd., Bowen	16,052	10 0	16,052	10 0	4,614	3 8	7,912	10 10	8,139	19 2	<i>a</i> Paid, 4th July, 1904.	
Mackay Meat and Dairy Export Company, Ltd.	6,350	0 0	6,000	0 0					6,000	0 0	Possession taken of this security on 15th December, 1903.	
<i>Carpentaria District.</i>												
Queensland Meat Export and Agency Company, Ltd., Burketown	2,900	0 0	2,900	0 0	557	19 2			2,900	0 0		
	£ 96,302	10 0	95,305	5 0	26,863	9 3	22,494	9 0	72,810	16 0		
									1,566	1 8	2,300	16 2



## ADVANCES FROM DAIRY FUND AS ON 30TH JUNE, 1904.

To Whom Advanced.	Amount Authorised.		Amount Advanced.		Repayments to 30th June, 1904.		Balance.		Payments in Arrears, 30th June, 1904.		Remarks.
	£	s. d.	£	s. d.	£	s. d.	£	s. d.	£	s. d.	
<i>Southern District.</i> Greenmount Dairy Company, Ltd.	200	0 0	200	0 0	77	9 8	129	12 4	2	11 11	a Paid 20th July, 1904. No payment yet due. a £14 10s. 2d. paid on account on 5th July, 1904. b £42 9s. paid on account on 5th July, 1904. Balance arrears promised by end of December.
Ditto	500	0 0	500	0 0	156	17 8	500	0 0	...	...	
Pilton Dairying Company, Ltd.	462	0 3	462	0 3	...	...	362	14 3	a	27 6 4	
Daly Bros., Jondaryan	350	0 0	350	0 0	123	14 1	259	0 2	5	3 7	16 7 11
Wallumbilla Co-operative Creamery	71	0 0	71	0 0	...	...	71	0 0	20	15 8	12 1 2
Teviotville Farmers' Co-operative Dairy Company, Ltd.	120	0 0	120	0 0	27	0 6	77	3 0	...	...	Company unable to carry on. Action being taken to take possession of security and realise thereon. Security taken possession of and sold, realising £49 17s. 6d. Balance will be written off.
Cressbrook Dairy Company	775	0 0	775	0 0	147	17 10	775	0 0	...	...	Company unable to carry on. Action being taken to take possession of security and realise thereon. Security taken possession of and sold, realising £49 17s. 6d. Balance will be written off.
Milora Farmers' Co-operative Dairy Company	100	0 0	100	0 0	...	...	100	0 0	...	...	
Lord John Swamp Co-operative Dairy Company	75	0 0	75	0 0	...	...	75	0 0	...	...	
Mount Walker Co-operative Creamery Company, Ltd.	87	0 0	87	0 0	18	6 4	87	0 0	...	...	
Silverwood Dairy Factory Company, Ltd., Gympie	1,200	0 0	1,200	0 0	...	...	1,200	0 0	...	...	
Charles Sealy, Trelawny	1,400	0 0	1,400	0 0	...	...	1,400	0 0	...	...	
Ramsay Dairy Company, Ltd.	125	0 0	125	0 0	...	...	125	0 0	...	...	
<i>Central District.</i> Peak Downs Butter Factory Company, Ltd.	1,000	0 0	1,000	0 0	...	...	1,000	0 0	...	...	
<i>Northern District.</i> Mackay Meat and Dairy Export Company, Ltd.	1,015	0 0	950	0 0	...	...	950	0 0	...	...	
	£ 7,480	0 3	7,415	0 3	551	6 1	7,111	9 9	55	17 6	



## TOTAL RECEIPTS AND EXPENDITURE FROM INCEPTION OF FUND TO 30TH JUNE, 1904.

## MEAT FUND.

	Southern.			Central.			Northern.			Carpentaria.			Total.		
	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.
<b>RECEIPTS.</b>															
Assessments ... ..	42,834	8	8	44,076	7	2	30,439	19	6	6,477	3	10	123,827	19	2
Less Refunds ... ..	920	13	2	1,583	11	6	631	3	3	639	13	4	3,775	1	3
	<i>a</i> 41,913	15	6	42,492	15	8	29,808	16	3	5,837	10	6	120,052	17	11
Interest on Fund ... ..	2,072	7	5	1,996	9	10	549	2	7	428	18	2	5,046	18	0
Inspection Fees, &c. ... ..	145	14	0	96	9	3	210	2	6	10	16	0	463	1	9
Loans—Repaid ... ..	7,684	8	9	5,784	8	3	14,157	12	0	...	...	...	27,626	9	0
Loans—Interest on ... ..	9,045	12	6	8,317	6	0	9,517	17	0	557	19	2	27,438	14	8
Total ... ..	60,861	18	2	58,687	9	0	54,243	10	4	6,835	3	10	180,628	1	4
<b>EXPENDITURE.</b>															
Salaries and Contingencies ... ..	1,323	17	3	1,511	2	1	1,193	11	11	544	3	6	4,572	14	9
Loans ... ..	30,582	0	0	28,852	15	0	38,102	10	0	2,900	0	0	100,437	5	0
Maintenance, Mackay Meat Works	...	...	...	...	...	...	376	0	11	...	...	...	376	0	11
Refunds to Certificate Holders	11,138	19	6	8,819	10	6	10,817	13	10	...	...	...	30,776	3	10
Total ... ..	43,044	16	9	39,183	7	7	50,489	16	8	3,444	3	6	136,162	4	6
Balances, 30th June, 1904	£ 17,817	1	5	19,504	1	5	3,753	13	8	3,391	0	4	44,465	16	10

