JOURNAL

OF THE

BOARD OF AGRICULTURE

OF

BRITISH GUIANA.

VOL. XX. APRIL, 1927. No. 2.

MEETING OF THE BOARD OF AGRICULTURE.

A Meeting of the Board of Agriculture was held at the Court of Policy Hall, Public Buildings, on Tuesday, the 26th day of April, 1927 at 2.30 p.m.

The following were present:—The Acting Director of Science and Agriculture, W. Francis, Esq., F.I.C., Acting Chairman. The Honourable R. E. Brassington, Stanley De Freitas, Esq., M.A.,F.R., S. H. Bayley, Esq., E. M. Walcott, Esq., H. L. Humphrys, Esq., F. A. Mackney, Esq., The Superintendent of the British Guiana Sugar Planters' Experiment Station (Dr. C. L. Whittles), The Director of Co-operative Societies (G. L. B. Gall, Esq.,) The Economic Biologist (L. D. Cleare, Esq., F.E.S.) Edgar Beckett, Esq., F.L.S., The President, The British Guiana Farmers' Conference (H. A Britton, Esq.,) J. J. Da Silva, Esq., with E. M. Peterkin, Secretary. The Acting Government Veterinary Surgeon was also present.

Excuses were tendered on behalf of the Hon. C. D. Douglas-Jones, C.M.G., Colonial Secretary ; the Commissioner of Lands and Mines, the Hon. G. D. Bayley, C.B.E.; the Representative of the Royal Agricultural and Commercial Society, G. E. Anderson, Esq., and R. Strang, Esq.

The minutes of the previous meeting held on the 24th day of September, 1926, having been circulated to

the members of the Board, and having received their approval, were on the motion of the Chairman seconded by the Hon. R. E. Brassington taken as read and confirmed.

The Chairman reported:—

The resumption of duty of Mr. H. L. Humphrys.

The assumption of duty of Mr. Wm. Nowell, D.I.C., F.L.S., as Director of Science and Agriculture and Chairman, Board of Agriculture, on the 1st November, 1926, and his promotion on the 16th November, 1926, as Director, Amani Research Institute, Tanganyika Territory.

Application from Mr. T. Earle for two months' leave of absence.

Application from Mr. G. E. Anderson, Representative of the Royal Agriculture and Commercial Society for six months' leave of absence.

Application from Dr. C. L. Whittles, Superintendent, British Guiana Sugar Planters' Experiment Station, for six months' leave of absence.

Death of filly foal at the Stud Farm, D'Urban Park.

B. Troop stable and compound, Eve Leary, quarantined for glanders on 20.11.26,—quarantine lifted on 11.12.26.

Death of imported ram sheep at Onderneeming.

Affiliation of the Berbice Agricultural and Industrial Association.

Affiliation of the Beterverwagting and Triumph Farmers' Association.

Appointment of Mr. Stanley De Freitas, M.A., F.R., as an ordinary member of the Board.

Appointment of the Hon. C. D. Douglas-Jones, C.M.G., Colonial Secretary, as an ordinary member of the Board.

Appointment of Mr. F. A. Mackey as an ordinary member of the Board.

The re-appointment of the Economic Biologist as an ordinary member of the Board.

The re-appointment of Mr. E. M. Walcott as an ordinary member of the Board.

The re-appointment of Mr. R. Strang as an ordinary member of the Board for one year.

The expiry of the contract with the Daily Chronicle for printing the Journal of the Board of Agriculture and its renewal.

The following appointments were made to the Board's Committees:—

EXECUTIVE COMMITTEE.

The Hon. C. D. Douglas-Jones, C.M.G., Colonia Secretary.

AGRICULTURAL EXHIBITIONS COMMITTEE.

Stanley De Freitas, Esq., M.A., F.R.
E. Beckett, Esq., F.L.S.

SUBSIDIARY PRODUCTS COMMITTEE.

F. A. Mackey, Esq.
E. Beckett, Esq., F.L.S.

LIVE STOCK COMMITTEE.

Stanley De Freitas, Esq., M.A., F.R.

PLANT DISEASES AND PESTS COMMITTEE.

The Assistant Botanist and Mycologist (Co-optative), The Superintendent of the British Guiana Sugar Planters' Experiment Station.

The Chairman laid on the table :—

Report on Farmers' Competition held on the East Coast of Demerara in December, 1926.

Journal of the Board of Agriculture, Volume XIX, No.4. Journal of the Board of Agriculture Volume XX, No. 1. Annual Report of Sophia Sugar Experiment Station from 1st October, 1925, to 30th September, 1926.

List of Registered Veterinary Surgeons for 1927.
Agricultural Census Returns for 1926.

Report on Berbice County Agricultural Show, 1927.

Report on Beterverwagting Agricultural Show, 1927.

Services of Stud animals for 1926 and where stationed.

Report by Mr. R. A. Altson, A.R.C.S., B.Sc., Assistant Botanist and Mycologist on the suspected outbreaking of Mosaic disease at Sophia and Mr. Nowell's remarks thereon.

Report on present position of *Antidesma*. After some discussion, Mr. Britton moved seconded by Mr. E. M. Walcott, that the Government be asked to take action at once as this pest was becoming a serious menace to Agriculture. This was carried unanimously.

The Chairman moved that three of the four ram sheep imported in September, 1926, be sold at cost price. Mr. De Freitas asked that if sold they be disposed of at auction, but that he was opposed to selling them, as no useful purpose would be served thereby. If the Department seriously proposed to improve the sheep in the Colony it would be necessary to establish a large flock and have annual sales. After some discussion it was decided that the sheep should not be sold but stationed in the farming districts.

The Chairman submitted the decision of the Agricultural Exhibitions Committee with regard to the allocation of Vote No. 62—Grants-in-aid of Agricultural Shows, Exhibitions and Competitions—$2,000.00 as under :—

Berbice County Show ...	$1,000.00
Beterverwagting District Show ...	200.00
West Bank Show	200.00
Farmers' Competition, W. B. Demerara ...	120.00
Farmers' Competition, Mahaicony ...	60.00
Farmers' Competition, Plaisance	60.00
Affiliation Grants	160.00
Department's Expenses	200.00
Total	$2,000.00

This was, on the motion of the Chairman, seconded by the Hon. R. E. Brassington, confirmed.

The question of individual exhibits obtaining prizes at more than one Show was discussed. It was decided that it was undesirable at present to place any restrictions on this, as the interchange of exhibits from one district to another very often serves as an object lesson of what could be done if they tried.

The Chairman stated that the Secretary, Board of Agriculture, had submitted the following suggestions for the improvement of the quality of rice grown in the Colony, and invited discussion :—

"The Chairman,

"Board of Agriculture.

"Sir,

In view of the steady deterioration of rice in the "Colony, a matter of great urgency and importance, I "have the honour to submit the following suggestions for "your consideration and that of the members of the "Board of Agriculture.

2. Fifteen acres of rice are cultivated at the Botanic "Gardens producing 41,562 lbs. of specially selected seed "padi, which is distributed to farmers of the Colony for "the purpose of improving the quality of rice grown. At "one time a large percentage of the padi was given to "poor farmers free of charge, but as there was no apparent "improvement in quality a nominal price was charged to "impress on their minds the value of this seed. This "method has also proved a failure, only a few growers "having benefited thereby. At present the farmer pur- "chases his seed padi from the Botanic Gardens, plants "and reaps his crops and sells every grain that is produced "without retaining any from this specially selected seed "plot for replanting. He again purchases seed from the "Department and the same procedure is followed year by "year."

3. These experiments cost $2,000 per annum "which is money expended without any permanent benefit "to the Colony."

4. I suggest that the Inspector of Districts be "asked to arrange for the cultivation of small areas, in "the various rice growing districts, to be planted with "selected seed from our next crop, which will serve as "centres of distribution to each district for the following "year. The seed padi can be sold to the farmers at a "price to cover the cost (rent, value of padi, cultivation, "etc.) of these plots, which can be increased in size from "year to year. This scheme should, in a few years enable "practically the whole Colony to be planted with selected "seed padi."

5. This scheme could be initiated without any "actual cost to the Colony. All that is required is an "advance from the Government to start the plots. This "advance will automatically be recouped when the crop is "reaped and sold, and if a reasonable profit be allowed "for, these plots will eventually become self-supporting."

6. It is useless to leave the question of improve- "ment to the farmer. He has proved himself too lazy "and improvident in the past to expect any improvement "from him."

7. These plots should be under the personal super- "vision of the Travelling Agricultural Inspector, assisted "by the Resident Agricultural Instructors. When on "their regular visits to the districts in question they can "inspect them without incurring increased travelling "expense."

I have the honour to be,
Sir,
Your obedient servant,
(Sgd.) E. M. Peterkin,
Secretary, Board of Agriculture.

It was agreed that the quality of rice in the Colony was very poor and that steps to improve it were necessary. The Chairman suggested that a more comprehensive scheme be drawn up.

The report of the Special Stock Farm Committee was not submitted as it was not completed in time.

The Chairman reported that he had received an offer from the Trinidad Department of Agriculture to exchange their Stallion "Nelsweep" with the Government Stallion "Waterbass" for a period of six months. After some discussion it was decided to accept the offer.

The Chairman reported that arrangements had been made to import 1,000 suckers of the Giant Fig Banana. These would be planted at the Board's Quarantine Station, Brickdam.

The chairman moved the following By-laws for the control of the Plant Quarantine Station, Georgetown:—

1. The Station shall be situated in such place as the Plant Diseases and Pests Committee may decide from time to time.

2. Visitors shall not be permitted unless properly authorised.

3. Trespassers will be prosecuted.

4. No person shall remove any plant or part thereof from precincts of the Station, without written permission of the Chairman of the Board of Agriculture or his Deputy.

5. Every person who infringes these By-laws is liable, on summary conviction, to a penalty of Twenty-four dollars (Ordinance 14 of 1891-21 (b))

These were seconded by the Government Economic Biologist and carried *unanimously*.

Mr. Britton asked the following questions notice of which had been given :—

1. *Question.*—Whether or not there is on record a positive case of Panama Disease in local Banana cultivation ; if there is no known case, will the Department of Science and Agriculture take steps to ascertain whether or not the disease exists in the Colony ?

Answer.—The following Memorandum on Panama Disease prepared by Mr. R. A. Altson :—

Memorandum on Panama Disease.

"An exhaustive examination of departmental reports "from 1880 to date shows that Panama disease of bananas "has never been recorded in this Colony.

"The only diseases of musaceous crops (i.e., plantains "and bananas) which have been reported are the "following :—

"(1) A bacterial disease affecting plantains, and at least "one type of banana, namely the Dwarf or Chinese "(*Musa Cavendishii*).

"(2) A disease, said to be caused by a fungus "(*Ustilaginoidella oedipigera*), known as Surinam disease "or 'elephantiasis', which is quite distinct from Panama "disease, and of little economic importance.

"(3) Anthracnose of banana fruits due to *Gloeosporium* "*musarum*.

"The bacterial disease of plaintains or, as it is usually "called 'plaintain disease' has been known in the Colony "for a great number of years, but it was not until 1915 "that its bacterial origin became recognised. I believe it "to be identical with a disease known in Trinidad as "'moko-disease', which has recently been shown to be due "to a bacterium (*B. Solanacearum*) known in many parts "of the world as the cause of destructive wilts in several "crop-plants.

"The external and internal symptoms of plantain "disease are very similar to those of Panama disease, and "this is not surprising, for although their origins are quite "distinct (Panama disease being caused by a fungus, "*Fusarium cubense*), both are diseases of the vascular "system. On account of this similarity, I have no doubt "that cases of this bacterial disease have at times been "mistaken for Panama disease. However, they differ very "widely in their relation to the various types of musaceous "crops. The Gros Michel or Jamaica banana is extremely "susceptible to Panama disease, but resistant to the "bacterial disease. On the other hand, plantains, which "are very susceptible to the bacterial disease are immune

"to Panama disease, and the Dwarf banana although "susceptible to bacterial disease is highly resistant to "Panama disease.

"The well known fact that the ravages of Panama "disease were responsible for the failure of a highly "organised banana industry in Surinam, has led to the "belief that this disease must of necessity be present in "British Guiana.

"There appears to be no evidence, other than that of "a casual field observation, that Panama disease existed in "Surinam prior to the establishment of the banana industry, "that is, prior to large importations of suckers from "Jamaica. These importations were made in 1906. In "the following year, according to a statement made by the "then Surinam Government Botanist, 'some cases of "Panama disease were noticed, but it was not yet serious.' "By 1908 the disease had begun to cause heavy losses "and this was the beginning of the end of the Surinam "industry.

"It is now known (though at the time the knowledge "was wanting) that in 1906 when the importations were "made, Panama disease was present in Jamaica having "been introduced by labourers returning from the infected "fields in Panama, and there is therefore decided justi- "fication for supposing that the disease was introduced into "Surinam on the imported suckers.

"Four official introductions of banana suckers into "this Colony from questionable sources are on record. "Three from Jamaica and one from Surinam.

"The three from Jamaica are not, in my opinion, "open to suspicion. The first two were made at a period "(in 1888 and 1890) when, it is safe to assume, Jamaica "was free from the disease, for it had not then developed "in Panama. The third took place in 1905, when suckers "representing 27 varieties, mostly of Asiatic origin, were "received from the Hope Gardens. These gardens are "known to have been free from infection at that time. "The fourth introduction, that of the Congo banana from

"Surinam in 1914, might at first be regarded with suspicion, "but, considering the circumstances under which it was "made, there can be little doubt that every precaution was "taken to prevent the admission of the disease.

"Of course, it cannot be stated as a positive fact that "Panama disease is absent from British Guiana: but only "that there is no evidence that it is present. Were culti- "vators regularly to submit suspicious cases for examina- "tion it would be possible, after a period of time, to ex- "press a more definite opinion in regard to this matter."

"Suspicious cases would be cases of wilt occurring in "the Gros Michel (Jamaica or Martinique) banana. Cases "of wilt in plantains, Dwarf, Giant Fig (Cokerite), Congo "or red bananas do not fall into this category.

(Sgd.) R. A. Altson.
Assistant Botanist and Mycologist."
12/4/27.

2. *Question.*—What, if any, are the citrus and other fruits, budded from standard varieties, that are now available to the public at the Botanic Gardens; if none, when will such be available?

Answer.—There are none available at present, and none will be available for some time. It will be 18 months before the seedlings now being grown for stock will be fit for budding.

An early start in this direction is hoped to be made. A consignment of bud-wood is shortly expected from Trinidad, and specially named varieties from Florida.

3. *Question.*—Has the Department of Science and Agriculture taken steps through the Executive Government to obtain for the Colony a grant from the £1,000,000 Imperial Vote, to be utilised as a nucleus for founding a Fruit Industry as per Report of the Economic Committee.

This was postponed.

4. *Question.*—How many of the Agricultural Students, who received training at the Botanic Gardens, have by

Government been settled on the land; if none, why?

This was postponed.

5. *Question.*—Whether or not the Acting Director of Science and Agriculture will take steps to introduce a better variety of Citrus Fruits, e.g., Washington Navel Seedless Oranges and Grape Fruit?

Answer.—The following minute written by Mr. E. Beckett, Travelling Inspector:—

"Acting D. S. A.,

"With respect to the Washington Navel "Seedless Oranges—these were imported when Mr. G. S. "Jenman was Government Botanist. They did very bad-"ly, producing fruit that were extremely poor, lacking in "juice and flavour. The late Mr. Junor also reported "adversely against this well-known Orange. Apparently, "climatic or atmospheric conditions were against it.

(Sgd.) Elgar Beckett,
Travelling Inspector.
26/4/27.

6. *Question.*—Whether or not steps will be taken to import about 50 lbs. of English potatoes suitable for planting?

This was postponed.

MOTIONS BY MR. H. A. BRITTON.

1. That in the interest of developing and maintaining an Export Trade of Produce by the small farmers, it is necessary that Produce Inspectors be appointed. This was postponed.

2. That the Board recommend to Government the early introduction of legislation making it obligatory on Agents of small Farmers to keep proper books and make daily entries of all articles sold.

This was seconded by the Hon. R. E. Brassington and carried.

Mr. Beckett did not support this motion and remarked that he did not think that roguery, if it existed, could be cured by book-keeping.

3. That this Board take the necessary steps to increase production, and decrease the importation of certain articles of foodstuffs.

This was postponed.

4. That the charge for Poultry Eggs be reduced by 50 per cent.

This motion was not carried.

5. That two of the Ram Sheep be disposed of.

This was withdrawn.

6. That the Bulls be taken from place to place in the several Counties so that the small man may have their services to improve the breed of cattle.

This was withdrawn.

The Hon. R. E. Brassington laid on the table the following Resolution received from the County of Essequibo Agricultural Association :

"*Whereas* the entire District from Johanna Cecilia "to Annandale has been flooded for the past ten days and "in consequence of such flooding serious losses have been "sustained by all sections of the community, especially "Rice farmers and growers of ground provisions."

"*And whereas* the such flooding has been caused by "the bursting of the Savannah Dams aback of Pln. Cullen "and Annandale."

"*And whereas* the bursting of the said Dams was due "entirely to the Savannah water being unduly checked at "the Relief Koker under the right of way trench at the "Oena Creek, the said relief koker being only of 6 ft. "bore, it is obvious that is utterly inadequate to cope with "the discharge from two 12 ft. sluices and a 4 ft. "box koker."

"*And whereas* it is necessary that a twelve ft. sluice "be put down immediately at the right of way trench "crossing the Oena Creek in place of the 6 ft. tube as a "relief from the Weirs and box koker above-mentioned."

"*And whereas* it is imperative that the Irrigation and "Drainage of the District be placed on a sound footing "and under the control of a Competent Authority."

"*Be it resolved* that this Association desires to repre-"sent to the Board of Agriculture the seriousness of the "position with a request that Government be asked to ex-"pedite the passing into Law of the proposed Irrigation "and Drainage Bill with the view to the prevention of a "recurrence of this scandalous state of affairs."

He explained that the Irrigation and Drainage Bill had already been passed.

The Chairman then adjourned the meeting to a date in May to be fixed later.

REPORT ON EAST COAST FARMERS' COMPETITIONS.

The Acting Director,
Science and Agriculture Department.

Sir,

We have the honour to submit our report on the Farmers' Competitions on the East Coast of Demerara, at Victoria, Nabaclis, Golden Grove, Friendship and Buxton.

2. In judging these Villages we were guided according to whether the competitors had been carrying out the agricultural instruction given them throughout the year.

We are pleased to be able to report that there are signs of improvement, and a considerable awakening on the part of the majority of the farmers. We were especially pleased with the work being carried on by the farmers at Nabaclis.

