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STANDARDS OF PURITY AND GERMINATION PRESCRIBED FOR SEED OATS, BARLEY, RYE, AND WHEAT.

BY F. F. COLEMAN, Expert under the Pure Seeds Acts.

"Many of our farmers have only a limited knowledge of weeds, and in many cases do not recognise those that are dangerous on their first appearance. Hence we have 'One year's seeding, seven years' weeding.' There are some weeds so noxious that if farmers knew their real character, and recognised the plants on their first appearance, they would postpone all other business until they were destroyed."—H. Mackellar.

Although buyers and sellers of wheat, barley, oats, and rye are able to form a good idea as to their market value, experience shows that they are frequently misled as regards purity and germination. It is in fact impossible to determine with any accuracy the purity or germination by a casual inspection of the sample; all opinions as to the amount of weed seeds, non-germinable seeds, or other foreign ingredients should be based on actual facts revealed by the analysis and germination-test of a large sample drawn from the actual bulk.

The following table gives information as to the purity and germination of samples examined at the Departmental seed laboratory in the course of 1921:—

Kind of Seed.	Percentage of Samples Germinating, Between—				Percentage of Samples up to the Standard of Purity and Germination prescribed for—		Percentage of Samples which did not comply with the prescribed Standards on account of—	
	100-90	89-80	79-70	69-0	A Grade.	B Grade.	Impurities.	Germination.
	%	%	%	%	%	%	%	%
Barley, Cape	82·9	14·3	..	2·8	77·2	17·1	2·9	2·8
Barley, skinless	76·2	23·8	..	..	76·2	23·8	..	..
Barley, malting	84·6	15·4	..	..	77·0	15·3	7·7	..
Oats	72·5	13·7	9·8	4·0	68·6	19·6	7·8	4·0
Rye	80·0	20·0	..	..	80·0	20·0	..	..
Wheat	82·6	13·1	4·3	..	82·6	17·4	..	..

The attention of both buyers and sellers in directed to the Regulations under the Pure Seeds Acts, which prescribe the proportion or amount of foreign ingredients allowed in barley, oats, rye, and wheat. Every farmer should be interested in the subject, which closely concerns him both as a producer of the article and as the ultimate consumer. It is frequently stated that even among farmers there are more buyers than sellers; as this is true regarding oats and rye, greater care should be taken in their purchase.

STANDARDS PRESCRIBED BY THE REGULATIONS UNDER THE PURE SEEDS ACTS.

THE PROPORTION OR AMOUNT OF FOREIGN INGREDIENTS THAT MAY BE CONTAINED IN A GRADE SEEDS.

Kind of Seeds.	Inert Matter.	Seeds of weeds or seeds of any cultivated plant not included in (A.I.) which will not pass through a metal sieve perforated with round holes $\frac{1}{14}$ of an inch in diameter.	Seeds of weeds which will pass through a metal sieve perforated with round holes $\frac{1}{14}$ of an inch in diameter.	Seeds of any cultivated plant included under (A.I.) other than seeds of the kind to which the sample purports to belong.	Diseased or Insect-infested Seeds.	Dead and Non-germinable Seeds.
(A.I)	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
Barley	1	1	Nil	1	Nil	10
Oats	1	1	Nil	1	Nil	15
Rice	1	1	Nil	1	Nil	15
Rye	1	1	Nil	1	Nil	10
Wheat	1	1	Nil	Nil	Nil	10
Maize	1	Nil	Nil	Nil	Nil	10

THE PROPORTION OR AMOUNT OF FOREIGN INGREDIENTS THAT MAY BE CONTAINED IN B GRADE SEEDS.

Kind of Seeds.	Inert Matter.	Seeds of weeds or seeds of any cultivated plant not included in (B.I.) which will not pass through a sieve perforated with round holes $\frac{1}{14}$ of an inch in diameter.	The number of weed seeds which will pass through a metal sieve perforated with round holes $\frac{1}{14}$ of an inch in diameter contained in each ounce of the sample of the seeds in question.	Seeds of any cultivated plant included under (B.I.) other than seeds of the kind to which the sample purports to belong.	Diseased or Insect-infested Seeds.	Dead and Non-germinable Seeds.
(B.I.)	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
Barley	2	2	10	2	Nil	25
Oats	2	2	10	3	Nil	30
Rice	2	2	5	2	Nil	25
Wheat	2	2	5	2	Nil	25
Rye	2	2	5	2	Nil	25
Maize	2	1	Nil	Nil	Nil	25

Any person who sells, or offers or exposes for sale, or contracts or agrees to sell or deliver, any seeds which contain a larger proportion or amount of foreign ingredients than is prescribed, is guilty of an offence against the Acts.

Samples of any seeds purchased or offered for sale as seed for sowing, may be sent to the Department of Agriculture for analysis. All samples must be drawn from the actual bulk in the sender's possession, and care should be taken to obtain a small quantity from each bag, carefully mixing the portions so obtained, in order to make the sample truly representative of the bulk.

A leaflet giving information as to size of samples and other particulars may be obtained from

The Under Secretary,
Department of Agriculture and Stock, Brisbane.

HORTICULTURAL NOTES.

By E. W. BICK, Curator, Botanic Gardens.

This is quite a busy month in the garden. Dahlias should now be flowering well. Remove all spent blooms to prevent plants seeding, as this lowers their vitality. When cutting flowers for any purpose, take off a fair amount of "wood"; this assists as a pruning. Chrysanthemums should be making good growth. Keep them well staked, and when plants commence to throw up flower stems, liquid manure occasionally will strengthen them, and they will produce better flowers. Towards the end of month put in carnation cuttings, and do not forget that to grow these favourite flowers successfully it is essential to keep raising young plants; the old ones cannot be relied upon. When taking cuttings, it is important to obtain them from healthy plants, as weak or diseased cuttings never develop into really good plants. The growths or side-shoots that are found about half-way up the stems make the best cuttings. Choose well-developed ones, because if too soft they will damp off; on the other hand, when too old and hard at the base they are slow in sending out roots. They should be taken when from 3 to 4 in. long. Remove them with a gentle pull downwards, then trim the base with a sharp knife and cut off the lower leaves. Do not pull them off, otherwise the bark is often injured and the cutting spoilt. The best cuttings usually produce the finest plants. They must not be allowed to lie about when taken off, but should be put in at once. The soil used should be a free, sifted loam and sand in equal parts; if available, a sprinkling of cocoanut fibre dust and powdered charcoal will be of material assistance. The cuttings will also root readily in pure sand. Use small pots, about 5 in.; crock and fill, pressing the compost or sand firmly, then use a dibber to put cuttings in, making sure that the soil is pressed firmly round each cutting. Then water, preferably with a can with a fine rose. They strike best if kept in a sheltered place in a small frame or box away from wind or draughts. Procure a box that will be 2 or 3 in. above the tops of cuttings; the bottom must not be watertight, it may be knocked out altogether. Plunge the pots of cuttings in ashes or cocoanut fibre refuse, and cover top of box with a sheet of glass. The glass should be partly removed each morning and replaced in the evening. Gradually increase the air supply until after about a month, when the glass can be done without altogether, as by then the cuttings should be rooted. When rooted, pot off young plants. Handle carefully, as the young roots are very tender. Make the soil firm, but not hard. Should pots not be available, the cuttings can be struck in a box, but see that you have good drainage; also, if glass is not at hand, use oiled calico or hessian, and keep them from direct rays of the sun. Give a gentle spray of water as required, but do not keep them wet and sodden, but just moist.

This is also the time for the main sowing of sweet peas. Trench or dig your ground deeply, and manure freely (well-decayed cow manure is about the best), and see that you have good drainage, but do not have your plants too close together, as one robs the other. Exercise care in planting seed. Should you have planted too thickly, thin out just before the plants begin to run.

A planting may now be made of bulbs, such as anemone, babianas, freezias, gladioli, ixias, ornithogalums, narcissus, ranunculus, sparaxis, and sprekelia (Jacobea lily). A free soil is necessary for most kinds; fresh manure should never be used, and a place that has been fertilised heavily for a previous crop is suitable. Freezias are very useful, grown in 6-in. pots, as they flower so freely.

A good sowing of seeds for winter flowering plants should now be made, such as antirrhinums, daisies, calliopsis, candytuft, canterbury bells, carnation, marguerite, dianthus, delphiniums, hollyhocks, hunnemannia, larkspur, lobelia, mignonette, pansy, stocks, phlox drummondi, verbenas, wallflowers, and poppies, including the Iceland variety. This last has rapidly come to the front in the Southern States as a florists' flower; they are exceptionally useful for decorative purposes, lasting when cut for quite a long time. Plant the seed as early as possible.

SEED WHEAT FOR DISPOSAL.

Better and more reliable varieties of wheat, higher average yields per acre, and a generally improved standard in the milling quality of grain have latterly done much towards increasing the popularity of this crop and placing Queensland in the position of being fully able to meet her own requirements and have a small surplus for export purposes.

After experimenting and testing several varieties, many growers have already chosen those which suit their respective requirements. Others, apparently, are not fully alive to the advantages to be gained by systematic effort of this character.

It is recognised in practice that no single variety of wheat combines all the essentials required to meet the varying conditions of soils, seasons, and climatic conditions under which grain is produced; consequently it follows that a close study of the characteristics of individual varieties and the testing of new and improved wheats is a medium whereby growers can improve their own position, and that of the industry generally.

Reference was made in the January number of this journal to the fact that, as a result of the Department's efforts in the breeding and selection of wheats for Queensland conditions, approximately 1,000,000 bushels of grain from this source were harvested in 1920.

Wheatbreeding work and the testing of highly improved strains are still being carried on in an endeavour to produce rust-resisting and dependable varieties for the betterment of this industry in our State.

Pure-graded seed of several kinds (in not less than 1-bushel nor more than 9-bushel lots) is being offered for sale this season at 7s. 6d. per bushel, railage paid to the purchaser's nearest railway station.

Orders for any of the varieties (referred to in the letterpress of this issue) should be sent to the Under Secretary for Agriculture and Stock, Brisbane, accompanied by the necessary remittance.

Applications will be treated according to priority of order, but a second choice should be made from the list of varieties being offered. Where stocks of any particular variety of grain have been absorbed by previous orders, the Department will substitute another variety resembling it, unless specifically advised not to do so.

As none of the grain has been "pickled" for the prevention of smut (bunt), prospective growers are recommended to treat their seed wheat with bluestone and lime, according to the usual formula.

DIRECTIONS FOR PICKLING WHEAT (BLUESTONE AND LIME TREATMENT).

Mix 1 lb. of bluestone* or copper sulphate with 5 galls. of water in a wooden or glazed earthenware vessel. Suspend bluestone in a bag just below surface of water and leave overnight.

Iron or metallic vessels are not suitable for bluestone mixture.

A hogshead is to be preferred, sawn into halves.

Rig up a fork and lever alongside of tub to facilitate lifting of wheat in and out of tub.

Use open-mesh jute bag (bran bag) for dipping.

The secret of dipping is the rapid and even dipping of each grain, and, to secure this, agitate the grain by stirring whilst in the pickling mixture.

Three minutes is sufficient for dipping, after which the bag should be allowed to drain on two pieces of scantling, allowing the drainings to run into the pickling tub.

Lime solution—

Quicklime, 2½ lb.

Slack lime, with sufficient water to reduce to consistency of cream, placed in one of the half-casks for the purpose, and add up to 22 galls. of water.

Transfer wheat from bag in which it was dipped in bluestone mixture to a similar open-meshed bag, and dip in lime solution for two minutes.

Drain and dry thoroughly by spreading in thin layers on bags or tarpaulins.

To prevent re-infection of grain—

Dip all bags used for conveying seed after pickling in bluestone mixture, and dry in the open.

If dried out thoroughly after pickling, grain may be kept for some weeks before sowing.

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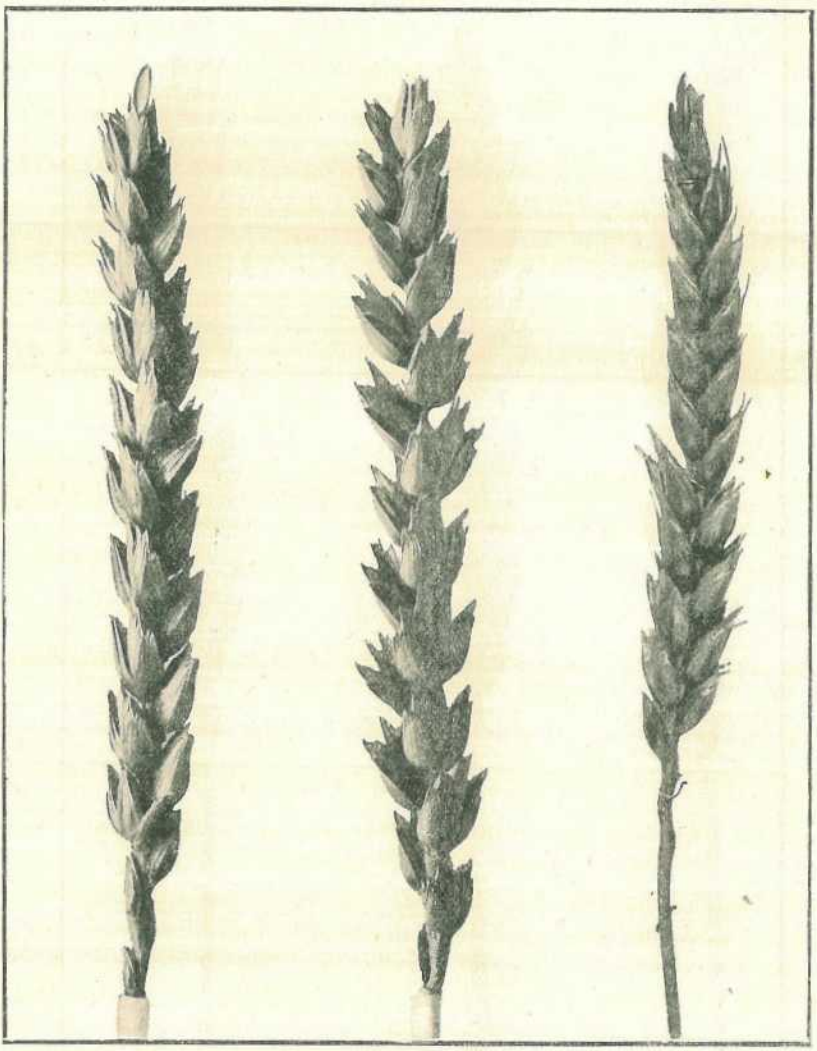
* The current wholesale quotation for bluestone in Brisbane is 60s. per cwt.—ED.

1. AN ESTABLISHED QUEENSLAND VARIETY.

2. AN ESTABLISHED QUEENSLAND VARIETY.

3. UNNAMED CROSSBRED.



AMBY.

BUNGE, NO. 1.

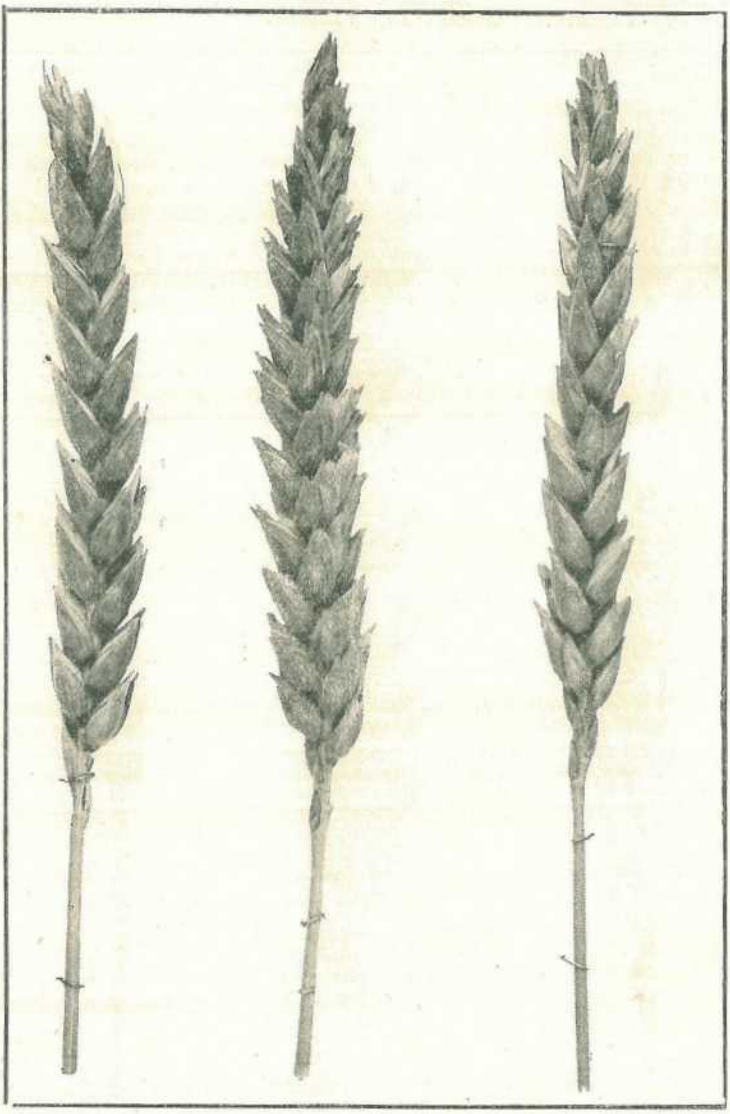
BUNGE–INDIAN PEARL CROSS, SELECTION 4.

