QUEENSLAND AGRICULTURAL JOURNAL

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Agriculture.

PASPALUM.

Paspalum has proved itself to possess many excellent characteristics and abnormal stock-carrying capacity when grown under conditions congenial to its development. Apart from its value on scrub, and other classes of country, it has much to recommend it for sour, swampy situations. In respect to the specific inquiries made to the Agricultural Department of this State, it can definitely be stated that paspalum pastures, even when situated in the most favourable localities, commence to deteriorate after several years, owing to the abnormal root-development of the plant. The root system becomes very pronounced in the sense that a mass of interlocked root fibres results, which fibres form a dense mat excluding air and moisture, and, unless the rains are of a steady soaking character, the subsoil, under the circumstances, is not replenished with sufficient moisture to maintain a vigorous growth. Disc-ploughing and reworking of old paspalum pastures is the only effective method of giving the grass a new lease of life.

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MANURING FOR POTATOES.

Potato crops, more than any other, may unquestionably be profitably increased by the use of artificial fertilisers, but, as the crop is dependent quite as much upon the season as upon the fertiliser, it may happen frequently that manuring does not appear to give much better results.

Again, manuring will only be of use if combined with effective cultivation.

The effect of artificial fertilisers may become considerably increased by the addition of farmyard manure, which by itself is one of the best manures for potatoes when applied early as the land is being got ready. As the heavy amounts (10 to 20 tons per acre) of farmyard manure, which would be necessary if used by itself, for a complete dressing, are not always available, smaller quantities of 3 to 6 tons per acre may be used profitably in addition to artificial fertilisers.

As a rule, complete manures give by far and away the best results, and may even be used in small dressings in comparatively rich soil, and will then prevent their rapid exhaustion.

The dominant manure for potatoes is potash, and it appears that potassium chloride gives better results in some cases than the potassium sulphate. As our soils are generally rather high in chlorides, the use of potassium sulphate is to be preferred, and it may be used in quantities from 1 to 2 cwt. per acre, according to the quality of the soil and the presence of available potash.

Nitrogen.—Nitrogen is only required in moderate quantities, and gives the best results if applied in the form of nitrate of lime, cyanamide or nitrolin, or of dried blood, which may be used in quantities from 1 to 2 cwt. per acre. This element has at times a somewhat forcing effect on plants, and under some circumstances may act in a detrimental manner. For instance, should the spring crop receive a check from dry weather just as the tubers are setting and this be followed by thunderstorms and heat, there is an over-luxuriant growth of tops, and the energies of the plant are misdirected, with a consequent reduction in yield.

Phosphoric Acid is generally applied, in the form of superphosphate or bonedust, in quantities of from 2 to 4 cwt. per acre.

When a complete mixed fertiliser is to be used, such a one should be chosen which contains from 8 to 12 per cent. of phosphoric acid, 3 to 4 per cent. of nitrogen, and 8 to 9 per cent. of potash, and in quantities of not less than 6 cwt. per acre on soils considered to warrant the application of such dressings. Local conditions vary very much, and are of greatest importance, and even have such an influence on the composition of the soil that an ordinary agricultural analysis may not always be a safe guide; for this reason, small experimental plots are recommended, where the quantity and kind of fertilisers may be gauged to suit the

class of soil and other controlling influences. These may be designed as follows:—

1. Unmanured.
2. Nitrogen and potash.
3. Potash and phosphate.
4. Unmanured.
5. Nitrogen, potash, and phosphate.
6. Nitrogen, potash, phosphate, and stable manure.

The Application of Artificial Fertilisers.—A concentrated fertiliser is more readily distributed by mixing it with several times its own bulk of sifted soil. If applied directly to the furrows, the root system of the plants is confined to a more limited space, and the crop will suffer to a greater extent in dry weather than if the fertiliser was spread over the land and ploughed or worked in just previous to planting. This is to be commended when the more slowly assimilible fertilisers are used; for others, exclusive of the most soluble kinds, broadcast the fertilisers over the open furrows before planting. The covering in of the crop will tend to incorporate it with the soil. The soluble fertilisers supplying the nitrogen are usually distributed between the rows by hand when the plants are several inches in height, and this is followed up by scuffling the crop.

Farmyard Manure.—Apart from the manurial constituents contained, it acts as a mechanical improver of the soil, providing humus to surround the soil particles, and preventing plasticity; this, as already noted, is of extreme importance in connection with potato-raising. Usually this class of manure will contain from ½ to 1½ per cent. of useful plant food (N.K.P.), but many things have influence on its value; for instance, its origin, the manner and length of time it has been stored, the nature and quantity of food and litter supplied, and the ages of the animals, &c.

If stored and rotted down in pit or heap, it is reduced to a pasty mass, and much valuable material is lost by fermentation and by its depreciation as a mechanical improver of the soil.

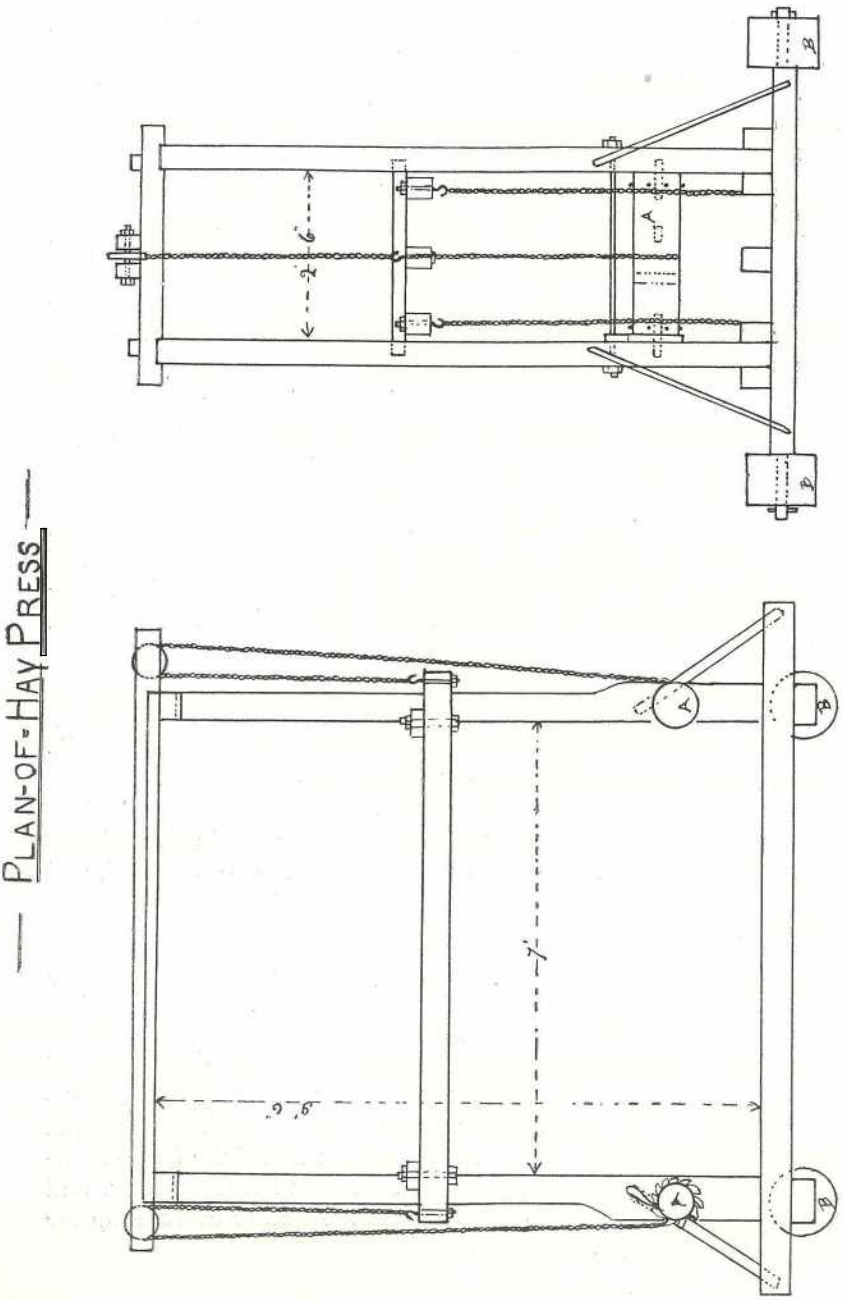
In temperate climates it is customary to apply in drills and plant the potatoes on the manure with satisfactory results; but in this climate it is best carted direct from the sheds to the paddock to be manured, and ploughed in some time before planting. This allows for a more complete decomposition.

Green Manure.—To maintain that loose friable state of the soil so necessary in the production of potatoes, and to improve the mechanical condition of lighter soils deficient in vegetable matter, and of soils which have depreciated in texture from continuous cultivation, the practice of growing and "ploughing in" a leguminous crop as a soil renovator, allowing it to rot down in the season prior to the planting of the potatoes, is commended. Ordinary field and cowpeas are both useful for the purpose —the former adapted for growing from autumn to early spring, and the latter from the latter time to early autumn. Another useful crop for sowing in autumn is rape.

HOME-MADE HAY PRESS.

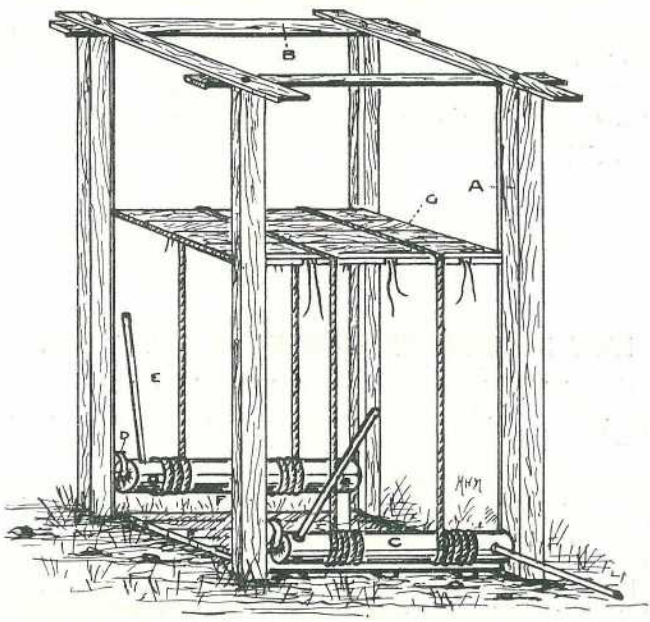
In response to a request from a correspondent, Mr. Cuthbert Potts, Principal of the Queensland Agricultural College, Gatton, furnished the accompanying diagram and description of a simple, effective hay press, which is doing useful work at the College. Mr. Potts writes:—

"The hay press represented in accompanying sketch is home made. The rollers (A) and wheels (B) are made from well-seasoned round



A HOME-MADE HAY PRESS AT THE QUEENSLAND AGRICULTURAL COLLEGE.

posts. The bed is made of five 5 in. by 4 in. hardwood beams set on two 8 in. by 4 in. hardwood crosspieces. The uprights start at 8 in. by 4 in., and at a height of about 2 ft. are reduced to 5 in. by 4 in. Each upright is stayed in two directions with iron stays attached to the bed. At the top, 5 in. by 4 in. crosspieces hold the uprights, while above these are three members running the length of the press; the two outside pieces are 3 in. by 2 in., the centre piece 8 in. by 4 in. The latter is slotted at either end, and carries two 6 in. pulley wheels. The winding rollers (A) are set about 16 in. above the bed, and each has a ratchet wheel at one end. The rollers have two square holes through them set



at right angles and near the centre; these are for the insertion of spokes for winding up the chains. A short distance above the rollers are 1 in. iron bars holding the uprights rigid and preventing the rollers from jumping out of their bearings. This bar also carries ratchet paul. The floating top is composed of three members, 5 in. by 4 in., held together with two 4 in. by 2 in. crosspieces. The outside 5 in. by 4 in. are attached to the crosspieces by bolts which work in slots, so that the width of the floating top can be adjusted. From each end of the centre member of the floating top a chain passes over the pulleys and back to the rollers (A). This enables the top to be raised, and it can be held in any desired position by means of the ratchet wheels. The length of the bales is controlled by nailing chocks across the bed and the under side of the floating top. These chocks hold in position 3 in. by 2 in. uprights, which fit between the beams of the floating top, and so do not interfere with its movement up and down. Having adjusted the size of the bales, the floating top is raised, the required amount of hay put in, then the floating top is released and settles on the hay. To develop the

pressure, four chains are attached to the ends of the outside members of the floating top. These are now attached to the rollers by hooking on to pins which are driven into the roller near each end. The pressure chains are wound round the roller in the opposite direction to the central lifting chain, so that on using the winding spokes the lifting chain is unwound as the pressure chains are wound up. It only remains to wire the bales and trim them. I trust this explanation will be clear enough; if not, it might be possible to take a run up to the College and see the actual press.

[In the issue of the *Queensland Agricultural Journal* for February, 1903, we illustrated and described the construction and operation of a rough home-made press, which did its work very well in the early days of farming in Queensland. A comparison between this and the College press is interesting as showing under what different conditions the present-day farmer works, who has the advantage of scientific advice.—Ed., "Q.A.J."]

NEW METHOD OF COMBATING PHYLLOXERA.

Widespread invasion of phylloxera in Spain, with consequent loss of productive value of vineyards, moved the Government to favourable action on the proposal to lower the tax value of land affected. A royal order of 22nd July, 1915, outlines the procedure to be taken by property owners who desire to benefit therefrom.

Apropos of the phylloxera situation and efforts to eradicate it, a Valencia trade paper quotes the Italian daily, "Il Popolo Romano," to the effect that experiments now under way in the Province of Lecce, Italy, may result in a practical and efficacious method of combating the disease. It appears from the article in question that a farmer planted tomatoes between the vines in an infected field, in the hope of deriving a larger income than the constantly decreasing grape crop would produce. A short time thereafter, as the tomato plants developed, he observed with surprise that the vines took on new life, showing signs of vigour such as they had not shown in years.

Not knowing the cause of the phenomena, but being of an investigating turn of mind, the farmer uprooted several tomato plants, on whose roots he found thousands of dead insects. This led to further investigations by a committee of experts, which is now going on. The scientific explanation is that tomatoes, belonging to the "Solanaceæ" family, contain the poisonous alkaloid solanine, which destroys the insect which preys on the vine.

The Valencia paper referred to recommends a trial by Valencia farmers, especially since it can be done without much trouble or expense. —Commerce Reports.

Pastoral.

MUNRO HULL CATTLE TICK REMEDY.

The Select Committee appointed by the Government included Mr. Walker, Mr. A. J. Jones, Mr. Larcombe, Mr. Bayley, and Mr. W. N. Gillies, Chairman, Members of the Legislative Assembly.

REPORT.

The Select Committee, appointed on the 6th October to inquire into and report upon the alleged discovery by Mr. G. W. Munro Hull of a Remedy for Cattle Tick, and the charges made by him against certain officials of the Agriculture and Stock Department of Queensland, beg to report as follows:—

1. That the Committee have examined the following witnesses:—G. W. M. Hull, C. J. Pound, E. G. E. Scriven, St. G. Thorn, H. B. Watson, W. C. Carmody, A. K. Henderson, H. Tryon, A. H. Cory, T. H. Johnston, B. H. Corser, W. A. A. Bates, A. J. Jones, and have carefully considered their evidence.

2. That the Committee have had before them the Departmental Papers, including the whole of the correspondence between Mr. Hull and the Agriculture and Stock Department of Queensland.

3. That in carrying out this inquiry the paramount consideration on the part of the Committee has been to ascertain the merits of Mr. Hull's claim to have found a remedy for Cattle Tick, and whether further investigations and experiments are warranted.

4. That, regarding charges made by Mr. Hull against officials of the Department, the Committee find there has been, generally speaking, a lack of sympathy, a spirit of scepticism, and a failure to grasp the possible national importance of such a discovery; that there was a manifest desire to disprove, rather than a whole-souled desire to co-operate and assist in a thorough and impartial investigation; and for this the Government of the time must be held responsible.

5. That, in spite of the fact that the evidence tendered has proved conflicting and indeed contradictory, the Committee are of the opinion that it certainly warrants the Government proceeding further in regard to the matter.

RECOMMENDATIONS.

6. The Committee recommend that further investigations and experiments should be carried out on practical and scientific lines.

7. That the following gentlemen be appointed by the Government as a Committee to supervise and direct such investigations and experiments:—Mr. Tryon (Government Entomologist), Mr. Pound (Government Bacteriologist), Mr. Cory (Government Veterinary Surgeon), Dr. Johnston (Queensland University), Professor Steele (Queensland University), and another person to be nominated by Mr. Hull.

The first meeting of the Committee was held at the Department of Agriculture and Stock on the 15th February, 1916.

Dairying.

THE DAIRY HERD, QUEENSLAND AGRICULTURAL COLLEGE, GATTON.

MILKING RECORDS OF COWS FOR MONTH OF JANUARY, 1916.