Special mention might be made of the tilth, that many farmers have procured in their provision beds. Such tilth could not have been secured without deep ploughing during the disastrous period of drought, when naturally all farmers were very discouraged and it took considerable labour and a great deal of grit and determination to fork these lands, when they were of the consistency of concrete.

3. We are glad to be able to report that some of the farmers in these Districts are beginning to take an interest in ground-nuts, and we have every hope of seeing a fair area under this legume during 1927. Small plots have already been planted with satisfactory results.

It is a pleasure also to report that a much greater interest is being taken in the planting of permanent crops—seedling beds with Arabian and Liberian coffee have already been started, so that we can look forward with confidence to seeing coffee being planted on some scale during the coming year. Young coconuts have also been planted, and much greater care has been given to selection of seedlings and the spacing of the palms.

Interest is also being aroused in bread-fruit and bread-nuts—the latter can readily be converted into butter and the former always commands a ready sale.

These farmers are now taking a much greater interest in pruning, and some citrus trees intelligently pruned can be observed here and there. It is interesting to note that already pruning tools have been purchased and used on co-operative lines.

4. We inspected Victoria on the 1st instant, Golden Grove and Nabaclis on the 2nd instant, whilst Buxton and Friendship were "judged" on the 3rd instant.

The following are the results—cultivation, drainage and sanitation :—

Victoria

	Per cent.		
C. Poole ...	60 ...	...	$10.00
C. Adams ...	58 ...	...	8.00
B. Russell ...	56 ...	...	6.00
R. Benn } ...	54 ...	...	{ 5.00
T. Dover }			{ 5.00
R. Haynes ...	53 ...	...	4.00
T. Dick ...	52 ...	...	3.00
C. Blair ...	50 ...	...	2.00
Prince Cuffy ...	50 ...	...	2.00
M. Collins ...	50 ...	...	2.00
		Total	$47.00
R. Elias ...	48 ...	...	...
Thos. Cuffy ...	48 ...	...	...
H. Collins ...	45 ...	...	...
A. Wood ...	45 ...	...	...

Nabaclis and Golden Grove.

H. Wood ...	77 ...	...	$18.00
E. Ward ...	75 ...	...	16.00
L. Francis ...	75 ...	...	16.00
A. C. Baptiste ...	72 ...	...	12.00

W. Baptiste	...	72	...	...	12.00
E. Barry	...	71	...	...	10.00
J. Baptiste	...	70	...	...	8.00
G. Cockfield	...	70	...	...	8.00
J. Lane	...	70	...	...	8.00
J. Barry	...	55	...	...	6.00
				Total	$114.00
W. Ashby	...	49	...	...	...
S. Mc Garrell	...	42	...	...	...
J. Lacum	...	40	...	...	...
J. Limerick	...	40	...	...	...
Buxton and Friendship.					
J. J. Marshall	...	58	...	...	$8.00
Jaggah	...	54	...	...	6.00
H. Gill	...	52	...	...	3.00
				Total	$17.00
E. Adonis	...	48	...	...	...
T. J. Jordan	...	42	...	...	...
				Total Prize Monies	$178.00

Of these Villages, it will be seen that Buxton and Friendship are the most backward.

We recommend that the prizes be given as mentioned in the above list.

We have the honour to be,
Sir,
Your obedient servants,

EDGAR BECKETT,
Travelling Inspector.

C. C. DOWDING,
Agricultural Instructor,
East Coast District.

BERBICE AGRICULTURAL LIVE STOCK AND INDUSTRIAL SHOW.

By Edgar Beckett, F.L.S.

The Berbice County Agricultural Live Stock and Industrial Show, was held on the Berbice Turf Club Grounds on the 31st March and the 1st April.

The Show was organised under the auspices of the Board of Agriculture. Though a score of years have elapsed since the last County Show was held in Berbice, yet the interest awakened was most marked and complete success crowned the efforts of the Committee. We feel confident that these County Shows will be held at regular intervals and that no longer will Berbice allow another twenty years to slip away before they have their next Exhibition. Indeed if these Shows are to awaken an interest in agriculture and to give an impetus to farmers in the way of competition, it is an absolute necessity that they should be held at stated times.

There is no doubt that there is a quickening in agricultural matters, and that generally speaking, a revival in agriculture throughout the whole Colony is taking place.

The Show was opened by His Excellency the Governor, who was accompanied by Lady Rodwell and Captain Stayner, A.D.C. His Excellency and Lady Rodwell were welcomed by Mr. W. M. B. Shields, the President of the Council of Management. In the course of an excellent speech, Mr. Shields pointed out the important part these Shows could play—especially at this time when the Government had removed a long standing ground of complaint, by certain developments in drainage.

"Farming," Mr. Shields stated, "has ceased to be a conservative occupation, and farmers of to-day, whether they grow provisions or sugar canes must adopt up-to-date methods if they mean to survive."

Mr. Shields pointed out that Shows like these should really be farmers' schools and he expressed the wish that some instruction could be given at them, so that farmers

might understand why certain exhibits received prizes and others did not.

The Governor, before he declared the Show open, after congratulating the Committee on their energy and enterprise, expressed surprise at the fact that twenty years had elapsed since the last show, and hoped that the renewal of such shows was a sign of a revival and awakening of a general interest among the population in agriculture. After touching upon the importance of our staple industry, His Excellency pointed out that this importance did not mean the over-shadowing of other industries, but that there was room for development in other directions.

"It always seems to me," continued Sir Cecil, "that agriculture has a firmer foundation than other products—minerals for instance, such as gold and diamonds. When you take diamonds or gold out of a country, you are taking out your capital, but for every new acre brought under cultivation—agricultural cultivation—you are increasing your capital, and all you are taking out of your country is the interest in the form of crops and produce. Apart from the economic side, it always seems to me that there is a certain romance—I might almost say a certain poetry—about agriculture. There are many of you here who remember perhaps a little bit of your Virgil. Virgil in that splendid poem of his, told the farmers how to raise their crops, and very much of what he said in those days is proved to-day. I also remember another old Latin poet who held the same wise views on Agriculture. He was writing about gold and he said, 'Gold which is hidden in the earth is better left so.' I do not quite agree with that because I think we want to get out of our gold mines and diamond mines all the gold and diamonds we can. But there is something about Agriculture which appeals to me in a way in which gold and diamonds do not. There is a certain dignity about the pursuit of Agriculture. I consider men should be proud and not ashamed to till the soil. I perhaps speak with some feeling in the matter, because my own forebears were farmers, and I look forward, if I

survive the period of my official career, to spending the evening of my days as a farmer."

Turning from the sentimental to the practical side, His Excellency continued—"I attach a great deal of importance to the teaching of the elements of agriculture in our schools." He said that he was glad to find that at the Berbice High School for Boys and Girls, an important part was played in the curriculum by practical training, and he expressed the hope that many of the boys would go on the land.

Amongst other products, the Governor emphasised the cultivation of ground nuts. "I have been reading," said His Excellency, "all the literature I could lay my hands on on the subject of ground nuts. I have also heard a great deal about them lately from Mr. Roy Wilson, one of the members of the recent Parliamentary Commission. Mr. Wilson has an intimate knowledge of agricultural developments on the West Coast of Africa, and I was amazed at what he told me of the wealth which is being won in that part of the world from the cultivation of ground nuts ; and I firmly believe that that is a branch of agriculture which ought to be given a proper trial here." So interested is the Governor in the possible development of ground nuts that he has started to grow this legume himself.

His Excellency then formally declared the Show open, expressing the hope that it might be the forerunner of regular periodical Shows in future.

Before commenting on the exhibits we should like to congratulate the President and the members of the Committee on the excellence of the general arrangements. We also congratulate the exhibitors on the manner in which most of the exhibits were displayed and on the general quality of all the exhibits. The only complaint that can be made is that the number of exhibits was unsatisfactory. One should like to have seen a very much larger quantity of exhibits in each class, so as to help in healthy competition and rivalry.

It is pleasing to be able to report that the attendance was very large, and keen interest was taken by farmers and others in the various sections. The Militia Band added to the attraction, while the behaviour of everyone was excellent—even those who did not secure a prize, and who thought they earned one, were not heard to express any dissatisfaction with the decision of the judges.

THE EXHIBITS.

Class A. Fruits :—On the whole this exhibit, taking all the circumstances into consideration, was quite good. Mangoes were well represented, there having been some fifty exhibits. We were pleased to notice several fruit from grafted trees and we congratulate Mr. Whitehead on his display. "Bombay Yellow," "Princess Marie Louise," "Gopaul Bhag," "Sabot," "Peach," "Number XI," were amongst these. Oranges were rather poor and there were only four exhibits of Grape Fruit, which, however, were satisfactory. The Limes were only fair, with the exception of a fine exhibit of half a barrel which earned the special prize presented by Messrs. S. Davson & Coy., Ltd. There were two exhibits of Grapes, but these were not well-grown, no attempt had been made at thinning out the fruit.

Sapodillas (*Sapota achras* L.) were well represented altogether 24 exhibits. The Soursops (*Anona muricata* L.) were just ordinary but the display of Star Apples (*Chrysophyllum Cainito* L.) was good. The Granadillas (*Passiflora qudrangularis* L.) were poor, while the other representatives of this genus were fair. Guavas (*Psidium Guajava* L.) with the exception of two exhibits of pear-shaped fruit were poor.

The display of Pineapples (*Ananas sativus*. Schult.) was fair, whilst the 8 trays of Mixed fruit were quite satisfactory. The Musk Melons (*Cucumis Melo* L.) were good but there were only three exhibits. The Water Melons (*Citrullus vulgaris* Schrab.) were poor. Breadnut (*Artocarpus nucifera* L.) and Breadfruit (*Artocarpus incisa* L.) were poor, whilst the ten exhibits represent-

ing Papaws (*Carica Papaya* L.) of five varieties were satisfactory. The Pomegranates (*Punica Granatum*, were not fully ripened but it was refreshing to see this fruit on show.

Class B. Vegetables.—The Vegetable Marrows were only ordinary. The trays of mixed vegetables certainly claimed attention, the one obtaining the second prize contained Beet, Cabbage, Leek, Artichokes, Carrots and English Tomatoes. The Pumpkins were quite good while the Boulangers (*Solanum Melongena* L.) creditable as a whole, were especially good in many instances. The first prize reflected great credit on the winner (Mr. R. R. Ross of the West Coast of Berbice) as did also the Capsicums, the first prize again going to Mr. Ross. The Peas and Beans were fair. The Bananas, Cayenne, Dwarf and Fig, might be classed as fair, Plaintains were good with the exception of the 'giant' or 'horse' variety. A fair exhibit of Ochroes displaying four varieties showed up better than the Escallots but there was a fine exhibit of locally grown Onions, exhibited by Mr. Ross.

The first prize for Cabbages showed that locally grown cabbages can be made to produce decently formed "heads." The Tomatoes were quite good, Mr. Ross again winning the first prize for a splendid display of fruit. The Cucumbers call for no special mention while Sweet Potatoes were represented by one or two well-grown tubers. Yams might be described as very fair, Eddoes as good and Tannias as only fair. The exhibit of Sweet and Bitter Cassava was very good.

There was a good display of Eggs.

Economic Products.—This section was fairly well represented. The oils, Castor, Coconut, Kokerite (*Maximilliana regia Mart.* et Schrank), were very good—some could fitly be termed "excellent."

The 16 exhibits of Guava Jelly were for the most part up to stand[illegible] ch as Pineapple, etc., were al[illegible] acies as Guava Cheese, etc. [illegible] was good, some

were spoilt owing to the fact that spice had been added to the "sticks."

As usual the Meals and Starches showed how well our people understand this work. It seems a pity that such nutritious products as Plantain and Banana Conquintay cannot be exported to British biscuit manufacturers. With an analysis of the product and a few remarks on the vitamins contained, with an attractive label of the plantain tree with a tropical setting, Biscuits made from these meals might become most popular. The dried plantains and bananas were extremly well prepared and reflect great credit on those who sent these exhibits.

Cassava cakes when toasted and buttered while hot are superior to any kind of biscuit imported into this Colony. Those on show, some two dozen exhibits, certainly convinced most people that the art of making wafer cassava bread or biscuits is one in which our farmers excel.

The samples of Tapioca and Farine were quite good nor must we forget the two exhibits of Puffed Rice—these exhibits show that we might be able to do away with the importation of rusks, quaker oats and the like.

The Rice exhibits disappointed one. They were few in number and were, on the whole only fair.

With the exception of one or two samples which were ill-cured and 'green,' the 14 exhibits of Coffee, "Creole," Liberian and Robusta, were good. Most of the prizes went to Canal No. 1. Berbice farmers should remember that at one time, Berbice coffee fetched the highest prices in the markets of the world and we trust that they are making an effort (as are the farmers elsewhere) of planting both "creole" and Liberian, on some scale.

Cacao was represented by only 7 exhibits, while there were ten exhibits of Cacao Pods showing five varieties. The Ginger was good but two exhibits only were sent. Turmeric also was satisfactory, but here again only two persons sent this condiment, while there was an interesting exhibit of Guinea Pepper.

The Copra exhibit consisted of nine entries, all of which were very fair. Plantations "Blairmont" and "Port Mourant" shewed excellent samples of White and Coloured Rum, Power Alcohol and Sugar. There was no exhibit of Farmers' Canes.

An exhibit that attracted attention was that put forward by Mr. J. M. Cush, consisting of tinned pine-apples, tinned sausages, both open for inspection, and various tinned products such as ochroes, tomatoes, etc. He also exhibited specimens of locally cured salt beef and salt pork.

There was an excellent exhibit by the Creek lands Rubber and Produce Coy., Ltd., of Raw and Concentrated Lime Juice and Distilled Oil of Limes, together with fine specimens of Para Rubber — all neatly and attractively shewn.

Copraline also found a place whilst Honey, Wax, Cherry and other Jams, Hot Sauce, Pickles and Marmalade, were all worthy of praise. The Cassareep exhibited impresses one with the possibility of an export trade being built up in this product, which is said to be the basis of most sauces.

Ground Nuts (Arachis hypogaea L.) were represented by nine exhibits, some of which were well grown. A special prize was given by the Governor in connexion with this exhibit.

The samples of Desiccated Coconut were satisfactory though few in number.

The Bread, Cakes and Biscuits, proved that our local manufacturers know their work.

Altogether this section was a credit to the exhibitors.

Class D.—Handicrafts and Works of Art.—The Fancy Work was good as is usually the case. With regard to handicraft there were on view good specimens Mats, well-made Walking Sticks all of native woods, an Inlaid Tray by Mr. J. C. P. Winter, composed of fourteen different woods was much admired, while a card table by Mr. D.

"the class of donkeys throughout the Colony "has improved. Those exhibited were of a "high standard, and compared favourably "with imported animals as to height, confor- "mation, bone and style."

"The feathered stock consisted of turkeys, fowls, "ducks and pigeons. The poultry, on the "whole was satisfactory, but unfortunately "only one to two breeds were on show. The "ducks were of a high standard, but only two "breeds were exhibited."

"The pigeons, a few pairs of which were exhibit- "ed, consisted of the Runt and Homer "crossed—the birds were large and showed "signs of great powers of prepotency and re- "production."

Reference must be made to the exhibit of the Singer's Sewing Machine Coy. Three models were on show, one of each equipped with an electric motor. Various stages of machinery, needle and embroidery work, were demonstrated by an instructress from Georgetown. There were several dresses, locally made, showing the delicacy and intricacy of the beautiful embroidery work of which these machines are capable. There was also an elaborate display of silk embroidery work from the New York Office, and also fancy Renaissance Lace work. Mr. J. Jardim, the local manager, must be congratulated on the excellent display he put up.

The Educational Section, under the care of Messrs. de Weever, Taitt and Bannister, of the Educational Department, demanded the careful attention of all. The Oxford Picture Reading Cards, the methods adopted for teaching children the counting of money, sound boxes ranging from loud and harsh sounds to faint and gentle, the child being taught to arrange them according to degrees of sound. Shape and form, taught by metal discs, various forms of straps, buckles—letters taught by touch and sight, arrangements of colour in cubes, on rods,—in short a very fine display of the Montesori system.

With respect to the Section devoted to the school children themselves, the children's contributions were very creditable. Special mention might be made of the work of the Rosehall School and the really splendid basket netting of bottles, from Barra-Carra School on the Canje river. The Hammock-making from the Hopetown Congregational School must also be mentioned, as well as the rope and mats made from a species of *Cyperus*, from the Newmarket (Corentyne) English School.

The prize for the best all-round exhibit was secured by Mr. M. Nathoo of the Rosehall Scots School, Corentyne, the second prize being won by Mr. A. Babooran of Albion, Canadian Mission School.

In conclusion, we repeat Mr. Shield's pertinent question, "We have," he said, "a fair collection of exhibits to-day, but can these be supplied to us in quantities for our daily consumption ?"

BETERVERWAGTING AGRICULTURAL, LIVE STOCK AND INDUSTRIAL SHOW.

By Edgar Beckett, F.L.S.

The Beterverwagting Agricultural, Live Stock and Industrial Show was a distinct success, and the President and Officers of the Beterverwagting-Triumph Farmers' Association are to be congratulated on their work. The Show was held on 20th April at the Anglican Schoolroom, and was opened by His Excellency the Governor, Sir Cecil Rodwell, who was accompanied by Lady Rodwell. His Lordship the Bishop of Guiana, the Chief Justice, The Honourable the Colonial Secretary and Mrs. Douglas-Jones, and the Honourable the Attorney-General were amongst those who were present.

Mr. J. R. W. Straughn, the President of the Association, in welcoming the Governor and Lady Rodwell, referred to the fact that without the Drainage Scheme pro-

vided by the Government, there would have been no Show. He assured His Excellency of their gratitude to the Government for the success of the scheme. He pointed out that the district was essentially an Agricultural one, and that recently they had started a co-operative movement amongst the farmers in connexion with the cultivation of ground nuts. His Excellency in the course of his speech congratulated the exhibitors on the way in which they had put up their exhibits—"I hope," he said, "you will observe that I have brought with me our new Colonial Secretary, a gentleman I may say, who has done a great deal for agriculture in other colonies, and I believe he is going to do a great deal to help you here."

His Excellency stated he had been most favourably impressed by all he had seen and he believed he had seen every one of the exhibits, the quality and quantity of which were quite remarkable. "I can only feel regret," continued His Excellency, "that a larger sum was not available for distribution in prizes. But as you know very well, we are passing through a lean period financially, and there is not very much to spare just now. I am quite sure that the Combined Court—I hope some of the Members are here to-day—fully realised that money voted for prizes in Shows of this sort, is money well spent."

The Governor also mentioned his appreciation of the fact that a prize had been given for the best kept private garden, and expressed his determination to see the garden which had secured the first prize in the Village. With respect to the marketing of produce, the Governor pointed out that the importance of this question was fully realised by the Government, but that there was one thing the Government must have and that is co-operation amongst the producers themselves, and he was very glad to learn that co-operation had given the villagers a start in the line in which he was particularly interested, and that was the matter of growing ground nuts.