PLATE 28.

4. UNNAMED CROSSBRED.

5. UNNAMED CROSSBRED.

6. UNNAMED CROSSBRED.



BUNGE–INDIAN PEARL CROSS, SELECTION 9.

BUNGE–MANITOBA CROSS, SELECTION 5.

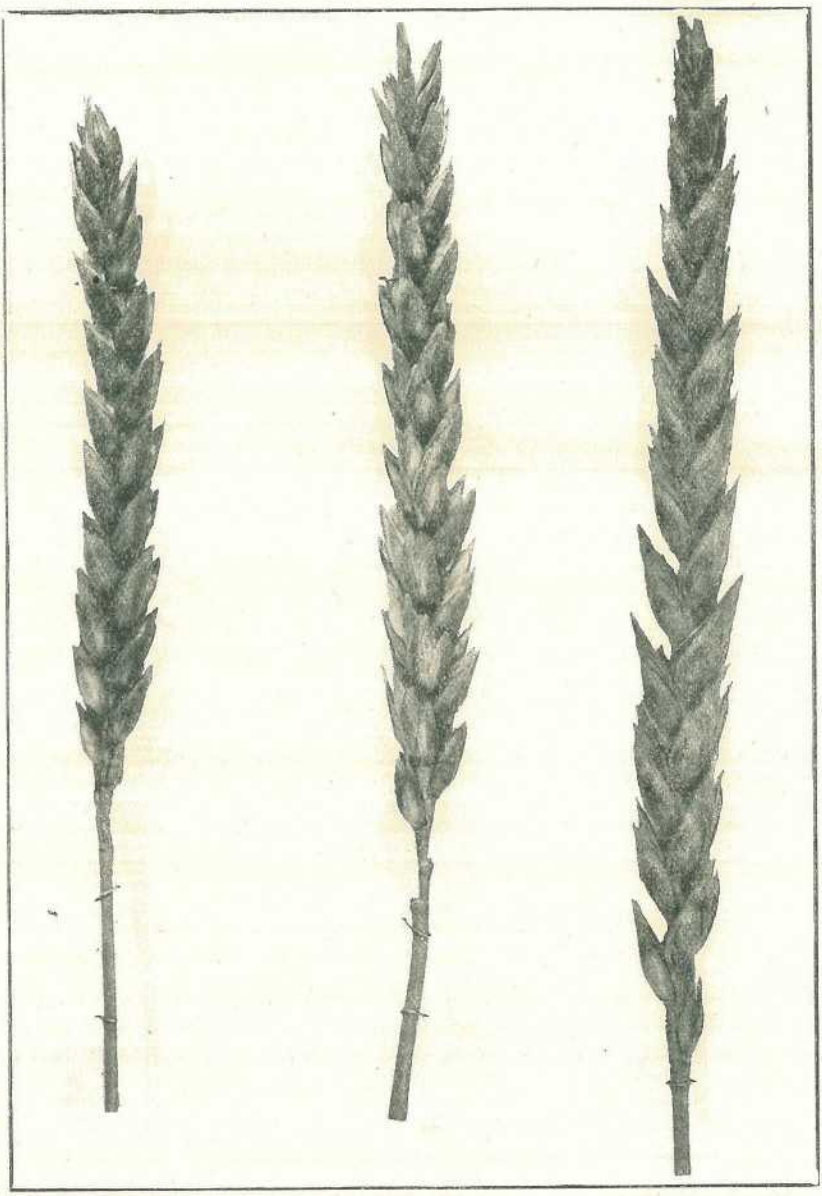
BUNGE–MANITOBA CROSS, SELECTION 7.

PLATE. 29.

7.
UNNAMED CROSSBRED.

8.
CEDRIC.

9.
INGLEWOOD.



BUNGE–MANITOBA CROSS, SELECTION 9.

BUNGE–CEDAR CROSS.

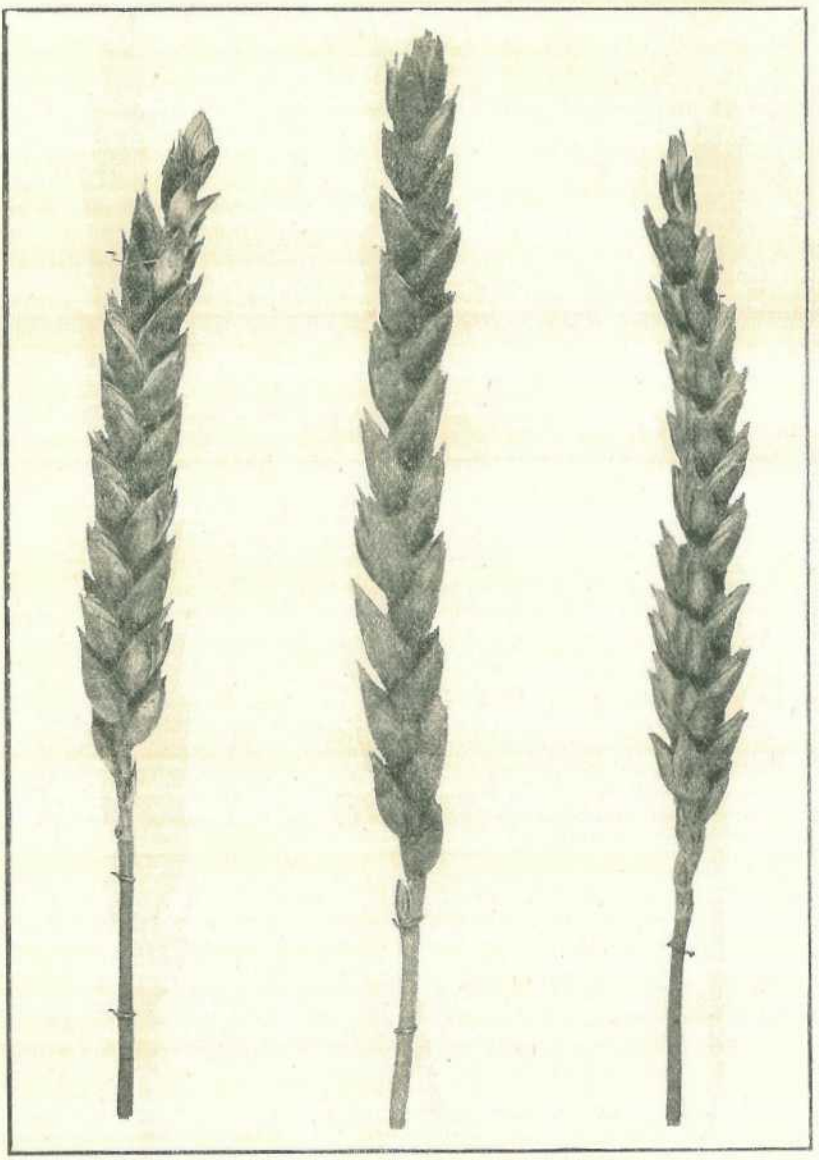
BUNGE–FEDERATION CROSS, SELECTION 33.

PLATE 30.

10. GUNDI.

11. PUSA NO. 4.

12. PATRIOT.



BUNGE–FEDERATION CROSS, SELECTION 37.

IMPORTED INDIAN VARIETY.

BUNGE–DURHAM CROSS, SELECTION 57.

PLATE 31.

Name or Stud Number.	Period Recommended for Sowing	Characteristics.						Remarks.
		Stools.	Flag.	Straw when Ripe.	Ear.	Grain.	Rust Resistance.	
1. Amby	May	Well ..	Medium amount	Of medium tallness and stoutness; not inclined to lodge	Bald; white chaff; holds grain well	Plump, shotty medium hard, semi-translucent	Good ..	Established good milling and main crop variety; adaptable to both light and heavy soils. Suitable for all grain districts. Yields of 36 bushels per acre obtained in Maranoa district last year.
2. Bunge No. 1 ..	Middle of May to third week in June	Light ..	Light ..	Of medium tallness, tough, somewhat slender, inclined to lodge if crop rank	Bald; white chaff; holds grain fairly well	Above medium size; hard, translucent	Good ..	Established, good general purpose variety; suitable for chief grain districts. Will thrive on heavy soils, but is more suited to those of a lighter class.
3. B. x I.P. 4 (Bunge and Indian Pearl Cross)	Middle of May to third week in June	Light ..	Light ..	Of medium height, slender, willowy, inclined to lodge if crop rank	Bald; light brown chaff; holds grain fairly well	Medium size, plump, reddish coloured; hard; bright; thin skin	Fair ..	Yielded 25 bushels to the acre in Jandowae district. More suited to light than to heavy soils.
4. B. x I.P 9 (Bunge and Indian Pearl Cross)	Middle of June ..	Light ..	Light ..	Resembles B. x. I.P. 4, but stands up better against heavy winds	Bald; white chaff; holds grain well	Medium size, rice-like; somewhat narrow, hard, bright, attractive grain	Fairly good	Yielded 28¼ bushels to the acre in Bell district; has averaged over 24 bushels per acre at Roma State Farm. Suited for chief grain-growing districts, preferably on light soils, and is of a quick-maturing habit.
5. B. x M. 5 (Bunge and Manitoba Cross)	Early in May ..	Well ..	Medium amount	Tough; of medium tallness and stoutness; erect habit, not inclined to lodge	Bald, flattened, attractive looking; white chaff, holds grain well; prolific type	Red, medium, plump, attractive grain of medium hardness	Good ..	Yielded 27 bushels in Inglewood district. Good milling variety; suitable for main crop sowing; stands up well on black soils.
6. B. x M. 7 (Bunge and Manitoba Cross)	Early in May ..	Well ..	Medium amount	Tough; of medium tallness and stoutness; erect habit, not inclined to lodge	Bald, flattened, slightly tapering; white chaff, holds grain well	Medium size; bright, plump, attractive grain, fairly hard; smooth, thin skin	Good ..	Yielded 28½ bushels per acre at Inglewood. Good milling variety. Thrives well on black soils; a good saleable type of grain.

Name or Stud Number.	Period Recommended for Sowing.	Characteristics.						Remarks.
		Stools.	Flag.	Straw when Ripe.	Ear.	Grain.	Rust Resistance.	
7. B. x M. 9 (Bunge and Manitoba Cross)	Early in May ..	Fair ..	Medium amount	Tall growing; of medium stoutness; fairly erect habit, but inclined to lodge if rank	Bald, smooth, tapering; white chaff; holds grain moderately well	Long, narrow pointed; dull red, somewhat starchy grain, softer than B. x M. 5	Fairly good	Yielded 25½ bushels per acre at Inglewood. Thrives fairly well on black soils.
8. Cedric (Cedar and Bunge Cross)	Middle of May to second week in June	Fair ..	Light ..	Of medium tallness, somewhat slender; tough, willowy; not inclined to lodge	Bald; faint reddish tinged chaff; holds grain fairly well	Medium size, full-bosomed, dull red colour; of medium hardness	Good ..	Yielded 30 bushels at Roma State Farm and 30 bushels at Inglewood; attractive class of grain; good milling quality, suitable for main crop sowing on a variety of soils.
9. Inglewood (Bunge and Federation Cross)	Early in May ..	Well ..	Abundant	Not tall; stiff, erect habit: of medium stoutness, somewhat soft	Bald; reddish coloured, holds grain well	Medium size; amber coloured grain, of medium hardness	Fair ..	Prolific yielder under favourable conditions, over 37 bushels at Inglewood. Suitable for South-Western districts, more so than on the Downs
10. Gundi (Bunge and Federation Cross)	Early in May ..	Well ..	Abundant	Not tall; stiff, erect habit; of medium stoutness, somewhat soft	Bald; smooth, light brown in colour, holds grain well	Medium size, somewhat rough skin, white in colour	Fair ..	Prolific yielder under favourable conditions, over 37 bushels at Inglewood. Suitable for South-Western districts, more so than on the Downs.
11. Pusa No. 4 (Indian)	Late May and early in June	Fair ..	Medium	Medium height and stoutness; erect habit, not inclined to lodge	Bald; velvet chaff, holds grain well	Medium size, plump, bright, hard, translucent grain	Good ..	Yielded 32 bushels at Roma State Farm and 24 bushels at Allora. Suitable for main crop sowing on both light and heavy soils.
12. Patriot (Bunge and Durum Cross)	May	Fair ..	Medium	Medium height and stoutness; erect habit, not inclined to lodge	Tapering; bald, white chaff; holds grain well	Short, plump, dull yellow; starchy	Good ..	Yielded 28¼ bushels at Roma State Farm. Has also given satisfactory results in the South-Western districts.

REPORT ON EGG-LAYING COMPETITION, QUEENSLAND AGRICULTURAL COLLEGE, JANUARY, 1922.

Extremely hot weather was again experienced during January, which considerably upset the laying. On the 29th of the month 110 deg. were registered inside the buildings on the poultry section. One death occurred through heat apoplexy (H. Chaille's "E" Black Orpington). Several of the birds are now in moult. T. Fanning's White Leghorns again head the list with a score of 155 eggs for the month. The feeding of the birds was not as good as one would care to see it, but the loss of appetite may be accounted for by the trying weather conditions. Following are the individual records:—

Competitors.	Breed.	Jan.	Total.
LIGHT BREEDS.			
*J. M. Manson	White Leghorns	142	1,337
*W. and G. W. Hindes	Do.	132	1,317
*T. Fanning	Do.	155	1,286
*Mrs. R. Hodge	Do.	136	1,285
*H. Fraser	Do.	135	1,250
R. Gill	Do.	99	1,241
*C. M. Pickering	Do.	108	1,182
*Geo. Trapp	Do.	86	1,176
Oakleigh Poultry Farm	Do.	119	1,173
F. Birchall	Do.	103	1,171
*W. Becker	Do.	111	1,143
*R. C. J. Turner	Do.	114	1,130
*H. C. Towers	Do.	93	1,127
*Thos. Eyre	Do.	108	1,125
R. C. Cole	Do.	97	1,119
*Thos. Taylor	Do.	117	1,118
H. C. Thomas	Do.	74	1,117
*C. Goos	Do.	124	1,111
W. A. Wilson	Do.	96	1,108
Mrs. E. White	Do.	118	1,097
*J. W. Newton	Do.	86	1,096
*S. L. Grenier	Do.	111	1,086
*E. Chester	Do.	105	1,081
*Mrs. L. Anderson	Do.	120	1,076
Bathurst Poultry Farm	Do.	112	1,076
*E. A. Smith	Do.	107	1,075
J. W. Short	Do.	118	1,072
*G. W. Williams	Do.	111	1,070
M. F. Newberry	Do.	90	1,060
H. Stacey	Do.	107	1,046
*B. Chester	Do.	90	1,045
W. Barron	Do.	93	1,044
*H. P. Clarke	Do.	125	1,033
*Haden Poultry Farm	Do.	110	1,031
O. C. Goos	Do.	90	1,006
Mrs. E. Z. Cutcliffe	Do.	80	968
Linquenda Poultry Farm	Do.	100	954
E. Stephenson	Do.	83	953
W. M. Glover	Do.	81	910
Brampton Poultry Farm	Do.	76	898
*W. and G. W. Hindes	Brown Leghorns	53	894

EGG-LAYING COMPETITION—*continued.*

Competitors.	Breed.	Jan.	Total.
HEAVY BREEDS.			
T. Fanning	Black Orpingtons ...	103	1,293
*R. Burns	Do.	113	1,269
*T. Hindley	Do.	121	1,239
*A. E. Walters	Do.	119	1,237
W. Becker	Langshans	120	1,235
*Parisian Poultry Yards	Black Orpingtons ...	129	1,215
*C. C. Dennis	Do.	116	1,183
*Jas. Ferguson	Chinese Langshans ...	81	1,164
Geo. Muir	Black Orpingtons ...	102	1,141
*E. Morris	Do.	103	1,139
Rev. A. McAllister	Do.	86	1,138
Jas. Ryan	Rhode Island Reds ...	89	1,133
*E. F. Dennis	Black Orpingtons ...	98	1,111
Jas. Every	Langshans	91	1,081
*J. Cornwell	Black Orpingtons ...	92	1,079
*N. A. Singer	Do.	101	1,077
Jas. Potter	Do.	57	1,055
*R. Holmes	Do.	114	1,034
*J. E. Smith	Do.	116	1,032
*E. Stephenson	Do.	94	1,001
*H. M. Chaille	Do.	96	996
*E. Oakes	Do.	113	995
*A. Shanks	Do.	85	995
G. Cumming	Do.	91	988
*Mrs. G. Kettle	Do.	96	981
J. W. Newton	Do.	85	949
F. Harrington	Rhode Island Reds ...	84	900
T. C. Hart	Black Orpingtons ...	90	846
Total	...	7,100	75,591

* Indicates that the pen is being single tested.