Name of Cow.	Breed.	Date of Calving.	Total Milk.	Test.	Commercial Butter.	Remarks.
			Lb.	%	Lb.	
Lady Melba	Holstein	17 Dec. 1915	1,260	3·8	56·15	
Madam Melba	,, ...	28 Oct. ,,	879	3·9	40·23	
Lady Margaret	Ayrshire	14 Oct. ,,	693	4·5	36·72	
Violette's Peer's Girl	Jersey	8 Dec. ,,	628	4·9	36·31	
Miss Melba	Holstein	30 Sept. ,,	726	3·9	33·22	
Sweet Meadows	Jersey	28 Sept. ,,	496	6·0	30·77	
La Hurette Hope	,, ...	17 Nov. ,,	570	4·5	30·21	
Twylish's Maid	,, ...	22 Oct. ,,	489	5·2	30·03	
Dottie ...	Shorthorn ...	27 Nov. ,,	493	4·5	26·12	
Miss Edition	Jersey	27 Sept. ,,	459	4·8	25·95	
Daisy ...	Holstein	23 Nov. ,,	614	3·6	25·89	
Gretchen ...	,, ...	16 Aug. ,,	597	3·7	25·88	
Rosebud II.	Ayrshire	11 Oct. ,,	547	4·0	25·68	
Bluebelle ...	Jersey	20 June ,,	462	4·7	25·59	
Laurette II.	Ayrshire	9 Oct. ,,	550	3·9	25·17	
Noble Dot ...	Jersey	2 May ,,	399	5·3	24·98	
Miss Jean ...	Ayrshire	5 Nov. ,,	542	3·9	24·80	
Sylvia ...	Shorthorn... ...	25 Aug. ,,	491	4·2	24·22	
Lady Twylish	Jersey	5 June ,,	394	5·2	24·19	
Constancy ...	Ayrshire	24 Nov. ,,	462	4·3	23·37	
Special Edition	Jersey	1 Nov. ,,	433	4·5	22·94	
Miss Bell ...	,, ...	2 July ,,	358	5·4	22·83	
Miss Lark ...	Ayrshire	8 Sept. ,,	476	4·0	22·35	
Jeannie ...	,, ...	1 Nov. ,,	497	3·8	22·13	
Rosine ...	,, ...	7 Aug. ,,	481	3·7	20·84	
Windyhill Davidina	,, ...	21 Aug. ,,	453	3·9	20·72	
Lilia ...	,, ...	19 Aug. ,,	464	3·7	20·14	

In addition to the rough feed available in the paddocks, each cow received a daily ration composed of 12 lb. oaten chaff, 8 lb. lucerne chaff, and 4 lb. bran.

PLANTING COW-PEAS WITH MAIZE.

For seed purposes the cowpea thrives best when sown by itself where it can receive plenty of sunlight. To grow it between rows of corn will reduce the progress and capacity of the plant to yield a good crop, unless, of course, the corn is thinly planted. If it is a question of growing fodder, then, certain varieties of cowpeas can be sown simultaneously with the maize, or after the first cultivation is given to the corn.

Poultry.

REPORT ON EGG-LAYING COMPETITION, QUEENSLAND AGRICULTURAL COLLEGE, JANUARY, 1916.

Six thousand three hundred and sixty eggs were laid during the month, an average of 120 per pen. Taking into consideration the time of year, the fact that a number of birds were in moult, and that no green food was available, the return may be looked upon as a good one. We used scalded lucerne chaff with the pollard and bran, but, as pointed out before, this is a very poor substitute for green feed. J. D. Nicholson wins the monthly prize with 143 eggs. Throughout January there were only five birds in Mr. J. R. Johnston's pen of Plymouth Rocks. The following are the individual records:—

Competitors.	Breed.	Jan.	Total.
C. B. Bertelsmeier, S.A....	White Leghorns ...	131	1,306
J. D. Nicholson, N.S.W.	Do.	143	1,283
A. H. Padman, S.A.	Do.	136	1,271
Mrs. Munro	Do.	124	1,270
J. Gosley	Do.	120	1,255
J. R. Wilson	Do.	129	1,248
E. F. Dennis	Do.	122	1,243
A. W. Bailey	Do.	125	1,241
Jas. McKay	Do.	102	1,239
J. M. Manson	Do.	140	1,238
J. M. Manson	Black Orpingtons ...	117	1,235
King and Watson, N.S.W.	White Leghorns ...	132	1,213
Kelvin Poultry Farm	Do.	122	1,212
W. Parker	Do.	138	1,199
A. T. Coomber	Do.	125	1,198
O.K. Poultry Yards	Do.	120	1,197
Mrs. J. Jobling, N.S.W.	Black Orpingtons ...	106	1,187
T. Fanning	White Leghorns ...	139	1,185
E. A. Smith	Do.	119	1,183
H. Hammill, N.S.W.	Do.	139	1,183
C. Knoblauch	Do.	127	1,183
W. Purvis, S.A.	Do.	127	1,170
T. Fanning	Black Orpingtons ...	115	1,167
C. T. Clark	White Leghorns ...	108	1,164
E. V. Bennett, S.A.	Do.	120	1,163
Cowan Bros., N.S.W.	Do.	135	1,162
S. E. Sharpe	Do.	97	1,160
Moritz Bros., S.A.	Do.	139	1,154
R. Burns	Black Orpingtons ...	120	1,150
E. A. Smith	Do.	126	1,137
F. Clayton, N.S.W.	White Leghorns ...	110	1,135
W. Lindus, N.S.W.	Do.	122	1,130
E. Le Breton	Do.	106	1,124
J. H. Gill, Victoria	Do.	139	1,109
R. Burns	S. L. Wyandottes ...	116	1,107
Derrylin Poultry Farm	White Leghorns ...	124	1,106
W. Meneely	Black Orpingtons ...	113	1,101
Geo. Tomlinson	White Leghorns ...	110	1,100
R. Jobling, N.S.W.	Do.	114	1,098
Cowan Bros., N.S.W.	Black Orpingtons ...	115	1,087

EGG-LAYING COMPETITION—*continued.*

Competitors.	Breed.	Jan.	Total.
W. Lyell	White Leghorns ...	120	1,080
J. G. Richter	Do.	108	1,079
Loloma Poultry Farm, N.S.W. ...	Rhode Island Reds ..	121	1,058
J. Zahl	White Leghorns (No. 1)	101	1,054
G. H. Turner	White Leghorns· ...	107	1,038
J. Aitcheson	Do.	102	1,037
R. Jobling, N.S.W.	S. L. Wyandottes ...	100	1,031
J. Zahl	White Leghorns No. 2	105	1,020
S. Chapman	Brown Leghorns... ...	136	1,004
E. Pocock	White Leghorns ...	100	996
W. H. Forsyth, N.S.W.	Do.	130	970
F. Clayton, N.S.W.	Rhode Island Reds ...	125	964
J. R. Johnstone	Plymouth Rocks ...	93	757
Totals	...	6,360	60,379

PRESERVING EGGS.

At this time of the year a certain, sure plan to preserve eggs is almost invaluable. There are many plans adopted by poultry keepers, but I am pretty confident the most simple plan is the most successful; particularly when, as is generally the case, it is only for two or three months' keeping. The main, and most pertinent, point is to close the pores of the shell, which can be most easily done by rubbing well over by butter, oil, lard, or dripping. The best way is to render down some lard in a basin, dip the eggs one by one into it. Do not make the mistake that has so often been done by having the liquid lard, oil, butter, or dripping hot, but just warm enough to melt those substances so that the eggs can be dipped into it. Then the greasy substances must be well rubbed into the pores of the shell with the fingers. After these operations have been faithfully performed, the eggs can be stored in bran in the store tub, or packed in a barrel in hay, if it is purposed to send them away. If the eggs are stored in bran, they must be tended from time to time to prevent the bran becoming damp or mouldy, which would utterly spoil them.

Another good way to preserve eggs would be to take, say, a couple of hot lime shells, place them in an earthen basin, slake them with a good quantity of water, stirring it all the time so as to allow the sediment to fall to the bottom. Place this mixture aside for some hours, and when the water has risen to the top, pour it off, leaving only the thick creamy soft lime, and there you have the material which, when hardened round the packed eggs, preserves them most effectually for some months at a stretch. Then take the eggs and place them in any suitable vessel (chipped or cracked milk dishes would answer the purpose admirably); then put them in a layer all straight on end, and with a spoon fill up with the lime until the eggs are more than covered. Then put in another layer, and proceed as before until the dish is filled up. After filling the dish, place it in a cool place, but which should not be too dry—a floor of a cellar would be excellent for the purpose. When these

eggs are required for use, pick them over carefully, first taking them out of the lime, with the point of a knife or a sharp spoon.

The great secret of preserving eggs fresh without recourse to more elaborate processes is to place the egg small end downwards, and keep it in that position. This should always be the position of an egg whether kept for sitting or for use, rubbed with grease, or preserved in lime or chemical preparations. An inch board about a foot wide, and from two to three feet in length should be procured, and holes bored in it an inch and a-half in diameter. Strips of board or lath might then be nailed round this board as a ledge, and a cupboard in a cool place fitted up with five or six inch boards or shelves. Then, as fast as you get fresh eggs, place them in the holes in the boards, small ends downwards, and they will thus keep fresh for some weeks. These shelves might be substituted for boxes. A carpenter should make boards of this description for a very small sum, but if you are any way handy with tools, as so many poultry keepers are, you make them yourself.

Eggs can be preserved by being brushed all over with a solution of gum arabic, and then packed in dry charcoal dust—also by being kept in the following mixture, which was invented by a Sheffield, England, poultryman, thus:—"In a tub place a bushel of quicklime, two pounds of salt, half-a-pound of cream of tartar, and mix all together with sufficient water to make the composition of such a consistency that an egg put into it will swim to the top just above the fluid—then put in the eggs, which, it is said, will keep good for two years.—Exchange.

The Horse.

STATE HORSE BREEDING.

At the Newmarket (London) sales lately the mare Tresanta was sold to go to Australia. The total lots sold numbered 497, and their value 84,200 guineas. About 100 lots were bought for Australia.

The Government has acquired Colonel Hall Walker's training stables at Rushley Park, and Colonel Hall Walker thereon presented to the Government all the horses in the Tully stud and at Rushley Park suitable as stallions.

The London "Daily Telegraph" says that by accepting Colonel Hall Walker's offer the Government has pledged itself to embark upon some scheme of State horsebreeding. The vital importance of the gift lies in the fact that the possession of Tully and Rushley will be some sort of insurance against an absolute dearth of horses for war purposes. There is now an absolute lack of suitable light horses. The time will come when the Government will have their own thoroughbred stallions and be likely to get three-quarter and half-bred stock of the desired type. War demands have doubtless largely depleted the horses of Canada and Australia. The Government from its studs will be able to supply the Colonial Governments with horses and improve and stimulate the breeding thereof.

The Orchard.

A FINE MANGO.

We have received from Mr. Swayne, M.L.A., a very fine specimen of a mango, which is identified by Mr. A. H. Benson, Director of Fruit

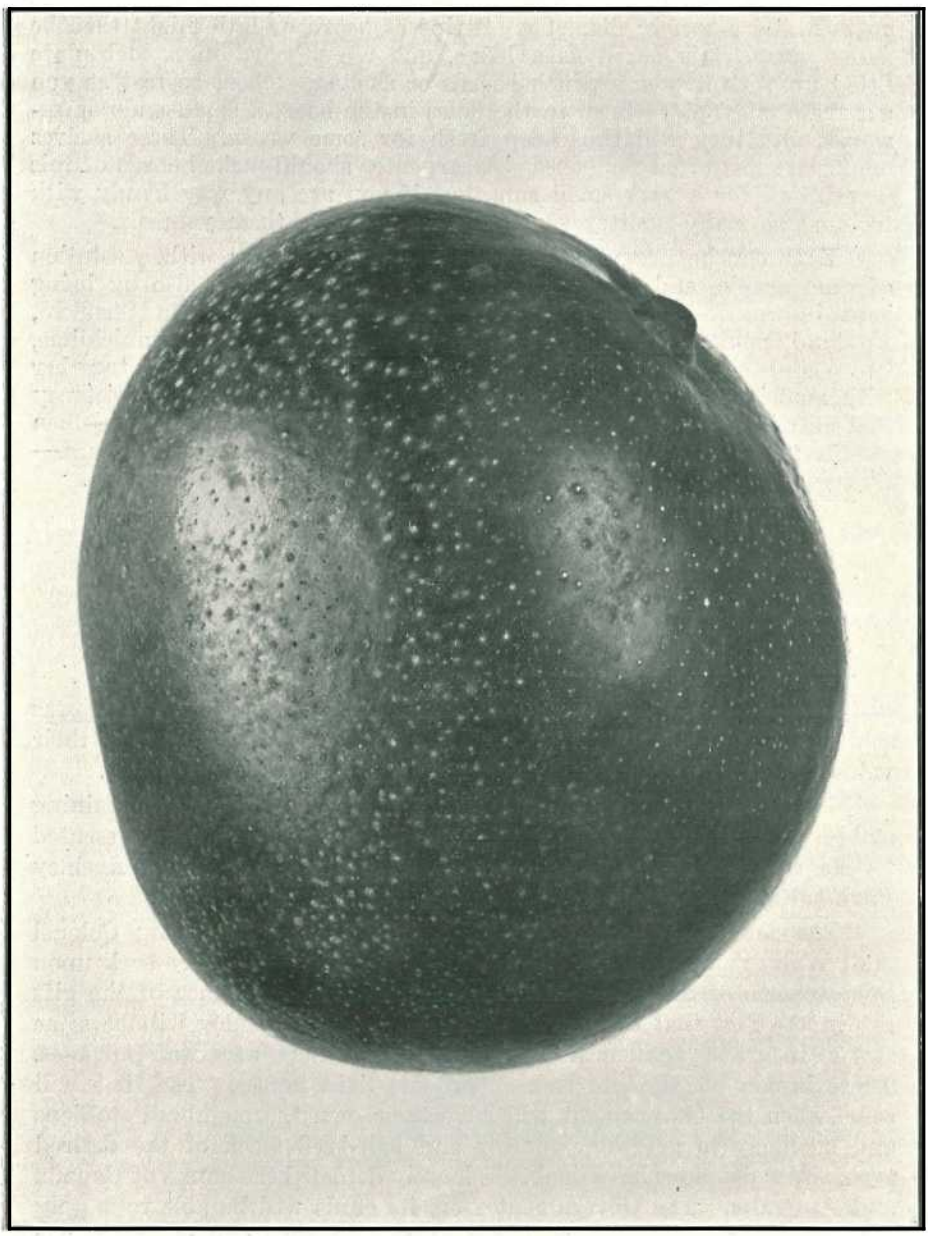


PLATE 10.—THE "GOPAL BAUGH" MANGO, GROWN AT AUCHENFLOWER BY MR. JEFFS.

Culture, as being probably the Indian "Gopal Baugh." This mango was grown by Mr. Jeffs, of Auchenflower. Two of them weighed 3 lb. 4 oz., and the fruit here depicted weighed 1 lb. 9 oz. In colour it is of a yellow tinge when ripe, and is more round than of the usual oval type. The flesh is firm, light in colour, and of a most exquisite peach-like flavour, differing considerably from that of most mangoes grown in the State. The sub-acid juice gives an additional charm to the flavour of this fine fruit. The stone or seed is of considerable size, but there is no sign of fibre whatever. Such an exquisite fruit should find a good market here, and also in the Southern market, as the firmness of the flesh even when just ripe indicates that it would prove a good carrier.

REPORT ON INVESTIGATION OF BITTER PIT.

A number of copies of Professor D. McAlpine's fourth Report on the investigation of bitter pit are in the possession of this Department, and those fruitgrowers interested in apple culture can obtain a copy of the same by application to the Under Secretary. The matter is of especial interest to the fruitgrowers of the Stanthorpe district and other parts of the State where apples and pears are grown commercially.

AGRICULTURAL LABOUR.

The difficulties of obtaining an adequate and suitable supply of labour, both skilled and unskilled, just at the moment when it is most required constantly face the agricultural community, and these have not been overlooked by the Government in its efforts to assist the primary producers. The Department of Labour has been reorganised, and practically remodelled, with a view to affording every facility to employers and employees to make known their requirements and to bring them into touch with one another. The system provides for a constant interchange of information respecting the labour market between all central exchanges, so that surplus labour may be rapidly transported from one district to another in which a demand exists. Our readers' attention is drawn to an advertisement appearing in this issue which amplifies the above and describes the advantages to be derived from the use of the Department's agencies, not the least of which is the fact that no charge is made to either the employers or employees for the services of the exchanges. A new feature, adapted from the New South Wales system, is the placing of post-free letter cards at all post offices throughout the State, on which the employer may, without cost, notify the nearest central exchange of his wants, and similarly the unemployed worker may register his name as an applicant for employment.

The women's registry office, which has recently been opened in Adelaide street, and at which domestic labour, and, in fact, female labour of all classes, may be engaged, has already proved its usefulness, and the volume of business being transacted at this branch of the department is increasing daily. The concession granted by the Government of rail fares at half-rates to all employees engaged at the Government exchanges, is another inducement to both employers and employees to patronise the exchanges to the fullest extent.

Horticulture.

JADOO FIBRE.—No. 2.

In the issue of this journal for December, 1899, Mr. J. C. Brünnich, Agricultural Chemist of the Department of Agriculture and Stock, gave an analysis of the Jadoo fibre. In his report thereon he said:—

"Several articles have appeared in this journal on Jadoo fibre, an artificial fertilising product, which, so far, has hardly received in this colony the attention it seemingly deserves.