He heartily congratulated the Association on their organisation of the Show and formally declared the Show open. Lady Rodwell was then presented with a bouquet.

Mr. H. Aaron Britton added his congratulations, referred to certain difficulties and the question of the marketing of produce, and called for three cheers for His Excellency, Lady Rodwell and their children.

THE EXHIBITS.

The exhibits were numerous, well put up and on the whole exceedingly well arranged.

Fruits.—These were on the whole fair. Three exhibits of the eight sent of Sweet Oranges were very good; the one exhibit of Tangerine was poor, whilst the Seville Oranges were very fair, as were also the Shaddocks, Grape Fruit, Lemons and Limes. Exhibitors should bear in mind that no scale insects should be allowed to remain on their citrus fruits. The Sapodillas, of which there were twenty exhibits of several varieties, were good, two being excellent. The small exhibit of Soursop was fair. Thirteen very good exhibits of Starapples and the same number of Pineapples, all very fair, were followed by ordinary exhibits of Custard-apples, Guavas, Water Melons, Musk Melons and a poor exhibit of Granadillas. The trays of mixed fruit were ordinary, while the two exhibits of citron were poor, but the twenty exhibits of husked coconuts call for special mention, many of these being excellent. Bread-fruit, Jack-fruit and Papaws were fair. There was quite a good show of Pomegranates, as well as three baskets of Sidiums.

The Bananas made a splendid exhibit. There were fifteen exhibits of the variety known locally as 'The Fig,' one of the 'Buck,' seventeen of the 'Dwarf,' and eighteen of the Cayenne variety—these being very good.

There were sixteen exhibits of Mangoes which were, on the whole very fair.

Vegetables.—Plantains were represented by three good exhibits of 'Giant' and nine exhibits of others. The Yams,—Buck. White and Purple, were very fair, whilst thirty exhibits of Bitter and Sweet Cassava were very fair, as were also the fourteen exhibits of Tannias and Eddoes and the twenty exhibits of Sweet Potatoes. There were

two uncommon varieties of Pumpkins, the fourteen exhibits of which, (there had to be three to each exhibit), made quite a brave show—four varieties were represented. Three varieties were to be seen amongst the eight exhibits of Vegetable Marrow or Squash and six exhibits of Tomatoes of which one only was good were succeeded by quite a number of well grown Eschallots. The Lettuce and Cabbage were both poor, but the exhibit of Onions, though small, was excellent, The peas and beans included "Black Eye," "Pigeon Pea," and "Bonavist," it was pleasing to note no less than forty-two exhibits.

Three varieties of Ochroes were to be found in the seventeen exhibits. The twelve exhibits of Capsicums were attractive. Coffee was represented by Arabian, Liberian and Robusta—16 exhibits, all very fair, as were the eight exhibits of Cacao. The Ginger, of which five exhibits were shewn, was satisfactory with one exception. The Ground nuts were quite good. The first prize went to the District School Garden of Belfield, the second prize to Mrs. McGarrell of Golden Grove, and the third prize to Mr. Robinson of Enmore.

The Indian Corn was good, thirteen exhibits were on show. The condiments included Turmeric and Guinea pepper. The Rice exhibits were very fair, both Brown and White. Of the padi, two were good samples. The Meals were all in splendid condition—no less than ninety-eight exhibits were displayed in this class. There were thirty-two exhibits of Starches all very good, whilst Tapioca and Farine accounted for thirty-five exhibits. These exhibits of starches, meals tapioca, etc., were all good and it is to be hoped that the exhibitors,—if a market is found for products of this kind—will be able to supply them in commercial quantities.

Thirty-five exhibits of Cassava Bread and nine exhibits of Cassareep shewed that the villagers know how to prepare these articles. There were fifteen samples of Copra, two of which were distinctly good.

This section included Orange, Jamoon and Ginger Wines, Hot Sauce, Guava Jelly, (20 exhibits); Pine Apple,

Papaw, Golden Apple, Tomato and Mango Jams; Guava Cheese, Tamarind Syrup, "Fly," and two exhibits of Tobacco, while Dried Shrimps and Desiccated Coconuts elbowed each other for room, so numerous were the exhibits sent in under this Class. The oils,—Coconut, Castor and Awarra (*Astrocaryum Tucumoides*) were a good collection; the Chocolate was good whilst the small exhibit of Honey was only fair. Preserved Duntes (*Zyzyphns Jujuba*) said to be a substitute for Olives, was a rare exhibit.

Pickles were fairly well represented and there were samples of very well made Curry Powder—the first prize went to Mrs. Gonsalves of Triumph.

The large exhibit of Bread, Biscuits, Cakes, etc., was most creditable. A special feature of this Show was a splendid display by the well-known firm of Wieting and Richter of their excellent Soda Biscuits. These local biscuits (samples of which were distributed to many persons) are attractively and neatly put up in tins, 2½ lbs. nett. These biscuits afford an opportunity to farmers and others of supporting local industry. Possibly in the near future this firm which has already done so much to foster local industries, might be able to utilise some of the starches and meals, such as cassava, rice flour, etc., which are produced by our local farmers.

Class E.—Needle and Fancy Work attracted a large number of competitors, whilst Class D. certainly added to the appearance of the School Room, some of the ferns being well-grown.

Only three exhibits of Farmers' Canes were on show, Sugar Cane and its products were practically unrepresented.

The School Children's Section was quite creditable, consisting of models in paper, card-board, etc., basket-making, drawings, hat-making, etc.

The Special Section consisted of various articles from Flower pots to shoes. Six prizes were awarded here, one for the flower pots, one for a well made hammock (gained by the children of the R.C School, Main Street), one for an excellently made trunk, one for a good sample of cotton,

one for a sample of fibre, while a straw broom made from locally grown broom corn also gained the recognition it deserved.

Live Stock.—The Board of Agriculture exhibited two fine bulls, one Holstein-Freisan and one Devon, both in excellent condition, in spite of the fact that the latter had recently recovered from an attack of Pneumonia. The Board also exhibited White and Brown Leghorns and Indian Runner Ducks.

The exhibit of Live Stock on the whole was satisfactory with the exception that not a single horse was sent in.

Dr. Bruce, Acting Government Veterinary Surgeon states with regard to this section :—

> "There was one Bull exhibit—poor in type—the "heifers and steers were on the whole good, "the donkeys again established the fact that "the importation of Stallion Jacks by the "Government is bearing good fruit. The "Ram Sheep exhibited by Mr. Wiltshire was "one of the best creole rams ever seen in this "Colony ; the Ram Goats, few in number, "were ordinary."
>
> "The feathered stock call for no special mention, "except two capons which were in good "condition."

One would have liked to have seen a larger number of exhibits in this section. There was a deer on view as well as a pair of labbas (*Hydrochoerus capybara*). Labba 'farming' might possibly prove quite a lucrative business to be engaged in. There was a very large and fair exhibit of eggs—thirty-two entries of a dozen each took up considerable space.

The Government Model Exhibit was practically the same as that displayed at the recent Berbice County Show. It attracted considerable interest. There were some well grown corn and peas from the Government Industrial School, Onderneeming, and mats and ropes from the Georgetown Prison. The poster on the Coconut Caterpil-

lar and specimens of insects, were well in view and certainly proved interesting to the farmers.

The Singer's Sewing Machine Coy. again made an excellent display and as at The Berbice County Show, attracted the attention of numbers of visitors, Mr. Jardim, the local Manager, making this exhibit most interesting.

These District Shows, as forerunners of the County Shows, should prove of use in making the more important Shows well represented Exhibitions.

With respect to the District School Garden Section, I would suggest that at these District Shows, substantial prizes be offered for the best exhibition of manual work performed by the school children—in this way any idea that may be lurking in the minds of children that field work is undignified, may be dissipated.

NOXIOUS WEEDS.

By Edgar Beckett, F.L.S.

Most countries have to face the question of either the subjection or the eradication of noxious weeds. Unfortunately in British Guiana, hitherto, there appears to have been a *laissez-faire* attitude—an attitude which the disastrous growth of the pernicious and dangerous species of *Antidesma* has altered.

The plant has escaped from control. The damage that can be done by this pest can readily be seen by anyone who takes the trouble to visit *Le Repentir* Cemetery, New Town, The Lodge Village and other places contiguous to the Botanic Gardens.

The eradication of annuals which reproduce themselves from seeds alone, is not a difficult matter, but a plant like *Antidesma*, which reproduces itself, not only from millions of seeds, but also tillers and shoots from any portion of broken root, every such shoot growing into a robust plant, whilst any scattered

joints however small, if allowed to remain also grow into vigorous plants, each in its turn producing more seeds and more root-stocks ; a plant pest such as this, presents a problem pregnant with difficulties, even at control, not to mention subjection or eradication.

The species of *Antidesma* to which we have referred will send out roots 50 feet in length and to a depth of six feet.

This pest has now forced itself upon us as a menace and one of grave danger.

"Prevention is better than cure" is a very old and hackneyed adage, but it has lost none of its force to-day.

Any early appearance of this pest, if tackled at once, will keep this enemy out of pasture or cultivated area easily enough, but if it is allowed to escape from control, the loss of unoccupied and pasture lands will be very great, whilst cultivated areas might have to be entirely abandoned if the march of destruction is allowed to go on unmolested.

It is advisable for everyone of our cultivators to view with suspicion any strange plants that he may see shooting up in his fields. One has only to refer to Para grass (*Panicum barbinode*), probably introduced from Africa, which, had it been kept out of sugar and other cultivated lands, would have saved hundreds of thousands of dollars and many numbers of years of labour. The Bahama grass (*Capriola dactylon*) is another example—instances are not unknown in which this grass has actually beaten the cultivator.

It is to be hoped, therefore, that every planter and farmer will see to it that this species of *Antidesma* is not allowed to sneak its way into any of his lands, eventually to become a persistent and pernicious pest.

It must be remembered that what may not be a pest in one country, may, on its introduction to another country, prove a most serious source of danger—this

is not only true with respect to plants but also to animals. In 1919, the Fijian Government brought to the notice of the Imperial Department of Agriculture and also to the Government of British Guiana, the seriousness of the pest known as Köster Curse," *Clidemia hirta*, one of the *Melostomaceae*, a common plant in British Guiana and the West Indies from Trinidad to Jamaica. In this part of the world it gives no more trouble than any other melostomaceous plant and is not a source of any worry at all.

Introduced into Fiji however, it has been found an agricultural pest and is a curse to cultivators. On the other hand, *Antidesma Dallachyanum*, known as "The Herbert River Cherry," is found amongst the flora of Wooroonooran, Australia, where it fruits heavily and is made into excellent jam or jelly.

There are other plants which, though not perhaps a serious pest with us, are so threatening a danger to agriculturists that legislation has been introduced in connexion with the control or suppression of such plants. For example, in Ceylon, the Water Hyacinth (*Eichornia* sp.) has became a serious nuisance and has been declared a 'weed' under the Plant Protection Ordinance and the Department of Agriculture has been definitely charged with its eradication from the Colony. This weed has been the cause of serious damage in many countries. In Bengal, Burma, Indo-China it has became a menace. Mr. Stockdale, the Director of Agriculture, Ceylon, is determined that it shall not be allowed to race riotously over Ceylon, and in the December issue of the *Tropical Agriculturist* appears a strong appeal from his pen against this Water Hyacinth menace.

There are other plants in this Colony which we have noticed show signs of beginning to become a source of danger. One of these plants which is a considerable nuisance, is called in some parts of the Colony, "Wild Coffee" (*Clerodendron siphonanthus.*)

This plant roots deeply and it is making its unwelcome presence felt in many parts of the county of

Demerara. We strongly advise that a check be given to its advance and every effort made to eradicate it on its very first appearance. So marked is the damage done by this pest that many cultivators have been under the impression that this pest is the antidesma pest, concerning which the writer drew up the following Notice for the Official Gazette of 5th August, 1926.

WARNING TO FARMERS.

Noxious Weed.

Cultivators throughout the Colony are warned to keep a very sharp lookout for a noxious weed known as *Antidesma*, the common names are :—"Congo Weed," "Sour-Bush," "Black Tongue," "Worthless Bush"—and "Wild Jamoon." This plant, at a distance, does not look unlike a guava bush, but on closer examination it is quite unlike guava, the leaves are, unlike guava, alternate and smooth.

At a distance also, to a casual observer, young shoots of Jamoon do not look unlike young *Antidesma*, but actually the two plants are not alike.

It grows into a tree some twenty feet high, produces many thousands of flowers. The flowers are inconspicuous and are borne on spikes. The fruit is a little red berry something of the colour of a "black sage" berry, which later turns dark, almost black, in colour. Birds eat the fruit and so spread the pest. Children are very fond of the sub-acid flavour of the fruit and suck the little berries readily.

The plant spreads exceedingly rapidly, not only by seeds but by root suckers. The smallest piece of root left in the ground will grow and spring up into a sturdy plant.

At its first appearance it should be carefully dug up, all the roots removed, and the whole burnt.

Those farmers and cultivators who do not know the plant should visit the Botanic Gardens, Georgetown, where a specimen will be shown them by the authori-

ties, after which they should visit the north-eastern section of Le Repentir Cemetery—and see for themselves the dreadful wholesale destruction that can be wrought by this noxious and pernicious weed. Once it is thoroughly established it is almost impossible to get rid of it."

The genus *Antidesma* belongs to the large order *Euphorbiaceae* and contains about 200 species. It is a tropical tree or shrub, the leaves are simple and entire, the inconspicuous yellow flowers are borne on spikes, unisexual, whilst the fruit is a little round one-seeded drupe, first green, then a pretty red, turning at a later stage dark to almost black in colour.

Apparently it flowers and fruits the year round, the writer has seen a few flowers as late as September, and as early as March. The fruiting is prolific. Birds readily eat the fruit and so disperse the seeds. Children are extremely fond of the fruit—the sub-acid taste appealing strongly to them. They gather huge quantities of fruit and they also help to disperse the seed. When it is remembered that pieces of root ½ an inch long, if left in the ground, grow readily into sturdy plants, that it tilters and suckers in a most alarming fashion, it will be seen how desirous it is to check the disastrous work this plant is now carrying on. In some localities large areas are already hopelessly ruined.

Clerodendron siphonanthus belongs to the order *Verbenaceae* and is of course entirely unlike *antidesma*. It is well-known to most of our readers by the name of "Wild Coffee."

This plant must not be confused with *Clerodendron aculeata* also known as "Wild Coffee" and which is so useful as a hedge plant.

A species of *Flemingia*, known in Demerara as "Wild Cacao," is also proving itself a nuisance to some farmers; this plant is not to be confused with the "Wild Cacao" of the rivers (*Pachira aquatica*) *Flemingia* belonging to the *Leguminoseae*, one would

not have thought could have proved itself a pest, but though it is a leguminous plant, it certainly is a worry to many farmers.

The plant known as "Baby Jamoon," apparently a species of *Eugenia*, can be quite troublesome, and farmers and others on the West Coast of Demerara would be well-advised to keep this plant out of their cultivation. A species of *Mucuna* is also becoming a pest in the Mahaica District.

In Volume XVI of September 22nd 1917, *The Agricultural News* under the caption of "A noxious Weed" referred to the fact that, in the West Indies there were to be found many wild species of the genus *Amaranthus*, amongst them the vigorous weed known 'as prickly caterpillar' (*Amaranthus spinosus.*) The article in question continues "In the pastures near Honolulu, Hawaii, this weed has spread so extensively as to cause the Board of Agriculture and Forestry to issue warnings to ranchers against this obnoxious plant, advising the use of every possible means to prevent its further spread."

In March, 1921, this same publication pointed out to growers in the West Indies in general, in an article entitled, "Weeds as pests and their suppression" that "very often there is a tendency to neglect a weed on its first appearance until its spread has become alarming."

The article pointed out that when the plant pest known as the Russian Thistle was first observed in California, had vigorous action been taken followed by persistent watchfulness to avoid new infestations the state might have been freed of this pest, but in spite of all warnings the weed was allowed to spread until it covered "the southern half of California and a large area of the northern part."

In the Canje river the mass of weeds known as "Missouri grass," is a serious menace to navigation, and has cost many thousands of dollars. The mass

of grass consists of *Panicum amplexicaule* and other aquatic plants. *Telanthera philoxeroides*, *Polygonum glabrum* and *Ipomaea aquaticea* with sub-aerial creeping stems. In our rice lands a species of *Jussiena* is found very frequently and though at present it is not a source of any danger it should be eradicated at once.

It will be seen that certain plants can prove to be a source of real danger to the Colony. Ranchers may find large areas of pastoral land utterly useless for grazing purposes, if certain noxious weeds are allowed to escape from control.

It behoves all agriculturists to keep a keen watch on plants which give any indications of being a pest either in their cultivated areas, their pasture lands, or in navigable waterways. By taking action at once, a saving of years of labour and large sums of money may be the result.

On the other hand, a careless attitude may result in a weary waste of years of labour and the expenditure of very large sums of money, with possibly the abandonment of areas of land which would, otherwise, have been beneficially occupied.

It is not a pleasant sight to witness areas of useless "bush" growing on lands which might be supporting numbers of cattle, or smiling with crops of sugar or rice.

Everyone of our farmers must do his share in keeping in check weeds which are potentiascourges.

GINGER.

Its Cultivation and Preparation.

The following is an extract from an Article on Ginger, its Cultivation, Preparation and Trade, in Vol. XXIV No. 4, of the Bulletin of the Imperial Institute.—Editor.

The bulk of the world's supplies of dried ginger is at present produced within the Empire, in the West Indies, India and West Africa. Jamaica ginger is of a relatively uniform high grade. Indian ginger is on the whole of somewhat lower quality, although certain kinds, such as Calicut ginger, realise prices approaching those of Jamaica ginger. The ginger produced in Sierra Leone, however, which forms a very large proportion of the material imported into the United Kingdom, is of a lower grade. The Imperial Institute is informed that the United Kingdom market could absorb increased supplies of ginger of the better qualities, and for this reason it has been considered desirable to draw the attention of present and potential producers to the best methods of cultivating the plant and preparing the product for the market. In the case of Sierra Leone and Dominica this has already been done to some extent by means of a memorandum sent recently by the Imperial Institute to the respective Governments of those countries. Through the agency of the present article, it is hoped to create an interest in the product in other parts of the Empire, where the conditions are suitable for its production.

The Ginger Plant.

The ginger of commerce consists of the underground stem or rhizome of a herbaceous perennial, *Zingiber officinale*, Roscoe, belonging to the natural order Zingiberaceæ, a section of the Scitamineæ. The rhizome is branched and bears at intervals upright leafy shoots, about 2ft. high, and, usually distinct from these, an erect flowering shoot.