DETAILS OF SINGLE TEST PENS.

Competitors.	A.	B.	C.	D.	E.	F.	Total.
LIGHT BREEDS.							
J. M. Manson	212	227	247	215	249	187	1,337
W. and G. W. Hindes (W.L.) ..	231	206	217	234	228	201	1,317
T. Fanning	235	206	230	201	205	209	1,286
Mrs. R. Hodge	213	214	236	220	224	178	1,285
H. Fraser	244	180	219	214	211	182	1,250
C. M. Pickering	219	200	204	178	210	171	1,182
Geo. Trapp	211	188	211	189	196	181	1,176
W. Becker	213	211	178	177	211	153	1,143
R. C. J. Turner	190	179	185	181	191	204	1,130
H. C. Towers	202	179	189	155	174	228	1,127
Thos. Eyre	201	184	151	193	208	188	1,125
Thos. Taylor	189	187	184	160	174	224	1,118
C. Goos	194	202	161	146	163	245	1,111
J. W. Newton	190	203	211	189	128	175	1.096
S. L. Grenier	175	208	156	188	185	174	1,086
E. Chester	205	178	162	177	174	185	1,081
Mrs. L. Anderson	187	194	170	174	190	161	1,076
E. A. Smith	217	164	198	183	175	138	1,075
G. Williams	239	194	151	154	175	157	1,070
B. Chester	145	163	204	179	187	167	1,045
H. P. Clarke	222	142	179	145	186	159	1,033
Haden Poultry Farm	113	175	192	190	175	186	1,031
W. and G. W. Hindes (B.L.) ..	133	162	137	116	139	207	894

DETAILS OF SINGLE TEST PENS—*continued.*

Competitors.	A.	B.	C.	D.	E.	F.	Total.
HEAVY BREEDS.							
R. Burns	159	193	258	194	218	247	1,269
T. Hindley	223	213	225	169	194	215	1,239
A. E. Walters	238	213	201	200	186	199	1,237
Parisian Poultry Farm	213	200	197	264	151	190	1,215
C. C. Dennis	196	179	179	220	207	202	1,183
J. Ferguson	187	180	186	224	197	190	1,164
E. Morris	208	197	140	210	190	194	1,139
E. F. Dennis	173	201	178	174	185	200	1,111
J. Cornwell	158	187	176	198	164	196	1,079
N. A. Singer	190	173	179	181	163	191	1,077
R. Holmes	146	183	181	183	201	140	1,034
J. E. Smith	222	238	163	124	145	140	1,032
E. Stephenson	201	161	180	178	125	156	1,001
H. M. Chaille	126	180	176	201	171	142	996
E. Oakes	160	170	170	190	147	158	995
A. Shanks	138	165	176	178	151	187	995
Mrs. G. Kettle	160	190	213	110	147	161	981

CUTHBERT POTTS,
Principal.

CANE PEST COMBAT AND CONTROL.

The General Superintendent of the Bureau of Sugar Experiment Stations has received the following report (dated 17th February, 1922) from the Entomologist, Mr. E. H. Jarvis:—

"In the course of the past month our time has been largely occupied with very necessary laboratory work in connection with certain methods of control to be directed this season against second and third stage grubs of the cane-beetle *Lepidoderma albohirtum.*

"Initial experiments with miscellaneous preparations, conducted by the writer last November, led to the discovery of two substances that appear well worthy of investigation. These will be thoroughly tested and the results reported later on.

"I have already pointed out that although ideal methods of combating this insect are admittedly those in which we succeed best in preventing ovipcsition by destroying as many egg-laden female beetles as possible, the greater length of the grub stage compensates to some extent for its secondary importance, since it admits of the practice of control measures throughout a period of about six months, while the sphere of action of this pest underground is greatly restricted.

"OUR FIGHT AGAINST ANTS AND VEGETABLE PARASITES.

"Allusion has been made from time to time in these reports to a small black ant (*Pheidole megacephala*) which occurs freely in most canefields, where it does good service by destroying caterpillars of moth-borers, &c. In the laboratory and insectary, however, where its presence is anything but desirable, it proves a continual source of annoyance. In one of our large cages, for example, built recently for rearing tachinid-fly parasites, the legs were stood, as usual, in pans of water, and before planting the canes containing borer grubs the soil (about 36 cub. ft.) was twice fumigated with carbon bisulphide, and the surface afterwards treated with boiling water. This answered for a time only, until the swarming period occurred, when a few of the winged female ants flew unobserved on to the sides of the cage, and crawling between the boards invaded the forbidden soil, forming colonies consisting of thousands of individuals, which a week or so later were found to have taken complete possession, and to be actually nesting in some of the bored canes. This voracious little ant will devour, alike, leaf-feeding caterpillars and other insects, household foodstuffs of any kind, or newly hatched featherless birds. It is supposed to be a native of Mauritius, but is now of world-wide distribution.

"In spite of such drawbacks, fully 200 tachinid flies, intended for distribution at Babinda and South Johnstone, emerged in this cage towards the end of December. Unfortunately, however, a spell of wet weather lasting about a fortnight set in at this time, establishing climatic conditions eminently favourable to the development of a certain fungus (*Empusa* sp.) which straightway attacked these parasites.

"Most people have occasionally noticed house flies when killed by *Empusa muscæ* sticking, as if glued, to a window pane, with wings and legs fully extended and the body swollen, yellowish, and mouldy-looking. Tachinid flies exhibiting this characteristic appearance were found each day adhering to the sides of the cage (mosquito netting) and to leaves of shade plants, &c. In a week or less this vegetable parasite had accounted for more than 50 per cent. of the flies.

"This fungus doubtless operates as a controlling factor in canefields during the wet season, probably affecting broods of flies emerging between December to February.

"FUMIGATING CANE GRUBS.

"The question of machine treatment for administering bisulphide of carbon in canefields is still receiving consideration. Mr. Dawson's machine was submitted to a field test last November, but did not prove satisfactory. A continuous flow of bisulphide was administered from one side of an iron tooth drawn through the soil. In the first trial no provision was made for filling in the furrow left by this tooth, or consolidating the soil above the line of injection by some downward pressure. The bisulphide, being left in loosened-up earth which was dry overhead, doubtless escaped upwards during the ordinary course of evaporation of the moisture. Mr. Dawson deserves credit for being the first, I believe, to attempt machine treatment for the fumigation of cane grubs; such pioneering work is always commendable.

"Some of the growers here are applying bisulphide this season by means of the "Danks injector." The following hints on the use of this fumigant may be found useful:—

(1) Injections in light soils among young plant cane should not be made closer than about 6 in. from the plants, and 18 in. apart; and need only be applied on one side of a line of stools.

(2) Injections made during high temperatures or when the soil is too dry may injure or kill young cane.

(3) Fumigation should *not* be carried out at a time when the ground is dry or cracked, or when its porosity is closed by excess of moisture.

(4) In red, volcanic country the soil is generally open and in good condition for treatment a few days after heavy rain, as the surface, being then caked, prevents escape of the bisulphide fumes, and all that is necessary is to close the holes made by injections.

(5) Sandy soils are in fair condition for treatment after a light rain.

(6) Do not cultivate the soil for a week or so after treatment.

(7) An application of carbon bisulphide greatly improves exhausted soils, and destroys certain injurious bacteria.

(8) Before application, examine the roots of a few stools to find depth at which the grubs are working, and then arrange things so that injections will be made an inch or two above them.

"LONGEVITY OF THE GREY-BACK COCKCHAFER.

"In view of the fact that growers here appear to be uncertain regarding the length of life of our principal cane-beetle (*Lepidoderma albohirtum*), it may be well to mention that recent investigations by Labitte, who has made a special study of the longevity of beetles, has supplied us with valuable data in this connection. In his table giving the maximum period of existence for no less than forty-eight different species of coleoptera in captivity, we find that a tenebrionid beetle (*Blaps gigas*) lived 3,349 days, the lives of nine other species being found to vary from 1,005 to 1,219 days. An additional thirty-three beetles, belonging to different genera, had a maximum longevity of from 114 to 989 days, while the shortest life period among all these forty-eight beetles was found to be that of the common European cockchafer (*Melolontha melolontha*), an insect closely allied to our own cane-beetle, and of similar habits, which lived only thirty-one days. During the past seven years I have repeatedly found that captured specimens of albohirtum, taken just after emergence, do not live longer than from three to four weeks, even when kept under the most favourable conditions. It is interesting to note that the period of longevity in our own species happens to coincide with that of the European cockchafer.

"A NEW DIGGER-WASP PARASITE OF THE GREYBACK CANE-BEETLE.

"I have pleasure in recording *Scolia formosa* Guer, as being parasitic on the grubs of our cane-beetle (*Lepidoderma albohirtum* Water).

"This discovery was made in May, 1920, when the writer, chancing to obtain a female of this handsome digger-wasp at Gordonvale, succeeded in working out its life-history. This specimen, which lived just eight weeks in confinement, laid twenty-four eggs on grubs of albohirtum, but refused to oviposit on those of *Lepidiota frenchi*.

"Only eleven cocoons were obtained, the remaining eggs having been destroyed by mites and other enemies. The life-cycle occupied 108 days, three being taken up by the egg stage, eleven by the maggot condition, and ninety-four by the cocoon stage. *Scolia formosa*, which is about the size of our common digger-wasp *Campsomeris tasmaniensis*, is mostly black, broadly banded on the abdomen with reddish-orange, while the thorax, legs, and head are rather densely clothed with reddish hairs. The egg differs from that of Campsomeris in being shorter and proportionately broader; and the larva, when about three-sixteenths of an inch long, is shining, smooth, pale greenish-yellow.

"*S. formosa* is rather a rarity in this district, so may be very subject to attacks from hyperparasites. In view of the fact that it occurs in other countries, so probably has acquired a habit of frequenting quite a number of different honey-bearing flowers, it seems likely that our 'feather-horn' beetle (*Macrosiagon pictipennis* Lea), which is hyperparasitic on Campsomeris wasps, may find *formosa* a readily accessible host."

THE DAIRY HERD, QUEENSLAND AGRICULTURAL COLLEGE, GATTON.

MILKING RECORDS OF COWS FOR DECEMBER, 1921.

Name of Cow.	Breed.	Date of Calving.	Total Milk.	Test.	Commercial Butter.	Remarks.
			lb.	%	lb.	
College Evening Glow	Jersey ...	10 Oct., 1921	855	5·6	57·45	
Auntie's Lass ...	Ayrshire ..	31 Oct. ,,	982	4·7	55·00	
Hedges Madge ...	Holstein ...	15 Aug. ,,	1,017	4·3	52·47	
Iron Plate	Jersey ..	12 July ,,	981	4·4	51·79	
Thyra of Myrtle-view	Ayrshire ...	31 July, ,,	1,246	3·7	51·45	
Prim	Holstein ...	9 Mar. ,,	1,221	3·6	48·80	
College Mignon ...	Jersey ...	7 July ,,	793	5·0	47·58	
Gatton Glitter ...	Guernsey ...	9 Sept. ,,	729	5·0	43·74	
College St. Margaret	Jersey ...	25 Sept. ,,	776	4·6	42·83	
Bellona	Ayrshire ...	26 June ,,	902	4·0	40·28	
Yarraview Snowdrop	Guernsey ...	14 Oct. ,,	639	4·8	36·80	
College Bluebell ...	Jersey ...	22 Oct. ,,	730	4·5	35·42	
Miss Security ...	Ayrshire ...	20 Aug. ,,	1,030	3·1	35·13	
Buttercup	Shorthorn...	28 Oct. ,,	947	3·2	33·52	
College Prima Donna	Holstein ...	17 Nov. ,,	936	3·2	33·17	
Nina	Shorthorn...	11 Nov. ,,	764	3·8	32·18	
Miss Betty ...	Jersey ...	7 July ,,	588	4·2	29·63	
Netherton Belle ...	Ayrshire ...	30 Nov., 1920	451	5·4	29·22	
Sweet Meadows ...	Jersey ...	31 Oct., 1921	416	5·3	28·45	
College Cold Iron	,, ...	10 Mar. ,,	484	4·8	27·92	
Glow VI.	Guernsey ...	28 Aug. ,,	675	3·7	27·58	
College Meadow Sweet	Holstein ...	17 May ,,	478	4·8	27·53	
Dawn of Warragaburra	Jersey ...	15 Oct., 1920	397	5·5	26·32	
Little Buttercup...	Holstein ...	12 Dec., 1921	804	2·7	26·04	
Miss Fearless ...	Ayrshire ..	26 May ,,	515	4·2	25·98	
College Cobalt ...	Jersey ...	6 Jan. ,,	420	5·0	25·20	
Yarraview Village Belle	Guernsey ...	6 Aug. ,,	370	5·5	24·36	
Comedienne ...	Jersey ...	26 Nov., 1920	381	5·2	23·77	
College Grandeur	,, ...	29 Dec. ,,	381	5·0	22·81	
Hedges Dutchmaid	Holstein ...	26 May, 1921	462	4·9	22·17	
College Sunrise ...	Jersey ...	12 June ,,	376	4·9	22·10	
Rosine	Ayrshire .	19 Jan. ,,	523	3·8	22·01	
College Desire ...	,, ...	16 Nov. ,,	405	4·5	21·87	
Lady Amy ...	,, ..	27 June ,,	391	4·5	21·11	
Thornton Fairetta	Jersey ...	15 Mar. ,,	322	5·4	20·86	
Hedges Nattie ..	Holstein ...	26 Feb. ,,	475	3·9	20·65	
College Wildflower	Jersey ...	10 Dec. ,,	390	4·4	20·59	Rainfall, 760 points.

MILKING RECORDS OF COWS FOR JANUARY, 1922.