"The Department of Agriculture supplied a quantity of Jadoo fibre to the Agricultural College for experimental purposes, and the results of these experiments will be looked for with interest, although in our rich College soils the effects might not be so marked as in poorer soil.

"In order to see if what the inventor claims is really true, I made a complete analysis of the product, with the following result:—

"I found Jadoo fibre to be a fine fibrous product, of brownish colour, which, almost like a sponge, has the power of absorbing an enormous quantity of water, up to six to eight times its own weight. This fact alone will explain part of its practical value, when used for pot plants, in the orchard or vineyard. This fibrous raw material is saturated with plant foods, which, according to analysis, are to a large extent soluble in water, any plant having thus a fair amount of plant foods at once available for its growth; other portions of the plant foods, are, like some in the soil, not soluble in water, but soluble in hydrochloric acid, and these will become available gradually by the chemical dissolving action possessed by the roots of growing plants. As a matter of fact, Jadoo fibre must be considered a highly fertile artificial peaty soil.

Analysis.

	Per cent.
Organic matters	71·40

Containing ·812 per cent. of Nitrogen=·986 per cent. Ammonia.

Mineral matters—

Soluble in water (total, 4·36 per cent.)

	Per cent.
Phosphoric acid, P_2O_5	·445
Sulphuric acid, SO_3	1·286
Nitric acid, N_2O_5	·520
Alumina and iron, Al_2O_3, Fe_2O_3	·271
Lime, CaO	·303
Magnesia, MgO	·107
Potash, K_2O	·357
Soda, Na_2O	·750
Ammonia, NH_3	·020

Soluble in hydrochloric acid, 1·1 sp. gr.

	Per cent.	
Silica, SiO_2	·031	
Sulphuric acid, SO_3	·926	
Phosphoric acid, P_2O_5	·715	
Alumina, Al_2O_3	·765	
Iron, Fe_2O_3	·170	
Lime, CaO	1·875	
Magnesia, MgO	·163	
Potash, K_2O	·402	
Soda, Na_2O	·791	
	5·838	
Insoluble in HCl	4·012	
Total ash		9·85
Moisture		18·75

"The inventor does not claim the product to be a manure, and in accordance with the analysis, the actual value of the plant foods, phosphoric acid, potash, and nitrogen amounts to 15s. per ton of Jadoo fibre. The secret of the preparation lies in the foundation material, which has the power of absorbing and retaining the fertilising ingredients, which are thoroughly incorporated with the fibre by a slow process of fermentation.

"I believe the manufacture of this product could be successfully started in this State, and I do not think that a better foundation material could be found than finely crushed megass from a sugar-mill. Megass by itself has only a slight manurial value (about 6s. per ton), but it possesses great absorptive power, and retains water just as well as Jadoo fibre; and, again, does not rot quickly in the ground. Perhaps finely chopped trash, or, again, dried filter press cake, might be added with advantage to the megass."

In connection with this foundation peat moss, we may mention that the writer, accompanied by Captain Pennefather, Comptroller of Prisons, made an examination of some peat moss on Mud Island. When this material was cleaned and dried, a sample was sent to Mr. Virgoe, in Melbourne, who, after a trial, pronounced it to be a very good foundation material. There is any quantity of it on Mud Island, close to the highland on which a huge fig-tree is growing.

JADOO FIBRE—HOW TO USE IT.

Since Jadoo fibre was introduced into Australia in 1896 by Mr. W. R. Virgoe, as agent for the Jadoo Company in England, many people have tried it, and report very favourably on its qualities as a plant food. All, however, do not possess the knowledge of how to use it. Some, indeed, have thrown away the fibre after a season, under the impression that it was used up. As a matter of fact, it can be used many times over; in fact, it has not been ascertained yet when it becomes exhausted. Colonel Halford Thompson, chairman of the

company, in a letter to the "Tropical Agriculturist," Colombo, says:—"It has proved practically *impossible* to wash out the properties of Jadoo fibre, even when exposed to tropical rain."

Preparation for Use.—Jadoo fibre is exported in bales containing six bushels in each, hydraulically compressed into a space of 5 cubic feet. In a fresh state, as it leaves the factory, a bale weighs 2 cwt., but owing to evaporation of moisture, on its arrival here in summer, or after being here some time, the weight is considerably reduced, though the substance is there all the same; hence it is always sold by measure.

Before using, the fibre must be thoroughly disintegrated. This can be done in various ways; the simplest being either to use an ordinary washwoman's board and rub the fibre on it, placing the board on a slant in a box or case as a washwoman would do in a tub; or a piece of the wire netting with which the bale is encased may be tacked on to a flat board and used in the same way. Small quantities may be rubbed between the hands.

Before using in the open ground for trees, plants, vines, &c., or for potting plants, the fibre should be moistened with water, if at all dry, until a bushel weighs about 35 lb.; but if only for seed sowing it may be watered as directed under "Sowing seeds."

It is advisable to prepare only such quantity as is required for immediate use, so as not to unnecessarily promote evaporation of moisture.

Potting Plants in Jadoo.—Always use pots two sizes smaller than required for soil; then proceed exactly as with soil, but pot much more firmly in all cases. If Jadoo and soil are used together, then a pot *one* size smaller than that for soil may be used, and the firmness of potting modified accordingly. Some plants require loose potting in soils; pot these a little firmer in Jadoo. Some, again, such as palms, require very firm potting; use extra firmness with Jadoo; then, again, the firmness of potting should be modified by the quantity of soil mixed with the Jadoo. When watering, do it thoroughly. Don't water merely because the surface seems dry. No hard-and-fast rule can be laid down—discretion must be used. Mr. W. Wallace Lunt, a celebrated horticulturist, who has had wonderful successes with Jadoo, may be here quoted. He writes:—"In conclusion, let everyone who has brains grow his plants in Jadoo, but if he intends growing on the 'hit-or-miss' plan let it alone."

Sowing Seeds.—Crock the pans or pots as usual, putting some of the rougher portions of the Jadoo over the crocks. Fill up with the fibre and press evenly down, and water thoroughly; then sow the seed thinly and cover to about its own depth, add a little silver sand, and again press all firmly and smoothly. Be careful not to over-water afterwards. If Jadoo and soil are used, mix thoroughly before use. The above applies to the larger kinds of seeds, from the size of a small pea upwards. For fine seeds—

First sift a small quantity of Jadoo with a sieve, say ⅛-inch mesh (or smaller according to size of seed). Then proceed as above, but, before sowing, water well and let the pan stand for awhile; then sprinkle about an eighth or a quarter of an inch of the fine Jadoo over the surface, and sow the seed thinly, and sprinkle a little more fine Jadoo and silver sand to cover it (if required), and press all evenly down (the bottom of a pannikin or similar article effects this purpose well). Very fine seeds, such as lobelia, &c., require no covering.

After once watering, or if Jadoo is used in a sufficiently moist state, more water is seldom required till the seeds germinate. Should the surface appear very dry at any time, a slight sprinkle with a fine syringe is sufficient.

Vines.—For Old Vines: Scrape away the earth as near the principal roots as possible; place the Jadoo about 6 inches below the surface, covering up with earth again. The object is to cause fresh fibrous roots to form in the Jadoo. It is specially important that the Jadoo be used moist. For striking vines, the eye, or cutting, should be started in a bed of Jadoo fibre. In planting out young vines put a gallon of Jadoo fibre above and also below the roots. Jadoo liquid diluted 20 to 1 will be found to help on the crop greatly, given when vines are first breaking, and when the fruit begins to colour.

Fig-trees.—Scrape away earth for 6 inches deep in a circle round the stem, varying in diameter with the size of the tree, dividing the earth taken out into two parts; mix an equal quantity of Jadoo with one of them, replacing it next the roots, then put the other half on the top next the surface. The actual quantity of Jadoo used must depend on the size of the tree.

Peach-trees.—Scrape away the earth and put in a bushel of Jadoo to each tree, as close to the roots as possible, replacing earth above it. In planting young peach-trees put a peck (quarter bushel) of Jadoo in with the tree, part below, part above the roots.

Vegetables.—Put about an inch of Jadoo in the furrow in which you sow the seed. This will greatly accelerate germination, and thereby bring crop to maturity at least a fortnight sooner. It also makes healthier and stronger plants.

Chrysanthemums.—Put the cuttings in two-thirds Jadoo, one-third loam with a sprinkling of sand; afterwards use half Jadoo, half loam, until final shift, when the Jadoo may be reduced or increased as experience dictates.

For chrysanthemums grown in earth Jadoo liquid will be found an excellent mode of feeding, diluted in 48 to 1 at first, and gradually increased to 20 to 1. Plants grown entirely in Jadoo fibre do not want this unless very large flowers are required.

Potatoes.—Early potatoes should be placed in the furrow so that they lie in about 2 inches of Jadoo. This will accelerate the maturing of the crop considerably.

Twenty-five tons to the acre of marketable tubers have been grown in poor soil by this method.

TO RENOVATE JADOO FIBRE.

Jadoo can be used many times over; in fact, it has not yet been ascertained when it becomes exhausted. This is a great point in its favour, and tends materially to reduce its original cost. The writer has raised six pans of seedlings in one year with the same lot of Jadoo, adding a little, of course, to make up for what adhered to the plants in pricking out from the pan, the method adopted being thus:—As soon as the young seedlings were pricked off the fibre was spread out in a box, and exposed to the air for a few days to sweeten; it was then watered with Jadoo liquid at a strength of 1 to 20 of water, until sufficient moisture had been absorbed to restore it to its original weight (about 35 lb. per bushel), and then used as at first.

With Jadoo remember these points:—

Thoroughly disintegrate the fibre, leaving no lumps.
Use in a moist state.
Pot firmly.
Don't over-water.

Jadoo Liquid.

Jadoo liquid is a highly concentrated solution of the elements which enter into Jadoo fibre, the proportion of these elements being slightly changed. It is used diluted in water in the proportion of 1 part Jadoo liquid to 20 to 48 parts water, according to circumstances. Its composition never varies, thus avoiding all possibility of mistakes in its use. Jadoo liquid revives drooping plants, strengthens the weak, and nourishes the strong. Above all, it increases the size, causes greater profusion of bloom, and heightens the colour of all flowers.

THE SUGAR SEASON OF 1915.

In the middle of the season, Mr. Easterby, General Superintendent of the Bureau of Experiment Stations, estimated the probable cane crop at 1,230,000 tons, and the yield of sugar at 136,000 tons, reckoning 9 tons of cane per ton of sugar. How nearly this estimate was correct is shown by the returns of the Government Statistician, who shows that the yield of sugar was 143,427 tons, which is considerably higher than was hoped for when Mr. Easterby made his estimate in the middle of the season. Yet the two estimates of the tonnage of cane harvested were almost identical. "The larger output of sugar (says the 'Sugar Journal') is due to the superior quality of the cane this year in most districts. This means, taking the Queensland crop as a whole, that 1 ton of sugar has been produced from just about 8 tons of cane, which is a better yield than has been recorded for any previous year."

Forestry.

FOREST CONSERVATION.

The subject of the preservation of our timber supplies has been brought under the notice of the rural public for many years, yet the destruction of many valuable timber trees is carried on daily, without the slightest individual or co-operative attempt to supply the drain. Why should people always look to the State to do this work for them? When a settler begins to plant an orchard, he does not ask the Government to supply him with trees at the public expense; he purchases his own trees, plants them at his own expense, and spends his private means on carefully tending them until they finally begin to repay him for his outlay. If a tree dies or becomes weak from too heavy bearing, he roots it out. Does he leave a blank in the orchard? He knows better than that. He at once plants another in its place, which in due time will repay the care bestowed upon it. As other trees fail or die from various causes, the gaps are regularly filled up, and so the orchard goes on year after year with no diminution either in numbers or in yield.

Is it so with our forest and scrub trees? When cedars, beeches, and pine trees are cut down, does the timber-getter, even if he be the owner of the land, ever think of planting others in their places? Never. Then comes the question, "Why not?"

Perhaps the answer of one man may serve for that of all owners of heavily timbered land.

That man was in treaty for the purchase of a large property not 50 miles from Brisbane, and one inducement held out to him was that the timber on the land was worth at least £500.

"Oh! bother the timber," was his reply, "I want it cleared off to grow stuff for the stock." *E uno disce omnes.* So says the Latin writer, and it is equally true of our planters, farmers, and selectors. The case of one is the case of all. Get rid of the timber. There is enough to last their day; and as for posterity, well, let posterity look after its own timber supplies. What many fail to understand is, that a well-managed timber estate is worth more than a poorly managed farm or orchard.

For the sake of comparison, let us take a rich rubber-tree forest, such as are to be found in Brazil, in Central America, and other countries of the world. The old trees are there. They are constantly reproducing themselves. When the old trees die or are killed off by excessive tapping, there are constant supplies of young trees coming on, hence the supply of rubber is practically inexhaustible. No man would be insane enough to clear off the rubber-tree producing jungles for the purpose of growing corn for cow feed.

A fifteen-year old *Hevea Braziliensis* will yield nearly 5 to 6 lb. of rubber per annum, valued at 3s. 6d. to 4s. per lb. An acre containing 100 of these trees is therefore worth £100 to £120. All the time during which the old trees are being tapped the younger trees are coming on, and are ready to take the place of those that are worn out or dead.

An acre of land planted with citrus fruits contains, say, 100 trees. The gross annual value of the produce of these trees may be averaged at £100, some producing as much as £5, others only 5s. From this has to be deducted the cost of cultivation, pruning, dressing, spraying, fumigating, picking, packing in cases, &c.—expenses which vary with the soil, climate, locality, proximity to market, &c.

Now take the case of bananas, which produce more food matter than any known product of the soil, acre for acre. It is estimated that 100 acres of good land established in bananas will yield during the second and subsequent years after planting about 1,000 bunches per week. Each bunch will contain, according to the variety, from seven to ten hands—a hand consisting of from ten to seventeen bananas; each bunch would thus be worth about from 2s. to 2s. 4d., bringing the yield of an acre up to over 9s. per week, or over £40 to £50 per acre per annum. Jamaica bananas sell in the London market at from 12s. to 15s. 6d. per bunch, whilst at Glasgow some were sold as high as 14s. to 16s. per bunch.

We have now compared three crops—rubber, citrus fruits, and bananas. The first requires no cultivation; the second stands in need of constant care and attention, involving considerable expense from the very outset. The third can pretty well look after itself, once the stools are established.

What I more particularly want to point out is the pressing need for caring for the perpetuation of forest and scrub trees, hard and soft.

In all our yet standing scrubs, the timber-getter is busy removing the various commercial timbers peculiar to the scrubs, amongst which the principal are kauri pine, hoop pine, cedar, beech, crows' ash, and silky oak. When these are gone, then, according to popular opinion, nothing is left of any commercial value, and the scrub is only fit to be cut down and burnt off. But there are still many timber trees in the coast scrubs especially which will yet be of great commercial value for the purpose of furniture-making, veneering, &c. Such are the yellow-woods, rosewood, tulip-wood, brigalow, satin-wood, and many others, all of which are capable of taking a high polish, and of making excellent veneers, and these should be preserved as much as those in more immediate demand.

This does not imply that no scrub should be cleared, or that the more valuable timbers should not be brought to market. Timber we must have, and forests were intended by Providence to be cut down for the use of man, and for other purposes besides, such as attracting rain, preserving the land from being dried up by exposure to the scorching rays of the sun, and protecting the soil from being washed

down into the watercourses. But what is required is the protection and nursing of the young trees which, in the ordinary course of nature, would eventually take the place of those removed.

Planting young trees is not so much a necessity as the nurture of those growing naturally. To this end all that is needed is for the timber on our lands already reserved by the Government for forest areas, to be carefully tended.

In France the work of restoring the forest is being systematically carried on, and in mountainous country, ages since denuded of timber, the course of torrents is stopped or deflected by means of stonework and fascines made of live willow. These fascines readily strike root, and form a barrier behind which the débris from the high lands accumulate, and so by degrees the wasting of the surface is arrested and forest planting begins. It must be borne in mind that the re-afforestation of a denuded hillside, cut into deep chasms by the descending torrents, extends its influence to the plains below, often for hundreds of miles.

The silt washed down from the bare hills is carried on to the low lands, and instances can be multiplied in every country of the world, where civilised man has planted his foot, of tens of thousands of acres of rich alluvial plains being overwhelmed with barren gravel, sour mud, and other silt. Witness the ruin of many farms in Southern Queensland after the great flood of 1893. Not only were many acres completely washed away, but entire farms were for miles covered with a sour deposit several inches thick, which rendered the land utterly unfertile, and caused the owners to abandon them in despair.

In Germany the forests are so skilfully managed that 11,000,000 acres of State forests produce an annual income of £4,000,000. And this result is arrived at, not so much by planting as by intelligent work in regenerating the forests. The German forester works on opposite lines to those of the lumberer. He arrives at his happy result by a process of natural selection—he gets rid of the least valuable timber in various ways, and causes the survival of the fittest by judicious culling. The lumberer destroys the fittest and leaves the most useless to cumber the ground.

The Khanate Bucharia was once upon a time the most flourishing and fertile region of Central Asia. It was well timbered and well watered. What has happened to this earthly paradise is happening now in our midst. A mania for clearing seized the inhabitants within the last thirty years. All the great forests have been destroyed, and what was spared was swept out of existence by fire during the civil war. Now mark the consequence. With the disappearance of the forests, the watercourses gradually dried up; there was no water left to feed the empty irrigation canals. The great barrier against the desert sands was removed, and irresistibly they advanced upon and gained daily on the fertile plains; and it is now only a question of a short time when this magnificent region will become a desert as desolate as the solitudes that separate it from Khiva.