*a* The Refundment Certificates which have been issued against these amounts to 30th June, 1904, were—

Southern.	Central.	Northern.	Carpentaria.	Total.
£40,328 19 11	£37,039 13 8	£29,653 4 11	£4,989 9 6	£112,061 8 0

## TOTAL RECEIPTS AND EXPENDITURE FROM INCEPTION OF FUND TO 30TH JUNE, 1904.

## DAIRY FUND.

	SOUTHERN.		Central.	Northern.	Carpentaria.	Total.									
	Erection.	Bonus.													
	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.
<b>RECEIPTS.</b>															
Assessments ... ..	4,714	7	4	3,127	10	10	4,318	16	8	4,462	1	10	707	2	1
Less Refunds ... ..	9	2	1	0	1	0	3	4	6	0	4	6	16	12	8
	<i>a</i> 4,705	5	3	3,127	9	10	4,315	12	2	4,461	17	4	690	9	5
Interest on Fund ... ..	127	6	1	101	7	4	327	13	6	342	17	1	56	11	9
Inspection Fees, &c. ... ..	88	16	0	50	3	0	10	10	0	5	5	0	...	...	...
Loans—Repaid ... ..	5,601	18	11	...	...	...	...	...	...	...	...	...	...	...	...
Loans—Interest on ... ..	1,430	19	1	...	...	...	...	...	...	...	...	...	...	...	...
Loan—From Revenue ... ..	600	0	0	...	...	...	...	...	...	...	...	...	...	...	...
Total ... ..	12,554	5	4	3,279	0	2	4,653	15	8	4,809	19	5	747	1	2
<b>EXPENDITURE.</b>															
Salaries and Contingencies	1,448	14	7	288	13	2	800	15	8	740	16	1	210	19	7
Loans ... ..	10,763	8	8	...	...	...	1,000	0	0	950	0	0	...	...	...
Bonuses ... ..	...	...	...	2,990	7	0	...	...	...	...	...	...	...	...	...
	12,212	3	3	3,279	0	2	1,800	15	8	1,690	16	1	210	19	7
Balances, 30th June, 1904	£342	2	1	...	...	...	2,853	0	0	3,119	3	4	536	1	7

*a* The Refundment Certificates which have been issued against these amounts to 30th June, 1904, were—

Southern.	Central.	Northern.	Carpentaria.	Total.
£5,578 4 9	£3,302 0 7	£3,229 15 9	£532 17 8	£12,642 18 9



## ADVANCES FROM THE VOTE FOR LOANS IN AID OF CO-OPERATIVE AGRICULTURAL PRODUCTION AS ON 30TH JUNE, 1904.

To Whom Advanced.	Amount Authorised.	Amount Advanced.	Repayments to 30th June, 1904.		Balance.	Payments in Arrears, 30th June, 1904.		Remarks.
			Interest.	Redemption.		Interest.	Redemption.	
Bundaberg Co-operative Dairy Company, Ltd.	£ 800 0 0	£ 800 0 0	£ 148 6 3	£ 236 17 6	£ 563 2 6	£ 11 5 3	£ 26 12 1	
Ditto ... ..	350 0 0	288 0 0	30 6 7	76 17 8	191 2 4	3 16 5	6 7 3	
Roma Co-operative Milling Company, Ltd.	1,750 0 0	1,750 0 0	149 5 6	95 13 4	1,654 6 8	a 97 5 3	a 151 4 9	a Company promise to reduce this amount before September.
Ditto ... ..	184 0 0	184 0 0	9 14 4	10 1 2	173 18 10	10 4 7	15 17 11	"
Ditto ... ..	138 0 0	138 0 0	...	...	138 0 0	6 13 4	a 7 10 11	"
Maryborough Co-operative Dairy Company, Ltd.	1,164 0 0	1,164 0 0	124 2 10	164 4 5	999 15 7			"
Queensland Farmers' Co-operative Dairy Company, Ltd., Booval	1,200 0 0	1,150 0 0	116 11 11	128 5 0	1,021 15 0			
Dalby Farmers' Flour Milling Company, Ltd.	1,370 0 0	1,370 0 0	...	...	1,370 0 0	a 54 2 6	a 74 17 10	Company arranging to pay.
	£ 6,956 0 0	6,824 0 0	578 7 5	711 19 1	6,112 0 11	183 7 4	282 10 9	



Date	Particulars	Debit		Credit		Balance
		Rs.	P.	Rs.	P.	
1901	...	...	...	...	...	...
1902	...	...	...	...	...	...
1903	...	...	...	...	...	...
1904	...	...	...	...	...	...
1905	...	...	...	...	...	...
1906	...	...	...	...	...	...
1907	...	...	...	...	...	...
1908	...	...	...	...	...	...
1909	...	...	...	...	...	...
1910	...	...	...	...	...	...
1911	...	...	...	...	...	...
1912	...	...	...	...	...	...
1913	...	...	...	...	...	...
1914	...	...	...	...	...	...
1915	...	...	...	...	...	...
1916	...	...	...	...	...	...
1917	...	...	...	...	...	...
1918	...	...	...	...	...	...
1919	...	...	...	...	...	...
1920	...	...	...	...	...	...
1921	...	...	...	...	...	...
1922	...	...	...	...	...	...
1923	...	...	...	...	...	...
1924	...	...	...	...	...	...
1925	...	...	...	...	...	...
1926	...	...	...	...	...	...
1927	...	...	...	...	...	...
1928	...	...	...	...	...	...
1929	...	...	...	...	...	...
1930	...	...	...	...	...	...