Name of Cow.	Breed.	Date of Calving.	Total Milk.	Test.	Commercial Butter.	Remarks.
			lb.	%	lb.	
Auntie's Lass ...	Ayshire ...	31 Oct., 1921	1,093	4·7	62·00	
College Evening Glow	Jersey ...	10 Oct. ,,	860	5·6	57·79	
Iron Plate ...	,, ...	12 July ,,	1,043	4·4	55·00	
Hedges Madge ...	Holstein ...	15 Aug. ,,	992	4·3	51·18	
Lute	Ayrshire ...	8 Jan., 1922	846	4·9	49·74	
Thyra of Myrtle-view	,, ...	31 July, 1921	1,180	3·7	48·57	
College Mignon ...	Jersey ...	7 July ,,	796	5·0	47·76	
Prim	Holstein ...	9 Mar. ,,	1,150	3·6	46·00	
College Bluebell ...	Jersey ...	22 Oct. ,,	845	4·5	43·23	
Gatton Glitter ...	Guernsey ...	9 Sept. ,,	729	5·0	43·20	
Little Buttercup ...	Holstein ...	12 Dec. ,,	1,352	2·7	42·89	
Lady Mitchell ...	,, ...	20 Dec. ,,	1,135	3·4	42·52	
College St. Margaret	Jersey ...	25 Sept. ,,	766	4·6	42·28	
Buttercup	Shorthorn...	28 Oct. ,,	1,153	3·2	40·64	
Bellona	Ayrshire ...	26 June ,,	893	4·0	40·10	
Netherton Belle ...	,, ...	30 Nov., 1920	599	5·4	38·81	
College Wildflower	Jersey ...	10 Dec., 1921	729	4·4	38·49	
Nina	Shorthorn ..	11 Nov. ,,	871	3·8	36·84	
Sweet Meadows ...	Jersey ...	31 Oct. ,,	528	5·7	36·11	
College Meadow Sweet	Holstein ...	17 May ,,	627	4·8	36·11	
Yarraview Snowdrop	Guernsey ...	14 Oct. ,,	620	4·8	35 71	Rainfall, 229 points.
Miss Betty ...	Jersey ...	7 July ,,	704	4·2	35·48	
Miss Security ...	Ayrshire ..	20 Aug. ,,	1,007	3·1	34·31	
College Prima Donna	Holstein ...	17 Nov. ,,	932	3·2	32·51	
College Promise ...	Jersey ...	6 Jan., 1922	639	4·2	32·20	
Miss Fearless ...	Ayrshire ...	26 May, 1921	632	4·2	31·85	
Dawn of Warragaburra	Jersey ...	15 Oct., 1920	463	5·5	30·55	
Glow VI.	Guernsey ...	28 Aug., 1921	741	3·7	30·46	
Comedienne ...	Jersey ...	26 Nov., 1920	482	5·2	30·07	
College Cobalt ...	,, ...	6 Jan., 1921	508	5·0	30·00	
College Sunrise ...	,, ...	12 June ,,	506	4·9	29·40	
College Desire ...	Ayrshire ...	16 Nov. ,,	529	4·5	28·32	
College Grandeur..	Jersey ...	29 Dec., 1920	443	5·0	26·58	
Lady Annette ...	Ayrshire ...	2 Jan., 1922	884	2·5	26·52	
Fair Lassie ...	,, ...	19 Oct., 1921	388	5·2	24·21	
Thornton Fairetta	Jersey ...	15 Mar. ,,	371	5·4	24·04	
Rosine	Ayrshire ...	19 Jan. ,,	558	3·8	23 71	
Hedges Nattie ...	Holstein ...	26 Feb. ,,	536	3·9	23·50	
Confidante ...	Ayrshire ...	12 May ,,	553	3·8	23·28	
Hedges Dutchmaid	Holstein ...	26 May ,,	520	4·0	23·24	
College Cold Iron	Jersey ...	10 Mar. ,,	403	4·8	23·04	
Lady Amy ...	Ayrshire ...	27 June ,,	442	4·5	22·86	
Confidence ...	,, ...	8 Feb. ,,	446	4·2	22·47	
Yarraview Village Belle	Guernsey ...	6 Aug. ,,	336	5·5	22·17	
Mistress May ...	Ayrshire ...	3 Dec. ,,	674	3 0	22·06	
Charming Damsel	,, ...	12 May ,,	519	3·8	22·01	
Magnet's Leda ...	Jersey ...	6 Oct., 1920	401	4·4	21·17	

ELECTRICITY FROM WATERWORKS.

An English city has developed quite an interesting scheme for utilizing water power afforded by its reservoirs. It recently extended its waterworks system, and in order to provide electrical power for operating the ropeways, crushers, cranes, and other machinery required in the construction of a dam, it arranged a water turbine installation driven from the existing reservoir. The water, after it has done its work in the turbine and generated its electricity, is returned to the water-supply system. Not only was sufficient power generated for the purposes already mentioned, but enough was produced to light a village and the residences of the staff engaged on the work.

PLASTIC WOOD.

The name "Plastic Wood" is given to an extraordinarily interesting material recently introduced by a British firm. It is made of very fine wood meal mixed with collodion so as to become of the consistency of soft putty. It can be used for filling and stopping holes in wood, as it is exceedingly tenacious and adheres firmly to woods of all qualities. One of its most valuable applications is in the making of patterns for casting purposes. It can be built up into any form and it sets quite hard, so that it can be cut like ordinary wood or turned in the lathe. It has the valuable quality of being waterproof, and it does not warp or deteriorate through damp. Plastic wood can also be finished with sandpaper in the ordinary way, giving a highly glazed finish. Nails can be driven firmly into it without cracking it. Perhaps the only drawback is that its adhesive qualities are so marked that it sticks on the hands of anyone using it. The manufacturers, however, supply a special solvent which enables it to be thoroughly cleaned off the hands.

QUEENSLAND TREES.

BY C. T. WHITE, F.L.S., Government Botanist, and W. D. FRANCIS, Assistant Botanist.

No. 9.

WHITE MYRTLE (*Rhodamnia argentea*).

Derivation.—*Rhodamnia,* from Greek *rhodamnos,* a young branch (probably alluding to the slender branchlets of the first species so named; *argentea,* Latin, silvery (referring to the silvery under-surface of the leaves).

Description.—A tree attaining a height of 100 ft. and a barrel diameter of nearly 3 ft. Barrel often channelled and slightly flanged at the base. Bark reddish-brown or grey, finely fissured; often flakey in the channels of the barrel; when cut, dark brown, varying from ⅛ to ¼ in. thick on a tree with a barrel diameter of 2 ft. 9 in. Sapwood pale-brown to yellow. Young shoots and underside of leaves covered by a more or less dense, white, silvery, powder-like fluff. Leaf stalks 1/6 to ⅓ in. long. Leaves opposite, egg-shaped, lance-shaped, or elliptical in outline, tapering, or sometimes nearly rounded at the base, blunt or protracted into a long point at the apex, the midrib and a curved lateral nerve on each side of it prominent on both surfaces; the nerves diverging from the midrib and the net veins are more conspicuous on the under-surface. Measurement of leaf-blade 2 to 3½ in. long, two to three times as long as broad. Flowers in small bunches (cymes) in the forks of the leaves, two to four stalks springing from each fork; each stalk measures from ¼ to ½ in. long and bears three flowers, the central one of which is sometimes without a stalklet, whilst the flower on each side has a stalklet about ⅛ in. long. The lowermost part of the flower (the calyx) is about 3/16 in. in diameter; its lower part is cup-shaped, and its upper part divided into four oval lobes about 1/10 in. long. Alternating with the calyx lobes are four white, broadly oval petals about ⅛ in. long. On the inside of the petals are numerous (over twenty) bristle-like stamens about 1/6 in. long. The ovary fills the cup-shaped part of the calyx, with which it is united, and tapers into a slender style about ¼ in. long. Fruit globular, black, about ⅓ in. in diameter, the outer fleshy part enclosing one, two, or more hard, smooth, yellowish seeds.

Flowering period irregular.

Distribution.—Confined to Australia. Coastal scrubs from the Clarence River to Baffle Creek (north of Bundaberg); National Park; ranges about Killarney and Blackall Range.

Uses.—The timber should be useful for general building work, indoor fittings, and cabinet-making. Mr. R. T. Baker, quoting C. W. Chapman, states that it could be used for carriage, wagon, and wheelwrights' work, boot lasts, gun stocks, and golf clubs. He also states that it could be tried for woodworking planes.

References.—*Rhodamnia argentea,* Bentham, "Flora Australiensis," vol. III., p. 278; F. M. Bailey, "Queensland Flora," part II., p. 653.

Photo. by the Authors.]

PLATE 32.—THE WHITE MYRTLE (*Rhodamnia argentea*), Ranges eastward of Emu Vale, Killarney District.

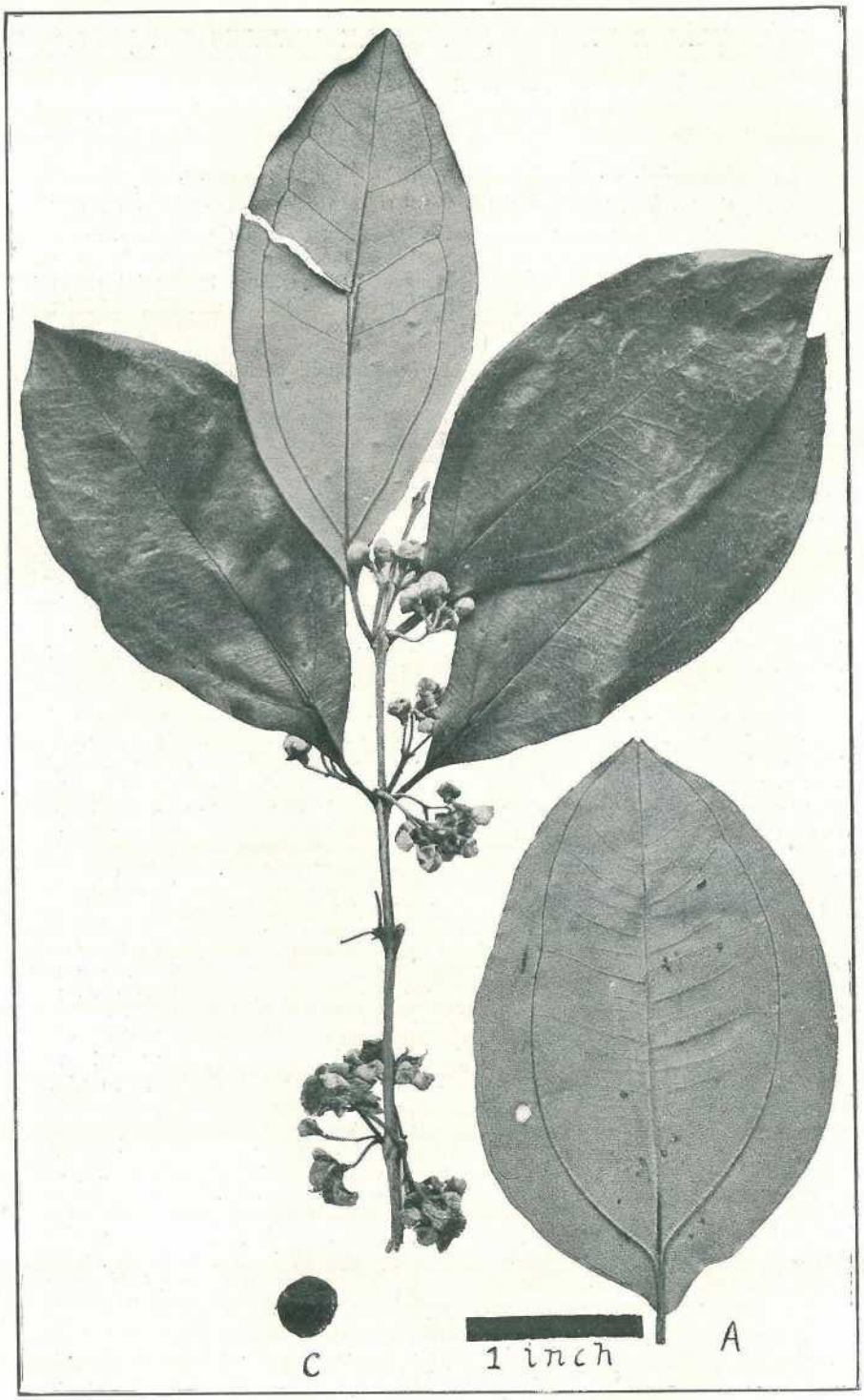


PLATE 33.—WHITE MYRTLE (*Rhodamnia argentea*).
A. and B.—Underside and variation in shape of leaves. C.—Fruit.

FLOWERING TREES OF BRISBANE BOTANIC GARDENS.

BROWNEA GRANDICEPS.

NATURAL ORDER LEGUMINOSÆ.

BY E. W. BICK, Curator, Brisbane Botanic Gardens.

Derivation.—From "Botanical Magazine," 4859 (1845):—"*Brownea* named in honour of Dr. Patrick Browne, M.D., of County Mayo, Ireland (born 1720), practised medicine in London for a time, and afterwards in the West Indies (first in Antigua, and then in Jamaica), was a correspondent of Linnæus, and keenly interested in Botany; did a lot of collecting; published his valuable ' Civil and Natural History of Jamaica ' in 1756. *Grandiceps*, large-headed."

Description.—A tree, said to grow 60 ft. high in its native habitat (Nicholson's "Dictionary of Gardening," vol. I., 215). In the Gardens it is a large spreading shrub about 25 ft. in diameter and about 16 ft. high, forming no trunk of any height, the branches commencing within a few inches of the ground.

Leaves.—Large, from 9 to 18 in. in length, drooping, alternate, abruptly pinnate; pinnæ from nine to fourteen pairs, from 3 to 5 in. long, upon very short petiolules, and extending the whole length of the very downy ferruginous petiole; they are alternate, oblong, lanceolate, entire, obtuse at base, sharply acuminate; lower pinnæ cordate, with a narrow point fully half the entire length. The new growth at ends of branches, usually of eight or nine leaves, is drooping and flaccid, of a delicate pale-green colour, mottled with light-brown splashings; the latter disappears as the leaves harden, the general appearance of the new growth being somewhat like that of long racemes of flowers.

Flowers.—Large, rosy-red, exceedingly numerous, forming a dense pendant globe; the flowers open from centre, and the older ones on outside fall off; the globe or "head" of flowers is from 6 to 8 in. across, and forms at the downy apex of a branch, usually underneath; well-sheltered with foliage. Individual flowers: Calyx funnel-shaped, in three portions, upper segment longer and deeply two-lobed; petals large, spathulate, lamina obovate, waved claws slender; stamens arising from tube of calyx, as long, or rather longer than the petal; anthers linear, versatile; ovary stipitate, springing from the tube of calyx, linear, oblong, downy; style slender, awl-shaped, exceeding the petals or stamens in length; stigma capitate.

Legumen (Pod).—From 3 to 6 in. long, up to 1¾ in. in breadth, covered with a dense, rusty, brown down, containing from one to three large seeds varying very much in size and shape, some being oblong, others elongated heart-shape, from 1 to 2 in. long and 1 to 1½ in breadth when freshly gathered.

Habitat.—Venezuela, in the mountain regions of Cumanna, Caraccas, and others where it is known amongst the inhabitants as "Rosa Del Monte" (Rose of the Mountains).

Propagation.—From seed (unfortunately our specimen does not seed freely); comparatively few pods form; the seeds germinate readily, and the young plants grow quickly. It being very spreading in growth, an old plant covers a large area of ground.

There is a large plant in the Botanic Gardens, between the centre island pond and the main riverside roadway. It flowers for several months in the year, usually in August, September, and October, and the magnificent, unique heads of brilliant flowers attract universal attention.

There are a number of other species of this fine Genus, all of which are indigenous in South American countries, of which *Brownea coccinea* is the only other species represented in the Gardens. We are endeavouring to obtain seeds of some of the others that are very interesting and beautiful.

PLATE 34.—"BROWNIA GRANDICEPS."
1.—Flower Spike. 2.—Seed Pod and Seeds.

SHEEP ON THE COAST.

By W. G. BROWN, Sheep and Wool Expert.

The old and cherished theory that sheep will not thrive on the coast is gradually being worn down by the success of men who have backed their opinion in a practical try-out. From time to time reports reach us of the successful establishment of small flocks on various parts of the coast, and even on adjacent islands; and the evidence supports the contention that, under right conditions and capable management, sheep of suitable breeds will not only do well but will prove a very profitable side line to general farming in seaboard areas.—ED.

A decided acquisition to the farmers' flocks of Queensland is the one recently established by Mr. Hugh McMartin at Glen Pullen, Pullen Vale, near Indooroopilly. Mr. McMartin has had a long experience among sheep. Prior to going on service with the A.I.F. he was engaged on a grazing venture on the Northern Downs. After discharge from the army he was attracted by the prospect of success in the establishment of a stud nearer the coast, and, after full inquiry, planned accordingly. After travelling up and down the State, he fixed upon Glen Pullen as a property most suited to his purpose. The holding comprises about 500 acres, and is situated within 10 miles of the Brisbane G.P.O. and 7 miles from Indooroopilly. Although but partly improved, enough has been done to show that in time it will become a snug little property, ideally adapted to sheep-farming. The country for the most part is undulating, and the cleared and rung areas are well covered with natural and exotic pastures. Though mostly forest land, there are fairly extensive patches of rich vine scrub, and the valley bottoms contain some excellent arable areas already abundantly productive. Permanent water is provided in creeks and springs.