From very early times the plant has been grown from cuttings of the rhizome and, like certain other plants which are propagated entirely by vegetative means, such as the banana, fertile seed is rarely produced. The cultivated plant consequently shows little variation in botanical characters and the various forms of ginger which appear on the market owe their differences almost entirely to the method of cultivation and preparation practised in the region of production. It was at one time stated that the relatively juicy Canton ginger, from which the Chinese preserved ginger is prepared, was derived from a distinct though related plant, *Alpinia galanga*. This, however, is now known to be erroneous, and the succulence and slight pungency characteristic of Chinese ginger appear to be due to the special methods of cultivation adopted in China and to the rhizome being harvested at a comparatively early age.

The original home of the ginger plant is not known with certainty. It occurs wild in South-east Asia and in the Malay Archipelago, and it has also been recorded in a wild state in Colombia. It has been suggested, however, that the plants found in Colombia are relics of early cultivation, as may possibly be the case also in the other two regions mentioned.

Cultivation and Preparation.

Climatic Requirements.

For the successful cultivation of ginger the essential requirements as regards climate are a good rainfall and a high temperature during the growing period. In the ginger-growing region of Jamaica the mean annual rainfall is 88 in., whilst in south-west India it is over 100 in. A dry season during the resting period and prior to planting is an advantage, as it facilitates the thorough preparation of the soil required for the crop, but is not essential.

Owing to the fact that a high temperature is needed for the optimum growth of the plant, cultivation is naturally most successful in tropical and sub-tropical regions.

It need not be restricted to such areas, however. Provided that the heat and sunshine are sufficient during the greater part of the year, a cold winter is immaterial, as before this period is reached the rhizomes will have been dug up from the ground, the bulk already prepared for the market and the remainder stored for planting the following season. These are actually the conditions obtaining round Canton and also in parts of Queensland where the crop is grown.

As regards altitude the plant succeeds in Jamaica from sea-level to considerable elevations, and in India also it is grown both in the low country and up to 4,000—5,000 ft. in the Himalayas.

Soil and Manure.

Ginger is an exhaustive crop and, unless manures are readily and cheaply available, the soil in which it is grown must be rich in plant food. The plant will not succeed in land liable to become water-logged or in soil of a gravelly or very sandy nature. The most suitable kind of soil, therefore, is a rich vegetable loam. The land must be well drained, as if water collects about the rhizome the latter is liable to rot.

The best varieties of Jamaica ginger are grown on a sandy loam, and in India the ginger produced on the compact black soils is said to be inferior to that grown on the lighter sandy loams. The amount of sand should probably be not more than 30 per cent. and of clay not above 20 per cent.

The principal constituents removed from the soil by ginger are stated to be lime and phosphoric acid, and it is the replacement of these constituents which should be aimed at.

Cultivation.

In Jamaica two methods of cultivation are adopted. That by which the best ginger is obtained consists in planting in March or April portions of selected rhizomes from the previous year's crop, care being taken that each

portion planted contains an "eye" (embryo stem). The land is raised into ridges and the pieces of rhizome are placed a few inches below the surface and about one foot apart, the process being much the same as that observed in planting potatoes. It is advisable thoroughly to clear the land of weeds before planting the rhizomes, as the removal of weeds becomes difficult later on when the ginger plants have developed. Unless the rainfall is good it is necessary to resort to irrigation, as the plants require a good supply of water. The ginger produced in the foregoing way is known as "plant ginger."

"Ratoon ginger" is obtained by leaving in the soil from year to year a portion of a rhizome containing an "eye." This "eye" develops in the normal way, giving rise to a supply of rhizomes in the succeeding season. "Ratoon ginger" is smaller and contains more fibre than "plant ginger," and the product obtained by this means is said to deteriorate steadily from year to year.

In some parts of India it is usual to plant the crop in beds about 10 to 12 ft. long and 3 or 4 ft. wide, in which the sets are placed about 9 in. to 1 ft. apart. The field is then covered over with the leaves of trees or other green manure to keep the soil moist, and over the leaves organic manure is spread to a depth of about $\frac{1}{2}$ in. At the end of the rainy season it is necessary to resort to irrigation. During the first three months of the dry season the field is weeded about three times.

Before planting, the land must be thoroughly hoed (or ploughed) and harrowed, in order to produce a fine tilth. In planting large fields it would appear preferable to open up drills about 4 in. deep and 2 ft. apart, much as is done in planting potatoes on a large scale. Artificial manure, such as superphosphate and bone meal, can then be incorporated in the soil at the bottom of the drill, before planting the sets.

On account of the crop taking up such large quantities of plant food a system of rotation should be adopted if possible. This is done in some parts of Jamaica, where much of the ginger is grown in small quantities as a garden plant, in association with bananas, chillies, etc.

the crop is divided into four or five grades. The best "hands" obtained in Jamaica weigh as much as 8 oz., 4 oz. being an average weight.

Unpeeled ginger is merely freed from its rootlets and excess of soil, and then thoroughly washed in water or scalded in a boiler of hot water, and finally dried in the sun.

Preparation of Preserved Ginger.—In China the first crop of ginger is ready about three months after planting. This is known as "young ginger" and is the least pungent and most expensive. Unlike the Jamaica and Indian ginger, the rhizomes are not allowed to mature, as they become too pungent for the purpose for which they are required. After harvesting the roots are washed and the skin carefully scraped off. They are then punctured by means of a fork and afterwards washed in rice water (the water left from washing rice) to improve the colour. The rhizomes are next boiled in three or four changes of refined sugar and water for one or two hours, until thoroughly soaked. They are then placed in barrels or other containers and covered with syrup. In the case of dry preserved ginger, the wet rhizomes are strained till dry and then rolled in sugar placed on bamboo matting.

Yield.—The yield of ginger varies considerably with the climate, soil, and methods of cultivation employed. In Jamaica the average return is from 1,000 to 1,500 lb. of dried ginger per acre, but as much as 2,000 lb. per acre has been obtained under the best conditions. The recorded yields in different parts of India vary within wide limits. In Bengal it is stated that 1,000 to 1,500 lb. per acre is the average crop, in the Punjab 2,100 lb., in Travancore 2,000 to 2,500 lb., whilst in an experimental cultivation at Surat, Bombay Presidency, the yield was equivalent to over 8,000 lb. per acre. As already mentioned, a yield equivalent to nearly 3,000 lb. per acre was obtained in Jamaica on exhausted land by the application of a suitable manure ; and there is no doubt that, by careful cultivation and manuring, the yield in all the countries mentioned

could be considerably increased. It takes about 4 tons of freshly dug rhizomes to give one ton of dried ginger.

Pests and Diseases.—Owing to the pungent nature of the shoots, the ginger plant is attacked by very few insect pests, and it has even been recommended that the crop should be planted in orchards to prevent the development of pests of fruit trees.

Considerable injury is inflicted on ginger crops in Jamaica by a disease called "black rot," which attacks the underground parts of the plant, and brings about decay of the rhizomes. The first indication of the disease is a yellowing of the leaves, which droop and wither; the bases of the stems become discoloured and rot, and finally decay spreads to the rhizomes, which disintegrate to form a putrifying mass of tissue. A fungus present in the decomposing rhizomes was found to form spores in a similar manner to *Allantospora radiciola*, Wakker, a fungus which causes a root disease of sugar-cane in Java. It was not clearly shown, however, that the fungus found in the old rhizome was the cause of the disease (Howard, *Bull. Bot. Dept. Jamaica*, 1901, **8**, 181 ; 1902, **9**, 42).

A similar rot of the rhizome, caused by a species of *Pythium*, which occurs in India, was first recorded by Butler from Surat and is described by McRae in *Agric. Journ. India* (1911, **6**, 139). The disease spreads rapidly through the soil, and to prevent infection of healthy plants every portion of an affected plant must be removed and burnt, whilst the soil itself should be treated with lime, or a light dressing of sulphate of iron may be applied. Isolation of infested soil by a trench has been tried with success, but in the case of a bad attack, ginger should not be grown on the land for at least three years. The disease is most serious on wet, heavy soils, or in exceptionally rainy seasons, and it may be prevented to a large extent by draining the land, so that no water lies round the collar of the plant. Great care should be exercised in selecting only healthy rhizomes for planting purposes, any plants with even the slightest trace of disease being rejected. After a bad attack it is advisable to steep the rhizomes for

about half an hour in Bordeaux mixture before planting, to destroy any fungus spores or hyphæ on their surface or in the soil clinging to them. The fungus, which also occurs on tobacco and papaya in India, was at first thought to be *Pythium gracile*, Schenk, which in Europe is found on freshwater algæ. Subramaniam, however, showed that it is a distinct species, which he calls *Pythium Butleri* (*Mem. Dept. Agric., India, Bot. Ser.*, 1919, **10**, 181.

Another disease of ginger, which does some damage in Jamaica is locally called "cork rot." This cannot be detected until the crop is gathered, when the rhizomes are found to be of cork-like texture and quite valueless. The exact nature of this disease does not appear to have been investigated.

Uses of Ginger.

For flavouring purposes ginger is perhaps the most widely used of all spices. It is employed whole in the preparation of various confections, chutneys, pickles and the like, and in the ground condition for a great variety of purposes. Large quantities are used in the manufacture of ginger beer, ginger ale and similar beverages. Its medicinal value is well known, the root being used chiefly as a stomachic and internal stimulant, especially in flatulency and colic. The pungency of ginger is due to the presence of a resinous substance and the odour to an essential oil. The latter is separated by steam distillation and used to some extent in perfumery.

In connection with the attempts being made to improve the quality of Sierra Leone ginger, the Imperial Institute recently made enquiries regarding the uses of the various types of ginger, the results of which may be here summarised.

Unscraped (unpeeled) ginger is used as a cheap substitute for peeled ginger for most of the purposes for which the latter is usually employed. When peeled ginger is relatively cheap, less unscraped ginger is used in this way whilst, on the other hand, more of it is used when peeled ginger commands a high price. A certain amount of

unscraped ginger is also employed by distillers in the United Kingdom, who prefer it to peeled or scraped ginger, because it contains rather more essential oil.

For certain purposes only peeled ginger is suitable *e.g.*, for the "whole ginger" sold by grocers, for the best grades of ground ginger and for the best kinds of ginger beer. Unscraped ginger is sometimes used for the lower qualities of ground ginger, but not commonly for ginger beer. For medicinal use, "scraped" ginger alone is official in the British Pharmacopœia, but both peeled and unpeeled may be used for official preparations in the United States.

Ginger from no one country is in demand exclusively for any particular purpose. The peeled ginger from Jamaica, Cochin and Japan is all used for the same purposes, the grade of ginger employed depending on the quality of the article to be produced. Unscraped varieties from different sources are generally interchangeable.

TOBACCO CULTIVATION.

An address given by Professor J. S. Dash at a meeting of the Agricultural Society, held at the Imperial College of Tropical Agriculture on 20th January, 1927.

The Chairman introduced Professor J. S. Dash to the meeting. He referred to the great interest Professor Dash had taken in tobacco cultivation since his arrival here, and stated that no tobacco had hitherto been raised in this colony on a commercial scale or any part of the West Indies, with the exception of Jamaica. He was sure that the lecture would prove of great interest.

Professor Dash said: In the first place, I should like to say that our tobacco field work has been going on since 1923 primarily for the purpose of giving practical instruction to our students. From a beginning of about 100 plants we have progressed until this year we have an

area of 1½ acres. One-half is devoted entirely to the study of strains and seed work, and the other half more particularly to finding out something of the commercial aspects of tobacco culture. Up to some time ago it looked very promising indeed and this prompted the suggestion that you might care to see it if you were interested. But unfortunately on Christmas Eve some persons entered the tobacco field and nearly an acre of the plants was pulled up. Next day the field resembled one in full harvest rather than one in full growth. Through the prompt action of the overseer they got a gang out on Christmas Day and replanted the tobacco. With the recent rains the plants had nearly all caught on again, but we stand to lose considerably with respect to leaves on the older plants. The younger ones suffered very materially from having their growth checked. They bloomed almost immediately and thus the leaf crop was relatively smaller. They would be able to see from certain plants left untouched in the scamper of the persons to get away, what the field would really have looked like. At the demonstration in the field I will be assisted by a post graduate student from South Africa, who has had a wide experience in tobacco growing.

It is not intended nor is it possible in a single effort to cover the subject of tobacco growing in all its various aspects and ramifications. It is a highly specialized industry, and one in which there is ample room for trained experts, for the crop is a peculiar one and not rivalled by any in regard to effect of soil, climate, fertilizers, handling, etc., on the final product. So much so indeed, that even those best qualified in its culture are at times baffled by its behaviour and varying response to the conditions under which it is grown. This is not hard to understand when it is remembered that the tobacco plant enjoys a very wide distribution, being cultivated on every continent of the globe :—Europe, Asia, America, Africa, Australasia, all figure in the production of various types and classes. It thus happens that what is termed quality in tobacco, as in many other products, while difficult to define, depends very largely on a point of view ; the quality required in cigarette tobacco, for example, being very different from

the quality required, say in a heavy pipe or plug tobacco. The grower, however, must keep certain generalized distinctions in mind since soil and treatment are most important factors, apart from variety considerations, in determining quality ; and in the long run, the grower is limited to the type he can profitably cultivate by the nature of his soil and environment. No other crop is so influenced by these factors as is tobacco, judged from the point of view of manufacturers' requirements, and high agricultural yields are, within limits, sacrificed in order to satisfy these requirements. Quality in the case of bright tobacco particularly, is usually enhanced where the crop is grown continuously on the same land.

It may be of interest to note that tobacco in the United States, the world's largest producing country, was at an early date subject to certain economic laws. Thus, in 1921, the profits were so great and the production of food crops neglected to such an extent that each colonist was limited in regard to the number of plants he could grow and even in the number of leaves allowed per plant. The expansion of the American industry since those early Virginian days has been phenomenal, for the crop is now grown in 42 States on nearly half a million farms and possesses a value of many millions of dollars.

British territories having relatively important tobacco industries are : India, Canada, Union of South Africa, Rhodesia, Nyasaland, Ceylon, and Australia. Considerable interest has developed in Nyasaland because of its suitability to the production of bright leaf probably closest in quality to that produced in the United States, which has hitherto enjoyed almost a complete monopoly in this particular class. Small but successful industries exist in other places, Jamaica furnishing a good example. Under the existing protection it might be possible to supply some of the local demands, notably in the heavier manufacturing types. The Colony is importing annually about 500,000 lbs. of unmanufactured leaf.

With the decrease in cigar smoking generally and the special exigencies of the trade in this class of tobacco, new prospects for it are not promising.

The following is a brief outline of the more important points in the culture of the crop :—

Classes and Varieties.

There are two main classes of tobacco : the cigar and the manufacturing. The differences are commercial and varietal rather than botanical, both coming under the same species—*Nicotiana tabacum. N. Rustica* constitutes another class grown mainly for nicotine production and includes also Turkish and Levant tobaccos. The cigar group at the College is represented by the following varieties : Comstock Spanish, Big Havana and Connecticut Havana (all used as filler and binder) also four strains of Sumatra wrapper leaf. The manufacturing class may be divided into three groups of varieties : bright, heavy and special types. The first is represented in our collection by Hickory Pryor, Warne and Gold Leaf; the second by Kentucky One Sucker, Yellow Mammoth and Tennessee Red; the third by White Burley and Maryland. There are also in the plots two strains of *N. rustica* under observation for nicotine production. The first group demand special curing facilities in the way of flue-barns if a high quality bright leaf is to be obtained, and for special studies in this work it is hoped to be suitably equipped before long. Hickory Pryor is a promising variety in this connection. In the meantime, all varieties are being air-cured in the usual way.

Both Kentucky One Sucker and Yellow Mammoth are good yielders of heavy tobacco under our conditions. The greater part of the commercial area at the College is devoted to these two and an effort is being made to get accurate figures as to cost of production on this area.

Soils and Climate.

As noted previously, environment plays an important part in determining the type of tobacco to be grown. Broadly speaking, sandy or clay loams of high fertility are best suited to cigar tobacco, since the plants must make rapid and continuous growth, especially where high quality wrapper leaf is aimed at. In the case of bright tobacco, typical soils are light, infertile, sandy loams, liberal

applications of fertilizers being used to produce the crop. For dark, heavy-bodied tobacco the soils may be more clayey in texture than for the other classes and richer in organic nitrogen ; alluvial soils and the heavier loams are very suitable—in fact almost any good fertile soil gives satisfactory results. No matter what the type of soil unless it is well drained, profitable crops of tobacco cannot be produced.

The rainfall should be moderate but well distributed throughout the growing period and rather light during the maturing and harvesting period: heavy rains, especially at harvest time, are very prejudicial to the quality of the leaf which is rendered thin, deficient in gums and light in weight in proportion to bulk. Planting is therefore done in time to catch the late rains, allowing for sunny dry weather as maturity approaches.

Seeds and Seed Beds.

The tobacco plant being propagated from seed, the grower should take every precaution to select vigorous plants, true to type, and uniform in respect to time of maturity, as seed bearers. Where more than one variety is grown the seed heads should be bagged (any strong paper bags serves the purpose) before the flowers begin to open. The bags are retained in position until the seed capsules are full, it being necessary periodically to raise the bag as the flower stalk elongates, at the same time removing the old fallen flowers from the bags and destroying any bud-worms that may be at work. As soon as the seed pods turn brown they should be harvested and allowed to further dry out in a cool, dry room, free from vermin. The seed is then shelled, winnowed and placed in glass containers (*e.g.* jam bottles), taking care to reject that from poorly developed capsules which will be light and will tend to produce poor plants. Tobacco growers in many places are often inclined to favour the use of imported seed as against home grown, believing that the latter soon deteriorates. There is, it is true, every danger of this when seed selection is not practised.