Dr. D. Morris, C.M.G., M.A., &c., &c., in his report on the "Economic Resources of the West Indies," in alluding to the forests of British Guiana, says:—"The total export of timber is £16,000 per annum. The forest lands yield a yearly revenue of about £48,000, made up of "acre money," royalty on timber shingles, charcoal, balata (the milky juice of the bullet-tree (*Mimusops globosa*), a kind of guttapercha), and gums. These forests, rightly controlled, should constitute an important source of wealth to the colony. Owing to the difficulty of reaching the region above the falls [presumably of the Essequibo River—A.J.B.] the forests below have been cut over several times and the best timber removed. In some localities firewood-cutters and charcoal-burners are destroying valuable timber and preventing the growth of young saplings.

The Guiana forests are the most valuable of any in the West Indian colonies. Hitherto they have only been partially protected, and it is evident that they are in danger—at least, in the most accessible districts—of being seriously injured. The vast regions above the falls are safe only from their inaccessibility. If suitable means of reaching them could be devised, and the cutting carried on under proper regulations, they would be capable of supplying valuable timber and contribute largely to the wealth of the colony. The most valuable timber is the "greenheart," known also as the "bibiru" (*Nectandra Rodiæi*). This tree (one of the laurels) is widely distributed on rocky soils along the banks of the Essequibo, Mazaruni, and Cuyuni Rivers, but not extending more than about 100 miles inland from the coast. The bark yields a valuable tonic medicine—biberia. The timber is very hard and durable, and is specially valuable in the construction of canals, wharves, dock-gates, and in shipbuilding. It withstands the attacks of the teredo, and lasts longer than any other timber under water.

According to Mr. McTurk, greenheart in British Guiana has been practically exhausted in the area below the falls, "but, above, there are millions of cubic feet that have never been touched by the axe." These are protected to the extent that those squaring less than 12 inches are not now allowed to be cut. The indiscriminate cutting of wood for charcoal-making is regarded as very injurious to the forests of the colony.

In Grenada, attention has been called to the serious effect of deforestation. The best timbers are everywhere being destroyed to convert into charcoal.

With all the knowledge we possess on the subject of forest conservancy, we still persist in the suicidal policy of extermination. Whence shall we obtain our supplies of the marvellously durable timber of the *Eucalypti*, once we have swept them from the face of the land? How many generations will come and go before such magnificent trees as we have seen even in the close neighbourhood of Brisbane can be reproduced? To depend on foreign countries for our supplies is to depend upon a broken reed. The vast forests of North America, Canada, Oregon, British Columbia, and Vancouver are being destroyed wholesale. There is nothing to take their place. The great forests of South America cannot furnish us with our requirements. But we have the means in

our own hands of keeping up our supplies for all time, and it is the duty of every citizen of the State to help in the work, and to do so before irreparable damage has been done.

A Parliamentary return in connection with the Woods and Forests Department of South Australia shows that for twenty years, so far back as 1876, the expenditure on natural forest management was £44,626 7s. 8d.; on establishing plantations, £55,451 19s. 5d.; on rearing and distributing trees gratis, £26,101 5s.; in experimental and ornamental planting, £9,160 7s. 11d.; total, £135,340. The revenue derived from natural forest management—rents and sales of timber, £117,904; from plantation timber, £1,000; valuation of existing plantations (6,751 acres), £120,000; value of 4,000,000 trees given away at 2d. per tree (exclusive of vines), £33,000. The balance in favour of the department was £136,564.

THE NEED OF REAFFORESTATION.

Many articles on this and other subjects connected with forestry have been published in previous numbers of the "Queensland Agricultural Journal," and much information contained in those articles has been the outcome of what has been done in the direction of the conservation, reproduction, and destruction of various timber trees, in many parts of the world, as well as in our own State. Our personal knowledge of the timber industry in Queensland goes back to the year 1861, when dense scrubs, rich in pine, yellow-wood, crow's ash, &c., clothed the banks of most of the rivers and creeks, and timber-getters and shingle-splitters located themselves therein, only a short distance from Brisbane. In the Logan and Albert districts large quantities of splendid cedar and beech were obtained, whilst hardwoods, such as ironbark, gum, bloodwood, &c., abounded. The extensive scrubs of the Blackall Range, holding a wealth of Moreton Bay and Kauri pine, had then not been exploited. If in little over fifty years our timber supplies have disappeared from many localities, what must be the inevitable result in another half-century, unless vigorous steps are taken in the direction of reafforestation? The subject is ably discussed in the following article by W. Swan, in the "New Zealand Farmer, Stock, and Station Journal," of January, 1916:—

Much has been written of late in regard to the above subject, dealing generally with the commercial point of view, viz., timber, and as we are all agreed on this matter, it is not my intention to deal with this particular line, but rather from a wider outlook—as it affects the climate and general conditions of a country. When dealing with probabilities of the future it is always advisable to look into the past, and from the evidence gained thereby a more sound argument can be obtained. Following on these lines the first question arises, "Has deforestation adversely affected a country?" One of the most notable examples in the affirmative is found in what is now known as the Great Sahara Desert. Historians state that at one time this was apparently a most fertile tract

of country, probably heavily wooded, and a long time since inhabited by the Phœnicians. At that period this nation was the most advanced and powerful race living, occupying the proud position similar to that held by the British to-day as the strongest marine power existent. Shipbuilding of iron being then unknown, the forests were denuded of their growth to supply the timber for the construction of ships both for the navy and the merchant service, till finally the country was practically cleared of arboreous growth. Then the climate gradually changed, rain became more and more intermittent, greater extremities of heat and cold were experienced, powerful gales swept the country, and, against overwhelming odds, the race passed out of existence, and the hitherto fertile country is to-day a vast barren region—rainless, exposed to terrific gales that tear up the sand, rendering life impossible, either animal or vegetable, and a temperature of such diversity that at midday it may well be over 100 degrees in the shade, whilst shortly after sunset down below freezing point.

Coming to more modern times, we may next take notice of an island to which frequent allusion has been made of late. I refer to St. Helena. This island is at present a bleak, barren spot, possessing a climate of considerable extremity, especially in heat, and suffering more or less by absence of rain a great part of the year, and during the wet intervals visited by tropical rains of great severity. At one time, probably in the early part of the seventeenth century, it is known that this island was heavily wooded, and possessed an enjoyable climate, with sufficient rain to maintain vigorous growth. Goats were then introduced, and a fairly profitable industry sprang up in connection with them. The goats had not been there a great length of time before they commenced depredations on the forests, and by eating the bark and leaves caused the death of a great number of the trees. Some more far-seeing individuals drew the attention of the authorities to the matter, protesting that in a brief time the island would be treeless if the goats were not restricted. The authorities made answer that the goats were of more importance than the trees, and so the matter dropped, till finally they cleared off vegetation. The climate then gradually changed. The hillsides being bare, there was nothing to prevent the fertile soil from being swept away by rains and winds; soon it was impossible to grow anything satisfactorily, and finally it became a bleak, barren area, and for agricultural purposes valueless, and so through this short-sighted policy they lost both trees and goats.

"But how can the loss of trees cause this?" it may be asked. The answer is, trees conserve moisture, and moisture affects the temperature, the two being correlative—affecting each other. Firstly, trees intercept the moisture-laden winds, causing them to deposit the rain; owing to resistance, the velocity of the wind is lessened, consequently a greater fall. Then, as the tree roots have penetrated the subsoil, the water is able to reach greater depths, thus conserving a larger supply to the soil, and, as the foliage breaks the sun's rays, evaporation is not so rapid. These two causes enable evaporation to be continued over a longer period than if the land were treeless. Another effect generally overlooked is that moisture attracts moisture, a statement we can easily prove by taking

a damp and a dry cloth to wipe up any water that may be spilt; we find that the damp cloth absorbs far more rapidly than the dry one, in like manner a humid atmosphere attracts the moisture borne by the wind, causing more frequent rains and lesser quantities at a time, an effect most beneficial to agriculture.

Evaporation results in the loss of heat, so it is not surprising to find that a country that has been reafforested, in some cases, results in a decrease of the average mean temperature, but as the loss is chiefly perceptible in the summer, it is more beneficial than otherwise. On the other hand, a humid atmosphere is not such a good conductor of heat, as instanced by land adjoining the sea; this has a more equable temperature than land in the same parallel further inland.

At different times I have met those who argue that as frosts are generally more severe in a valley, it is due to the humid atmosphere conducting the cold; this is not the reason, but owing to the natural law of cold air being heavier than the warmer, therefore the cold air sinks in the valleys; hence the sharper frosts. In some modern orchards there is an equipment by which water is diffused in a fine spray in the air over the trees and successfully used in warding off severe frosts. From these illustrations we can see that humidity in the atmosphere is advantageous, and as trees tend to produce a more constant degree of humidity, forests are of value to the agricultural community at large.

From the health standpoint trees have a very beneficial influence. Most of us are aware of the action of vegetation by transpiration—that is, the process of taking in carbon-dioxide, a gaseous combination deleterious to animal health, retaining the carbon and liberating the oxygen to again combine in the atmosphere. Trees, owing to their height and dense leafage, are powerful air filters, and if we were to take the leaves from a large tree, and lay them all on a flat surface, we should be greatly surprised at the area they would cover, in some cases exceeding the space (flat ground measurement) by over a hundred times, so we can form a rough idea of the value of a tree versus other vegetation for this purpose. Bacteriologists affirm that in the vicinity of trees there are a greater number of less harmful germs than are found in treeless spaces.

Water flowing from an afforested region is purer, and issues in larger quantities than from the same extent of open country—a point worthy of consideration by water board authorities* On the other hand, trees should not be permitted too near the reservoir, as the action of the roots opening up the subsoil allows a greater escape, and the leaves falling and decaying in the water are, to a certain extent, harmful.

On the æsthetic theme much might be written, but for the present I will leave this out. Stockowners have proved that a certain extent of ground occupied by shelter trees enables a larger number of stock to be carried than if all was under grass. The cause is not far to seek. We know that a certain amount of food has to be utilised to create bodily heat, and as trees assist to retain heat the cattle require to eat less than

* This point has already been taken cognisance of by the Metropolitan Water and Sewerage Board in this State.—Ed. "Q.A.J."

if not so provided. In the hot weather cattle will be found peacefully reposing in the shade, whilst in an open paddock they may be seen walking restlessly about, which is not conducive to either good temper or condition. When in conversation with an old inhabitant of this country, how frequently we hear this lament: "In the old days we had warmer winters and cooler summers, and you could rely on the weather; besides, we had none of the diseases in potatoes, peaches, and other things, and spraying was unknown," and so they run on. Whilst allowing a little for faulty memory, there is undoubtedly a modicum of truth in their statements. Fruitgrowers all know that with a cold, windy spring, diseases such as leaf curl are very rife—in fact, at one time it was thought that leaf curl was caused by cold winds. It is now known to be due to fungi, and its rapid increase under the above conditions is not that the bacteria flourish more with weather of that description, but that the vitality of the plant is lessened, consequently it has less resistant power, and, in many cases, a rule that applies to plants applies to animals also.

It is very noticeable that when the true native bush is cut out, it never reverts to the original state; even if a clump is left untouched it rapidly dies out. How seldom we see a good specimen of kauri, totara, or other truly native trees outside virginal bush. Even young trees, grown under cultivation, soon assume a gaunt, ragged appearance. "What cannot speak cannot lie" is an old axiom. They prove that it is not what it used to be, and that climatic conditions are more harsh, due to excessive clearance of the bush.

Droughts similar to that experienced last summer are not welcome, but they will be more regular visitors if the wholesale slaughter of forest goes on unchecked. It is not an individual question; it is a national one. In this country we have not, nor do we wish for, large areas reserved for sporting purposes and the preservation of game; but if the Government passed an Act compelling every landowner of more than 10 acres to either plant or retain uncut, say, a 2½ per centage of his farm under timber, the farmer would for his own benefit reserve it on the bleakest portion, and good result to all would ensue. There are thousands of acres in this country to-day—land of poor quality and steep of grade—that was covered with bush, now cleared and under grass, that in a few years will be valueless, as grass will not hold; yet land adjoining, similar in character, is being served in like manner. This ought not to be allowed; it should be retained for Crown forest reserve, and no one would be the loser. The Government is doing good work at Rotorua and other places, but what is so little amongst so much? We have incurred expenditure for a Commission to inform us that we are running short of timber, and that reafforestation is necessary, and what has been done in consequence? Away back in the country, on a summer's evening, there may be seen the glow of countless fires, proving that devastation is going on as rapidly as ever, and with the exception of a few shelter belts and a few trees around the homestead, what is there to compensate?

The sooner the matter is tackled the easier it will be. It can be dealt with in such a manner that it will not fall heavily on any one individual, and for want of a better suggestion I am giving a rough outline of how

this may be accomplished, and feel sure that as the subject appeals alike to the commercial, health-giving and æsthetic instincts it will not be difficult to carry it into effect.

I commenced by a description of the harmful result of deforestation, and will conclude with a proved trial of comparatively recent times of the beneficent effect of reafforestation. In the south-west of France is a province known as the Landes, that was at one time one of the poorest and least inhabited of any in that populous country. It included a large area of swampy land, low-lying, difficult to drain, and practically valueless. The climate was bleak, suffering from a frequency of cold fogs, comparatively unhealthy, and the sparse population held a meagre existence. It is probably reminiscent to our schoolboy days as a place where most of the inhabitants went about on stilts, it being impossible in many parts to get about by any other means on account of the marshy nature of the country. A number of years ago the French Government set about to reclaim it, and it was accomplished in the following manner. Firstly they planted willows; thereupon sprang up the osier industry with the allied trade of basket-making, wickerwork, &c., finding employment for a number of individuals. After a time, owing to the willows dropping their foliage annually, and the roots retaining the silt washed from the highlands, it became possible to plant other varieties of trees on the land thus reclaimed. The forestry industry then sprang up with allied industries, timber-cutting, charcoal burning, and so on—this industry gradually supervening the willow working trade. To-day there are portions where it is possible to grow wheat and other crops, and the climate is most pleasant and healthy—most of the former unpleasant features are almost banished, and the province is an asset by no means to be despised by the country at large. This surely is a triumph of human ingenuity, working against nature, by the aid of nature, for the benefit of man.

SUGGESTION FOR NATIONAL REAFFORESTATION.

AN OUTLINE FOR A NECESSARY ACT.

Every person owning land to the amount of 10 acres or more shall retain, plant, or cause to be planted, not less than 2½ per cent. of the whole in forest trees. The trees selected shall be at the owner's discretion, provided that under normal conditions they may be expected to attain a height of not less than 20 ft. and 1 ft. in diameter of trunk. Stone and pip fruit trees excluded. The method of planting and reservation may be either as shelter belts, plantations, clumps, or isolated specimens.

For computation, the following number of trees to be considered equivalent to a 2½ per centage. Isolated specimens, an average of not less than three to an acre; clumps (three trees or more, not less than 6 ft. apart), an average of six trees per acre; plantations or shelter belts, an average of not less than seventeen trees per acre planted 4 ft. apart or more—equal to in all an average of one tree per 8 ft. square to area planted.

In plantations and shelter belts measurement of area may also be resorted to; in that case the measurements shall be taken 6 ft. from the trunk, outside the line of trees, &c.

There would be several other clauses necessary, defining the ownership of the trees, prevention of planting evergreen species within a chain of public road, distance from boundaries, *re* possible nuisance or damage, &c., too numerous to mention here. The Government should also assist by publishing leaflets descriptive of suitable trees, their treatment, requirements, &c. They should also obtain seeds of the most useful kinds, and supply at cost price to *bonâ fide* planters. I quite believe the opposition to some such method would be practically negligible, and in twenty years from the time the Act was enforced there would be a huge national asset.

A SUGGESTION FROM JAMAICA.

The "Journal of the Jamaica Agricultural Society," referring to the casual way in which many recipients of that journal read it, approves of the suggestion by the chairman of a Branch Agricultural Society:—

"That at each meeting a member (or members) of the Branch should be appointed to read the last issue of the Journal previous to the next meeting and select therefrom what in his opinion is the best and most useful article for the particular Branch and discuss it at the next meeting, and that it should be put on the Agenda as a part of the regular business of each meeting.

"This is an excellent idea and a very practical method of ensuring that the articles in the Journal reach most of those which they are intended for. We know from letters we receive that the Journal is often read so casually that we are written to, asking for exactly the same information as was already given in the Journal the month previously."

[We constantly are having questions sent to the "Q.A. Journal" by subscribers, who, if they had read their latest Journal, would have saved themselves and us the trouble of writing and the cost of postage.—Ed. "Q.A.J."]

Tropical Industries.

COTTON-GROWING IN QUEENSLAND.

By DANIEL JONES.

My object in asking the Editor of this "Journal" to give space for the photograph accompanying this article is not so much to attract attention to the general pursuit of cotton culture as to dispel the many fallacies which some persons will persist in expressing; and thereby retard the growth of a much required and important vocation.