Mr. McMartin made a start with a small flock of crossbred ewes headed by a purebred Border Leicester ram, and these are doing well. Within the last few months a flock of Dorset Horn ewes and a ram of the same breed (imports from a well-known South Australian stud) have been added. Inspection showed that these sheep are of very great excellence, and since their coming to Queensland they have improved remarkably.

The two flocks are kept apart and are being fed—the first on natural grasses, and the Dorsets partly on indigenous pasture and partly on introduced grasses and cultivated fodders.

The accompanying plate gives some idea of the quality of Mr. McMartin's Dorset Horns and of the country upon which they are running.

CHARACTERISTICS OF THE DORSET HORN.

"Both male and females have horns, those on the males curving backward and around spirally, while those on the ewes curve outward, down, and forward, with tips rising about level with the eye, perhaps turning in slightly. The face, legs, and hoofs are white. The nostrils are also white; face strong, with considerable breadth between the eyes. Compared with the ideal mutton sheep, the neck and body tend to be long and rangy, and there is hardly the spring of rib and levelness of back most desirable. The head should have a short foretop of wool; the back part of the head below the ear should be woolled; and the body generally should be well covered with a fine fleece, extending down to the knees and hocks. The breed is from medium to heavy among the middle-wool breeds. Rams in fair flesh should weigh about 225 lb., and ewes 165 lb.; however, much larger weights are secured."—"*Types and Breeds*" (Plumb).

The foregoing gives an idea of what to look for. The weights given have been exceeded by as much as 100 lb.

Excellent results have been obtained by numerous crossing experiments with the Merino. The cross produces ideal spring lambs much sought after by butchers. Dorsets shear about 9 lb. for rams and 6 lb. for ewes. The quality of the staple is of medium grade, being neither fine nor coarse.

THE SUCCESSFUL MOTOR LORRY.

One of the reasons for the pre-eminence of British motor wagons is that open competitions are held between the different makers every year. A trophy is awarded annually for the most successful performance in any certified trial for a total distance of over 1,000 miles. The successful vehicle at the last trial gave an average running speed of nearly 16 miles per hour, with a consumption of motor spirit of 13 miles to the gallon. The lorry was fully loaded, its total running weight being 5 tons 6¼ cwt. The oil consumption worked out at 504 miles per gallon, and throughout the whole of the ten days' trial no adjustments were effected except the cleaning of a choked petrol cock.

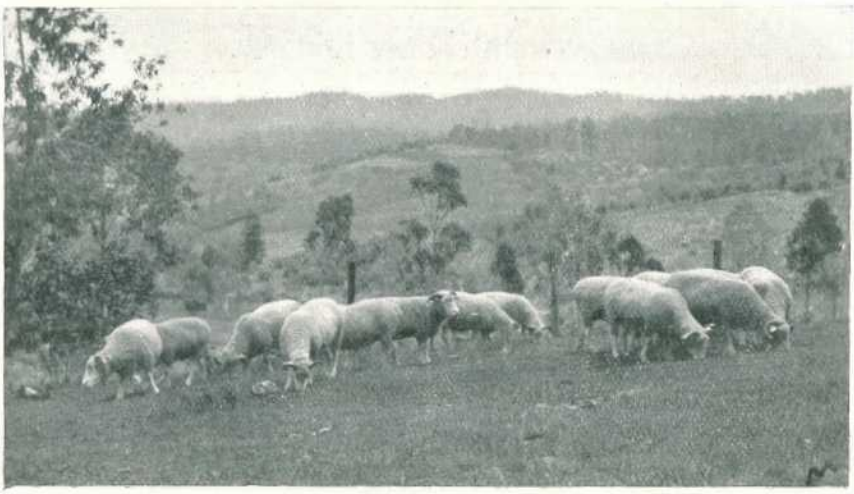


PLATE 35.—DORSET HORN SHEEP ON MR. HUGH MCMARTIN'S PROPERTY, "GLEN PULLEN," PULLEN VALE.

NEW TYPE OF CONCRETE ROAD.

Concrete roads have become quite familiar in many parts of the world, especially where highways capable of carrying very heavy traffic are required. The making of a satisfactory concrete road is, however, a matter of great skill; and in many cases disappointing results have been achieved. One of the drawbacks of concrete as a road material is that it contracts to a certain extent in setting and also as the temperature falls. Again, when concrete of the usual kind is laid in position, the scum always works to the surface and forms a layer which, when dry, prevents a proper junction being made between different portions of the roadway. The consequence is that cracks appear in the roadway, especially at places where the laying of the concrete has been arrested, as in the case of the end of a day's work. A British road engineer has developed a new method which he claims obviates these difficulties. He lays the concrete in alternate portions and does not fill the intervening spaces until the material in the first portions has set and contracted. Further, he makes the edges of each portion exactly vertical by means of special appliances. This ingenious method results in the roadway being split up into straight, close joints instead of a number of irregular cracks.

COMMERCIAL FRUIT PACKING.

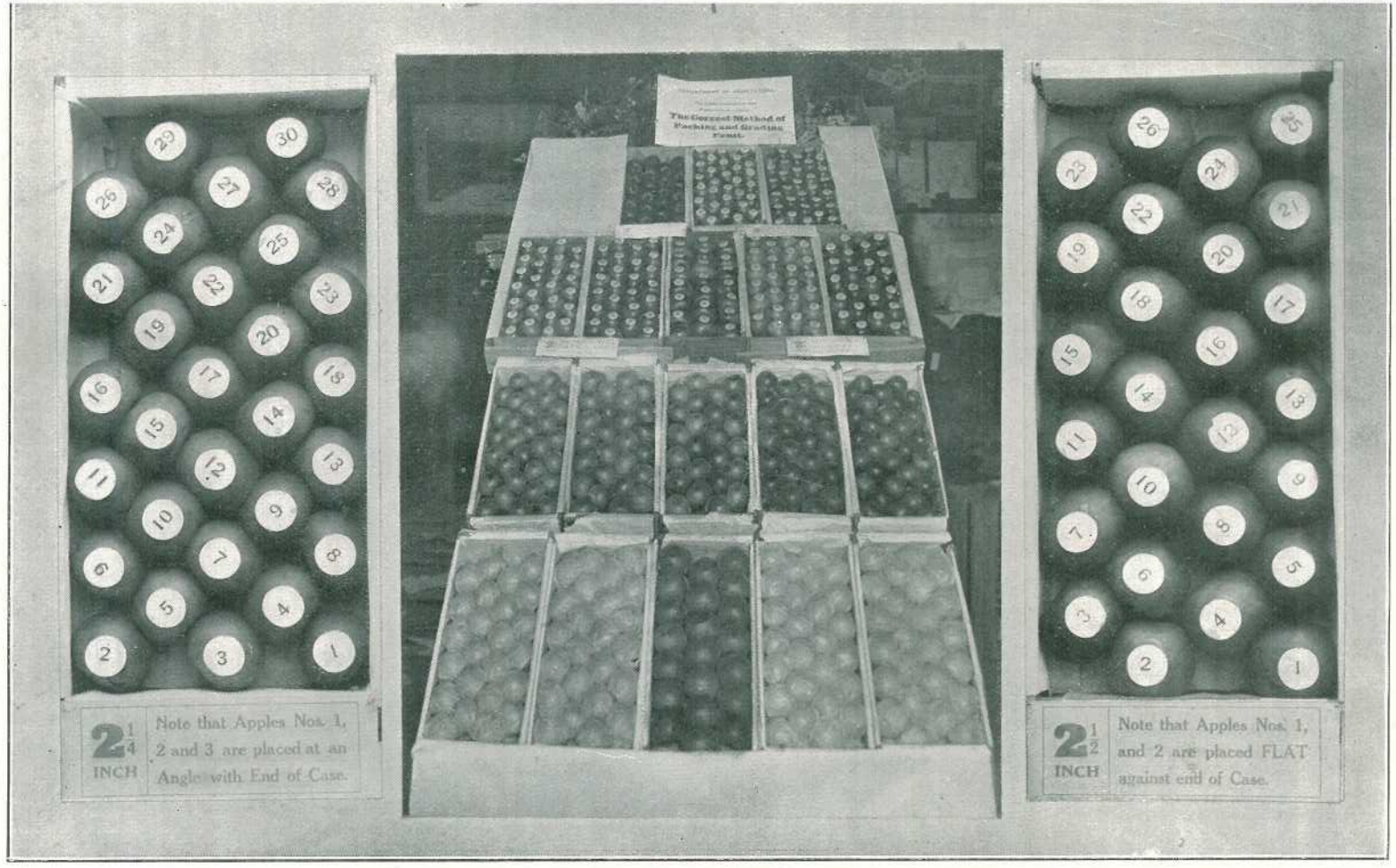
For a considerable time past the Department of Agriculture has been striving, through the Journal and other media, to impress Queensland fruitgrowers with the necessity of the utmost efficiency in picking and packing their products. An awakened public opinion among orchardists on the Granite Belt led to the expression of a strong desire for instruction in improved methods, and this was met by the State Government with an arrangement with the Tasmanian Ministry of Agriculture for the loan of the services of an expert packer. In placing the time and experience of Mr. W. Rowlands, a valued departmental officer, at the disposal of Queensland growers, the Tasmanian Government acted generously, for among the orchardists of the island State there is a constant demand for the expert packers' knowledge and assistance. Mr. Rowlands' tour of duty was limited to one month in the Stanthorpe district, and the growers on the Granite Belt made the most of his visit. An immediate result of his instruction was a notable improvement in Stanthorpe consignments received at Roma Street, and a consequent improvement in prices.

Though a much longer period of instruction was desired, it was only possible to secure the services of the expert for the month of January. Full use, however, was made of the time allotted, and altogether thirty-seven public demonstrations were given. The localities covered were Eukey, Glen Aplin, Ballandean, Bald Mountain, Beverley, Broadwater, Applethorpe, The Summit, Thulimbah, Cotton Vale, Pozieres, Bapaume, Amiens, Dalveen, Stanthorpe, Wyerba, Dalcouth, and Kyoomba.

Attendances were particularly good, growers generally evincing the keenest interest in the demonstrations. Methods hitherto in vogue were, in many instances, somewhat slack and antiquated, and a result directly traceable to the instruction of the demonstrator is the checking of a tendency to disregard modern market requirements. On the other hand, orchardists who are most careful in picking and packing received an appreciable stimulus. It is interesting to note that Stanthorpe growers, who have in the past recognised the selling force of sound, well-packed products of good quality, are among the more prosperous. It is an axiom in Roma Street that any fruit of desirable variety, well grown, carefully handled, properly graded and packed, is more than half sold. Fruits and primary products generally are sold on the farm. Good fruit, honestly and carefully packed, will sell in any market. Slack packing and "topping" kills the grower's reputation. The markets are rarely glutted with first-grade fruits. Both dealers and consumers want the best.

A full description of Mr. Rowlands' methods, as adopted by the Tasmanian Government and adapted to Queensland conditions, together with appropriate illustrations, will be published in the Journal as soon as the letterpress comes to hand. It will be subsequently printed for distribution in pamphlet form.

One illustration shows trays of apples packed by the Tasmanian expert for exhibition at the recent Stanthorpe show.



2. THE 3–2 PACK.

PLATE 36.—1. DISPLAY OF FRUIT PACKED BY MR. ROWLANDS, EXHIBITED AT THE STANTHORPE SHOW.

3. THE 2–2 PACK.

STANTHORPE JUBILEE SHOW.

The actual initiation of fruitgrowing in the Stanthorpe District is shrouded in obscurity, but the pioneers who in the beginning obeyed the behest to establish a new industry builded better than they knew. To-day Stanthorpe, in its jubilee year, stands as a monument to the faith and character of its founders. Like some other Queensland towns, it enjoyed a transitory mining boom and suffered a temporary decline. But there were men in the district who knew that more wealth was to be won from the disintegrated granite beneath their feet than from stream and reef, and on that knowledge is built the prosperity of to-day. And with the complete emergence of man's oldest industry from the primitive to the scientific, it requires but little imagination to see Stanthorpe celebrating her centenary as a city centre, with well-constructed roads radiating to the limits of the Granite Belt, and providing every amenity that enriches rural life.

THE OPENING.

The Stanthorpe Jubilee Show was opened on 2nd February by His Excellency the Governor, Sir Matthew Nathan, who, in the course of his remarks, said:—

"This is the second year in succession that I have had the pleasure of opening your Show, and the occasion has afforded me an opportunity of seeing the advance made in the main industry of the district during the year. When I was here last

PLATE 37.—HIS EXCELLENCY SIR MATTHEW NATHAN OPENING THE STANTHORPE JUBILEE SHOW, 2ND FEBRUARY, 1922.

year it was at a period of glut in the fruit market. A Stanthorpe Co-operative Canning, Jam, and Preserving Company had started pulping about a month previously, satisfactory manufacture suffering somewhat from the desire to save as much as possible of the fruit that ripened in the short season from the middle of December to the end of the first week in March. At Amiens, the Pikedale Soldiers' Settlement Canning, Jam, and Preserving Company were about to begin work by pulping tomatoes with a view to subsequent manufacture of soups, as well as of sauces and other condiments. The Broadwater Co-operative Packing Company, who were at work in grading and packing peaches and other products, were finding it difficult

to get a market for the fruit. At the end of the season it was estimated that about half the fruit grown in the district had been wasted. There had evidently been want of organisation, and the decision was discussed locally that the various co-operative companies in the Granite Belt should be amalgamated under one head.

PLATE 38.—CANNING ON THE ORCHARD. HIS EXCELLENCY THE GOVERNOR INSPECTING MR. T. J. BALLENGER'S HOME CANNING PLANT AT "GARTHORNE," STANTHORPE.

As to how far this has been done, how far complete co-ordination has taken the place of competitive co-operation, I am not quite clear, but I gather that you are on the way to this, and that there is a Stanthorpe Fruit Growers' Council that is looking after the general questions affecting the fruit of this district and co-operating

PLATE 39.—SUN-DRYING FRUIT AT "GARTHORNE," STANTHORPE.

with the Southern Queensland Fruit Growers' Society in securing a wider distribution of the deciduous fruit grown in the district. The special fruit train that has been run from Wallangarra to Brisbane under the auspices of this society since the middle of December has, no doubt, improved the conditions under which fruit has been put on the Brisbane market, but probably this year is distinguished from last not so much by improvement in organisation as by the fact that the fruit crop is light in quantity and good in quality, and so more easily marketed. I think, however, from what I have read, that the growers in the Belt are realising that against the time of large crops of fruit of mixed quality they must solve the two great problems of standardisation and distribution. I notice that when speaking a short time ago at the meeting of the Southern Queensland Fruitgrowers' Society, the chairman stated that during a trip from Newcastle he had interviewed numerous fruit merchants in the various towns on the line and that they had all expressed a desire to do business direct with the farmer, but that they must be able to rely on a standard quality and pack. He added that he had seen fruit in the shops that should never have left the farm, and that in very few instances was the fruit graded or packed properly. 'Fruitgrowers had reached the end of things under present conditions; it was life and death to the industry.' I suppose stardardisation would mean that all deciduous fruit of the Granite Belt would go through a single packing-shed, and no doubt that subject is receiving the attention of the Stanthorpe Fruit Growers' Council. It would appear, from what I have been reading, that consideration is also being given to the problem of distribution. One element of that problem is the form in which the distribution of the produce should take place. New experiments are being carried out by the Commonwealth Government, though I cannot find that Queensland is taking part in them, with regard to shipment in cold storage overseas. The Queensland Government is giving facilities to the Southern Queensland Fruit Growers' Society for cold storage experiments, and it may be found advisable to have a cold store here to preserve some of the fruit—apples particularly—which ripen in the summer months, for distribution during the rest of the year.

PLATE 40.—QUEENSLAND CO-OPERATIVE FRUIT PRODUCTS COMPANY'S DEHYDRATOR, GLEN APLIN, STANTHORPE DISTRICT.

"Then, again, various dehydration plants are on trial, including the one at Glen Aplin, put up by the Queensland Co-operative Fruit Products Company, Limited. The gist, however, of the distribution problem can scarcely be better put than in a letter which appeared in the Press a short time ago from a fruitgrower of Manly. He said this:—'The real problem which fruit farmers and planters have to face is not one of treatment so much as one of highly organised marketing. In this respect the American, of California, can show points to the whole world. Whether the fruit products be fresh, canned, or dehydrated, they are selected with the utmost

care, graded with scientific exactness, packed excellently, and then, with agents of ripe judgment in every quarter of the globe, he is advised daily by wire and cable, and places his fruits in markets where there is a scarcity, thus avoiding a glut. The fruit farmer should not pin his faith to any one method of disposing of his produce, but adopt all.' The main question then for the growers in the Granite Belt is how to organise their marketing. This problem is worth the consideration which I am sure it will receive from the best brains in this district.''