The seed bed is the next care and the operations connected therewith must be regarded as an essential feature in tobacco cultivation. Failure at this point means crop failure. In the first place, a well-sheltered, well-drained spot with access to water supply must be chosen ; the soil should be fertile and plentifully supplied with humus. The preliminary preparation consists in clearing and levelling followed by thorough working of the soil, with the incorporation of a liberal supply of well decayed compost or manure. The site is then lined off into beds of convenient size about 3 to 4 feet wide with paths between, which serve also as drains. Some method of sterilizing the beds to destroy weed seeds, ants, diseases pores, etc., is next recommended; for this purpose brushwood and other material should be piled on top of the beds and set on fire. The beds are afterwards brought to a fine tilth by careful mixing in of the ash resulting from the burnt bush, care being taken not to bring up unsterilized soil from below. The surface of the beds should be level in every respect; they are then ready for sowing and should be seeded at the rate of one teaspoonful of tobacco seed to 10 square yards: for even distribution the seed should be thoroughly mixed with some substance such as wood ashes before sowing. The surface of the beds after sowing is lightly pressed with a smoothing board before watering, which should be done from a can with fine rose. Sometimes a quick acting fertilizer is applied to the beds. The area of seed bed necessary can be judged from the fact that in one ounce of tobacco seed there are approximately 100,000 and an average teaspoon holds about 25,000 seeds when level. All the beds should not be sown at once ; three or four sowings at intervals of about 14 days are suggested, depending on the area to be planted and to provide sufficient material for supplying losses from insects or other causes It is a common practice to provide some sort of covering for the nursery beds ; under the humid conditions of this climate, where too much shading is given, the beds are subject to damping off troubles, and except for suitable shelter from wind and heavy rains, covering the beds is not absolutely necessary. The seeds germinate in from 7 to

10 days and the seedlings are ready for transplanting in from 6 to 8 weeks when they are 4 to 6 inches high; undersized plants may be used only if weather conditions are favourable as they are liable to be killed out by hot sun. On the other hand, large plants may run to seed before normal growth has been attained. Beds to provide seedlings for transplanting during November and December, when the bulk of our planting is done, are sown from mid-September to the end of October. It is recommended that the site for seed beds be changed annually to avoid insect and fungus troubles. Where thorough sterilization can be effected the change need not be so frequent.

Preparation, Planting and Cultivation.

Land for tobacco should be first thoroughly ploughed and any green growth thoroughly incorporated; a second ploughing is given a little time after the first, in the opposite direction, when an application of well-rotted pen manure at the rate of about 10 tons per acre can be worked in; then at the time of planting the surface should be harrowed and brought to a fine tilth. Drains may be dug at this time. The practice next adopted at the College is to open shallow furrows 3 feet apart—the distance between the rows—into which a mixture of well-pulverized cattle droppings and wood ashes is applied at the rate of about 5 tons per acre. The soil is then thrown back on this and the plants inserted, a cloudy day being usually selected for the latter operation. Care must be taken in removing the transplants from the nursery beds which, if dry, should be thoroughly watered before any plants are removed. The distance between the plants in the row depends on the type of tobacco grown; under average conditions 2 feet is ample. After the plants have begun to grow two or more surface cultivations according to the nature of the soil should be given; cultivation should cease when the plants have reached such size as to render them liable to damage by implements and labourers, usually at the topping stage.

After Treatment.

When the plants are about a foot high they may be gone over and one or two small leaves at the bottom which

would be of little value removed. As soon as the plants have reached the flowering stage the operation known as "topping" is carried out and consists in the removal of the terminal bud to prevent seed development. At this time those plants selected for seed are marked and the flower heads allowed to develop. Topping should never be neglected if leaves of the required texture are to be obtained. The number of leaves left per plant will depend on the class of tobacco grown; generally speaking, the lighter sorts are topped high—12 to 16 leaves, and the heavier classes low, about 8 to 10 leaves. After the plants have been topped suckers will shortly appear in the axils of the leaves and these should be regularly removed. The leaves will now rapidly take on size and body until ready for harvest which is usually 4 to 6 weeks after topping.

Pests and Diseases.

The tobacco plant is subject to a number of troubles, but only a few of those commonly met with here need be referred to. The most important pest up to the present has been the mole cricket; it cuts off young transplants and losses may be as high as 50 per cent. of the stand, especially where tobacco is grown near grassy areas from which the crickets migrate. It has been noticed that fresh grass clippings placed underneath the young plants when put out in the field gives them a certain amount of protection. Where a plant is cut or injured it is advisable for a search to be made in the soil and the insect destroyed before another plant is inserted. Fields have to be frequently supplied where the mole cricket is prevalent. The horn-worm and the bud-worm make their appearance at an early time and the plants have to be regularly searched for the caterpillars which should be destroyed. This operation must be efficiently performed during the entire growing period in order to avoid serious losses from defoliation. The suppression of all waste vegetation near tobacco fields and seed beds will often aid in preventing liability to serious caterpillar outbreaks. Dusting or spraying is sometimes recommended against caterpillars where the area is large, but there is danger of leaf damage from the poisons used.

This is a problem for future investigation under local conditions. Grasshoppers may also be mentioned as capable of doing considerable damage where their numbers are large.

In the case of diseases, reference has already been made to "damping-off" in the seed beds; too much shading and humidity helps to spread the disease, likewise thick seeding; in some cases entire beds may be lost from this trouble. Liming is beneficial, but a change in site is advised, also proper sterilization of the soil as previously noted. So far, at the College, there have been no instances in the field of other well-known tobacco diseases such as root-rot, wilts, or mosaic. Some leaf spotting has appeared due to the recent excessive rainy conditions, coupled with the severe set-back which the maliciously pulled out plants received.

A careful watch is being kept for any new troubles which may appear with increase in area.

Harvesting.

The stage at which tobacco is harvested plays an important part in successful curing; it requires a little experience to judge when the crop is at the right stage for reaping. The leaves should neither be too ripe nor too green and the principal indication of ripeness is the decided change of colour. As maturity approaches there is a gradual change from a deep green to a greenish yellow and where the leaf is of heavy texture the yellow may only show in spots. The leaf itself at this stage instead of being soft and pliable becomes rough to the touch and brittle. In general, tobacco which is air-cured should not be allowed to get over-ripe.

There are two methods of harvesting tobacco: the whole plant and single leaf; each has its advantages. The former is the more economical but its disadvantage is that all the leaves are not in the same stage of ripeness. The single leaf system requires more labour; on the other hand, by this means it is possible to get all the leaves in the same stage of ripeness—an important factor in the production of highest quality tobacco. Nevertheless, the

whole-plant method is widely used in the case of manufacturing tobacco and has proved quite satisfactory at the College where the practice is adopted of splitting the central stalk of the plant with a sharp knife to within 6 inches of the bottom, the stems being next severed just above the ground. The splitting of the stalk assists in the drying out of the tissue. The plants are allowed to wilt for a short time and removed to the curing room where they are suspended over wires or laths, great care being taken to avoid bruising or breaking of the leaf.

Tobacco should be harvested in fine whether, but not while the dew is on it or immediately after rain. Preferably, reaping should not be done much before 3 o'clock in the afternoon, unless the plants are allowed to wilt under shade.

Curing, Stripping and Sorting.

Certain chemical changes take place during the curing for which processes the prime requisite is proper ventilation to ensure a good circulation of air. Over-crowding of the plants in the curing shed should be avoided ; on the other hand, exposure to strong winds may do considerable damage to the leaf, while too much damp, moist air may cause harm by setting up attacks of mildew.

The size of shed will naturally depend on the area under the crop ; generally speaking, about one square foot of floor space for every 3—4 plants, for each story or tier in shed. Any vacant out-building can often be converted into an improvised curing shed if precaution in respect to proper air circulation be taken. An inexpensive building with thatched roof will equally serve the purpose.

The plants are allowed to hang until the mid-ribs of the leaves are thoroughly dry before being taken down—usually after 30 or 40 days. Curing completed, humid days have to be selected for the operations of stripping and sorting of the leaves, as on no account should tobacco be handled if the leaves are dry and brittle.

Sorting consists in classifying the leaves as fast as they are stripped into two or three grades depending on

requirements. In this operation, the bottom leaves are usually kept separate from the rest, while the latter may be further classified into "middles" and "tops." The tobacco is then pressed and packed in cases for delivery to the factory.

The process known as fermentation is beyond the scope of this paper.

Yields and Prospects.

Yields vary, depending on soil and treatment and the type of tobacco grown. Ordinarily, lower yields may be expected from varieties producing bright leaf than from heavy tobaccos. At the College last season from half-an-acre, of which a large part was in heavy tobacco, a yield of 700 lbs. was obtained and realised $504.00. In addition, there was a small ratoon crop of 200 lbs. which fetched much lower prices. This yield which works out at the rate of 1,400 lbs. per acre (exclusive of ratoon) may be considered good but certainly not excessive. On the average, it required 3 to 4 plants to produce 1 lb of cured tobacco ; at 6 square feet to each plant, if the field stand had been complete, the yield on the area in question would have approximated 1,800 lbs. per acre. The losses were due almost entirely to mole cricket which is likely to be an outstanding cause of poor stands under local conditions. From these figures, it is considered quite possible for any grower to get 1,000 lbs. of cured leaf per acre which, at fair prices, will return a satisfactory profit.

Tobacco has not generally been a very successful crop where individual areas are large ; the amount of supervision and handling necessary has usually restricted the area to be grown by any one individual—in the United States and Canada about 5 to 10 acres. The work, however, is not arduous even in the tropics, but time is an important factor. Preparation completed, keen gardeners in the early mornings and late afternoons will find pleasant occupation in the ordinary routine operations associated with the crop. Much can be done by mutual help in communities, notably at harvest time. In such ways, the actual amount paid

No. 4, from the Enmore Estates, grown on sandy soil. This is a good quality Ground Nut which, if carefully picked, might be used for confectionery purpose, and would probably command a good price for this purpose.

Nos. 5 and 6. These samples are very similar, and although given as 2nd and 3rd quality are, in my opinion, of equal value. I should call them about equal to Gambia quality, or perhaps a little better.

On the whole these nuts compare favourably with the various West African varieties and would, I am sure, find a ready market both in this country and on the Continent.

In regards to your query *re* Gambia and Nigerian Nuts, you are no doubt aware that the former are usually shipped in the undecorticated state, and the latter as decorticated kernels, and on this account it is rather difficult to make a comparison.

Generally speaking undecorticated nuts produce a better oil than the decorticated kernels, but, of course, the yield of oil is much lower from the former, and a normal difference in price between one and the other is about £5 per ton in favour of the decorticated.

If Gambia Nuts were decorticated I think they would produce a rather better kernel than the Nigerian quality, but it is difficult to express any opinion when there is no experience to go upon.

Yours sincerely,

(Sgd.) W. B. Bibby.

ANNUAL REPORT

OF THE

BRITISH GUIANA SUGAR PLANTERS' EXPERIMENT STATION.

1st OCTOBER, 1925, to 30th SEPTEMBER, 1926.

COMMITTEE.

The permanent members of the Committee were the same as for the previous year, viz., Sir John Harrison, C.M.G., Chairman, Hon. R. E. Brassington, Messrs. G. E. Anderson, A. E. Craig, R. Strang, W. M. B. Shields and D. Clark. On the lamented death of the Chairman in February, Mr. R. Strang was appointed Chairman and remained in this capacity until May when he went on leave. Mr. G. E. Anderson, succeeded to the Chairmanship which he has held to date. Mr. W. S. Jones continued to act for the Hon. R. E. Brassington until the latter's return to the Colony in March, while Mr. A. C. Ashbee acted for Mr. A. E. Craig from March until September. Messrs. C. Farrar and A. Murison acted for Messrs. W. M. B. Shields and R. Strang respectively from May until September.

STAFF.

SUPERINTENDENT.

This officer was absent on leave from 19th March to 16th April, 1926.

CHEMIST.

Mr. Lauchlan was absent on leave from December, 10th, 1925, to January 17th, 1926.

SECRETARY.

Mr. C. L. C. Bourne has held this appointment.

FIELD MAMAGER.

Mr. J. E. Kidman held this appointment on probation till May 30th, when Mr. C. Cameron was promoted. Mr. Cameron is an enthusiastic worker and has already shown that he will prove an efficient field manager.

FIELD OVERSEER.

Mr. Cameron held this appointment until his promotion on June 1st. Mr. H. D. Huggins, Diplomate of the Imperial College of Tropical Agriculture, Trinidad was appointed on probation on July 15th, the title of the post being changed to that of "Assistant Field Manager."

LABORATORY ASSISTANT.

Mr. E. S. A. Chin, who was absent on sick leave for a short period, remains in this post.

CLERICAL ASSISTANT.

Miss. M. Sealy continues in this appointment.

OBITUARY.

With the death of Sir John Burchmore Harrison, the Station has lost not only a Chairman but the advice of one who had carried on the raising of cane seedlings continuously since the discovery that sugar cane arrows produced fertile seed. Together with Jenman and Ward he was responsible for the production of D. 625 and D. 145, which have proved to be of such value to the Sugar Industry of his Colony.

WEATHER.

The long drought which only broke in June has proved a disaster to the Station as well as to the Sugar Industry of this Colony. Canes which should have been reaped in October 1925, immediately after analysis, were not cut till June 1926, owing to there being insufficient water in the navigation trenches for transportation. To a certain extent this will invaliditate the results of the year's work, but not completely, as the control rows of most of the fields were reaped with the remainder of the crop in June—September 1926.

From the diagrams under "DRAINAGE," it will be seen that the 8 inch centrifigul pump driven by the 8 H.P. Mietz and Weiss engine is now capable of dealing with ordinary rainfall, but cannot cope with exceptionally heavy or long continued rain. The capacity is about $1\frac{1}{4}$ inches rainfall in 24 hours, the area drained being 115 acres.

It is regretted that the Experimental Fields are still dependent on gravity drainage. It is hoped that a pump will be installed in the near future.

MANURIAL PLOTS.

It will be seen from the accompanying table that the crop was greatly reduced as a result of the drought and that the differences though still small are comfirmatory of results reported previously. It would appear that the waterlogged condition of this field during the previous year, which produced a very shallow root system, is largely responsible for the extremely poor growth. The canes were over mature when cut, it is true, but at no time was the growth vigorous.

It will be necessary to replant these fields in the near future, and it is proposed to put this in hand when the drainage conditions have been rectified.

SERIES, I.

Manurial Treatment	Tons Cane per Acre. Not Mulched	Mulched with rice straw.
Unmanured	8.7	14.1
Minerials only (no nitrogen) ...	9.4	14.8
Minerals + 200 lbs. Sulphate of ammonia	13.8	18.5
Minerals + 300 lbs. „	13.9	16.6
Minerals + 400 lbs. „	14.3	16.9
Minerals + 500 lbs. „	13.6	14.5
Minerals + 375 lbs. Nitrate of soda...	8.8	13.9

SERIES II.

MANURIAL TREATMENT	TONS CANE PER ACRE.
Nitrogen only	11.1
Nitrogen + Superphosphate ...	13.2
Nitrogen + Potash	13.1
Nitrogen + Potash + Superphosphate ...	14.6

1925 SEEDLINGS

A comparatively small number of seedlings was raised. Arrows were only collected from those varieties which had been examined in the laboratory and had shown promise, or which had appeared to be of special merit from their field characters. As the laboratory examination was started a month or so before arrows began to appear, only a few parents were selected in time for the collection of arrows.

1523 seedlings were ultimately planted in baskets and of these 735 were planted out in the field. The germination was low, probably as a result of the dry conditions.

Details as to the parentage of these seedlings will be found in the following table :—

Parents' Performances at Station.

Stock	Grand-parent	Parent	Tons Canes	% Avail.	Tons Sugar	Seedlings	
						Bas-keted	Planted out in field
Bourbon	Bourbon	416/21	14.5±3.2	3.7±1.0	1.27±.36	17	12
	D64	16/22	27.3	11.90	3.25	12	4
	D281	1843/21	17.6±1.9	10.07±.34	1.74,,.13	18	13
	D625	261/21	13.1	10.24	1.34	20	4
	,,	619/21	34.4±3.9	10.19±.19	3.59,,.41	27	2
Red Ribbon	D145	651/21	24.9	11.47	2.86	203	132
	,,	124A/21	24.9	10.27	2.56	387	222
	,,	112/21	46.8	10.66	4.99	229	162
	,,	98A/21	18.6	10.20	1.90	29	12
	,,	73/21	23.2	10.26	2.38	35	30
	,,	162/17	24.7±2.75	11.66±.43	2.92,,.38	52	22
	,,	657/21	18.0	8.61	1.55	15	6
	,,	89/21	17.2	10.73	1.85	62	12
	,,	495/21	13.1	10.50	1.38	121	24
Bourbon × Red Ribbon	D625 × D145	1641/22	28.8±8	9.79±.09	2.36,,.09	32	24
	...	D625x R.R	16.3±1.26	10.54±.26	1.71,,.12	69	7
Green Transp.	Gr. Tr.	187/21	30.0	10.31	3.09	45	8
	,,	201/21	14.5	12.11	1.75	29	3
	,,	190/21	19.2	10.55	2.03	18	5
White Transp.	D755	1400/22	23.0	10.43	2.40	13	4
	D5	733/18	26.4±1.1	10.73±.18	2.88,,.13	6	1
Wh. Tr. × Bourbon	...	D625 × Wh. Tr.	28.8±.8	9.79±.09	2.36,,.09	68	13
			14.8±2.8	10.66±.35	1.61,,.33		
Purple Transp. × Bourbon	...	D625 × Purple Transp.	28.8±.8	9.79±.09	2.36,,.09		
			...	...	...	8	1

1924 SEEDLINGS.

A careful selection of these was made and 29 were extended at Sophia.

Parent.	*Number of seedlings extended.*
B.H.10 (12)	12
D145	11
D419	4
D118	1
Green Transparent.	1

UBA X D145.

The seedlings produced by this cross were transferred to the Experimental Fields by Mr. Bastiaans in 1924, under instructions given by the late Sir John Harrison.

Unfortunately it has been discovered that sufficient care had not been taken to keep the individual seedlings separate, for as great a variation was found between one stool and another in any one row as was found between different rows. As extensions from rows would not be satisfactory, since this would give obviously mixed strains, each individual stool was treated as a unit, and extended at Sophia. This may result in a few strains appearing under more than one seedling number, but there is no doubt that each seedling number refers to one strain only.

UBA, ZAWENGA AND BAMBOO.

The plots of these varieties were cut and weighed, and the following results were obtained :—

Zawenga	...	29.5 tons cane per acre
Bamboo	...	24.9 „ „ „ „
Uba	...	24.3 „ „ „ „

It would appear the Zawenga is the best of the three, and it has been extended as a precautionary measure, since these varieties have the reputation of being immune to Mosaic Disease.

HYBRIDISATION PLOTS.

A selection of 16 seedlings with exceptionally high sucrose content and 9 seedlings of exceptional vegetative growth have been planted, in a chessboard, single stools forming the unit. It is thought that this arrangement will be more convenient for carrying out crossing operations than the older one of alternation of rows. At the same time a very much smaller area and far less planting material is required.

The results given by these seedlings at Sophia as 1st Ratoons will be found in the following table :—

Selected for Cane Tonnage.