As I have frequently pointed out, conditions in Queensland do not in any sense compare with those of other countries, inasmuch as our labour conditions, our climate, our seasons are all factors that bear materially on the successful conduct of this pursuit. For many reasons, too numerous to recapitulate, this industry has suffered woeful neglect. As a consequence, rural pursuits are not nearly so advanced as if this crop had been held before the farmers' attention in the way its merits deserve. As space will not permit of a lengthy article, I will briefly confine myself to the questions relating to its perennial character, its longevity, its acclimated virtues, its drought resistant features, and its auxiliary value as a stock fodder in periods of drought.

The illustration depicts a shrub of Jones' Hybrid, a fibre which I have been closely observing for the past ten years with some considerable degree of interest.

This variety was first observed in numerous fields of cotton in 1906, and, as far as can be surmised, is a sport originating from a Sea Island variety (Seabrook) and an Upland Type (Russell's Big Boll). I have seen this shrub thriving in fields remotely apart as Capella and Cleveland, while the best and most prolific in field culture was found at Beeville, near Goodna, on Mr. Butler's farm.

Unfortunately, field tests on a large scale have not been carried on; nevertheless the species from all appearances is likely to prove a welcome strain, and one that may be of high commercial value.

In reporting on a sample of this fibre, Mr. J. C. Atkins, the secretary of the British Cotton Growing Association, states that the sample sent was good and worth at that time 1s. per lb. in Liverpool. He further remarks:—"It appears to me you have succeeded in securing a good hybrid which will probably, as you suggest, yield considerably more than Sea Island. I feel sure that it will pay to export this quality of cotton to England, as it is much preferable to Caravonica."

Some samples have been reported on by Mr. J. C. Brünnich, the Chemist to the Department of Agriculture, for approximation of lint to seed in the specimens submitted.

Three tests were made which indicated the ratio of seed to lint as being 32 per cent. to 32 to 36 per cent of fibre, a very satisfactory average. It is claimed that our Mascotte types of cotton have a higher percentage of lint to fibre than is quoted here.

The shrub here illustrated has cropped regularly for the past eight years, and yields have been forthcoming of from 2 to 4 lb. of seed cotton. In field practice, when growing herbaceous types, it is regarded as

PLATE 11.—A VETERAN COTTON BUSH, TEN YEARS OLD, JONES' HYBRID.

profitable if 4 to 6 ounces per shrub can be gathered. The subject of hybridisation of cotton has so far received little attention from anyone save Dr. Tom Bancroft, who, some few years since, crossed several varieties, one of which is now growing in the Botanic Gardens, and is a

cross of Seabrook and Toole's Improved, an Upland variety, from which a Fassifern grower, in 1895, secured a crop of 2,000 lb. per acre. Unfortunately, this seed was not saved for further sowing, an oversight which is much to be regretted.

THE HYBRIDISATION OF COTTON.

The matter of the hybridisation of the cotton plant is one that holds out great prospects in Queensland. The numerous varieties flourishing in a more or less wild state throughout the country, many by natural crossing, have originated new and meritorious qualities noted for either hardihood or length and strength of fibre, factors indicating that a careful search and a judicious selection will place in our possession varieties of cotton surpassing any that can be imported, and so acclimated to our conditions that the initial risks ever present in experimenting with exotic species will be considerably lessened.

My personal knowledge of these, so to speak, "volunteer" varieties, which have been submitted or observed, from such regions as the Gulf of Carpentaria, Cape York Peninsula, westward to Winton, Charleville, Texas, and Longreach, indicates a wide habitat in which the plant thrives. In a recent letter from an American seed house to Messrs. Joyce Bros., commenting on a variety of cotton supplied that firm when some time since they were engaged in the trade, there is given valuable testimony to the adaptability of our climatic conditions as regards the improvement of types. The letter stated that the example of local-grown cotton forwarded, grown originally from the American seed, showed considerable improvement in quality of fibre, and the recipients were of opinion that a decided improvement in the quality of cotton might be made by the exchange of seed and experimental work conducted in this way.

So prolific and hardy have many of these acclimated cottons become, that in places in the North I have observed the local roadways obstructed by the growth of this self-sown cotton, compelling the local authorities to take steps for its abatement.

THE LONGEVITY OF THE PLANT.

The longevity of the cotton shrub is a factor of great value, inasmuch as the question of rainfall, a critical point in the matter of annual sowing, is largely eliminated. In those districts in the State where the climatic conditions are suitable for this practice the growth of cotton as a perennial has all to commend itself to prospective planters. The lessened expense and anxiety associated with annual planting is avoided. A cotton farmer the other day, in the midst of a very dry period, averred his indifference as to a season's rainfall, instancing the plot of cotton under notice as being established, and his future crop thus assured.

The illustration depicts a shrub, the seed of which was sown eight years ago, and has been bearing continuously ever since. As proof of the hardihood of some species of the plant, I observed some two months ago, cotton plants struggling that were sown five years previously, and had for the past two years been regularly browsed on by stock. This I claim to be a clear testimony of the hardihood of the shrub, enduring,

as in this case, both the browsing of animals and the vicissitudes of drought. In the more northern parts of the State shrubs are known to thrive up to fifteen years, cropping regularly; and, in fact, being often considered a nuisance. I have frequently inquired as to the whereabouts of shrubs formerly observed, and have been told by the tidy housewife that they created such a mess with the dropping fibre they had to be cut down.

This is surely a clear instance of dirt being matter in the wrong place.

ACCLIMATISED VARIETIES OF COTTON.

During my numerous investigations in search of improved sorts, I have observed several types which, through long years of, so to speak, self-acclimatisation, have developed distinct characteristics in relation to quality, colour, and length of fibre, as well as disclosing different habits of growth.

These variations are undoubtedly caused partially by climatic conditions as well as self-hybridisation.

Here the law of Mendel undoubtedly has its influence in a marked degree, and if careful investigation could be made of the variations to be seen, and traced to their source, much might be learned in regard to the improvement of the cotton plant. At Capella I noticed a variety unique in its habit, a most prolific cropper, which had been growing for several years unattended. In the same locality also I observed another type, totally different in colour of fibre and not so prolific. At Gordon Downs I noticed an arboraceous species which was cut down annually by frost, but bore excellent crops of one of the best staples I have observed growing on that class of shrub.

At Charters Towers I also found a variety of special merit, acclimatised, and which should be preserved, if possible, for plantation experiments. At Cape York there was growing in the plantation established by Mr. Frank Jardine a variety of herbaceous cotton having one of the best staples I have examined. Mr. Buhot, when acting as Stock Inspector in the Gulf country, submitted a "volunteer"-growing cotton of exceptional quality. All these instances prove that a collection of varieties already acclimatised would prove of advantage to prospective cotton-growers. These shrubs, succeeding as they do in such diverse localities, afford evidence commending this pursuit to new settlers.

AN AUXILIARY TO SHEEP FARMING.

Nor is it only for its fibre value that cotton can be appraised. Past experience has abundantly established it to be a standby in periods of drought. While it is by no means claimed to be a stock food, it, nevertheless, has on many an occasion demonstrated its value to dairy and sheep farmers as a natural silo when failure of other forms of vegetation rendered the position of the settler one of anxiety for the lives of his animals.

In the early days of cotton-growing, the expectation of being able to turn stock on to the harvested cotton plantations relieved anxiety

about winter feed. In those days our stock were carried through the winter season with less trouble than otherwise would have been the case. Our working stock and cows were tided over the sparse months, and when spring came were sleek and in fit condition for work.

From personal knowledge, I am confirmed in the opinion that if cotton plantations existed to the extent they might have attained, the loss of stock during the late drought to the small dairyman or sheepbreeder would not have been so acute as has been experienced in the calamitous period now happily passing away.

The beekeeper will also find in the cotton shrub a source of pollen in the early springtime, when he requires it most owing to the absence of other bloom.

As a cattle food the seed of the plant is valuable, while the oil industries of the world are largely dependent on the cotton fields for the great part of their needs.

I have, in this necessarily brief article, but advanced a tithe of the many advantages accruing from or associated with such a vocation as herewith now under consideration.

America finds the cotton industry one of the chief goldwinners for her farmers. In 1914 the value of exports of raw cotton from that country reached £150,000,000. As a factor in closer settlement, and also in any scheme for the establishment of "Ready-made Farms," the cotton plant holds out encouraging prospects. The vocation requires less experience, capital, or farm knowledge than any in vogue in Queensland.

As an auxiliary to dairying, sheepbreeding, beekeeping, and being a crop so drought-resisting, as also of high initial value, which does not deteriorate by ordinary exposure to the elements, as is the case with some farm crops, it has much to commend it to the notice of prospective settlers, either in the Commonwealth or elsewhere.

The imports into the Commonwealth in 1914 of raw cotton, chiefly from India, amounted, according to an estimate of the Federal authorities, to £47,700 worth of fibre which (and much more) could easily be furnished from Queensland farms.

COTTON-PICKING.

An important feature of cotton hybridisation is to secure a free-opening boll, which will lend itself to the enabling of mechanical devices to be used in the picking of the fibre.

American experiments have so far signally failed to invent a cotton-picking machine, largely owing to their inability to grow perennial types. These are usually free-picking varieties, the fibre of which, not being so adhesive to the capsule, and when fully matured hangs pendent so that a very slight pull will draw the fibre out.

I have, for some years, given attention to the selection of varieties that will be of value in respect to the utilisation of mechanical appliances and thus accelerate the harvesting of the cotton crop, the idea being to raise a cotton to suit machine-picking.

Recent tests of an appliance in Brisbane indicate that there is a probability of some degree of success, particularly when operating on the free varieties. It is well known that certain types are so adhesive to the boll that difficulty is experienced in freeing the cotton from the boll.

Such varieties as Sea Island and most of the Upland sorts are of this class; hence, in plantbreeding, this aspect must be taken into account, it being an important factor in the cost of harvesting a crop of cotton.

Size of boll, height of plant, hardihood, immunity to plant diseases, quality of fibre, period of ripening; all these call for attention when carrying out experiments in the improvement of the cotton plant.

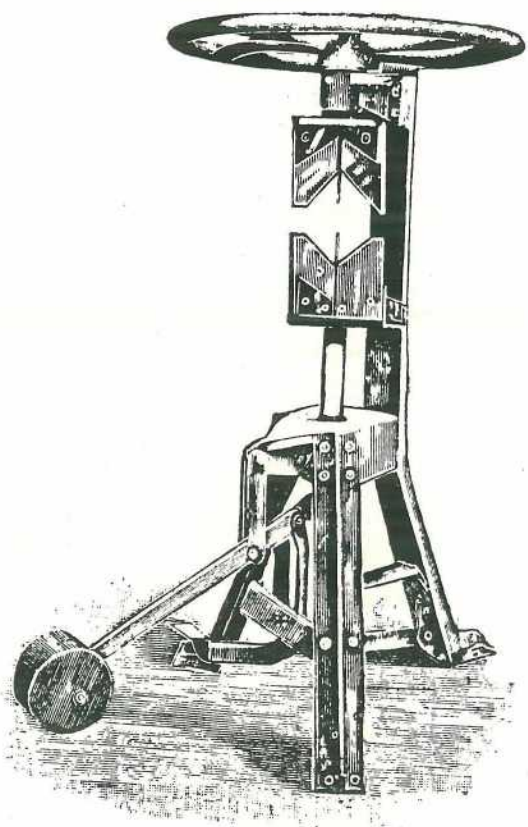
Now that the public mind is so much exercised by the problem of dealing with returned soldiers, I may be pardoned for indicating the unique merits of this crop as a factor in the preparation of "Ready-made Farms" for returned soldiers.

THE PREPARATION OF COPRA.

The methods of preparing copra are briefly as follow:—The outer fibrous husk (the coir from which ropes and mats are made) which envelopes the hard shell of the coconut is first removed. This is usually effected by striking the coconut on to the pointed end of a hard piece of wood or iron bar fixed firmly in the ground. A few sharp blows, followed by twists on the part of the operator, loosens the husk, which is then pulled off by hand. The husked nut is then split in two by cutting through the hard shell and kernel with a hatchet. The watery contents (so-called milk) are drained away, and the halves are placed on a clean piece of sandy ground or on a rough platform fully exposed to the sun, with their hollow sides uppermost. After a few hours' exposure, the portions of the kernel left in the halved nuts shrink sufficiently to allow of their being readily removed from the shells, and the separation of shells and kernels is the next operation. The kernels are then further exposed to the sun for several days, being frequently turned at short intervals, until sufficiently dry to be bagged for export. Copra prepared in this manner is known on the market as "sun-dried" copra, and if carefully and quickly made from thoroughly ripe nuts is usually of good quality. In order to expedite the drying process, the kernels, after being removed from the shells, are sometimes placed on tables of sheet iron protected from rain, or on a "grille" made of green saplings or bamboo over a fire of coconut shells. By this treatment, drying is completed in from twenty-four to thirty-six hours, but frequently the copra becomes blackened owing to contact with smoke from the fire, and has a smoky smell, in consequence of which its market value is lowered. Copra prepared in this manner is known as "kiln-dried," "smoke-dried," or "smoked" copra. During recent years specially constructed copra-

drying houses and machines have come into use, fitted with heating plant which maintains a current of hot, dry air, to which the kernels are exposed. The drying process is completed in a few hours by means of these contrivances, and copra of high quality is produced. This copra is known in commerce as "hot-air dried" copra. The care bestowed on the preparation of copra has considerable influence on the products subsequently derived from it, therefore clean, carefully prepared copra fetches the highest price on the market. If properly prepared from ripe nuts, copra is greyish white, and free from dirt and mould, and of an agreeable nut-like odour. Copra imperfectly dried is liable to the attacks of fungi, which cause discoloration and deterioration. It then has an unpleasant, often black appearance, is soft, and frequently of disagreeable odour. If kept dry, carefully prepared copra will remain in good condition for a long time. A considerable amount of copra is made in and exported from Papua. In 1913-14 the Papuan exports amounted to 24,020 cwt., of a value of £26,063. The value of the export of copra from the Solomon Islands (British) in the same year was £73,637.

The above notes on Copra are derived from an interesting book on Oil Seeds and Feeding Cakes, issued by the Imperial Institute, London, 1915.



Professor Dunstan, Director of the Imperial Institute in, we think, 1913, transmitted to the Ceylon Agricultural Society some useful information with reference to the latest developments in machinery for treating coconuts, especially with regard to the separation of the husk, which, as above stated, is, at present, wrenched off by hand with the aid of a spike in the ground.

We described, in the May issue of the "Queensland Agricultural Journal," 1913, a machine which cuts the entire layer of fibre into three longitudinal segments, which can then easily be removed by hand. With the aid of this machine, a skilled workman can remove the husks from as many as 100 nuts per hour. The illustration will explain the structure of the machine.

BERSEEM.

Referring to the note on Berseem Clover in the January issue of the "Journal"—this wonderful fodder plant (says the "Fruit World," Melbourne) has been introduced from Egypt, and has given splendid results wherever grown throughout the irrigation areas in the northern parts of Victoria. It is not generally known that there are four varieties of Berseem. The only one suitable for Victoria is Mesgawi. This is by far the most important variety. It is tall, luxuriant in growth, and yields an astonishing amount of green fodder. Where it can be grown in irrigated areas as many as five cuts can be obtained in a season. To derive the full benefit of the plant, the seed should be sown as soon as possible after the first autumn rains, or, in places where water is plentiful, early in February. Berseem is also used as a green manuring crop prior to the sowing of lucerne, and it is in this respect that we anticipate it will be mostly grown in Victoria. Messrs. F. H. Bunning Pty., Ltd., of 64 Elizabeth street, Melbourne, have just landed a large stock of new crop Berseem Clover seed and will be pleased to submit samples and send further particulars on application.

Botany.

NOTES BY THE GOVERNMENT BOTANIST—NO. 2.

TWO USEFUL TEA TREES (LEPTOSPERMUM).

(Plates 12 and 13.)

In 1905 R. T. Baker, F.L.S., and H. G. Smith, F.C.S., of the Technological Museum, Sydney, described in the proceedings of the Royal Society of New South Wales a new species of Leptospermum under the name of L. Liversidgei, and as this species and a variety of the well-known plant Leptospermum flavescens with probably the same properties, are found in this State and may prove of economic interest, it has been considered advisable to draw attention to their presence.

The feature about these two plants is the presence of a strong-scented oil of a citron odour similar to that possessed by the Citron-scented Gum (Eucalyptus citriodora).

L. Liversidgei occurs in abundance on the mainland and islands along our coast from Point Danger to about Bundaberg, and so far as observed makes a shrubby growth only. The new variety of L. flavescens, to which the name *citratum* (Bail. f. and White) has been attached, was recently found by C. T. White at Springbrook, on the Macpherson Range, where, like the normal form in other places, it forms a large shrub, occasionally making a small tree up to twenty feet high.

Should these plants furnish an oil equal to that of the Citron-scented Gum in value, it might prove profitable to cultivate the plants for the sake of this product, as, like other species of the genus, plants could be propagated by cuttings and put out to form hedges or individual specimens, and with judicious pruning at certain seasons of the year could be made to produce crops for many years. Unlike the Eucalypts the Leptospermums are liable to drop their leaves during the process of drying, therefore this would have to be taken into consideration when preparing the crop.