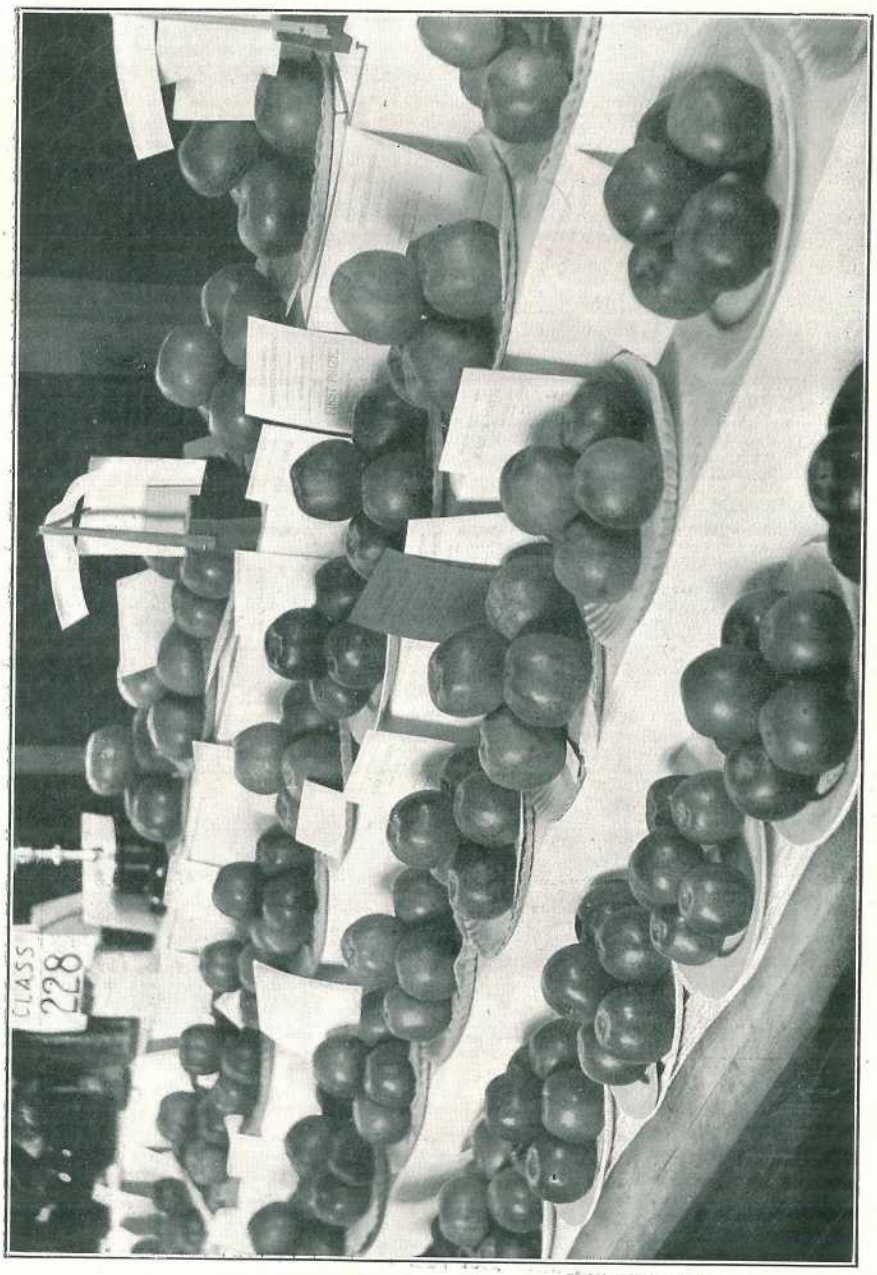


PLATE 41.—A FRUIT EXHIBIT, STANTHORPE JUBILEE SHOW, 1922.

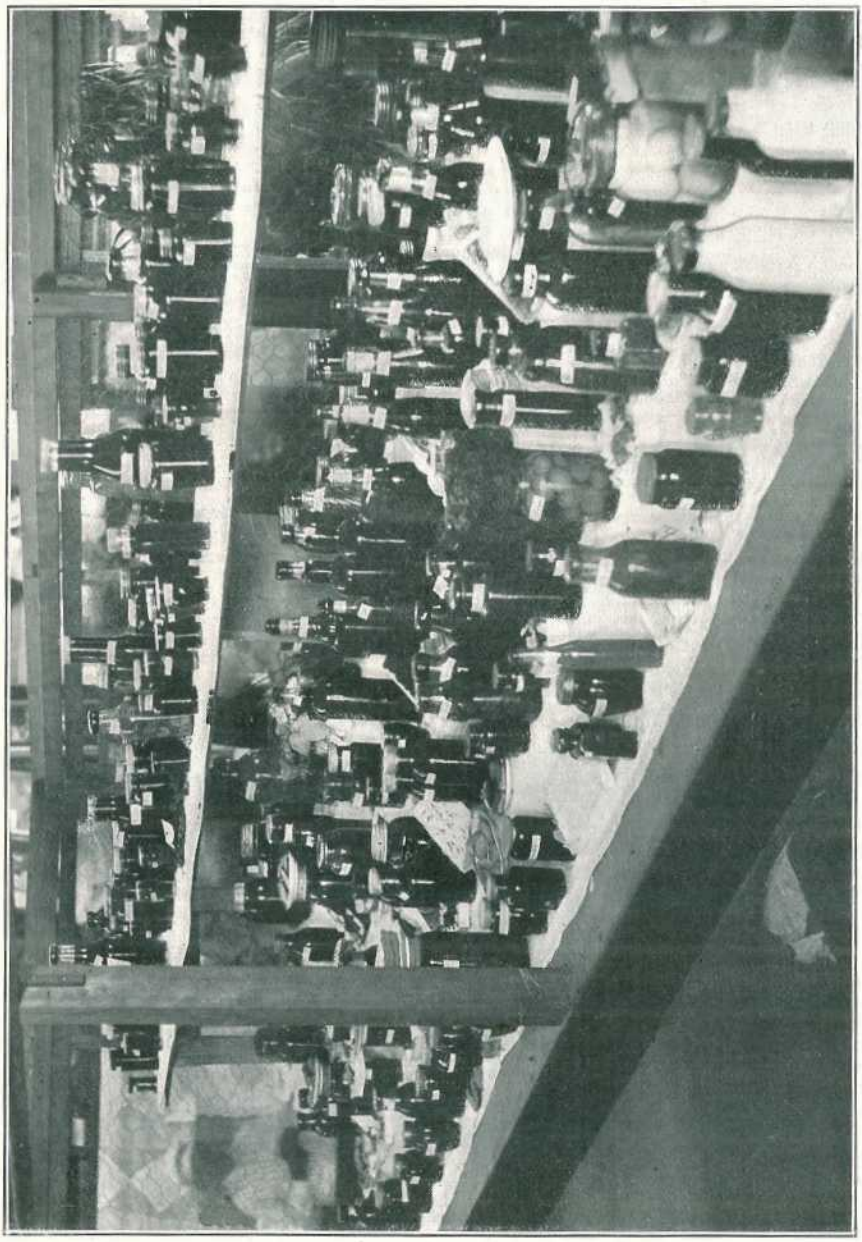


PLATE 42.—"HOUSEWIFE'S CUPBOARD," STANTHORPE JUBILEE SHOW, 1922.

THE FRUIT EXHIBITS.

The extensive collection of deciduous fruits was magnificent, and in the fruit section generally no fewer than 634 entries were received. The most striking feature of the display was the large number of cased exhibits showing a very high standard of selection and packing. A close and critical inspection made it very evident that the Granite Belt has nothing to fear from Southern competition. The Plate classes were also of outstanding quality. So good were the fruit exhibits generally that it became a matter for marvel that no local organisation has taken up the question of a constant supply of superior fruit to local hotels and railway stations. These provide means of advertisement of district products that cannot be disregarded.

RETURNED SOLDIERS' DISPLAY.

The Pikedale Returned Sailors and Soldiers' Co-operative Canning Company made a very attractive display of the products of their factory. The "Aussie Tomato Soup" label was prominent, and this is covering an excellent product.

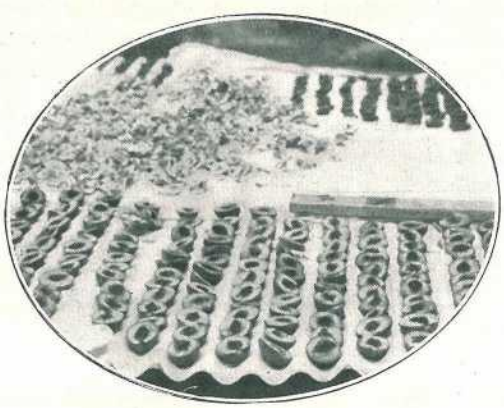
PLATE 43.—DISPLAY OF PRODUCTS OF THE PIKEDALE RETURNED SAILORS AND SOLDIERS' CO-OPERATIVE CANNING CO., LIMITED, STANTHORPE JUBILEE SHOW, 1922.

The plant at Pikedale is small but efficient, and the process of treating tomatoes is simple and comparatively inexpensive. The tomatoes are first put through a pulping machine, which tears them into shreds, and the pulp is then run into 60-gallon steam-jacketed pans. An important feature of the processing is that absolutely no water is added to the pulp in the whole course of the operations. After boiling, the soup goes through another machine, which eliminates seeds and skins, leaving the pure product ready for canning.

In other displays of art and industry the returned men were well represented among the prize winners.

OTHER EXHIBITS.

The other exhibits at least equalled, if not surpassed, the standard attained at previous shows. An example of the right methods of grading and packing, as demonstrated by Mr. Rowlands, the Tasmanian expert, is described and illustrated elsewhere.



SUN-DRYING FRUIT AT STANTHORPE.

A SHORT REVIEW OF THE SUGAR INDUSTRY IN QUEENSLAND FROM 1914.

BY H. T. EASTERBY, General Superintendent, Sugar Experiment Stations.

Considering the vast importance of the Queensland sugar industry to Australia as a whole in developing and settling the North, it is difficult to understand the hostile attitude adopted by the Southern Press. The idea present in many Southern minds is that sugar-growing is a highly prosperous industry in which "large planters" make enormous profits, this being a kind of tradition that has descended from other countries and other times, even though many of the old planters had, at times, to meet low prices and other hardships. As a matter of fact, sugar-growing is carried on in Queensland by a large number of small farmers, many of whom have a hard struggle to get on. For many years past the cane farmer has had unceasingly to struggle against the high cost of production, increasing wages, insect pests, cyclones, and enhanced prices for all the goods he uses. It is willingly admitted that since the date of the last agreement between the Federal and State authorities, whereby the price of sugar was increased to £30 6s. 8d. per ton, the growers have been in a much better position, but it is almost always overlooked that from 1914 onwards through the war period, they were supplying sugar at a very low price compared with what was being obtained in other countries in the world. When an application was made in 1914 to the Interstate Commission for consideration, it was postponed on the grounds that the war was sufficient protection in itself, and they stated "that the sugar-growers would have the market of Australia entirely to themselves for the next two years." This was poor consolation to the sugar-grower at a time when sugar values in all parts of the world but Australia were increasing rapidly. As a matter of fact, the price in Australia in 1914 was £1 per ton less than in the year before. No benefit, therefore, came to the Australian sugar-producer, either from the effects of the war on the European crops of beet sugar or from the fact that he did have the Australian market all to himself. The action of the Southern Control of Prices Boards in 1914 in holding down the price of sugar led to many of the mills making an absolute loss on the season's operations, and prevented the cane farmer from obtaining that increase in payment for his cane to which he was justly entitled. It was a position directly antagonistic to the white labour policy of this country, and the national view of settling the northern littoral by means of the sugar industry for defence purposes. Fortunately, some small measure of relief was afforded by an agreement between the Queensland State Government and the Commonwealth, in 1915, whereby the price of sugar was fixed at £18 per ton. This price was nothing like what was hoped for, and the industry in 1915 was further handicapped by a terrible drought, which did immense damage in a number of sugar districts, and proved a further setback to growers.

The price during 1916 remained at £18, but this was a bad year for growers and millers, also being famous in sugar circles as the "Dickson Award" year, when some mills did not crush at all, and others did not commence till very late in the season. This meant great loss to growers and the standing-over of large quantities of cane to the 1917 season. In 1917 the price of raw sugar was raised to £21 per ton by agreement, which was still too low a price, taking into consideration the high prices ruling in other parts of the world. The Queensland sugar-producer, however, never pressed for the outside price of sugar. He did not wish to penalise the country; all he desired and hoped for was fair treatment. At the commencement of the 1917 season conditions appeared favourable for the harvesting of a record crop; and, while this was ultimately realised, yet the estimated output was finally reduced considerably. This was due to two causes:—

First.—The industrial strife in the Southern States, which held up regular supplies of bags and lime to the mills and prevented the sending of ships for the conveying of sugar to the refiners. The district of Mackay suffered most particularly, and the mills of that locality had to close completely on two occasions for several days for lack of sugar-bags, which had the effect of disorganising labour and causing a considerable number of men to leave the district. Due to the non-moving of the sugar, every wharf and store was congested. Many of the mills were obliged to add to their storage accommodation at a time when galvanised iron was almost unprocurable and both it and timber were at a very high price. Some of the Northern mills were obliged to store sugar within the mill itself, and the loss that ensued from all this double handling, payments for insurance and storage, and the deterioration of the accumulated stocks of sugar, was very high. On the Lower Burdekin, owing to lateness in starting, closing-up during the Northern railway dispute, and stoppage for want of sugar-bags, there was a large amount of cane unharvested.

Second.—The 1918 cyclones, which at Mackay caused the loss of over 6,000 tons of sugar, washed away from the sugar stores at mills and wharves in the floods and heavy rains.

These two factors materially reduced the 1917 crop, though it was still a record, but a good deal of the loss, mostly that in connection with the sugar spoilt by the floods, was borne by the Federal Government, which relieved the situation to a large extent.

In 1918 the price still remained at £21 per ton. That year two appalling cyclones struck the Queensland coast in the sugar districts. The severity of those cyclones not only caused immense damage at Mackay, Innisfail, and Babinda in particular, but seemed to affect the cane more or less in all the sugar districts. In addition to this, rain, floods, and frosts played their part in reducing the 1918 crop. These two cyclones inflicted enormous losses on sugar-growers, not alone in the terrific damage done to cane, but in the loss of life, destruction of houses, stables, and outbuildings, the whole work of years in many cases being swept away in the course of a few hours. The terrific rainfall which fell at Mackay during the three days after the cyclone amounted to 55½ inches, and did irreparable damage to household goods. The courage displayed by the people of Mackay, Innisfail, and Babinda was wonderful, but was characteristic of the inhabitants of North Queensland, whom no cataclysm of Nature seems able to terrify. How little is known in the Southern States of the trying experiences which the sugar-farmer has to undergo in order to make a living and fill the sugar-bowls of Australia! His fight with the tropical jungle in the fierce heat of a humid summer in the endeavour to clear a space for canegrowing and build a simple home is never considered by the city dweller, who has every comfort at his command.

After the abnormal rainfall in the early part of the year, the end of the year proved very dry.

During the year 1919, the sugar-consumers continued to get their sugar at very much lower rates than in any other country, but even then there was an agitation amongst the jam manufacturers for cheap sugar. As the "International Sugar Journal" reminded them, they were getting their sugar "dirt cheap." The agreement with the Commonwealth Government for the sale of raw sugar at £21 per ton terminated that year. The drought which commenced towards the end of 1918 continued into 1919, and adversely affected the crop, the yield of sugar being poor, and amounting to only 162,136 tons.

The year 1920 saw the dawn of a brighter era. The continual upward tendency of the world's market price for sugar became so great that at last it was generally recognised, as it should have been previously, that the sugar-growers were being treated unfairly. Steps were taken by a conference, which was held at the Department of Agriculture, to wait upon the Prime Minister of the Commonwealth and request that the price of raw sugar should be increased from £21 to £30 6s. 8d. per ton, and that an agreement to that effect should be made for a period of not less than three years. This was finally given effect to, and it immediately gave an impetus to the production for next year. Encouraged by the better outlook, farmers in almost every sugar district increased their areas, not only putting under cane, land that had been lying unproductive, but in many instances bringing new land under cultivation.