Stock	Parent	Seedling No.	% Avail.	Purity of Juice	Tons cane per acre	Tons Sugar per acre
Bourbon	D625	572/17	8.81±.50	78.9±1.93	42.7±10.4	3.80±1.13
	„	231/20	9.21 „ .22	81.7 „ .62	41.5 „ 4.8	3.80 „ .42
	„	351/20	10.80 „ .57	86.8 „ .38	40.5 „ 1.8	4.39 „ .20
	„	349/20	9.97 „ .14	84.5 „ .51	40.2 „ 2.9	4.02 „ .34
	„	601/21	7.15 „ .25	75.3 „ .99	38.7 „ 7.0	2.75 „ .40
Red Ribbon	D145	203/20	9.87 „ .24	82.1 „ .85	39.2 „ 4.3	3.94 „ .38
	„	169/17	10.58 „ .38	85.0 „ .71	29.8 „ 2.7	3.17 „ .31
Green Tr'nsp.	Green Tr'nsp.	895/21	9.23 „ 1.14	87.5 „ 1.9	40.4 „ 1.1	3.74 „ .56
	„	661/18	8.17 „ .09	77.1 „ .15	37.3 „ .27	3.07 „ .03

Selected for Sugar Content.

Stock	Parent	Seedling No.	Sugar % Avail.	Purity of Juice	Tons cane per acre	Tons sugar per acre
Bourbon	D248	554/18	11.39 ±.126	87.7 ± .41	28.3 ±1.07	3.2 ±.145
	D625	246/20	11.58 „ .184	86.8 „ .55	19.4 „ .81	2.24 „ .093
	„	585/20	11.51 „ .34	86.8 „ .81	17.0 „ 3.7	1.96 „ .42
	„	345/20	10.95 „ .25	87.0 „ .54	13.9 „ 1.99	1.53 „ .19
	„	628/20	10.94 „ .11	85.6 „ .3	19.7 „ .95	2.16 „ .11
	„	„	10.71 „ .14	85.6 „ .7	13.8 „ 1.5	1.48 „ .16
	D721	447/17	11.32 „ .23	86.9 „ .13	33.8 „ 1.8	3.80 „ .22
Red Ribbon	D145	162/17	11.66 „ .43	86.9 „ 3.03	24.7 „ 2.75	2.92 „ .38
	„	679/20	11.56 „ .15	89.1 „ .37	17.8 „ 3.95	2.08 „ .49
	„	729/20	11.44 „ .78	89.2 „ 1.25	25.2 „ .29	2.88 „ .17
	„	699/20	11.43 „ .57	83.6 „ 2.01	19.2 „ 2.4	2.15 „ .32
	„	366/20	11.36 „ .22	92.1 „ .90	18.6 „ 1.2	2.11 „ .10
	„	156/20	11.25 „ .11	88.0 „ .25	14.4 „ 2.06	1.63 „ .25
	„	1005/20	11.22 „ .49	89.4 „ 1.60	16.6 „ 2.10	1.89 „ .32
	„	369/20	11.18 „ .43	87.8 „ .18	12.3 „ 1.49	1.36 „ .16
	„	169/17	10.58 „ .38	85.0 „ .71	29.8 „ 2.70	3.17 „ .31
	D145 x POJ 139	813/18	10.94 „ .36	85.3 „ 1.62	16.9 „ 2.22	1.87 „ .26
White Tr'nsp.	D239	528/18	11.22 „ .95	85.6 „ .52	23.9 „ 3.69	2.40 „ .37
	Not known	856/20	11.56 „ .35	89.0 „ 1.69	21.1 „ 2.15	2.43 „ .21

It is hoped that a cross of a member of the first group by a member of the second may give a hybrid which combines a heavy cropping capacity with a high sugar producing power.

Stumps were utilised as planting material and the growth obtained is highly satisfactory. Square planting has been adopted, the distance between two stools being 2 feet. This close planting will enable arrows from neighbouring stools to be brought together in one bag with

little difficulty. The method of de-antherising the arrow by spraying with water from a "Flit" sprayer, as recommended by d'Albuquerque will be adopted.

GREEN MANURES.

Sesbanea aculeata.

The high hopes entertained as to the future value of this plant in the Colony and expressed in the last Annual Report have not been realised. A caterpillar, *Mocis repanda*, the Grass Looper, which makes its appearance with unfailing regularity every year in June or July prefers Sesbanea to any other food. Plants 1 to 2 feet high were eaten down to the ground, both leaves and stems being consumed in less than a week. As it would not be an economic proposition to treat a green manure crop with insecticides, it is probable that some other plant will prove more suitable. At the same time it must be remembered that the tilth of the soil was not good and that the ground was by no means free from weeds. With a good clean friable seed-bed better results might have been obtained.

Crotolaria striata

This plant made extraordinarily good growth, even during the drought, the greatest height attained being 12 feet. The average was 7 feet, and it completely overshadowed all the shorter varieties of banana among which it was growing and rivalled the taller ones. Its growth was not appreciably effected by the dry weather, no signs of wilting being seen at any time. A further and even more important character is that this plant is immune to the depredations of the Grass Looper. This was rather strikingly demonstrated when the Grass Looper attack was most severe in June. A rambling vine known as the Wild Potato (*Ipomoea sp.*) growing on the edge of the drain had climbed in and amongst the *Crotolaria* right to the centre of the bed. This vine was completely devoured by the Grass Loopers but not a single leaf of the *Crotolaria striata* was touched.

There is, however, one difficulty with this plant; it is subject to the depredations of a seed-destroying insect; so that it is not easy to produce large quantities of seed. It is of interest to note that this insect is preyed upon by the same parasite as that which preys upon the Cane Moth Borer. It is possible that large areas of *Crotolaria striata* might have an appreciable influence on the degree of parasitisation of the Moth Borer.

Vigna repens

The growth made by this legume is also quite satisfactory, and it is being extended as rapidly as possible. It has been found that by planting 3 to 4 seeds in small holes made be a cutlass at a spacing of 3 feet 6 inches x 2 feet 6 inches, a sufficiently dense mat is obtained as to suppress all other vegetation. The second crop is, as a rule, better than the first, owing no doubt to the wider distribution of the symbiotic organism in the soil. As would be expected, vegetative growth is most vigorous during the rainy season. The crop stood up moderately well at first to the unfavourable conditions during the drought, but finally succumbed.

It seeds freely, and does not appear to suffer greatly from insect attack.

SOPHIA.

THE EXAMINATION OF THE SEEDLINGS.

As indicated in the last Annual Report, a systematic examination of the seedlings in cultivation at Sophia was commenced on September 15th, 1925. The East Section was completed on December 18th., the number of samples analysed being 5,686. The examination of the West Section was commenced after the Christmas holidays on January 12th, and, with the exception of the young transplants, finished on March 12th., 1926; 4,288 samples having been examined.

The transplants of the 1922 and 1923 seedlings together with the spacing experiment plots and a few from the Experimental Fields were examined in August 1926;

545 analyses being carried out. The total number of samples examined during the season, which, as pointed out in the last reports includes 690 from the previous financial year, was 10,519.

The number of samples must be high if any attempt is to be made to determine the degree of reliability of the results.

The labour of calculating the results of the analyses was reduced by a Marchant calculating machine which was kindly lent to the Station by Messrs. Booker Bros. McConnell & Co., Ltd. Unfortunately, after the work had been finished it was discovered that an error had been introduced through the use of an incorrect table so that all the results had to be recalculated.

A Marchant calculating machine was imported from America and arrived in July 1926. With the aid of this machine a statistical examination has been made of all varieties of which three or more samples have been analysed.

The following determinations have been made :—

The Arithmetic Mean The Standard Deviation The Standard Error of the Mean The Coefficient of Variability The Standard Error of the Coefficient of Variability	of	Cane tonnage per acre. Per cent. Available Sugar. Tons sugar per acre. Coefficient of Purity, (Coefficient of Variability not determined)

This has proved a long and tedious task, which was only completed in January 1927, and is responsible for the delay in the preparation of this report.

Before proceeding to discuss the results obtained, it may be of interest to describe the method adopted for weighing the crop. The unit adopted is the row. From each row a representative sample of 6 canes was taken for analysis. It is now realized that this was too small a sample and is subjected to a very large sampling error. It would have been better if one or two complete stools had been cut and taken for analysis.

At reaping, the canes are laid on the row. A substantial, spring balance (weighing to 100 lbs) carrying a small cradle and suspended from a bamboo tripod is used on each bed. The canes are weighed row by row, the individual weighments being written down by an assistant who supervises the work of three balances. The record is taken in carbon paper duplicating books, one for each bed, and at the end of the day's work the loose sheets are handed in to the office where the necessary additions are made. The width of the bed is also noted on each sheet, and with the aid of the calculating machine the crop is calculated in terms of tons of cane per acre. This multiplied by the sugar content, gives the tons of sugar available per acre. Where there are several rows of a variety, the means are calculated, so enabling a selection to be made for the immediate extension of promising seedlings. The selected varieties are marked with flags in the field, and, after a careful examination, all the available planting material is collected, bundled and labelled, and transported to the field where planting is in progress. The remainder of the crop is loaded into punts and despatched to the factory at Pln. Ogle for grinding. The extended rows of each variety are staked and labelled and a record is also made in a note book provided for the purpose, so that the identity of each seedling is never in doubt. The reaping of the crop was commenced in June 1926 and completed during August. The yield was extremely low owing to the high percentage of dead and dried canes as a result of the drought, reaping being 9 months late. The juice was extraordinarily poor, more especially in those fields which had been subjected to water logging in the early stages of the growth of the cane. So far as the cane tonnage figures are concerned, we can feel confident that any variety which has done well is a really vigorous variety.

It is obviously impossible to report the results in detail here. It is hoped to publish a full account in the form of a Bulletin in the near future. They are summarised in the following tables, in the study of which it

must be remembered that all the determinations are not of equal significance, since many seedlings are only represented by a single row. The guiding principle which has been adopted in making selections for extension is that any seedling which has given either a heavier cane tonnage or a higher sugar content should be extended and tested again. This rather generous selection has been considered advisable on account of the exceptional weather conditions which have prevailed.

Classification according to the tons of cane per acre.

Class		Nos. of varieties in each class produced in					
Limits tons cane per acre	Mean tons cane per acre	1917 & earlier.	1918	1920	1921	1922	Total
0.0— 1.2	0.6	...	...	...	...	3	3
1.3— 3.7	2.5	...	...	4	2	35	41
3.8— 6.2	5	...	...	13	18	101	132
6.3— 8.7	7.5	3	4	29	43	169	248
8.8—11.2	10	3	6	48	86	164	307
11.3—13.7	12.5	2	4	62	117	201	386
13.8—16.2	15	5	5	60	146	213	429
16.3—18.7	17.5	1	5	65	144	184	399
18.8—21.2	20	5	8	43	149	168	373
21.3—23.7	22.5	6	7	31	149	114	307
23.8—26.2	25	5	6	31	141	92	275
26.3—28.7	27.5	7	6	29	94	87	223
28.8—31.2	30	6	4	11	71	47	139
31.3—33.7	32.5	6	1	7	51	36	101
33.8—36.2	35	1	...	4	41	26	72
26.3—38.7	37.5	1	1	2	24	15	43
38.8—41.2	40	1	...	...	11	8	20
41.3—43.7	42.5	1	...	...	5	12	18
43.8—46.2	45	...	...	...	2	4	6
46.3—48.7	47.5	...	...	1	5	3	9
48.8—51.2	50	...	...	...	1	...	1
51.3—53.7	52.5	...	...	...	2	1	3
53.8—56.2	55	...	...	...	...	2	2
56.3—58.7	57.5	...	...	1	1	1	3

(D625)

Classification according to % Available Sugar.

Class		Seedlings of					
Limits available sugar per cent.	Mean Sugar per cent.	1917 & earlier	1918	1920	1921	1922	Total
4.88—5.17	5	—	—	—	6	3	9
5.13—5.37	5.25	—	—	—	6	4	10
5.38—5.62	5.5	—	—	—	6	4	10
5.63—5.87	5.75	—	—	—	15	13	28
5.88—6.12	6	—	—	2	18	7	27
6.13—6.37	6.25	—	—	1	27	14	42
6.38—6.62	6.5	—	—	5	39	17	61
6.63—6.87	6.75	—	—	9	59	22	90
6.88—7.12	7	—	3	5	60	37	105
7.13—7.37	7.25	—	2	6	70	34	112
7.38—7.62	7.5	—	2	14	82	56	154
7.63—7.87	7.75	1	4	18	98	66	187
7.88—8.12	8	2	3	19	95	75	194
8.13—8.37	8.25	3	4	26	112	97	242
8.38—8.62	8.5	4	6	31	110	98	249
8.63—8.87	8.75	6	5	42	87	115	255
8.88—9.12	9	4	5	37	86	94	226
9.13—9.37	9.25	4	4	41	73	99	221
9.38—9.62	9.5	7	3	34	62	111	217
9.63—9.87	9.75	6	3	38	63	128	238
9.88—10.12	10	2	—	33	53	108	196
10.13—10.37	10.25	4	4	28	33	111	180
10.38—10.62	10.5	6	1	21	13	86	127
10.63—10.87	10.75	2	3	16	6	72	99
10.88—11.12	11	1	—	3	3	59	66
11.13—11.37	11.25	—	2	5	4	44	55
11.38—11.62	11.5	—	—	1	3	34	38
11.63—11.87	11.75	1	—	—	—	37	38
11.88—12.12	12	—	—	2	2	21	25
12.13—12.37	12.25	—	—	1	—	14	14
12.38—12.62	12.5	—	—	1	—	13	14
12.63—12.87	12.75	—	—	—	—	2	2
12.88—13.12	13	—	—	—	—	2	2
13.13—13.37	13.25	—	—	—	—	1	1
13.38—13.62	13.5	—	—	—	—	1	1
13.63—13.87	13.75	—	—	—	—	1	1
13.88—14.12	14	—	—	—	—		—

Classification according to Tons Sugar per acre.

Class		No. of varieties in each class produced in					
Limits tons sugar per acre	Mean tons sugar per acre	1917 & earlier	1918	1920	1921	1922	Total
0—0.12	.07	...	...	...	...	7	7
0.13—0.37	.25	...	...	6	8	66	80
0.38—0.62	.5	3	2	23	40	133	201
0.63—0.87	.75	1	3	46	91	177	318
0.88—1.12	1.	4	8	56	137	198	403
1.13—1.37	1.25	1	4	54	174	194	427
1.38—1.62	1.5	5	7	64	165	178	419
1.63—1.87	1.75	1	6	50	156	165	378
1.88—2.12	2.	5	9	41	148	141	344
2.13—2.37	2.25	4	4	26	118	105	257
2.38—2.62	2.5	6	5	27	101	98	237
2.63—2.87	2.75	9	3	21	56	64	153
2.88—3.12	3.	6	5	10	35	50	106
3.13—3.37	3.25	...	...	3	19	27	49
3.38—3.62	3.5	4	...	3	15	24	46
3.63—3.87	3.75	3	...	1	14	12	30
3.88—4.12	4.	...	...	...	3	10	13
4.13—4.37	4.25	...	...	...	1	7	8
4.38—4.62	4.5	...	...	...	2	8	10
4.63—4.87	4.75	...	...	...	...	4	4
4.88—5.12	5.	...	...	2	1	2	5
5.13—5.37	5.25	...	...	...	...	1	1
5.38—5.62	5.5	...	...	...	...	1	1
5.63—5.87	5.75	...	...	...	...	3	3

Of those varieties of which 3 or more rows have been examined, 22 have been selected for distribution to the estates. In these sugar yield is significantly higher than that given by D625. the difference being greater than three times the standard error of the difference. The performance of these varieties as 1st. Ratoons is given in the following table ;—

Preliminary Statement of Promising Seedlings Selected for Distribution.

Seedling	Tons Sugar per acre	% Avail. Sugar	Rows	Tons Canes
351/20	4.39 ± .20	10.8 ± .57	57	40 ± 2
439/20	4.02 „ .34	9.97 „ .14	146	40 „ 3
203/20	3.94 „ .48	8.87 „ .24	170	39 „ 4½
231/20	3.80 „ .42	9.21 „ .22	11	41 „ 5
337/20	3.58 „ .22	10.31 „ .17	27	34½ „ 2
7/20	3.44 „ .09	10.85 „ .10	7	32 „ 1½
71/20	3.38 „ .23	9.66 „ .56	7	35 „ ½
209/20	3.04 „ .16	10.61 „ .23	13	29 „ 1½
554/18	3.22 „ .14	11.39 „ .13	49	28 „ 1
507/18	3.17 „ .17	10.30 „ .18	22	30 „ 1½
403/18	3.15 „ .12	9.85 „ .12	54	32 „ 1
666/18	3.07 „ .03	8.18 „ .09	274	37 „ ½
106/17	3.80 „ .13	11.66 „ .11	29	35¾ „ 1½
447/17	3.80 „ .22	11.32 „ .23	24	33½ „ 2
81/17	3.56 „ .20	10.14 „ .25	35	35 „ 2
31/17	3.44 „ .34	9.56 „ .40	36	36 „ 3
576/17	3.40 „ .26	9.61 „ .24	39	35 „ 2
238/17	3.39 „ .15	10.50 „ .17	98	32 „ 1½
15/17	3.14 „ .22	10.08 „ .17	125	31 „ 2
84/17	3.11 „ .16	9.79 „ .17	103	31½ „ 1½
195/17	3.03 „ .16	10.08 „ .19	61	29 „ 1½
73/17	2.91 „ .12	8.29 „ .12	85	36 „ 1
D,625	2.36 „ .09	9.79 „ .09	(112) (obs)	29 „ ¾

OLD VARIETIES.

These were also examined, and the results obtained are given below.

Variety	Tons Cane per acre	% Avail Sugar	Tons Sugar per acre
Red Ribbon ...	11.5 ± 1.58	10.99 ± .442	1.31 ± .210
Bourbon ...	13.2 „ 1.12	10.52 „ .210	1 39 „ .125
Caiara ...	28.0 „ 1.82	9.38 „ .286	2.61 „ .166
Leonardina ...	16.2 „ 1.65	10.66 „ .966	1.73 „ .187
Maroni I. ...	16.3 „ 5.26	10.66 „ .784	1.78 „ .439
White Transp. ...	14.8 „ 2.76	10.66 „ .347	1.61 „ .333
Sao Caetano ...	24.1 „ 6.75	10.63 „ .846	2.58 „ .416
Samsara ...	17.8 „ 1.93	9.37 „ .382	1.66 „ .196
Z. Cheribon ...	10.3 „ 7.85	10.62 „ .594	1.19 „ .952
B. 208	23.0 „ 1.99	10.57 „ .268	2.44 „ .223
Sacuri	18.6 „ 5.51	9.76 „ 1.078	1.87 „ .740
Canna Preta ...	21.3 „ 5.04	8.93 „ .696	1.94 „ .550
Burke	18.0 „ 3.29	11.10 „ .641	1.98 „ .455
Mantiego ...	26.2 „ 7.32	9.45 „ .561	2.54 „ .800
73 Jamaica ...	14.5 „ 6.18	9.87 „ .573	1.45 „ .662
B. 147	19.5 „ 1.14	6.74 „ .924	1.33 „ .262
Uba	28.9 „ 2.89	7.80 „ .282	2.25 „ .283
Armstrong ...	17.5 „ 6.66	9.03 „ .636	1.58 „ .294

The total number of varieties extended, either for distribution or for further trial is given in a table on the next page. It will be seen that a very considerable reduction has been effected, but that the number is still very high. Owing to the high pressure at which the selections were made, a number of promising seedlings, worthy of future trial, were overlooked. These will be examined in the field as 2nd Ratoons, and a further extension made.