Baker and Smith give the composition of the oil of L. Liversidgei as—

Citral	35·00 p.c.
Geranyl-acetate	5·35 p.c.
Free Geraniol	9·74 p.c.
Dextro-pinene	25·00 p.c.
Sesquiterpene and undetermined ..	24·91 p.c.
	100·00 p.c.

Besides the vernacular name Tea Tree the Leptospermums are also known as Native May; the former name was attached owing to the fact that the leaves of L. scoparium were used during one of Captain Cook's expeditions as a substitute for tea. The name Tea Tree has also been applied to allied plants, as, for instance, the genus Melaleuca, to which the well-known Paper-barked Tea Tree belongs, but is often erroneously termed Ti Tree.

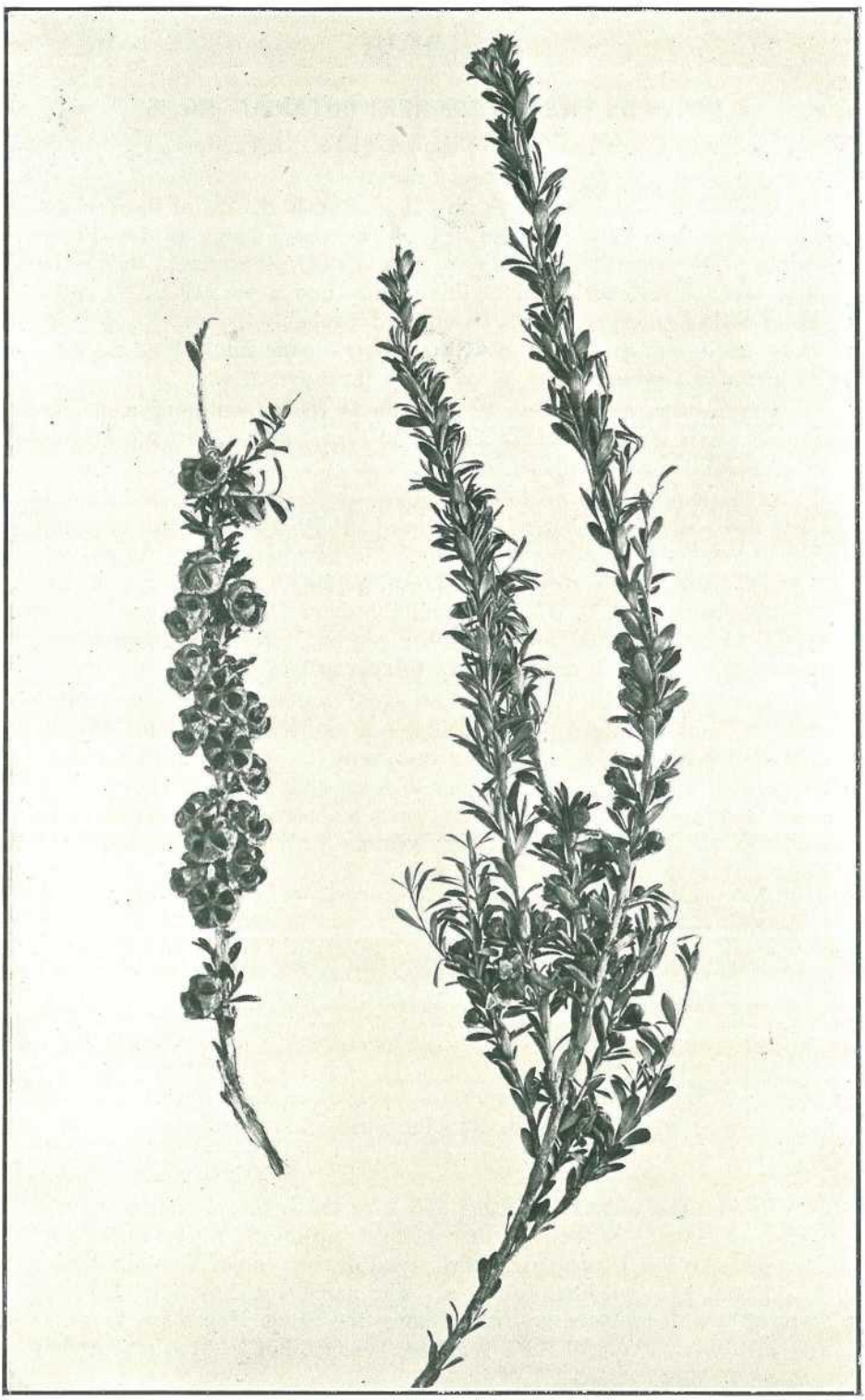


PLATE 12.—LEPTOSPERMUM LIVERSIDGEI.

PLATE 13.—LEPTOSPERMUM FLAVESCENS, VAR CITRATUM.

Science.

SOIL ANALYSIS.

Leaflet No. 293, issued by the Board of Agriculture and Fisheries, London, October, 1915, deals as follows with the matter of soil analysis:—

"Inquiries are frequently received by the Board from farmers and gardeners who wish to be informed where they can have soils analysed. In most cases the idea appears to be entertained that having a soil analysed is a ready means of determining its manurial requirements or of obtaining an indication of its fertility. A brief discussion as to how far this view is correct may therefore serve a useful purpose.

"A complete soil analysis includes chemical, physical, and bacteriological investigations, and may be accompanied by general field observations for the purpose of ascertaining the nature of the subsoil, the water supply, and climatic and other conditions important for the growth of plants. A full investigation of this kind, however, is very laborious, and in practice the analysis is usually less comprehensive, and aims not so much at giving a complete account of the soil as at determining the amounts of certain substances present in the soil which are known to have an important effect on crop production.

"Experience has shown that a soil analysis is of little practical value when the interpretation is based on the results obtained from an isolated sample of soil from a district of which the analyst has no intimate knowledge. In certain special cases, *e.g.*, where it is required to determine whether a soil is in need of liming, an analysis may be of great assistance to the farmer, but even where the investigation is a comprehensive one the analyst can only give a very incomplete idea of the general fertility of a particular field. It is difficult to place an absolute value on the results, and the element of uncertainty enters too largely into the interpretation. The difficulty will be appreciated if an attempt is made to obtain information as to the best system of manuring.

"The analyst can determine as accurately as need be the percentages of nitrogen, phosphates, and potash in the soil, but it has been found that, even where external factors, such as climate, depth of soil, &c., do not enter into the case, there is often little or no connection between these percentages and the soil's fertility or its manurial requirements. Any ordinary soil contains much more total plant food of all forms than a single crop of any kind can possibly require. Most of this plant food, however, is in a condition in which the plant cannot make immediate use of it, and is only gradually made available, the rate varying in different cases. As the plant can only make use of the free or available food, it is clear that it is possible for one soil containing quite small amounts of the manurial substances to produce better crops than another soil containing large quantities, if for any reason the first soil gives up

its material to the plant at a more rapid rate than the second. In fact, some soils contain large quantities of nitrogen and still respond most readily to small dressings of manure containing available nitrogen, because practically all that is already in the soil is unavailable and, as far as the plant is concerned, might almost as well not be there at all. This also holds equally for phosphatic compounds; a soil may contain a good deal of phosphate and yet respond to more.

"It is true that in the case of phosphates and potash a method has been devised of roughly measuring the amount which may be regarded as of immediate or prospective value to the plant, by ascertaining the quantity which is dissolved out in a given time by a weak solution of citric acid. This method gives results which in many cases indicate fairly well whether a particular soil will respond to an application of either of the two kinds of manure, and may be used in comparing soils of the same class. At the same time, there are many cases where the results obtained are at variance with those obtained by actual experiment in the field, and so far no ready method has been discovered by which the availability of the nitrogen in the soil can be estimated, except as regards the small amount present in the form of nitrates or of ammonium salts. It will be seen, therefore, that chemical analysis of an isolated sample of soil can hardly be expected to supply a very accurate and reliable means of determining its manurial requirements, and it is probable that a simple field experiment would yield better results.

"It is not only a question of what the soil contains, but also of what the plant needs. A plant is a living thing and its needs are not constant, but vary with the conditions under which it is grown. Thus a plant *needs* more phosphates on a clay soil than it would on a sandy soil, and it *needs* more potash on a sandy or peat soil than on a loam. Again, a plant growing in a district receiving 32 or more inches of rain is in greater need of phosphates than in districts with less than 24 inches of rain.

"Further, under present conditions an isolated mechanical analysis cannot be considered of much value to the farmer. By means of a mechanical analysis it is possible to measure the proportions of particles of different degrees of coarseness in the soil, and so determine to some extent the ability of the soil to meet the plant's requirements as regards the supply of water and the proper aeration of the soil. At present, however, it is probable that an experienced farmer would be able to gain more useful and accurate information by examining the land carefully at different times of the year.

"*Directions in which a Soil Analysis may be Useful.*

"While isolated soil analyses are of little practical value at present, there are one or two directions in which an analysis can afford useful assistance.

"1. A farmer may wish to know whether he has any reasonable chance of obtaining results similar to those demonstrated by field experiments on another farm in the locality. Where such experiments have shown the advantage of applying lime, phosphates, or potash, the analyst

can determine whether similar results are likely to be obtained on the soil which he analyses. The element of uncertainty will always be present, but there is every prospect that the advice will prove to be correct. In this way the farmer may be saved much time and expense in carrying out the experiment for himself.

"2. A soil analysis may also prove of assistance where a farmer proposes to introduce a system of cropping or tillage known to give good results elsewhere in the locality, but before doing so wishes to compare his soil with that on which the system is successful. Analysis may reveal differences which although not obvious to casual inspection are of vital importance to the success of the enterprise. Two heavy soils, for instance, may look very similar, but one may owe its heaviness to very fine particles, and the other to silt particles, and the methods successful in one case may prove failures in the other.

"3. A farmer entering a new farm may wish to obtain complete information as to the possibilities of the soil, with a view to taking up some special branch of production, or ascertaining for what special crops the soil is suited. A soil analysis will show whether the soil and general conditions resemble those obtaining where the proposed system of farming is known to be a success. Where important differences are revealed the farmer may be able, with the assistance of the agricultural expert, to modify the scheme so as to adapt it to the possibilities of his soil.

"It will be gathered from the above notes that the maximum assistance can only be obtained from a soil analysis when data are available for comparison with soils of the same type. Fortunately, the country is now provided with organised schemes under which systematic investigations may be made and the results recorded. Soil surveys supplying fairly full information with regard to special classes of soil in a limited area, and carefully conducted field experiments, are being carried out in many parts of the country. As time goes on, therefore, the possibility of setting up comparisons will steadily increase and analyses will be of correspondingly greater value.

NEW WAY TO GET POTASH.

Potash from feldspar is the latest announcement of scientific men. Dr. Thomas H. Norton, the Department of Commerce's commercial agent, announces that a young New York chemist has discovered a new process for extracting potash from the feldspar which is found in such large quantities in the Allegheny mountains.

Aluminum, silica, and potash are closely united in the feldspar and acids do not liberate them. Dr. Norton says an alkaline process is used before they can be split with acids. This releases the aluminum quickly and cheaply, and gives potassium carbonate almost directly from the rock. With potash in this form we can immediately get any kind of potash salts, including nitrate. The aluminium is also of much value, for 300 tons daily of this product is now required in our industries.—"Fruit World."

Vegetable Pathology.

A METHOD OF RENDERING CUCUMBER AND TOMATO PLANTS IMMUNE AGAINST FUNGUS PARASITES.

The prevalence of tomato diseases of late years renders it imperative that growers should be able to recognise the early symptoms of diseases, so that remedies may be applied before they have got beyond control. In the event of their not being able to determine any particular disease, there should be no hesitation in seeking the advice of the Entomologist and Vegetable Pathologist of the Department of Agriculture and Stock, Mr. H. Tryon. Meanwhile it may be of service to record some successful experiments conducted at Kew Gardens, England, by Mr. George Massee, V.M.H., of Kew, in 1903.

We cite as one subject of the experiments for combating fungoid diseases a minute fungus not uncommon in Britain and other countries, known as *Dendryphium comosum*. Previous to the present record, *Dendryphium* had never been known to act as a destructive parasite, and its becoming so was entirely due to its accidental introduction along with the manure to a set of conditions which enabled it to assume a parasitic existence on plants already predisposed to disease. As far as cucumbers are concerned, the experiments conducted at Kew proved conclusively that *Dendryphium* cannot attack these plants when growing in a cool frame. The use of fungicides in the form of sprays did not by any means produce the results desired and anticipated, and further experiments demonstrated that, under the conditions necessary for the rapid production of cucumbers, the daily syringing and constantly damp surface of the foliage render useless those fungicides which, when applied under more favourable circumstances, have proved effective.

A series of experiments was then carried out in order to ascertain whether some substance taken up by the roots of cucumbers and tomatoes would not render plants thus treated immune against the attacks of fungus parasites, without, at the same time, exercising any injurious or retarding effect on growth or on the production of fruit.

From among the various substances tested, sulphate of copper alone met all the above requirements. The treatment, generally speaking, consisted in watering the plants every third day with a solution consisting of one part of copper in 7,000 parts of water. The check plants, which were untreated, were indiscriminately mixed with the treated plants. The watering was done in the afternoon, and the quantity used with each plant was sufficient to soak the soil thoroughly.

After a month's treatment, all the tomato plants were perfectly free from disease, but of 300 cucumber plants, 34 showed blotches of the disease, while most of the check plants, tomatoes and cucumbers, were badly diseased.

At this stage both treated and check (untreated) plants were sprayed with water containing the spores causing their respective diseases, and this was continued weekly until the end of the experiments. Under this drastic treatment all the untreated check plants were badly diseased during the following two weeks. After six weeks' treatment with the solution of copper, as above, the strength was increased to 1 part of sulphate of copper in 6,000 parts of water, and the soil was soaked every fourth day to the end of the experiments, which lasted eleven weeks. At the expiration of this period both tomato and cucumber plants were bearing a good crop of well-matured fruit. Not a single one of the tomato plants so treated showed a trace of disease, and, in the case of the cucumbers, the disease never extended beyond the cotyledons, and this notwithstanding the fact that badly diseased plants were growing amongst the treated plants during the whole period.

PRACTICAL DIRECTIONS FOR TREATMENT.

Commence watering cucumbers and tomatoes, when a fortnight old, every third day with a solution consisting of 1 oz. of sulphate of copper dissolved in 50 gallons of water. After treating for six weeks as above, commence watering every fourth day with a solution consisting of 1 oz. of sulphate of copper in 35 gallons of water. The sulphate of copper should be pure, and rainwater should be used if possible.

It should be stated that the fungus disease (*Dendryphium comosum*) has not yet been noticed in Queensland, but *Fusarium lycopersici* is found, together with other diseases, on the tomato in this State. It does not, however, follow that the above treatment will necessarily be effective here.

THE "AGRICULTURAL GAZETTE" OF TASMANIA.

In the December, 1915, issue of the above publication it was notified that "solely from motives of expediency" the "Gazette" would cease to be issued "for a time at least—perhaps for all time." All who take an interest in the progress of Agriculture, and particularly of fruitgrowing, in Tasmania will regret the cessation of the journal of the Agricultural Department of that State, a journal which for twenty-four years has done good service in the interests of fruitgrowers in all the other States of the Commonwealth.

Entomology.

COMBATING THE CANE BEETLE.

The General Superintendent of the Bureau of Sugar Experiment Stations has received the following report from the Entomologist of the Bureau, Mr. Edmund Jarvis:—

From 1 to 2 inches of rain fell at Gordonvale between the 11th and 12th December, and was at once followed by a primary emergence on volcanic soils, near Meringa, of the cane-beetles, *Lepidiota albohirta* and *frenchi*. The former grey-back species was fairly abundant on the Carrah Plantation, but had the season been a normal one would probably have appeared in greater numbers. Unfortunately, the most favourable time for experimentation with light-traps—viz., throughout the week immediately following emergence of the beetles—happened to be moonlight, so it was decided to experiment during this period with various bait-traps, in hopes of discovering one that might prove attractive to the adult insect. Eighteen different odours were tested, both alone and in combination, including oils obtained from plants closely related to those upon which *albohirta* is known to subsist, but no definite reaction was noticed.

We must not, however, expect speedy results from this method of control; in fact, the possibilities of its ultimate success are somewhat uncertain. Had our enemy been a moth or dipteron (two-winged fly) the task would probably have been simplified, as many such insects are very susceptible to the odours of different vegetable and mineral oils.

The cane-beetle in question is a sleepy sort of creature at the best of times, its motions, even when on the wing, being lumbering and ill-directed. Moreover, the wide and varied range of its dietary tends to curtail the chances of our being able to induce reaction towards aromas resembling those associated with the chief food plants of this pest. On the other hand, it is not improbable that flight, prior to oviposition, may be affected to some extent by the occurrence of certain native shrubs having roots more palatable to the future larvæ than those of sugar-cane.

Its aerial movements are certainly influenced very sensibly by (1) topographical conditions, (2) the presence or position of feeding-trees, and (3) the mechanical nature of soils.