The more favourable rates for sugar did not come any too soon, as the price of all commodities which the sugar-grower uses had increased by leaps and bounds. Fertilizers, green manures, implements, and cost of living were all on a very high plane, and the latter has, of course, affected the wages of the labourer, so that the sugar-producer was often hard put to it to make ends meet. Compared with the prices that were obtained for sugar in outside countries, the price paid by Australia was very low.

The drought experienced in 1919 persisted into 1920, and the crop was again a poor one, though slightly better than in the previous year. The amount of sugar produced amounted to 167,401 tons. The new lands mentioned above as having been put under cane were, of course, not productive for that season. Hence the enhanced price received for 1920 did not benefit the industry to the extent hoped for, owing to short crops.

Coming now to the last twelve months, we may say that the sugar industry during that period has enjoyed a greater measure of prosperity than it has for many years past, and has made it apparent that if the industry is to be stabilised a fair price must be ensured.

While the price for sugar and cane is uncertain, growers will not risk putting in increased areas, nor can millers afford to bring their mills up to date and increase their efficiency. The effect of a guaranteed price for three years was immediately apparent. Farmers in nearly every district commenced putting new areas under

cane, using in many cases land that had been lying unproductive for years. The millers had their plants overhauled, and put in much-needed improvements, in many cases increasing the capacity of their mills. Improved railway communication also assisted matters; and new districts (such as Carmilla, near Mackay, and the Maria Creek Soldiers' Settlement, south of Innisfail) have been added to existing mills.

The present prosperity of the industry, however, did not come before it was needed. Due to the increased prices for all commodities and the high price of labour, farmers for some years prior to 1920 were unable to carry out the improvement of their land by better methods of cultivation and the use of fertilizers; and it may be added that a large number of our cane farmers were indebted to storekeepers, banks, and mills for financial aid. The present year, however, will see a great deal of this indebtedness wiped off, and a big advance in cultivation and the use of fertilizers has already taken place. It may be safely said that more fertilizers have been purchased this year than ever before in the history of the industry. It has been the aim of the Queensland growers to endeavour to keep Australia supplied with sugar, and as long as a fair price is offered, the industry will continue to do so.

The rich tropical belt of fine land comprised in the Banyan and Tully areas, between Cardwell and Innisfail, urgently needs developing by the erection of one or more large mills, and the sooner this can be accomplished the better. We require a great population in North Queensland along the coast to effectively settle and defend it, if need be; and the more population we have there, the more will the back country be settled and developed. It has been recently stated in connection with the last census that the increase in the population of the Herbert Electoral Division, which embraces the comparatively newly settled areas of Babinda and South Johnstone, was 19.4 per cent., or 14,929 persons—a greater increase numerically than in any other part of Queensland. This shows what can be done.

From the above review of the industry since 1914 it will be seen that the sugar-grower has had to struggle against a number of disadvantages, and that the Australian consumer profited at his expense for many years in obtaining cheap sugar, while all the rest of the world were paying enormous prices, up to 1s. 6d. per lb. It was always anticipated that owing to this fact and that the sugar-producer never asked for the world's parity during the war, they would be able to expect fair and just treatment from the Commonwealth of Australia. The present agreement only covers the coming crop, and the grower is at present again uncertain of what is going to happen. The highest need in the sugar industry is stability. Let us once secure that, and the expansion and success of sugar-production will become a certainty. New areas of land will continue to be put under cane; new mills will be erected, and the northern littoral of Queensland will become populated with a thriving community. If Australia is going to keep the sugar industry for the white race, it must be prepared to pay such a price for sugar as will enable this to be done. As the first Federal Royal Commission on the Sugar Industry said, "A white community which prefers to grow its own sugar in its own territory with white labour must face the responsibility of making good the increased cost of production under the higher standard of living and reward. Either the consumer or the taxpayer must pay." Australia is the only place in the world where cane sugar is being produced by white labour. We are in competition with countries which produce sugar by black labour and under black-labour conditions. Without protection, it will be quite impossible for the Australian industry to survive.

Finally, I would bring this paper to an end by quoting the words of the first Royal Commission:—

> "The problem of the sugar industry to-day is not, save in subordinate respects, a problem of industry, of wealth, or of production; it is primarily and essentially a problem of settlement and defence. No nation can afford to regard lightly the development of its industries, the progress of its wealth, or the economic efficiency of its productive machinery. But, important as these things undoubtedly are, they rank, as regards the sugar industry, on an inferior plane. The Commonwealth to-day is brought face to face with one of the gravest problems that has ever taxed the ingenuity of statesmanship—that of the settlement of tropical and semi-tropical areas by a white population living under standard conditions of life. And intimately associated with this problem is the question of national defence.
>
> "If the ideal of a White Australia is to become an enduring actuality, some means must be discovered of establishing industries within the tropical regions. So long as these regions are unoccupied, they are an invitation to invasion, as well as a source of strategic weakness. Granted so much, it follows that the supreme justification for the protection of the sugar industry is the part that the industry has contributed, and will, as we hope, continue

to contribute to the problems of the settlement and defence of the northern portion of the Australian continent. The recognition of the nature of this supreme justification is the first condition of a sound public policy in relation to the sugar industry. Relatively to it, all other issues are of minor importance.''

This statement as to defence has been justified by the fact that one in eight of the entire population of Mackay enlisted to defend our country; over 3,000 enlisted in Bundaberg—a similar proportion; and about the same proportion in Cairns. Had the rest of Australia enlisted in the same ratio, we should have had over half a million men.

SUGAR: FIELD REPORTS.

The Southern Field Assistant (Mr. J. C. Murray) reports under date, 7th February, 1922, as follows:—

''*Bundaberg.*—Remarkable growth is in evidence on all the Bundaberg cane farms, more especially on the highlands south of The Hummock. On the Woongarra area the farms are looking their best, and growers are expecting a heavy crop for next year. In anticipation of this, it is likely that the mills will start operations early in the season. Assuming that this will be so, much of the cane will have to be harvested at an unripe stage, as very few of the varieties attain their maximum c.c.s. values before the 20th of September. The question of introducing the early maturing cane (H.Q.285) should therefore be considered.

''Mr. R. Nielson, on the Sandhills road, has a fine crop of this variety to harvest next year, and growers interested should look at this cane growing under field conditions.

''Now that the soil is in good condition, with plenty of moisture, a good tilth should be kept, so that the capilliary moisture may be conserved as the earth dries.

''At Barolin the prospects are sound. More fertilising with concentrated fertilisers is being undertaken than hitherto, and although last winter the frost affected the cane on the low-lying portions, the beneficial results of these operations are noticeable. The best results have been obtained on red forest loams by fertiliser containing a predominance of potash, and by nitrate of soda as a top-dressing for ratoons, to the extent of 1½ cwt. to the acre.

''Good results have periodically been obtained by the Pemberton Estate management through the use of lime and the ploughing-in of maize as a green manure.

''Good results are being obtained from fertilising D.1135 with 3 cwt. per acre of bonedust. What may suit one farmer, however, may not suit another, and the best guide to manuring is local experiment and soil analysis.

''Early spring planting should be adopted as much as possible with quick-growing canes, so that, if frosts occur, the well-grown cane may have greater powers of resistance than young autumn-planted cane.

''At Millbank and on the river generally there is very little poor cane at present. Both the plant and ratoon crops have grown several feet in the last couple of months, and varieties such as H.Q.813, 112, 970, D.1135, M.1900, and H.Q.285, especially the latter, are all giving the growers satisfaction.

''To avoid confusion, growers obtaining canes from the Experiment Station should be careful to place the number of the variety at the end of the row after planting, for future identification. Careful methods of cultivation should be observed from now on through the year, as dry weather may come, and it is essential to keep the land in good condition, with a fine tilth.

''On the Gooburrum side the farmers are making headway. There is still a lot of land in this area suitable for cane. In this respect a number of farmers are seriously thinking of getting more land ready for the plough, and there are about 1,000 acres of swamp at the head of Tantitha Creek which would be excellent for agricultural purposes if cleared and drained.

''Cane pests and parasites are at present causing a minimum of trouble, although beetles are flying plentifully at present. Regarding the latter, one farmer mentioned the efficacy of the bandicoot in destroying grubs. He said they damaged the cane very little, but at one time completely wiped out a bad grub infestation on his farm.''

The Northern Field Assistant (Mr. E. H. Osborn) reports under date, 7th February, 1922, as follows:—

"*South Johnstone.*—The early part of January was spent at the Experiment Station here. The great growth in nearly all the cane was most marked. At the time the weather was ideal for canegrowing, as the heavy tropical showers were followed up by intensely hot bursts of sunshine, and any well-cultivated cane was bound to respond. Throughout South Johnstone and Mourilyan some fine cane was noticed, and all growers are busily engaged ratooning, scarifying, and weeding. At South Johnstone some of the Mourilyan farms were visited, and a little time was also spent at the mill. The mill finished crushing just prior to Christmas, after putting through the very good tonnage of 85,744 tons of cane off 4,615 acres, giving a return of 18.5 tons per acre. Of this tonnage 77 per cent. was green and the other 23 per cent. burnt; the density averaged in the vicinity of 13 c.c.s.

"No labour troubles of any kind caused delay, and the cutting rates were said to be very reasonable. The mill officials were very hopeful of a good season for 1922, as the acreage to be cut amounts to 5,010 acres, or practically 400 acres more than last year's, and the cane has been favoured with a good start.

"Probably 90 per cent. of the Mourilyan cane is Badila, the balance being H.Q. 426 and the Gorus 24, 24A, and 24B.

"A good deal of interest is being taken locally in the work of the Experiment Station, and a big demand for new varieties is sure to be made at the next distribution of cane plants. A great deal of interest is also being manifested in the new seedlings at present in the very early nursery stage. Of the eighty-two growers supplying the mill, about 25 per cent. are British; the remainder are represented by a very industrious type of Italians and Spaniards.

"Manuring is being carried on in a far larger proportion than in past years. Liming is such an expensive item in this district that its use so far has been very light, but the growers recognise the advantage of its use.

"The South Johnstone mill finished its season with a total of 120,686 tons of cane from an acreage of 6,697 acres, equalling a yield of 18 tons per acre. Practically 90 per cent of the crop was Badila, the remainder being H.Q. 426 or the Gorus. Of the total tonnage, 54 per cent. was cut green and 46 per cent. burnt.

The prospects for the coming season are bright. The acreage to be cut amounts to 7,204 acres from the South Johnstone mill area (of which 209 are standover) and 450 acres from the Maria Creek Soldiers' Settlement (195 acres of which are also standover), or a total of 7,654 acres in all.

"As most of the cane looks vigorous at the present time, a good crop should be the outcome for 1922.

"The mill management have initiated an active rat-poisoning campaign; and to combat the borers they are arranging with Mr. Jarvis, of the entomological station at Meringa, to free numbers of Tachinid flies in suitable cane areas to cope with the pest. Quite a large number of paddocks were noticed in the Goondi and Mourilyan areas under green manure. In the former area a large number of various makes of tractors were working, and the general satisfaction expressed by the owners at being able to carry on constant work, despite the very hot weather conditions, was marked. Goondi mill finished crushing earlier than either of its neighbours, and 105,000 tons of cane represented its output.

"*Soldiers' Settlement (Maria Creek).*—Since my last visit in September the North Coast line has been completed from Innisfail to this centre, and in future the railway station at the settlement will be known by the name of 'El-Arish' (Palestine Campaign). The linking up of this line has made a vast difference in this place, and travelling down in comparative comfort on the 3 ft. 6 in. line makes one recall the miles of slush called roads that formerly had to be negotiated in the wet season from the end of the 2-ft. line at Silkwood to the present terminus. This only refers to the early part of last year, and as 198 in. of rain fell at the settlement during 1921 it will be easily seen that the roads were very seldom dry. In going around the area, quite a number of new houses were noticed, and I learn that fifty-five settlers are now in occupation of their blocks. The area under cane is now 635 acres, the greater proportion of which should be harvested in 1922. Nothing but Badila has been planted in the area, and generally speaking it looks healthy. Mr. Martin, the supervisor, tells me that the cane has grown comparatively more in the last month or so than in any other period of its growth. Adjacent to the hillside, on the reddish soils, some very fair cane was seen. About the best of this was upon Mr. Willman's block. Mr. Willman has had previous experience growing cane with some of the leading farmers in the Goondi district and has kept his field in an excellent state of cultivation, with the result that a very heavy crop should be harvested. As all the areas are small there is no excuse for dirty cultivation.

"Regarding harvesting operations for the coming season, the Public Estate Improvement Board is making a number of main roads, and the South Johnstone mill is supplying the settlement with 3 miles of rails, to be used for a horse tram, and also a couple of miles of portable rails for the fields, thus connecting the farms with the derricks on the North Coast line.

"*Aloomba.*—A short visit was paid to Aloomba and Gordonvale. At the former place the cane looks healthy, for cultivation and liming are now being carried out. Green manuring the fertilizing have received much attention.

"On Mr. F. Martin's farm the writer saw one of the best crops of cowpea he has seen for some time. The cane on this farm compares very favourably with any seen in the vicinity, and it says much for the way in which the cane has been carefully cultivated.

"*Gordonvale.*—In this locality the cane also was looking very vigorous. The Mill harvested approximately some 4,100 acres, for a return of 85,500 tons of cane, giving an average per acre of 20.8 tons; 4,500 tons were also crushed for Babinda, making the total of 90,000 tons. Of this amount, over 80 per cent. of the total was burnt. Considering the average tonnage per acre, and the thorough cultivation that is generally carried out in this area, this percentage of burnt cane seems very high. The average density was 12.86 c.c.s. As a large amount of rain fell during the season these figures are very fair.

"Since the new year a surprising amount of dismantling work has been carried out in the mill. The alterations involved are vast, but if the amount of energy that is now being put into the work by the various responsible officers is any criterion of its future success, then the 1922 season will be all that the many wellwishers of the Mulgrave Mill hope for. When completed, the mill will be in a position to handle 5,000 tons of cane per week."

PORTABLE TREE-FELLING AND SAWING PLANT.

The felling of trees is part of the early work of the pioneer in nearly all countries, and many appliances have been devised for lightening the labour involved. One of the latest, which has the advantage of lightness and efficiency, has been put on the market by a British firm. It is driven by an engine which develops 2½ h.p., and it is capable of felling trees with the engine placed in almost any position relative to the tree. The saw is driven by means of a coupling-rod with universal joints. A clutch is provided to obviate the stopping and restarting of the engine every time the cut is altered. The engine is also provided with a pulley so that it can be used for driving stationary machinery. When the machine is employed for sawing logs the handles of the machine rest on the log, a movable chain with pointed hooks being provided to hold the log secure. It is a very simple matter to alter the machine from tree-felling to log-sawing, and the machine can be readily moved about and operated by one man.

BRITISH CONCRETE MACHINE.

At a recent exhibition held in London, a remarkable display of concrete machinery of various kinds was made by a large number of British firms. One of these machines was a concrete block maker capable of turning out 1,000 blocks in an eight-hours working day, or 130 partition slabs per hour. When used on a house-building contract, two of these machines turned out, on the average, 2,400 blocks per day of eight hours for a period of two months. On one day the two machines actually produced 3,320 blocks in eight hours. Another machine, designed for making concrete slabs for paving purposes, averaged between forty and fifty slabs in the hour, and has produced as many as sixty per hour under service conditions. A third machine is capable of producing everything in the way of material that a builder or anyone undertaking repairs to property may require. Blocks of various sizes, bricks, window-sills, steps, hearths, mantelpieces, wall-coursings, and so on, can all be produced by this machine.

WHAT PART CAN CHALCID WASPS PLAY IN CONTROLLING AUSTRALIAN SHEEP-MAGGOT FLIES?

BY PROF. T. HARVEY JOHNSTON and O. W. TIEGS, University, Brisbane.

In the "Queensland Agricultural Journal," June, 1921, there appeared an article by the senior author, entitled "The Sheep-Maggot Fly Problem in Queensland," in which certain investigations undertaken at the University in connection with the Walter and Eliza Hall Fellowship were referred to. In August, 1921, the writers published a paper in the "Proceedings of the Royal Society of Queensland" describing the results of their experiments as to the economic importance of chalcid wasps with regard to the control of the sheep-fly pest. As contradictory statements have been made from time to time regarding these insects, it was thought advisable to prepare the present article to give wider publicity to the views therein expressed, and to take the opportunity to add some further observations.