In future it may possibly be better to make extensions from the young spring about six months' after reaping, rather than to attempt to work up the data in time to make selections for planting the tops of the reaped canes. Better

Number of Seedlings Extended.

Year Produced	No. of Varieties examined (based on tons sugar per acre values.)	No. of Varieties extended.
1917 & earlier	52	37
1918	56	21
1920	433	144
1921	1,284	396
1922	1,675	570
Total	3,500	1,168 or 33⅓ per cent.

No. of varieties giving better returns than D625 as regards

Year Produced.	Cane Tonnage.	Available Sugar.	Sugar per acre.
1917 or earlier	16	16	28
1918	6	10	13
1920	26	110	67
1921	214	117	247
1922	155	606	311
Total	417 or 11.9 per cent.	859 or 24.5 per cent.	666 or 19.0 per cent.

planting material would be obtained, and the selection would be made after the statistical examination was complete. This postpones planting for six to eight months, but the attendant advantages more than compensate for the delay.

DRAINAGE.

Pumping Plant.

A thorough examination of the Mietz and Weiss 8 H.P. oil engine, which forms the power unit of the pumping plant, was made in the early part of the period under review.

It was found that the plant could be reconditioned so as to give moderately satisfactory service. This has been done.

The Side Line Canal.

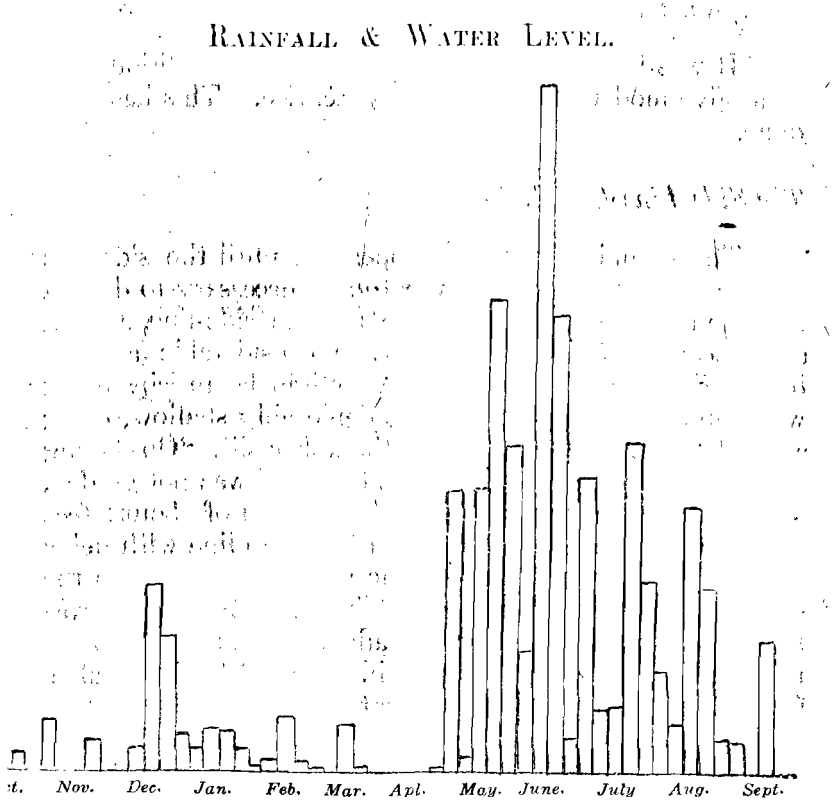
The pumping plant was operated until the side-line was practically empty. It was found necessary to deepen the channel connecting the basin and the side-line, as well as the collecting basin itself, by a considerable amount before the side-line was dry. As might be anticipated, it was found that the side-line was deplorably shallow, being at least 2 feet above the level of the koker sill. On taking levels it was brought to light that the canal was not graded, but that it would be possible to obtain a fall of about 2 feet per mile by excavating. A distinct crest in line with fields 10 and 11 was responsible for the very poor flow from the southern end of the Station. The West Side Line was then deepened and correctly graded, so that there was a uniform fall from south to north. Only 1 foot was taken from the East Side Line, and that only in the area under cultivation. A number of cuts connecting the two side lines were deepened.

The Collecting Basin.

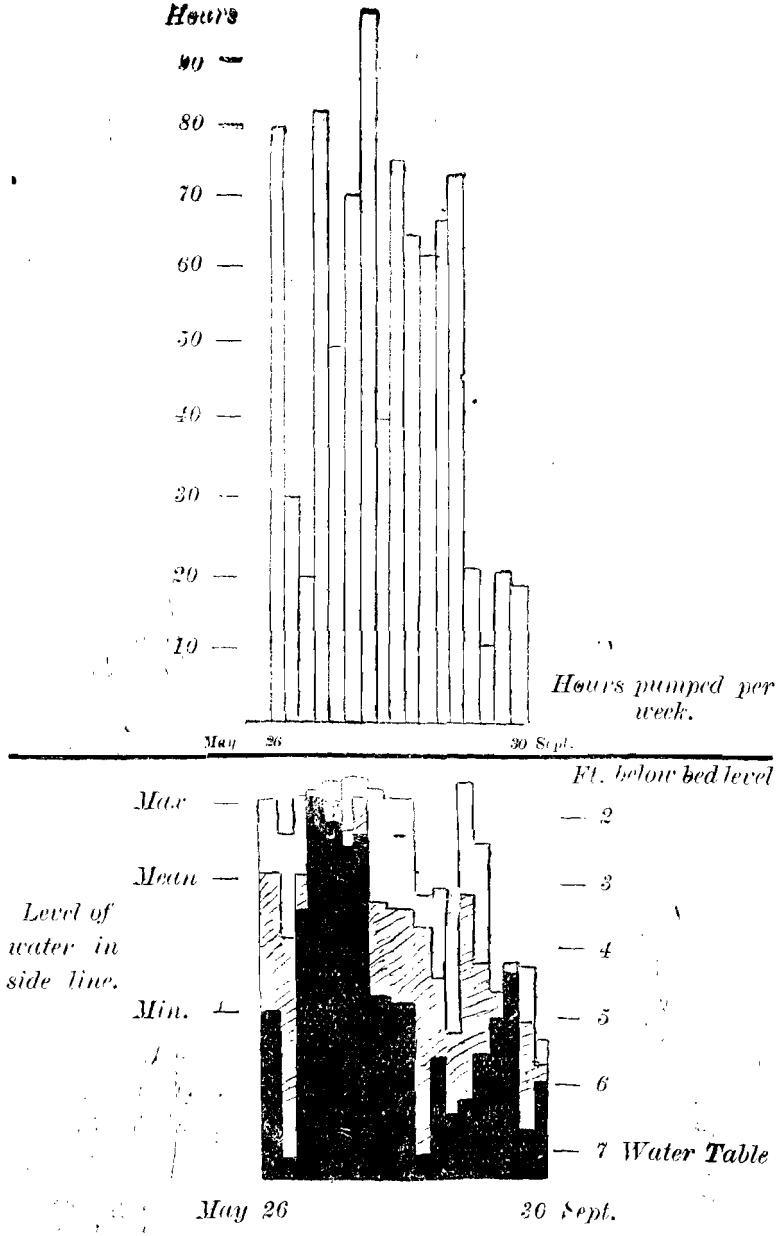
As has already been implied this was too small and was connected with the side-line by an inadequately small

ditch. The basin was extended towards the South to a point well beyond the koker connection the Side Line with the Cumings Canal and a broad connection thus made with the Side Line.

As it was desirable that it should be possible to transfer the pumping plant from the basin to the navigation trench for irrigation purposes when necessary, two locks were installed, one between the navigation trench and the basin, and one cutting off the pumping basin from the collecting basin proper. These were constructed of Greenheart.



RAINFALL.



There is no doubt that the new arrangement has effected a great improvement, but the capacity of the pump is insufficient to cope with heavy rainfall. It is not unusual to experience a rainfall of 10 or 12 inches in 5 or 6 days, *i.e.*, with an average of 2 inches in 24 hours, If the pump is only capable of removing $1\frac{1}{4}$ inches in

24 hours, it is inevitable that the fields should be flooded. Unfortunately, it has always been at times of heavy rainfall that the engine has broken down from some cause or other, and one can only summarise the position by saying that the drainage of the Station has been a continuous source of anxiety during the last two years.

UNDER-DRAINED PLOTS IN FIELD 12 W.

These, with the two neighbouring control beds, have been planted with seedlings and controls. It is proposed to weigh the produce of these, row by row, both as a test of these promising seedlings and also as a comparison of under-drainage with ordinary drainage. On forking these plots the labourers found that the soil on the under-drained areas was much easier to work than on the control beds.

UNDER-DRAINED PLOTS OF THE ESTATES.

It has been ascertained that the plots on various estates which have been drained experimentally by the cut-and-cover method have not suffered from waterlogging, and that the cane has appeared to be healthier than on the neighbouring control plots. Unfortunately, no crop returns are available so far, but it is hoped that these will be obtained in the near future.

SPACING EXPERIMENT.

The results obtained in this experiment are largely vitiated by the drought. The figures are given in the following table, but it is very doubtful whether any significant conclusions can be drawn :—

No. of tops per row.	Tons cane per acre.	% Avail. Sugar.	Tons Sugar per acre.	Coefficient of Purity.
6	7.14 ± .66	5.30 ± .19	0.39 ± .04	74.4 ± .86
9	9.9 „ .41	4.97 „ .23	0.45 „ .04	73.0 „ 1.00
12	10.8 „ .58	5.26 „ .28	0.59 „ .06	73.9 „ 1.17
15	10.9 „ .51	5.26 „ .19	0.58 „ .04	74.9 „ .69
18	10.8 „ .59	5.23 „ .16	0.55 „ .04	74.1 „ .68
24	9.6 „ .53	5.30 „ .19	0.51 „ .04	73.5 „ .85
36	8.8 „ .41	5.37 „ .17	0.48 „ .03	74.7 „ .84

It would appear that under the conditions prevailng no advantage is gained by planting more than 15 tops per row. This may have been largely the result of the exceptional weather conditions. The practice at the Station is to plant 18 tops per row.

The deplorable quality of the juice is shown by the exceptionally low sugar content. These canes were analysed at the time of reaping and afford an excellent example of the effect produced by the onset of the rains after a prolonged drought.

This effect is doubtless enhanced by the comparatively poor drainage conditions, though it is typical of what was experienced on the estates.

PESTS AND DISEASES.

Borer.

Advantage was taken of the examination of samples at the laboratory for an investigation of the damage caused by borer. This has been carried out under the direction of Mr. L. D. Cleare, Jr., Economic Biologist of the Department of Science and Agriculture. 2,304 samples were checked for borer, involving 612 varieties. It is proposed to reissue the results of this investigation as a Bulletin.

Grass Looper.

A small outbreak of this caterpillar did a certain amount of damage to the transplanted canes on field 5 W. in July. Control was rapidly obtained by spraying with lead chromate. The depredations of this pest on the green manure plants have already been noticed.

Plant Pests.

Sustained efforts have been made throughout the period under review in an attempt to eliminate *Antidesma sp.* and *Cleodendron sp.* A large reduction has been made, but both these plants still rank as pests.

VISITS TO ESTATES.

No visits were paid to estates during the period under review, as it was considered that the examination of the seedlings in cultivation at the Station was of paramount importance. Even from the brief summary of the seedling investigations presented in this report, it will be seen that the results have already fully justified the labour expended.

BUILDINGS.

The building comprising the field manager's office, the watchman's quarters and a half-open shed, which had developed a decided list, has been renovated. The watch-house situated close to the draw-bridge across the Lamaha Canal has been re-erected in the proximity of the office, so liberating the middle room of the office building. The half-open shed portion has been converted into an office for the Superintendent, the walls being constructed of panels of woven split bamboo subsequently plastered with a mixture of Portland cement and sand. At the same time the whole building was raised about 2 feet from the ground, being supported by small concrete pillars.

The Superintendent's office was transferred to the Station in June 1926. It has been found that it is far more satisfactory to have the head office at the Station, a great saving being effected in the time which was formerly spent in travelling. The middle room is now shared by the assistant field manager and the book-keeper.

A telephone service which is directly connected with the Central Exchange has been installed, a branch line giving connection with the laboratory. This has proved to be infinitely more satisfactory than the old arrangement in which all calls had to pass through the Botanic Garden exchange.

A private telephone line between the field manager's office and the watch house at the pumping plant has also been installed.

The laboratory at the Experimental Fields has also been repaired, and of this full account will be found in the chemist's report. It is, apparently, an open question as to whether the Station can look forward to the loan of this building renewed indefinitely. The bench accommodation has already become a limiting factor in the amount of work which can be done in the laboratory. If the Station, and the Sugar Industry of the Colony, is to obtain the maximum benefit accruing from the services of the chemist, a larger building with adequate working space will be required in the near future. So far as the chemical examination of the seedling canes is concerned it would obviously be advantageous for the laboratory to be situated in close proximity to the Sophia navigation canal, so as to avoid double handling and subsequent transportation by cart. The advantages attendant on offices and laboratories being in close proximity are obvious. Residences for the staff and dwellings for the labourers would also help to bring about greater efficiency.

COMMUNICATIONS.

Access to the Station is a matter of some difficulty. The road through D'Urban Park is now practically impassible to wheeled traffic. The Botanic Garden avenue is closed to heavy vehicular traffic in wet weather, and to drays at all times. The Lamaha Canal is now closed to through traffic to the Vlissengen road consequent on alterations carried out in connection with the new water-works. It has been suggested that the new water-works road may be continued to the boundary of the Station. This would be a great boon, since it would give direct access to the office, not only for the Station Staff, and for visitors, but also for vehicles for the transportation of planting material for distribution to the estates. An alternative suggestion originally made by Mr. Clementi,

was that the Sophia Front—Bel Air dam be opened as a roadway so as to give access to the railway line and to the East Coast main road. This would be of especial service for the despatch of planting material to the estates on the East Coast, either by road or rail. At the same time it might serve to encourage planters to visit the Station. If both these roads were opened it is probable that many would call at the Station on their way in or out of Georgetown.

VISITORS.

54 persons visited the Station during the period under review. These included:—Dr. Wilbrink, now Director of the Sugar Experiment Station at Cheribon, Java; the late Dr. C. L. Withycombe, Lecturer on Zoology and Entomology, and Mr. C. V. Shephard, now Professor of Economics at the Imperial College of Tropical Agriculture, Trinidad; and Viscount Peel.

SUMMARY OF DESIRABLE IMPROVEMENTS.

1. The provision of road access to the Station.
2. The installation of a pumping plant capable of removing a rainfall of two inches in twenty four hours.
3. The erection of a laboratory building, with adequate accommodation for both chemical and biological work, and for a library.
4. A collection of the more important scientific literature connected with investigations carried on by the Station.
5. The erection of residences for the Station staff.
6. The erection of dwellings for the labourers.

PROJECTS FOR 1926-1927.

1. Soil Acidity, Aluminium Toxicity and Patchy Infertility of the soil.
2. The Replaceable Bases in Cane Soils.
3. A chemical examination of the permanent manurial plots.
4. Inauguration of a Soil Survey of the Estates.
5. Classification of cane varieties on morphological bases.
6. Stomatal characteristics of cane varieties.
7. Root systems of cane varieties
8. Bibliography of Demerara Seedlings.
9. Collation of experiences with mechanical tillage.

REVISION OF THE ORDINANCE.

2. The following sub-section has been substituted for sub-section (2) of section three of the Principal Ordinance :—

"(2) The said Association may from time to time appoint a member of the Committee to be Chairman of the Committee. The Chairman shall preside at meetings of the Committee and in his absence from any meeting the members present shall choose one of their number to be Chairman of the meeting."

C. L. WHITTLES,
Superintendent.

BRITISH GUIANA SUGAR PLANTERS'

Statement Showing Total Receipts and Expenditure

RECEIPTS,

Balance, 1924-1925	... $ 7,424.81
Assessments, 1925-1926	13,855.76
Government contribution in lieu of Assessment on cane farmers	... 1,000.00
Interest on Savings' a/c	213.57
Refunds	562.79
Sale of Canes...	1,319.27
Other Sales...	55.21

EXPERIMENT STATIONS COMMITTEE.

for the year ending 30th September, 1926.

PAYMENTS.

MANAGEMENT.		
Chairman	$ 358.33	
Secretary	480.00	
Superintendent	4,220.64	
Chemist	2,503.33	
Field Manager	1,520.00	
Laboratory Assistant	432.00	
Assistant Field Manager ...	728.90	
Clerical Assistant	448.00	
Travelling	534.94	11,226.14
SOPHIA STATION.		
Wages.		
Buildings, Bridges, etc.	435.71	
Nursery	780.86	
General Cultivation	2,305.82	
Extension of Cultivation ...	164.40	
Manures and Manuring ...	163.04	
Reaping, Transporting & Distribution	1,275.51	
Pests	165.12	
Canals and Paths	465.15	
Navigation and Drainage ...	1,061.87	
Irrigation	336.52	
Miscellaneous	584.08	
Office	24.30	
Laboratory	345.54	8,107.92
Expenses.		
Rent and Insurance	1,311.00	
Buildings, Bridges, etc. ...	279.50	
Nursery	37.08	
General Cultivation	15.89	
Extension of Cultivation ...	3.97	
Reaping, Transporting & Distribution	34.51	
Pests	29.30	
Canals and Paths	10.04	
Navigation and Drainage ...	1,293.23	
Irrigation	266.56	
Miscellaneous	125.02	
Office	396.74	
Laboratory	835.00	
Contingencies	321.84	4,959.68
TOTAL PAYMENTS.		24,293.74
Balance in Barclays Bank, Current Account		87.67
Petty Cash on hand, Field Manager		25.00
Petty Cash on hand, Secretary ...		25.00
		$24,431.41

THE ANNUAL REPORT OF THE CHEMIST FOR THE YEAR ENDING SEPTEMBER, 1926.

STAFF

The staff of the laboratory during the last year consisted as previously of the Chemist, Chemist's assistant, and a number of agricultural apprentices.

The number of apprentices employed naturally varies with the amount of work in hand, but during the heaviest part of the work the number was only five.