Experiments made at the laboratory this month have demonstrated the susceptibility of *albohirta* to various aromas. Details need not be given here, but I may mention that the beetles reacted very noticeably and at once to the odours of cajeput oil, acetic acid, carbolic, and nitro-benzine, but were most strongly affected by oil of almonds. They were not in the least influenced by such substances as oil of cloves, fish oil, or

even the pungent fumes of formalin (40 per cent. strength). Knowledge of the above facts justifies us in assuming that reaction of a positive nature is, at any rate, within the bounds of possibility, and should encourage further research in this connection. Discovery of an attractive aroma would, I feel sure, go a long way towards solving the cane-grub problem. Once succeed in luring the beetles to a given spot, and their capture by mechanical methods would prove a simple matter. This method of repression is being successfully practised in parts of Europe, where bait-traps are extensively used against a formidable vine-moth (*Clysia ambiguella*). At a vineyard in France, for instance, during 1913, some of the catches per acre were 1,200 and 2,400 of these moths, the greater number being females, each capable of laying from 120 to 170 eggs.

A noteworthy instance of direct control brought about by hot weather occurred towards the end of this month. On the 19th instant we experienced a maximum dry temperature of 95 degrees F., following, on 20th instant, by 98 degrees F., the wet bulb on both days registering 86·5 degrees F., while the wind was from the warm quarter (N.W.). During the morning of the latter day cane-beetles (*L. albohirta*) became strangely agitated, and instead of remaining as usual on their food plants were observed to be taking short erratic flights or congregating on the shady side of tree trunks, evidently in a vain attempt to discover a cool resting place. Later, in the afternoon, a party of blacks who were collecting at Meringa told the manager of Currah Plantation that large numbers of cane-beetles were dying and dropping from the trees.

Finding their account to be correct, Mr. Greenaway communicated with this office, and the matter received personal investigation. Upon reaching the locality in question, the ground was seen to be strewn with dead grey-back beetles, mostly under, or in the vicinity of, Moreton Bay Ash trees (*Eucalyptus tesselaris*). No less than 25 were collected from beneath one gum tree of medium size, and in a space containing 2 square chains at random on forest land, Mr. Hadley picked up 98 specimens. Of these, 27 were males, 49 females, and 22 of undeterminate sex owing to injury by ants. The above area was hastily examined, so no doubt we overlooked several specimens hidden among herbage, &c. The occurrence of such heavy mortality acquires additional interest from the fact of its having happened about seven days after the emergence of these beetles, and consequently before they had had time to oviposit. I dissected several, and in all cases found the ovary only partially developed. The specimens contained 26 eggs each, most of which were more than half-grown. Further report on the question of oviposition is deferred until next month.

General Notes.

POISONING GREEN TIMBER WITH SODIUM ARSENATE.

C. W. BURROWS, Assistant Inspector of Agriculture, N.S.W.

In this country, where large areas of land are available for occupation, and are heavily timbered, it is of primary importance to remove the timber, either wholly or in part, in order to increase the productivity of the land, and the quickest means is usually the best.

Ordinary ringbarking is effective if done at the right time in that particular district, for it must be conceded that seasons vary considerably from year to year, making the operation an adjustable one. But ordinary ringbarking has one disadvantage—it is slow, often taking twelve to eighteen months before the trees can be burnt off.

Of late years, the action of arsenic has been introduced with marked success in hastening the killing by the ringbarking process, and trees that ordinarily would take months to kill by the old method are now killed in a few weeks, and frequently in a few days, by the application of arsenic.

Arsenic—the ordinary white arsenious oxide of commerce—costing about 26s. per cwt., is not soluble in water to any extent, so that soda, either the ordinary washing soda at about 5s. per cwt., or caustic soda at about 28s. per cwt., has to be used in conjunction with it, in order to make it soluble.

Should the ordinary washing soda be used, the proportion should be three of soda to one of arsenic, and boiling is necessary to bring about complete solubility. By using caustic soda, proportion of which is two of caustic soda to one of arsenic, the mere addition of water in reasonable quantity generates enormous heat, doing away with the necessity of boiling for the dissolving of the arsenic.

When large amounts of the solution are required, washing soda will be the cheaper, but for small quantities of solution, caustic soda will possibly be found the handiest, as boiling is unnecessary.

In dissolving the arsenic, whether for washing or caustic soda solution, there is one point worth remembering: Do not tip the whole of the arsenic into the solution in a dry state, but mix it to a paste slowly and carefully in the same way as the housewife treats her cornflour, then pour it slowly into the soda solution, stirring it all the time, and be careful to stand on the side away from the fumes, as they are poisonous. When once the soda and arsenic are dissolved and chemically combined, the bulk may be made up to the required dilution by the addition of water.

A useful strength for quick and effective work in all kinds of timber is as follows:—

Arsenic, 1 lb.
Washing soda, 3 lb., or caustic soda, 2 lb.
Water, 4 gallons
Whiting, ½ lb.

The addition of this whiting is merely that it may serve as an indicator on trees treated, as it turns white on slightly drying, making it quite certain what trees have been operated on. An empty kerosene tin makes a useful measure for dissolving in, as it holds 4 gallons.

The time to carry out the work of poisoning is when the tree is dormant—that is, when the sap movement is at its minimum and the sap right down in the roots and lower portions of the trunk. This occurs in the winter months from, say, March to July, according to the district, and must necessarily vary between these limits in a State like New South Wales, which embraces such a wide variation of climate. On parts of the North Coast ringbarking has been carried out to the best advantage as late as June and early July in certain years, whereas in the more central parts of the State late February and March have found the sap movements at their lowest.

The main object in catching the sap at the right season is to prevent suckering.

TO GET RID OF MOSQUITOES.

Various suggestions have been made from time to time for the destruction of mosquitoes in tropical countries. An American paper says that a very simple and perfectly effective remedy is to make use of permanganate of potash. Two and a-half hours are required for the development of the full-grown mosquito from the larva. It can be instantly killed, either in its infancy or at maturity by contact with minute quantities of this chemical. A solution of the salt containing only 1 part in 15,000 parts of water distributed in swamps and water-holes where mosquitoes breed will render the development of the larvæ impossible. A handful of permanganate will oxidise a 10-acre swamp, kill all the embryo insects and keep it free from organic matter at a cost of 25 cents (12½d.). An efficacious method is to scatter the crystals wide apart. A single pinch of permanganate has killed all the germs in a 1,000-gallon tank. The above is taken from "The Public Health Journal," U.S.A.

"It has long been known," said the London "Times," that Barbados is the only West Indian island that is absolutely free from malaria and from the presence of the Anopheles mosquito, and the reason for this was soon discovered. It appears that all the pools and swamps in the island were stocked with swarms of a tiny fish (known locally from their vast numbers as "Millions"), and that their favourite food was the larvæ of the mosquito."

For personal protection against mosquitoes, a Zanzibar paper recommended the use of alum. If a piece of alum about the size of a marble is thrown into a bowl of water, and the hands and face wetted with the solution, not a mosquito will approach you. They hum about a little, and disappear.

The "Agricultural News," Barbados (December, 1915) takes the following remedy for mosquitoes in pools and swamps from the "Colonial Journal" of October, 1915:—

"Ducks, which occur in all regions of the globe, are among the greatest enemies of mosquitoes, and consequently of yellow fever and malaria. Their value in this respect has been determined as follows: By means of dams two pools of equal area were made in a stream. Ducks were placed in one and fish in the other. The former was speedily cleared of mosquitoes, whilst the second continued to maintain the insects in all stages of development. Wild ducks were then introduced and found to prefer the insects to all other foods. At the end of twenty-four hours no pupæ were found in the pond, and after two days all the larvæ had been destroyed. These experiments confirm the observations of William Lockwood, who found that the duck was particularly adapted to devouring the larvæ on the surface of water, and of McAtee, who found mosquitoes in the gizzard of a wild duck.

"The mosquito has numerous animal enemies, of which the duck is the most widespread and consequently the most suitable to clean up unhealthy marshy districts which it would be too costly to drain."

AUSTRALIAN WHEAT TO FEED THE WORLD.

MEYER BROTHERS, LIMITED.

The war's fearful devastation of European crops has caused an unusual demand for grain. The people of the world must be fed. Already there is a big demand for Australian wheat, and as time goes on this demand will grow and continue. Farmers must grow more wheat and still more wheat.

The 1915 harvest, so far as Queensland was concerned, was a poor one. This shortage was due to the excessive long spell of dry weather. But was there a real and legitimate reason why such a great loss—we might almost say waste—should be?

Irrigation, the systemised kind of irrigation, would have saved immense crops from destruction and many a farmer from financial ruin. The farmer who has an irrigating system has no fear of a long spell of dry weather. His crops are assured the necessary moisture just when they want it, and the result is always satisfactory from his point of view.

Farmers who want to make money and happy prosperous homes for themselves, and at the same time help this country to raise immense wheat crops, are specially recommended to install the system of irrigation known as Nunan's system.

With this installation on their wheat lands, they are ready to defeat the next dry spell and raise fine, profitable wheat crops. Nunan's is the best, and the only satisfactory irrigation system on the market. Once installed it gives no trouble. A turn of a tap and a fine rain-like moisture is distributed just where needed. The irrigating can be stopped at any point without interfering with the rest of the system.

Nunan's irrigating system costs about as much to put in as it will save you the first year, so that it is not an expenditure but an investment. Just think this out, Mr. Farmer! You paid for this irrigating system last year, but did you get it? Even if you didn't install the Nunan irrigation system you paid for it in lost profits that came from drought losses. You, as well as any other farmer in a drought-infested area, should at least start now and inquire all about this system and its benefits.

With the Nunan irrigating system you have rain easily and quickly available, all ready to nourish the growing plants, to mature a large crop. Nunan's system sends the water high enough into the air for it to become saturated with life-giving oxygen. Don't wait for the rain that "may" come, make sure. Write to Buzacott and Co., Ltd., the irrigation and pumping experts, Adelaide street, Brisbane. Ask them to send you a booklet which fully explains Nunan's system. Address your letter to Desk "B1," and it will receive the manager's personal attention.

PRESERVING BOOT SOLES.

In view of the increasing cost of hides, leather, and consequently of leather footwear, a correspondent points out that shoe leather can be made to last for twice the ordinary time by simply rubbing Stockholm tar into the wearing surface with the fingers. Use as much tar as the leather will take up; allow it to dry; then repeat the operation. Two coats will be sufficient.

Answers to Correspondents.

JOHNSON GRASS.

W. SPEIRS, Kairi—

With reference to your inquiry as to whether a suitable specific can be recommended for the destruction of Johnson Grass, with which your field is overrun, the Director of Agriculture replies that, "although arsenical solutions are used in the case of prickly-pear and some scrub growths, it is almost impracticable to kill Johnson Grass by this means, owing to the fact that the creeping underground stems ramify through the soil and penetrate to a good depth. As you are doubtless aware, these underground stems possess buds at the joints which throw up shoots readily should favourable conditions prevail for plant development. This Department has already experimented in the destruction of Johnson Grass by means of arsenical sprays, and our experiments bear out the above."

In May, 1912, the editor of this Journal paid a visit to Bundaberg with a view to obtaining information concerning the methods of irrigation adopted there on sugar plantations and farms. Amongst other places, an irrigated farm worked by Messrs. Redmond Bros. was visited. Here there were 68 acres under lucerne and maize. We noticed one lucerne field where the Johnson Grass had taken almost entire possession, but Messrs. Redmond did not appear to think the lucerne was in danger of being choked out. They maintained that it was quite easy to get rid of it by mowing it down before it seeded, when the roots gradually rotted out. We subsequently heard that the grass was ultimately destroyed by this means.

The Markets.

PRICES OF FARM PRODUCE IN THE BRISBANE MARKETS FOR FEBRUARY, 1916.

Article.		FEBRUARY.
		Prices.
Bacon	lb.	1s. 3d. to 1s. 5½d.
Bran	ton	£5 15s. to £6
Broom Millet	„	£33 to £36
Butter	cwt.	125s. to 135s.
Chaff, Mixed	ton	£5 to £5 10s.
Chaff, Oaten	„	£6 to £6 10s.
Chaff, Lucerne	„	£8 to £8 10s.
Chaff, Wheaten	„	£5 10s. to £5 15s.
Cheese	lb.	10d. to 10¼d.
Flour	ton	...
Hams	lb.	1s. 4½d. to 1s. 5d.
Hay, Oaten (Victorian)	ton	...
Hay, Lucerne	„	£5 to £5 5s.
Honey	lb.	5d. to 6½d.
Maize	bush.	6s. 4d. to 6s. 5d.
Oats	bush.	2s. 9d. to 3s.
Onions	ton	£3 15s. to £5 10s.
Peanuts	lb.	4d. to 4¾d.
Pollard	ton	£7 15s.
Potatoes	„	£17 to £18
Potatoes (Sweet)	cwt.	10s. to 12s.
Pumpkins	ton	£10 to £11 10s.
Eggs	doz.	1s. 4d. to 1s. 8d.
Fowls	pair	3s. 6d. to 5s. 9d.
Ducks, English	„	4s. 6d.
Ducks, Muscovy	„	6s. to 6s. 6d.
Geese	„	...
Turkeys (Hens)	„	7s. 6d. to 8s. 6d.
Turkeys (Gobblers)	„	20s.
Wheat	bush.	5s. 8d.

VEGETABLES—TURBOT STREET MARKETS.

Cabbages, per dozen	3s. 6d. to 8s.
Beans, per sugar bag	4s. to 9s.
Beetroot, per dozen bunches	8d. to 1s.
Carrots, per dozen bunches	9d. to 1s. 3d.
Cucumbers, per dozen	1s. 3d. to 2s.
Custard Marrows, per dozen	1s. 6d. to 3s.
Vegetable Marrows, per dozen	1s. 6d. to 3s.
Lettuce, per dozen	9d. to 1s.
Peas, per sugar bag	8s. to 10s.
Parsnips, per dozen bunches	1s. to 1s. 3d.
Celery, per dozen bunches	...
Sweet Potatoes, per sugar bag	5s. to 6s.
Table Pumpkins, per dozen	2s. to 6s.
Tomatoes, per quarter-case	1s. 9d. to 4s.
Turnips, per dozen bunches	8d. to 1s.
Rhubarb, per dozen bundles	...

SOUTHERN FRUIT MARKETS.

Article.	FEBRUARY. Prices.
Bananas (Queensland), per case ...	3s. to 9s.
Bananas (Fiji), per case ...	17s.
Bananas (G.M.), per case ...	18s.
Granadillas, per double-case ...	...
Mandarins, per case ...	...
Mangoes, per case ...	2s. to 6s.
Oranges (Navel), American, per case	20s.
Oranges (other), Japanese, per case	
Passion Fruit, per quarter-case ...	2s. to 6s.
Lemons (Local), per bushel case ...	7s. to 18s.
Papaw Apples, per double-case ...	2s. 6d. to 4s.
Pineapples (Queens), per case ...	7s. 6d. to 10s.
Pineapples (Ripleys), per case ...	5s. to 8s.
Pineapples (Common), per case ...	4s. to 5s.
Rockmelons (Queensland), per case ...	...
Strawberries (Queensland) per tray ...	...
Tomatoes, per quarter-case ...	3s. to 4s. 9d.
Cucumbers, per case ...	...

PRICES OF FRUIT—TURBOT STREET MARKETS.

Article.	FEBRUARY. Prices.
Apples, per case ...	10s. to 14s. 3d.
Apples, Cooking, (Victorian), per case ...	6s. to 9s.
Apricots, per quarter-case ...	...
Bananas (Cavendish), per dozen ...	2½d. to 6d.
Bananas (Sugar), per dozen ...	2d. to 3½d.
Cherries, per case ...	...
Cocoanuts, per sack ...	12s. to 15s.
Custard Apples, per quarter-case ...	...
Lemons (Lisbon), Local, per case ...	3s. to 6s. 6d.
Lemons (Italian), per case ...	21s. to 22s.
Mandarins, per half-case ...	...
Mangoes, per case ...	2s. 6d. to 5s. 6d.
Nectarines, per quarter-case ...	6s. to 9s.
Oranges (Navel), per case ...	17s. to 18s.
Oranges (other), Italian and American, per case ...	17s. 6d. to 20s.
Papaw Apples, per quarter-case ...	1s. 6d. to 4s.
Passion Fruit, per case ...	3s. 6d. to 7s. 6d.
Peaches, per case ...	4s. to 8s. 6d.
Pears (Local), per case ...	9s. to 11s.
Peanuts, per pound ...	4d. to 4¾d.
Persimmons, per quarter-case ...	3s. to 5s.
Plums, per case ...	8s. 6d. to 10s.
Pineapples (Ripleys), per dozen ...	4s. to 8s.
Pineapples (Rough), per dozen ...	9d. to 3s. 3d.
Pineapples (Smooth), per dozen ...	3s. to 5s.
Rockmelons, per dozen ...	1s. 6d. to 4s.
Rosellas, per sugar bag ...	...
Strawberries, per dozen pint boxes ...	...
Tomatoes, per quarter-case ...	1s. 6d. to 4s.
Watermelons, per dozen ...	...

TOP PRICES, ENOGGERA YARDS, JANUARY, 1916.

Animal.	JANUARY. Prices.
Bullocks	£20 7s. 6d. to £27 10s.
Bullocks (Single)	...
Cows	£15 to £17 17s. 6d.
Merino Wethers	48s. 9d.
Crossbred Wethers	54s.
Merino Ewes	34s. 3d.
Crossbred Ewes	52s. 6d.
Lambs	38s. 9d.
Pigs (Porkers)	71s.

LONDON QUOTATIONS.

London, 12th February.—Danish butter is quoted at 158s. to 162s. per cwt.

The market for frozen rabbits is dull, and prices are unchanged.