The quality of the work performed has been maintained up to the standard observed last year, and the keenness which was noticed previously has in no way diminished

The period for which they have worked is given in the following table :—

Name	*Days*	*Name*	*Days*	
W. P. David	27	J. Pile	47	
M. Lall	216	H. Wren	83	
P. O. Jackson	143	W. Bovell	124	
H. Kissoon	57	T. B. Persaud	43	(Not an agricultural apprentice ; this boy was employed at the request of his parents.)
R. Hoppie	92			

BUILDINGS

In March, 1926, the Public Works Department decided to paint the laboratory and at the same time to make certain alterations. Previously the mill room had been separated from the remainder of the laboratory by a partition against which stood a bench.

For some time past this partition had been found inconvenient, firstly because it prevented proper supervision of the work in both rooms at once and secondly it made the arrangement of benches difficult, thereby wasting valuable space.

The partition was therefore removed and the bench which stood against it was removed to the side of the laboratory. Since this work has been carried out it is found that there is a little more space available and the ventilation of the laboratory is greatly improved.

Owing to the very limited space available for mechanical work in the laboratory, it was thought advisable to have a seperate workshop, since too much valuable bench space was occupied by the tools. Further, the acid fumes which are ever present in a laboratory are highly detrimental to tools.

The only available space for a workshop was a manure shed at the end of the laboratory. This shed was practically rebuilt by the Public Works Department and a concrete floor put down. In addition, a bench running the length of one side of the room was fitted up. It is now possible to perform all mechanical work and repairs under greatly improved conditions.

Electric power has been laid on from the laboratory for driving the lathe which has been mounted on one end of the bench.

This work was in progress from March until May 1926, and in consequence no work could be performed at the laboratory.

Many of the cupboards in the laboratory have had a second shelf fitted in order to provide sufficient storage space for apparatus and chemicals. Each drawer and cupboard has the contents stencilled upon it for the rapid location of apparatus.

The available bench space and storage capacity of the laboratory are quite inadequate for the amount of work which has been done.

MACHINERY

The machinery equipment for cane analysis has in no way been changed.

In October, 1925, the Squier mill broke down, one of the small pinions having worn out. This was replaced and no further trouble was experienced throughout that season.

In August the engine was cleaned and apart from a deposit of carbon on the piston head and valves, the engine was found to be in excellent condition. This engine has given the greatest satisfaction throughout the milling season, having given no trouble whatever during the six months grinding.

The Squier mill again broke down in August and the canes which were being analysed had to be milled on No. 2 mill. The trash plate of the Squier mill was very badly worn and the bar was slightly bent thereby allowing the megasse to pass through with the juice.

As far as can be ascertained the trash plate and bar have given trouble for some years and it has been decided to replace these parts with new ones.

Three new side pinions for the rolls have been fitted since the old ones were very worn and liable to break at any moment.

The dynamo used for supplying power to the laboratory had a slight repair in January 1926, but has given no further trouble since.

An oil bath made from tin plate has been fitted round the shafting pinion and the first gear wheel of the mill. This oil bath, using waste oil from the engine, has done much to reduce the noise and wear of this gear.

Six sets of new washers for the Squier mill were ordered as it was thought advisable to use the correct washers which the makers supply. These washers consisted of slabs of hard rubber without any internal canvas support and it was found that after two or three days use the washers split and were of no further use. This entailed constant renewal of the washers with consequent loss of time.

An experimental washer was made from an old motor tyre outer cover, which is reinforced with canvas, by making parallel cuts along the edge of the tread. This type of washer has been found to work exceedingly well and its life is at least three or four weeks.

Much time has been spent on overhauling and refitting the pumping plant at Sophia. The work actually performed on it has been discussed by the Superintendent.

APPARATUS.

A considerable amount of apparatus and chemicals have been purchased, as in the previous year the work had been considerably hampered owing to lack of equipment. Most of the apparatus consisted of glassware and as far as possible Pyrex glass has been purchased as this material is much stronger in every way than ordinary glass.

A separate bench has been fitted up for the determination of glucose where two assistants are able to work continuously. The necessary reagents are supplied from aspirators connected to automatic burettes and pipettes. This bench is used for soil ignitions when sugar analysis is not in progress.

An apparatus to be employed for sampling a soil suspension in mechanical analysis is under construction. Considerable difficulty has been experienced in the construction as certain parts have had to be sent to a foundry since the lathe at the laboratory was too small to take the work. The quality of the work done on parts sent out was very poor and has caused much trouble in adjustments.

The apparatus consists of a pipette carrier sliding vertically, the motion being obtained by means of a rotating screw and nut. The vertical slide rods were turned locally, and the work being poorly done, have had to be ground to uniformity. A new type of slide has been elaborated which embodies a universal joint connection to the travelling nut, and the motion now is almost without vibration.

The disturbance in the suspension caused by the immersion of the pipette is very much less than when it is lowered by hand. This is of great importance where accurate results are required.

The apparatus is to be mounted on an electric motor which drives the slider, and the whole being mounted on wheels will be able to travel between two rows of jars containing the soil suspensions to be analysed. The aim and object of the apparatus is to enable a large number of soils to be analysed with a high degree of accuracy.

In connection with soil analysis a set of vibrators has been set up for the preparation of the soil suspensions. After trituration with a rubber pestle the suspension is vibrated in a glass vessel provided with a flexible celluloid bottom. The jars rest upon a shelf which has circular openings cut in it, and below each opening is mounted an electric bell movement. The bells (1.5 volt size) are connected in parallel across a 6 volt circuit which is interrupted by a master vibrator mounted on the shelf. Excessive sparking at the contacts is prevented by a 2 M.F. condenser.

The whole bench is thrown into violent vibration which also assists the master vibrator, thereby maintaining a steady frequency. By removing the knob from the bell hammer the frequency was raised from 25 to 90 cycles approximately. The celluloid bottoms of the jars are protected from wear by having a thin metal plate suspended by threads between the celluloid and the hammer. This also enables a larger surface of the celluloid to be set invibration.

The temperature of the bell coils seldom rises more than 20°C above laboratory temperature in spite of the fact that they are being run at a much higher voltage than that for which they are intended.

A water table indicating apparatus has been built on field 7W. Sophia. The apparatus is similar to the one erected at the Experimental Fields so that the two levels

can be compared. The float has been coated with pitch as the acid soil waters set up an electrochemical action and destroy soldered joints.

The Still which was purchased by the late Superintendent has been fitted with a new condenser as the old one was punctured in several places, and a constant level water attachment so that it should need no attention.

Working all day with a large Barthel burner, it will supply 6 to 7 litres of distilled water. This is rather too little for the needs of the laboratory and it will be necessary to install a larger still, preferably of a more efficient pattern.

All apparatus in the laboratory has been catalogued for insurance purposes.

SUGAR ANALYSIS.

The technique of the sugar analysis is the same as that described in last year's report and needs no further comment.

The analysis terminated on the 9th March, 1925, and was recommenced in August for about a fortnight. The total number of analyses performed during the year is 10,599.

The discussion of the results has been dealt with by the Superintendent.

It has been found possible to recover much of the ammonia used in the determination of glucose, and a great saving in expense has been effected. This method of recovery is being extended to soil analysis where ammonia residues are available.

Experiments were carried out to determine the relative difference in power required to mill D.625 canes and new seedlings.

An extended pointer was attached to the fulcrum lever of the engine and a platinoid contact at the distant

end moved over a resistance wire in the form of an arc of a circle. This arrangement formed a simple potentiometer, the mid point of which was determined by the position of the engine governor. Considerable time had to be spent in order to find the most satisfactory resistance of the potentiometer. This potentiometer system was connected to a Callendar recorder, the pen of which traced a curve on an arbitary scale.

The Crossley engine is of the four stroke tpye and each explosion caused a momentary kick on the governor which was magnified by the potentiometer lever. This caused the recorder pen to run backwards and forwards continuously thereby ruining the record. Various adjustments were made but it seemed impossible to overcome the impulse due to the power stroke.

A direct mechanical method of recording is also useless on this account and an indirect method of attack will have to be made. Experiments are being carried out in this connection in readiness for next season's grinding.

SOIL WORK.

It is unfortunate that only a small amount of soil work has been carried out. For 6 months of the year the laboratory work consisted entirely of sugar analysis when it was impossible to carry out any other experiments owing to the limited accomodation. During the following 3 months the laboratory was under repair and in consequence no work of any description could be performed there. The remaining 3 months of the year the soil work consisted almost entirely of chemical analyses performed on samples sent to the laboratory for examination.

At the break of the drought the water in the side line was noticed to be of a peculiar colour, and also very clear, and it was thought advisable to perform an analysis upon it.

Below is given a table of the complete chemical analysis :—

	% on Water	% on Residue
Total solids	0.235	
Loss on ignition	0.600	23.90
Colloid clay, silica etc.	0.0086	3.41
Sulphates as SO_4	0.0413	16.22
Chlorides as Cl	0.686	27.29
Carbonates as CO_2	0.0022	0.87
Iron as Fe_2O_3	nil	nil
Aluminium as Al_2O_3	0.0033	1.20
Calcium as CaO	0.0095	3.48
Magnesium as MgO	0.0160	5.93

It will be seen that both the chlorides and sulphates are high and these alone are sufficient to cause a drop in fertility in the soil. The importance of thorough drainage and irrigation to remove harmful salts cannot be over estimated.

Sample of soil were received from Phn. Leonora for examination as the fields from which they were taken were infertile. The samples consisted of two sets of Top-soil and two sets of Sub-soil, numbers 1 and 2, 3 and 4 being pairs.

Total and citric soluble analyses were performed on the samples and it was found that the aluminium content was high in all cases. Below are given the results of these analyses :—

Topsoil No. 1	*Total %*	*Citric Soluble %*
Per cent. Matter insoluble in Conc. HCl	64.35	...
Aluminium as Al_2O_3	16.07	0.93
Iron as Fe_2O_3	3.40	0.25
Calcium as CaO	0.15	0.06
Magnesium as MgO	0.60	0.02
Potash as K_2O	0.23	0.06
Phosphate as P_2O_5	0.07	0.02

Subsoil No. 2.	*Total per cent.*	*Citric Soluble per cent.*
Matter insoluble in Conc. HCl	72.88	...
Aluminium as Al_2O_3	13.40	0.19
Iron as Fe_2O_3	3.00	0.11
Calcium as CaO	0.04	0.03
Magnesium as MgO	0.48	0.02
Potash as K_2O	0.60	0.10
Phosphate as P_2O_5	0.02	0.001

Topsoil No. 3	*Total per cent.*	*Citric Soluble per cent.*
Matter insoluble in Conc. HCl	73.60	...
Aluminium as Al_2O_3	11.53	0.58
Iron as Fe_2O_3	2.07	0.20
Calcium as CaO	0.40	0.02
Magnesium as MgO	0.34	0.01
Potash as K_2O	0.21	0.002
Phosphate as P_2O_5	0.06	0.01

Subsoil No. 4.	*Total per cent.*	*Citric Soluble per cent.*
Matter insoluble in Conc. HCl	83.93	...
Aluminium as Al_2O_3	8.41	0.16
Iron as Fe_2O_3	1.81	0.13
Calcium as CaO	0.03	0.03
Magnesium as MgO	0.25	0.02
Potash as K_2O	0.36	0.002
Phosphate as P_2O_5	0.05	0.001

It will be observed that in all cases the Aluminium content is high except in the citric soluble No. 4. (This deviation may be due to sampling error), and it is thought that this high aluminium content is the active principle causing infertility. Further work on these lines will be carried out next year.

A sample of soil from Pln. Uitvlugt was treated in a similar manner and below are shown the results :—

	Total per cent.	*Citric Soluble per cent.*
Matter insoluble in Conc. HCl	65.24	...
Aluminium as Al_2O_3	10.40	0.90
Iron as Fe_2O_3	7.88	0.74
Calcium as CaO	0.23	0.12
Magnesium as MgO	0.68	0.12
Potash as K_2O	0.97	0.01
Phosphate as P_2O_5	0.10	0.04
Nitrogen	0.16	...

It appears that the infertility is closely correlated with the aluminium content which is high in all cases. Unfortunately no exact determination of the H ion concentration can be performed as yet since the H ion concentration apparatus is not working satisfactorily.

The line of attack on this problem of infertility will be directed on the determination of the active aluminium and the acidity of the soils.

Owing to the unsatisfactory results obtained by different workers using platinum chloride or perchloric acid in potash determinations, it was thought advisable to try the sodium cobaltinitrite method as recommended by Christensen and Feilberg and also by Dodd.

At first the results obtained were about 20 per cent. too low and it was found that the quantity of sodium nitrite recommended was too small. It seems that the sodium nitrite decomposes slowly in the high temperature prevailing here and a larger quantity has therefore to be used. The results now obtained are very consistent and the method has the great advantage of being cheap.

This method has been adopted as the standard method for potash determinations.

At present owing to the small amount of work which could be performed, it is impssible to give any trustworthy advice concerning the soil problems which have been submitted. It is hoped that next year more work will be carried out since the laboratory conditions are improved aud no building operations will be in progress to hinder the work.

A. D. Elmsly Lauchlan,
Chemist.

EXPORTS OF AGRICULTURAL AND FOREST PRODUCTS.

Below will be found a list of the Agricultural and Forest Products of the Colony exported during the first quarter of 1927.

The corresponding figures for the same period during previous years and the average for the nine years previous to that are added for convenience of comparison.

Product.	*Average 1916-24.*	*1925.*	*1926.*	*1927.*
Sugar, tons ...	19,843	12,947	20,489	21,615
Rum, gallons ...	852,744	301,355	197,693	223,381
Molasses, gallons ...	23,075	16,717	170,124	861,839
Cattle-food (Molascuit) tons	431	458	266	211
Cacao, cwts. ...	10	None	None	None
Citrate of Lime, cwts.	18	None	None	None
Lime Juice, gals. ...	435	None	None	None
Essential Oil of Limes, gals. ...	22	None	None	None
Coconuts, thousands...	782	305	293	42
Coconut Oil, gals. ...	6,214	6,608	9,019	5,852
Copra, cwts. ...	1,044	4,159	16,169	4,040
Coffee, cwts. ...	1,941	1,779	4,882	1,142
Kola-nuts, cwts. ...	1	None	None	None
Rice, tons ...	3,117	2,324	1,534	2,183
Ricemeal, tons ...	13	None	None	None
Cattle, head ...	101	283	11	4
Hides, No. ...	1,459	3,119	2,553	1,398
Pigs, No. ...	91	361	122	178
Sheep, head ..	5	None	None	1
Balata, cwts. ...	2,410	2,887	3,902	478
Charcoal, bags ...	11,950	7,981	7,636	8,541
Firewood, Wallaba, etc., tons	2,026	1,901	1,792	2,339
Gums, lbs. ...	1,312	None	866	None
Lumber, ft. ...	49,604	13,695	95,261	45,405
Railway sleepers, No.	3,755	20,613	3,425	4,912
Rubber, cwts. ...	31	None	74	98
Shingles, thousands	416	299	370	459
Timber, cub. ft. ...	30,396	49,604	71,922	23,651

Meteorological Data—January—March 1927.

Recording Stations & Months.	Rainfall.	NUMBER OF DAYS OF RAIN						Evaporation.	Air Temperature and Humidity.			
									Air Temp.			
Botanic Gardens.	Total Inches.	Under ·10 Inch	·10 to ·50 Inch	·50 to 1.00 Inch	1.00 Inch to 2.00 Inches	Above 2.00 Inches	Total days.	Inches	Maximum.	Minimum.	Mean	
January...	18·52	5	9	3	2	4	23	3·53	83·8	74·9	79·3	8
February	8.34	4	10	3	1	1	19	3·93	83·9	75·2	79·5	8
March ...	1·86	3	2	2	...	...	7	6·06	85·0	75·8	80·4	7
Totals	28·72	12	21	8	3	5	49	13.52				
Means.	...	...	...	...	...	...	...	...	84·2	75·3	79·7	7
Berbice Gardens.												
January...	27·78	8	7	4	3	6	28	...	85·2	73·5	79·3	8
February	14·16	2	7	3	2	2	16	...	85·6	73·5	79·5	8
March ...	3·18	6	7	2	...	...	15	...	87·5	73·8	80·6	7
Totals	45·12	16	21	9	5	8	59	...				
Means.	...	...	...	...	...	...	...	...	86·1	73·6	79·8	7
Onderneeming.												
January...	22·10	1	10	4	3	4	22	...	89·0	74·0	81·5	
February	20·01	2	5	2	3	4	16	...	89·0	73·0	81·0	
March ...	1·21	...	2	1	...	...	3	...	89·0	74·0	81·5	
Totals	43·32	3	17	7	6	8	41	...				
Means.	...	...	...	...	...	...	...	...	89·0	73·7	81·3	
Morawhanna. N.W.D.												
January...	10·60	1	8	4	1	2	16	...	...	...	...	
February	14.74	2	9	8	4	1	24	...	...	...	...	
March ...	2·61	3	7	1	...	...	11	...	...	...	...	
Totals ...	27·95	6	24	13	5	3	51	...	...	...	...	...

ATTENDANCES AT THE DISTRICT GARDENS

Year.	Bourda.	Belfield, E. Coast.	Stanleytown, New Amsterdam.	Suddie, Essequibo.	Den Amstel.	Houston, E. Bank.	Wakenaam.	Total Attendances.
1912 ...	5,514	4,395	3,302	2,100	2,544	2,156	1,718	21,726
1913 ...	5,156	4,535	2,519	3,399	2,568	1,836	1,319	21,332
1914 ...	4,243	3,869	2,443	3,025	1,791	1,653	1,533	18,577
1915 ...	1,123	1,006	769	59	503	339	401	4,209
1916 ...	4,705	1,161	1,510	225	623	2,251	1,297	12,026
917 ...	4,991	2,820	1,366	3,297	1,186	2,564	1,663	17,086
918 ...	4,834	3,081	1,653	2,671	2,162	2,790	2,067	19,258
919 ...	4,769	2,425	1,582	2,798	1,851	2,480	1,556	1,4617
920 ...	6,285	2,312	1,665	2,525	2,532	3,228	2,148	20,695
921 ...	5,671	1,968	1,642	2,629	1,949	2,539	1,610	18,008
922 ...	3,557	1,841	1,105	1,593	1,525	1,522	1,397	12,950
923 ...	4,038	2,780	1,595	1,934	1,953	2,137	1,951	16,388
924 ...	4,123	2,827	1,103	1,789	1,678	2,146	1,664	15,330
925	3,317	2,755	1,580	1,819	470	1,663	1,597	13,201
926 * ...	1,732	2,627	1,219	2,172	364	1,268	1,600	10,982
27	414	768	346	683	266	598	598	3,673

* D...