Hides are very firm. Queensland meatworks, 50-60 lb. are quoted at 11⅛d.; 40-50 lb., 10⅝d; 30-40 lb., 10⅜d. New South Wales meatworks, 11⅜d., 10⅞d., and 10 7-16d.

Leather is in good demand. Best Sydney is quoted at 17d. to 19½d.

Basils are in good demand owing to shorter supplies, and some inquiry for Government work. First Sydney, 14d. to 15½d.; New Zealand, 16d. to 18d.

The Liverpool quotation for middling American cotton, February-April shipment, is 7·81d. per lb.

Jute, native, first marks, February-March shipment, from Calcutta, £31 5s. per ton.

Hemp, high point, fair, New Zealand, February-April shipment, £47 per ton.

Mexican sisal hemp, £46 10s. per ton.

Rubber, fine, hard Para, 3s. 2¾d. per lb.; plantation, first latex crepe, 3s. 5½d.; smoked sheet, 3s. 4¾d.

Copra, South Sea, January-February shipment, £34 10s. per ton.

Raw linseed oil, spot pipes, £44 per ton.

The present value of Mexican sisal fibre is equal to about £46 10s. per ton, but exorbitant rates of freight render its import into Europe impossible.

Mauritius hemp (Furcrea) is quoted at from £35 for fair to £37 for prime.

Statistics.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF JANUARY IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALLS DURING JANUARY, 1916 AND 1915, FOR COMPARISON.

Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	Jan.	No. of Years' Records.	Jan., 1916.	Jan., 1915.
North Coast.	In.		In.	In.
Atherton	14·97	13	7·64	2·56
Cairns	18·83	27	32·01	3·29
Cardwell	17·54	27	18·37	10·02
Cooktown	15·24	27	16·32	8·19
Herberton	10·49	27	5·50	0·90
Ingham	16·95	22	21·08	13·95
Innisfail	25·28	27	22·33	7·97
Mossman	22·71	5	21·66	6·32
Townsville	13·70	30	9·89	9·33
Central Coast.				
Ayr	12·11	27	5·66	2·12
Bowen	11·05	27	7·76	0·34
Charters Towers ...	6·45	27	1·85	1·58
Mackay	15·73	27	9·25	2·94
Proserpine	18·23	11	8·71	1·02
St. Lawrence ...	11·23	27	0·41	1·73
South Coast.				
Biggenden	5·18	14	0·76	3·23
Bundaberg	10·62	27	1·30	3·86
Brisbane	6·45	65	2·34	2·11
Childers	9·01	19	1·39	2·43
Crohamhurst ...	13·44	22	3·71	5·78
Esk	5·71	27	1·54	5·43
Gayndah	5·76	27	0·62	5·59
Gympie	7·55	27	4·02	4·97
Glasshouse M'tains	10·09	6	3·48	8·66
Kilkivan	6·49	27	1·68	3·10
Maryborough ...	8·33	27	1·82	3·39

Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	Jan.	No. of Years' Records.	Jan., 1916.	Jan., 1915.
South Coast—continued:	In.		In.	In.
Nanango	4·78	27	2·36	2·15
Rockhampton ...	9·54	27	0·39	4·26
Woodford	7·40	27	4·42	2·78
Yandina	10·45	21	4·61	6·23
Darling Downs.				
Dalby	3·75	27	3·59	2·40
Emu Vale	3·32	17	2·25	3·83
Jimbour	4·13	24	2·20	1·90
Miles	4·17	27	3·52	0·38
Stanthorpe ...	4·16	27	3·39	3·36
Toowoomba ...	5·69	27	1·70	2·33
Warwick	3·89	27	2·60	1·74
Maranoa.				
Roma	3·77	25	1·67	0·43
State Farms, &c.				
Gatton College ...	4·48	14	2·04	2·42
Gindie	3·82	13	2·37	0·06
Kamerunga Nurs'y	17·98	23	32·15	2·73
Kairi	8·36	3	10·08	3·96
Sugar Experiment Station, Mackay	14·70	16	7·56	1·96
Bungeworgorai ...	0·58	3	0·55	0·27
Warren	1·00	3	0·16	2·08
Hermitage ...	2·71	7	2·99	1·92

NOTE.—The averages have been compiled from official data during the periods indicated; but the totals for January this year and for the same period of 1915, having been compiled from telegraphic reports are subject to revision.

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ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY D. EGLINTON, F.R.A.S.

TIMES OF SUNRISE AND SUNSET AT BRISBANE AND THE PHASES OF THE MOON FOR THE FIRST FOUR MONTHS OF 1916.

Date.	JANUARY.		FEBRUARY.		MARCH.		APRIL.	
	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.
1	4·57	6·45	5·21	6·42	5·42	6·19	5·58	5·46
2	4·57	6·45	5·21	6·42	5·42	6·18	5·59	5·45
3	4·58	6·45	5·22	6·41	5·43	6·17	5·59	5·44
4	4·58	6·45	5·22	6·41	5·43	6·16	6·0	5·43
5	4·59	6·45	5·23	6·40	5·44	6·15	6·0	5·42
6	5·0	6·46	5·23	6·39	5·45	6·14	6·1	5·40
7	5·0	6·46	5·24	6·39	5·45	6·13	6·1	5·39
8	5·1	6·46	5·25	6·38	5·46	6·12	6·2	5·38
9	5·1	6·46	5·26	6·37	5·46	6·11	6·2	5·37
10	5·2	6·46	5·27	6·37	5·47	6·10	6·3	5·36
11	5·3	6·46	5·27	6·36	5·47	6·9	6·3	5·35
12	5·4	6·46	5·28	6·35	5·48	6·8	6·4	5·34
13	5·5	6·46	5·29	6·35	5·48	6·7	6·4	5·33
14	5·6	6·46	5·30	6·34	5·49	6·6	6·5	5·32
15	5·7	6·46	5·30	6·33	5·49	6·5	6·5	5·31
16	5·8	6·46	5·31	6·32	5·50	6·4	6·6	5·30
17	5·8	6·47	5·32	6·31	5·50	6·2	6·6	5·29
18	5·9	6·47	5·32	6·31	5·51	6·1	6·7	5·28
19	5·9	6·47	5·33	6·30	5·51	6·0	6·7	5·27
20	5·10	6·47	5·34	6·29	5·52	5·59	6·8	5·26
21	5·11	6·46	5·34	6·28	5·52	5·58	6·8	5·25
22	5·12	6·46	5·35	6·27	5·53	5·57	6·8	5·24
23	5·13	6·45	5·36	6·26	5·53	5·56	6·9	5·24
24	5·13	6·45	5·37	6·25	5·54	5·55	6·9	5·23
25	5·14	6·45	5·38	6·24	5·54	5·53	6·10	5·22
26	5·15	6·45	5·38	6·23	5·55	5·52	6·10	5·21
27	5·16	6·44	5·39	6·22	5·55	5·51	6·11	5·20
28	5·17	6·44	5·40	6·21	5·56	5·50	6·11	5·19
29	5·18	6·44	5·41	6·20	5·57	5·49	6·12	5·18
30	5·19	6·43	...	...	5·57	5·48	6·12	5·18
31	5·20	6·43	...	...	5·58	5·47	...	...

The Phases of the Moon commence at the times stated on or near the 150th Meridian, East Longitude.

			H.	M.	
5 Jan.	●	New Moon	2	45	p.m.
12 „	☾	First Quarter	1	38	„
20 „	○	Full Moon	6	29	„
28 „	☽	Last Quarter	10	35	a.m.

The moon will be partially eclipsed between 6 p.m. and 7·24 p.m. on January 20th. It will be at its nearest to the earth on the 4th at midnight, and at its greatest distance on the 17th at 3 p.m.

4 Feb.	●	New Moon	2	6	a.m.
11 „	☾	First Quarter	8	20	a.m.
19 „	○	Full Moon	12	29	p.m.
26 „	☽	Last Quarter	7	24	p.m.

The moon will be at its nearest to the earth on the 2nd at 10 a.m., and at its farthest on the 14th at 7 a.m. It will pass very close to the Pleiades on the 11th about midnight.

4 Mar.	●	New Moon	1	58	p.m.
12 „	☾	First Quarter	4	33	a.m.
20 „	○	Full Moon	3	27	„
27 „	☽	Last Quarter	2	22	„

The moon will be farthest from the earth on the 13th at 3 a.m., and nearest on the 26th at 11 p.m. It will pass over and occult the bright star, Antares, on the 25th between 4 a.m. and 5 a.m.

3 Apr.	●	New Moon	2	21	a.m.
11 „	☾	First Quarter	12	36	a.m.
18 „	○	Full Moon	3	7	p.m.
25 „	☽	Last Quarter	8	38	a.m.

The moon will be farthest from the earth on the 9th at about midnight, and at its nearest on the 21st at 9·36 p.m. It will be near the planet Neptune on the 11th at 7·30 p.m., but a good glass will be necessary to see the planet which will be rather more than the width of the moon to the south.

A total Eclipse of the Sun will occur on Feb. 3rd, visible in parts of Central and South America, in parts of the Pacific and Atlantic Oceans, and partially only in Great Britain, France, Spain, &c.

For places west of Brisbane, but nearly on the same parallel of latitude—27½ degrees S.—add 4 minutes for each degree of longitude. For example, at Toowoomba the sun would rise and set about 4 minutes later than at Brisbane if its elevation (1,900 feet) did not counteract the difference in longitude. In this case the times of sunrise and sunset are nearly the same as those for Brisbane.

At St. George, Cunnamulla, Thargomindah, and Oontoo the times of sunrise and sunset will be about 17 m., 28 m., 36 m., and 47 minutes, respectively, later than at Brisbane at this time of the year.

At Roma 15 minutes may be added to the Brisbane times for January and February, and about 17 minutes for March and April.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhere about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

[All the particulars on this page were computed for this Journal, and should not be reproduced without acknowledgment.]

Orchard Notes for April.

THE SOUTHERN COAST DISTRICTS.

The gathering and marketing of citrus fruit, as well as of pines, bananas, custard apples, persimmons, &c., is the principal work of the month. In the Notes for March attention was drawn to the necessity for keeping all pests in check, particularly those attacking the ripening fruit. As it is the height of folly to look after the orchard thoroughly during the growing period of the crop and then to neglect the crop when grown, every possible care must be taken to keep fruit fly, peach moth, black brand, or other pests that destroy or disfigure the fruit in check, and this can only be accomplished by combined and systematic action. Citrus fruit at this time of the year often carries badly, as the stem is tender, easily bruised, full of moisture, and, consequently, very liable to the attacks of the blue mould fungus, which causes specking. The loss from this cause can be lessened to a considerable extent by carefully attending to the following particulars:—

1st. Never allow mouldy fruit to hang on the trees or to lie about on the ground. It should be gathered and destroyed, so that the countless spores which are produced by the fungus shall not be distributed broadcast throughout the orchard, infesting many fruit, and only waiting for a favourable opportunity, such as an injury to the skin by an insect or otherwise, combined with favourable weather conditions (heat and moisture), to start into growth.

2nd. Handle the fruit carefully to prevent bruising. Cut the fruit, don't pull it, as pulling is apt to plug the fruit—that is to say, to either pull the stem out or injure the skin round the stem—and a fruit so injured will go mouldy.

3rd. Sweat or dry the fruit thoroughly; if the weather is humid, laying the fruit out in the sun on boards or slabs is a very good plan.

4th. After sweating, examine the fruit carefully, and cull out all bruised or punctured fruit, and only pack perfectly sound dry fruit. It is better for the loss to take place in the orchard than for the loss to take place in the case in transit.

5th. If the mould is very bad, try dipping the fruit for a few seconds in a 2 per cent. solution of formalin. This will kill the spores, and if the fruit is placed in the sun and dried quickly before packing there will not be much chance of its becoming reinfested.

Don't gather the fruit too green, especially such varieties as the Beauty of Glen Retreat mandarins, as immature fruit spoils the sale of the good article.

If the orchard has not been cleaned up after the summer rains, do so now; and do any other odd jobs that may be required, such as mending fences, grubbing out dead or worthless trees, cleaning out drains, &c.

Strawberry planting may be continued, and where new orchards are to be planted continue to work the soil so as to get it into the best possible tilth.

THE TROPICAL COAST DISTRICTS.

Clean up the orchards after the rainy season. Look out for scale insects, and cyanide or spray for same when necessary.

Go over the trees carefully, and when there is dead wood or water sprouts remove them. If bark fungus is showing, paint the affected branches with sulphur and lime wash. Clean up bananas, pineapples, and other fruits, as after the end of the month it is probable that there will not be any great rainfall, so that it is advisable to keep the ground well cultivated and free from weeds, so as to retain in the soil the moisture required for the trees' use during the winter months. Keep bananas netted; destroy guavas wherever found.

THE SOUTHERN AND CENTRAL TABLELANDS.

If the orchards and vineyards have not already been cleaned up, do so. Cultivate or plough the orchard, so as to get the surface soil into good tilth, so that it can absorb and retain any rain that falls, as, even though the trees will simply be hardening off their summer's growth of wood, it is not advisable to let the ground dry out. When citrus fruits are grown, attend to them in the manner recommended for the Southern Coast Districts; and, when grown in the dry parts, keep the land in a state of good cultivation. Should the trees require it, a light watering may be given. Do not irrigate vines; let them ripen off their wood.

Farm and Garden Notes for April.

FIELD.—The wheat land should now be ready for sowing the early wheats, and that which has not been prepared should be ploughed without delay, April, May, and June at latest being the months for sowing. The main potato crop, planted in February and March, will be ready for a first or second hilling up. The last of the maize will have been got in. Where cotton is grown, the pods will now be opening, and advantage should be taken of dry weather to get on with the picking as quickly as possible. Picking should not be begun until the night dew has evaporated nor during rain. Sorghum seed will be ripe. Tobacco also will be ripening, and either the leaves or the whole plant harvested. Lucerne may be sown, as the growth of weeds has now slacked off, but the ground must be thoroughly prepared and cleaned. Sow oats, barley, rye, wheat, mangolds, and Swede turnips. Plant out paspalum roots. Seed wheat of whatever variety soever should be dipped in a solution of sulphate of copper (bluestone) in the proportion of 1 lb. of sulphate to 24 gallons of water. The seed may also be treated with hot water by plunging it in a bag into hot water at 120 degrees Fahr. for a minute or two, and then into water heated to 135 degrees Fahr. Allow it to remain in this for ten minutes, moving it about all the time. Then plunge the seed into cold water and spread out to dry. This plan is useful in districts where bluestone may not be obtainable. Another safeguard against bunt, smut, black and red rust is to treat the seed with formalin at the rate of 1 lb. of formalin to 40 gallons of water. Schering's formalin costs about 2s. 10d. per lb., and is sold in bottles. It is colourless and poisonous, and should be kept where no children or persons ignorant of its nature can have a chance of obtaining it. To treat the seed, spread it on a wooden floor and sprinkle the solution over it, turning the grain over and over until the whole is thoroughly wetted. Then spread it out to dry, when it will be ready for sowing. Instead of sprinkling, dipping may be resorted to. A bushel or so of seed is placed in a bag and dipped in the solution. During five minutes the bag is plunged in and out, and then the seed is turned out to dry. Formalin is less injurious to the grain than bluestone, but, while the latter can be used over and over again, formalin becomes exhausted. It therefore follows that only the amount required for immediate use for sprinkling should be prepared. Do not sow wheat too thickly. Half a bushel to the acre is sufficient—more on poor land and less on rich soils. On light sandy soil the wheat should be rolled. On sticky land it should only be

rolled when the land is dry, otherwise it will cake, and must be harrowed again after rolling. When the wheat is 6 in. high go over it with light harrows. If the autumn and winter should prove mild and the wheat should lodge, it should be kept in check by feeding it off with sheep.

KITCHEN GARDEN.—Hoe continually among the crops to keep them clean, and have beds well dug and manured, as recommended last month, for transplanting the various vegetables now coming on. Thin out all crops which are overcrowded. Divide and plant out pot-herbs, giving a little water if required till established. Sow broad beans, peas, onions, radish, mustard and cress, and all vegetable seeds generally except cucumbers, marrows, and pumpkins. Early celery should be earthed up in dry weather, taking care that no soil gets between the leaves. Transplant cauliflowers and cabbages, and keep on hand a supply of tobacco waste, preferably in the form of powder. A ring of this round the plants will effectually keep off slugs.

FLOWER GARDEN.—The operations this month will depend greatly on the weather. If wet, both planting and transplanting may be done at the same time. Camellias, gardenias, &c., may be removed with safety. Plant out all soft-wooded plants such as verbenas, petunias, pentstemons, &c. Sow annuals, as carnations, pansy, mignonette, daisy, snapdragon, dianthus, stocks, candytuft, phlox, sweet peas, &c. Those already up must be pricked out into other beds or into their permanent positions. Growth just now will not be too luxuriant, and shrubs and creepers may be shortened back. Always dig the flower beds rough at first, then apply manure, dig it in, and after this get the soil into fine tilth. Land on which you wish to raise really fine flowers should have a dressing of bonedust lightly turned in. Wood ashes also form an excellent dressing for the garden soil. Prune out roses. These may be planted out now with perfect success. Take up dahlia roots, and plant bulbs as recommended for March. Layers that have made sufficient roots should now be gradually severed from the plant, and left for a fortnight before potting, to ripen the young roots.