The extent to which a parasitic insect, such as certain wasps, can control its host (*i.e.*, the insect or other organism in which it lives) depends on a number of different factors. (1) One of the most important of these is the readiness with which the parasite can gain access to the insect that it is able to destroy. If only a small percentage of the number of individuals of the species upon which or within which the parasite breeds is available for attack, then the economic importance of the latter is small; in fact, its usefulness depends directly upon the ratio of the number of host insects (sheep-maggot flies in this case) available for attack to those which are inaccessible. In other words, if only a small percentage be liable to infestation, then the controlling influence of the parasite will be comparatively small. (2) A second very important factor is the relative rates of breeding of the parasite and its host, not merely in regard to numbers of offspring produced, but also as regards the length of the life-history in each case. (3) Other factors which need to be considered are the presence of food for the adult stages of the parasite; the suitability of the environment as regards temperature and humidity; the presence of hyperparasites, &c. The effects of the various factors just mentioned could not readily be estimated in the laboratory, but the first (1) and second (2) were investigated. The results obtained proved unfavourable so far as most of the chalcids hitherto described as sheep-blowfly controls in Australia were concerned, and indicated that unless their behaviour under field conditions in sheep country was quite different from that which was observed in Brisbane, then little importance could be attributed to them as controlling agents. As indicated in a previous article in this journal, there are eight such wasps known in Eastern Australia as parasites of blowflies, while a ninth, which infests house flies, is also known. All nine are recorded from Queensland.

1. *DIRHINUS SARCOPHAGÆ* FROGGATT.

According to its discoverer, Mr. W. W. Froggatt, Government Entomologist, Sydney, this "digger wasp" is capable of digging beneath the surface of the soil in search of pupæ in order to lay its eggs in them. Our observations in the laboratory have not confirmed this, though it was found to readily oviposit in exposed pupæ of many different kinds of blowflies. The species, whose biology has been studied by us, is not very common in Brisbane and probably elsewhere also. Its importance in controlling blowflies appears to be negligible.

2. *PACHYCREPOIDEUS DUBIUS* ASHMEAD.

This small wasp, a parasite of house flies, is known to occur in North Queensland, but its relation to blowflies has not been ascertained. It appears to be so uncommon as to be of no importance economically in this State.

3. *HEMILEXOMYIA ABRUPTA* DODD.

This is a fairly large Diapriid wasp, about a quarter of an inch long, first obtained by Mr. Froggatt from the small black blowfly (*Ophyra nigra*), and later from *Calliphora villosa* (= *Neopollenia stygia*) in New South Wales. We have taken it from a carcass in the vicinity of Chinchilla, West Queensland (September, 1921). Mr. Froggatt, in his latest article ("Agric. Gaz., N.S.W.," Oct., 1921) describes it as parasitising the maggot stage, crawling amongst putrid matter in search of the fly larvæ. In this respect it acts like *Australencyrtus*, to be referred to later. It would be worth while to endeavour to breed up this wasp and to study its biology. Its habits, as far as we know them, should render it a valuable insect, if sufficiently abundant.

4. *CHALCIS DIPTEROPHAGA* GIRAULT AND DODD.

We found this species attracted to blowfly-maggots on one occasion in Brisbane. It was previously bred from fly pupæ in North Queensland. Its rarity prevents it from being an efficient blowfly exterminator.

5. *CHALCIS CALLIPHORÆ* FROGGATT.

This species resembles No. 4 in general characters, but possesses reddish-yellow antennæ and a shining red-brown abdomen. It was described as attacking living maggots, depositing a single egg in each. Like the preceding wasp, its rarity prevents it from becoming an important enemy of blowflies. It is known from New South Wales and North Queensland (W. W. Froggatt). The plate depicting this species, and contained in the senior author's previous article in this journal, was inadvertently inserted there by the Editor.

6. *PARASPILOMICRUS FROGGATTI* JOHNSTON AND TIEGS.

This proctotrypid wasp was first obtained by us in 1920 from naturally infected pupæ of the common green blowfly (*Lucilia sericata*). We have since met with it on several occasions in Brisbane, but it is too uncommon to be of any real economic importance. It is a parasite of blowfly pupæ, ignoring the maggots.

7. *SPALANGIA MUSCIDARUM* RICHARDSON.

Though originally described from the United States as a parasite of house and stable flies, it was found by us to occur in Queensland, naturally infesting the pupæ of various fleshflies and blowflies, in addition to those mentioned. In the Upper Burnett district more than 40 per cent. of pupæ of species of *Musca*, collected in the field, were found to have been parasitised and destroyed by this ant-like wasp. It is not common in Brisbane.

Some years ago Mr. F. H. Taylor sent us *Lucilia* pupæ from Roma, from which *Spalangia* was bred out in Brisbane. We were not able to distinguish it from *S. muscidarum*. A number of them were submitted recently to Mr. A. Girault, the well-known authority on chalcids and the describer of all the known Australian species of *Spalangia*, but he stated that the determination of species belonging to the group was almost impossible at present on account of the confusion which had crept into the literature. Mr. Froggatt (''Agric. Gazette, N.S.W.,'' November, 1921) referred to Mr. Taylor's specimens as *S. grotiusi* Girault. For the present we prefer to retain them under Richardson's name.

8. *NASONIA BREVICORNIS* GIRAULT AND SANDERS.*

This, the best-known chalcid parasite of the pupæ of muscid flies, has been utilised widely in New South Wales and Queensland in the attempt to control sheep-blowflies. It does not attack the maggot stages.

In order to determine the economic value of this insect, a number of experiments were carried out. It was first deemed necessary to estimate the extent to which blowfly pupæ (*Pycnosoma, Lucilia, Sarcophaga, Ophyra*) were available for attack. Some fully-grown larvæ were placed on soft soil, ¼ to ½ in. in depth, in a shallow basin; they soon pupated below the soil, and the basin with its contained pupæ was put in a cage in which were numerous female *Nasonia* wasps, but the latter were found to be unable to reach the pupæ, which were apparently safe from attack.

It is then very important to know where sheep-maggot flies pupate. The simple experiments to be mentioned now were carried out in Brisbane partly in the open and partly in the laboratory, both giving quite similar results. Still, as we have not had the opportunity to repeat them under natural sheep-land conditions, they cannot be accepted as conclusive. It should be noted, however, that those who have advocated the use of this chalcid have not paid any attention to this side of the question, upon which so much really depends.

Mr. Froggatt (''Agr. Gaz., N.S.W.,'' Oct., 1921, p. 726) mentions that the larvæ which are being bred up in his laboratory, in order to undergo artificial infestation later, leave the decomposing liver which serves as food, bury themselves into the sand used in the breeding boxes, and there pupate. In the succeeding number of the ''Gazette'' (Nov., 1921, p. 809) he states that the fully-fed larvæ, on falling from the live wool to the ground, usually pupate above the soil, while those in a dead beast crawl to the edge of the disintegrated carcass to pupate and are thus nearly all accessible to the ovipositor of the pupa-parasitising wasp.

The following experiment with *Lucilia sericata* (the green blowfly and one of the commonest sheep-maggot flies) was carried out by us in Brisbane:—A number of females were permitted to lay eggs on meat placed above some soft soil. Only

* Mr. A. Girault has just informed us by letter that the correct name of this wasp is *Nasonia abnormis* (Boheman), originally described from Europe.

the fibrous debris ultimately remained, and under this the larvæ could easily have pupated. Layers of underlying soil were carefully removed and the pupæ contained in each counted, the following results being obtained:—

	Pupæ.
On surface or partly exposed	105
To depth of ¾ inch	663
From ¾ to 2¾ inches	1,403
From 2¾ to 3½ inches	172
From 3½ to 5 inches	51
From 5 to 6 inches	7
Below 6 inches	0
Total	2,401

Out of a total of 2,401 pupæ, only 105, *i.e.*, 4.37 per cent., pupated in positions within reach of *Nasonia*. It was found that in wet weather all the pupæ were located beneath the surface. We have repeated the experiments with the large green blowfly (*Pycnosoma* (or *Chrysomyia*) *rufifacies*) on several occasions, with practically the same results, its hairy pupæ generally being situated below the surface. When a pastoralist turns over a carcass which has recently been destroyed by maggots, he may find thousands of pupæ beneath it, and of these perhaps at least half (or even up to 80 per cent.) may be parasitised and destroyed by the chalcid; yet the fly nuisance increases. The explanation—supposing that larvæ behave in the field as they do under laboratory conditions—is that for every pupa seen on the surface, twenty or more are to be found beneath the surface and out of reach of the wasp. These results are not encouraging.

Let us examine the second factor in effective parasitism, viz., the relative rates of breeding in the case of *Nasonia* and the sheep-maggot fly (*P. rufifacies*). Our observations in Brisbane show that the minimum period elapsing between the deposition of the eggs of the chalcid and the time when the resulting wasps which hatch out are ready to lay eggs, is about ten days; while in the case of the blowfly it is longer —a fact in favour of the chalcid. But let us examine further. The blowfly lays, as far as is known, on an average, about 250 eggs, whereas the chalcid deposits about 113. Now, unfortunately, the latter do not cause the destruction of 113 blowflies, since the wasp deposits on an average about six or seven in each pupa, thus parasitising from seventeen to twenty blowfly pupæ. At times the chalcid may deposit a much greater quantity in each pupa, so that the number of flies destroyed is correspondingly less.

A third fact tells against the importance attributed to *Nasonia*. During the height of summer it is found that the pupal period for the hairy maggot-fly is from three to four days. Even though the wasp may have deposited its eggs in a fly pupa, yet no harm can result until after the hatching of those eggs, an event which we found takes about forty hours to occur. Thus, out of the three or four days in which the wasp might destroy the pupa, nearly two days are necessarily lost during the hatching of the eggs. Hence if the pupæ are not attacked within about two days (perhaps less in summer) after pupation, the wasp can no longer injure them, no matter how many eggs may be laid in them after that period. Moreover, such eggs must perish when the fly emerges.

Most of the empty puparia, from which flies have escaped, would be removed by wind. It is almost certain that observers collecting fly pupæ in the field, in order to estimate the percentage of parasitised material, would pick up only the unhatched pupæ. Since the young stages (larva and pupa) of the chalcid occupy about eleven days, infected fly pupæ are, then, accumulating for eleven days underneath carcasses in the field. Blowfly pupæ, on the other hand, take only three or four days to develop into flies, so that uninfected pupæ are accumulating for that period only, under similar circumstances. Hence, when the collector brings in a batch gathered in the field on any particular day, he is really including both parasitised and non-parasitised material, but these would not be in the ratio in which they actually have been produced, but in the ratio of their relative rates of accumulation. In other words, there would be perhaps three or four times as many infected pupæ as should be taken into consideration when estimating a percentage infection. Of course, a series of collections at intervals of about three days would give a much more accurate result, as it would account for the uninfected flies which otherwise would have emerged and not become included in the tally. From the foregoing it will be seen that as a result of casual collecting there is great probability of a totally incorrect result being obtained.

We may, then, summarise the results regarding *Nasonia*:—

(*a*) The majority of sheep-maggot flies apparently pupate in places where they are not exposed to infection by *Nasonia* or other pupa-infesting wasps; hence only the smaller number which have pupated on the surface can become parasitised.

(*b*) Flies breed much faster than do the wasps, a single female *Nasonia* being able, on an average, to destroy from seventeen to twenty fly pupæ, whereas a single female blowfly can produce about 250 flies.

(*c*) During the hot season (*e.g.*, February) blowfly pupæ, on account of their accelerated development, enjoy a considerable degree of immunity from effective attack by such wasps as parasitise the pupal stage.

As a result of our observations, we are forced to regard *Nasonia* as a greatly overestimated factor in the control of blowflies.

9. *AUSTRALENCYRTUS GIRAULTI* JOHNSTON AND TIEGS.

This "brown-legged wasp" was discovered last year by us in Brisbane, and by Mr. Froggatt in New South Wales. It appears in the former locality in abundance during October and November (when *Nasonia* is not so common), but diminishes as the summer advances (when *Nasonia* becomes more plentiful).

It is slightly larger and more active than *Nasonia*, and is readily recognised by its yellowish-brown undersurface and its brown legs. The female confines its attention to the maggots, searching for them even amongst putrid material, and parasitising them even when fully covered by a thin layer of the decaying matter in which the larvæ are feeding. Pupæ are ignored by it. Apparently from five to seven eggs are deposited in a maggot at each act of oviposition (not merely one egg in each pupa as stated recently by Mr. Froggatt).

The wasp can be readily bred in captivity. During midsummer a period of twenty days elapses between oviposition and the emergence of the resulting adult wasp. This period lengthens to about twenty-five days in spring (October), twenty-eight to thirty in autumn (May); and about six weeks during winter (June and July). The female is able to parasitise maggots on the day of its emergence from the destroyed fly puparium.

The long developmental period appears to be a disadvantage from the point of view of efficiency in fly-control, but the fact that this wasp can attack the maggot stage is very much in its favour, because of the length of time occupied by the fly in this stage, and because of the need of the larva to maintain communication with the air, this giving the wasp an opportunity to attack it. An illustration of its efficiency was noticed last October, when, in order to obtain a supply of fly pupæ, some meat was exposed in a glass jar, soil being placed in the bottom of the jar to receive the pupating insects. The latter pupated under the soil, from which they were subsequently collected. On examination it was found that nearly all contained about five larvæ or pupæ of this wasp, this being apparently about the number deposited as eggs at one oviposition. This observation is open to the same objection as was raised against the recorded percentages of infection of pupæ by *Nasonia*, so that the actual percentage of infestation observed may have been too high. A more serious objection which it shares with *Nasonia* is the periodic nature of its appearances, but by means of laboratory supplies this could be remedied. It seems to us to be well worthy of trial under field conditions in Western Queensland.

This wasp was recently described in the "Agricultural Gazette, N.S.W.," (October, 1921, pages 730-1), by Mr. A. P. Dodd under the name *Stenosterys fulvoventralis*, which is a synonym of our name *Australencyrtus girault*i. The inclusion of the species in the genus *Stenosterys* appears to have been due to the difficulty in observing the structure of the mandibles. The presence of three "teeth," however, removes it from the Ectromini, to which *Stenosterys* belongs, and places it among the Mirini of Ashmead, or the Encyrtini, as conceived by Girault.

10. *ALYSIA MANDUCATOR* PANZER.

Alysia is a large braconid wasp, stated to be very active in controlling house flies in England, and, according to Professor Lefroy, would be of great value in combating the Australian sheep-flies. This insect has the special advantage that it attacks the maggot stage and lays only one egg in each. As it is capable of depositing a very large number of eggs, its effective destructive power must be considerable.

According to Mr. Froggatt, it is "an indiscriminate parasite on the pupæ of all kinds of flies, and among others is very partial to those of the European syrphid flies." As the latter are very useful agents in controlling aphids which attack cultivated plants, careful observations regarding the relation of *Alysia* to such useful flies would need to be made before the utilisation of even such an ally as *Alysia* should be attempted.

CERTIFICATES OF SOUNDNESS.

FEBRUARY REGISTRATIONS.

Name of Stallion.	Breed.	Period for which Certificate was issued.	Owner's Name.	Owner's Address.
Hindoo Lad ..	Blood	Life ..	W. Baguley ..	Pratten Street, Warwick
Victor Wilkes ..	Trotter	Life ..	C. W. Free ..	Headington Hill, Clifton
School Boy ..	Pony ..	12 months	W. J. McKone	Allan's Siding, Goondiwindi Line

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, 1922 AND 1921, FOR COMPARISON.

Divisions and Stations.	Average Rainfall.		Total Rainfall.		Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	Jan.	No. of Years' Records.	Jan., 1922.	Jan., 1921.		Jan.	No. of Years' Records.	Jan., 1922	Jan., 1921.
North Coast.	In.		In.	In.	*South Coast*—continued:	In.		In.	In.
Atherton	12·44	20	8·27	7·37					
Cairns	16·98	39	6·05	15·65	Nambour	9·47	25	4·39	9·18
Cardwell	17·30	49	3·92	12·44	Nanango	4·58	39	3·22	3·32
Cooktown	14·74	45	8·08	33·67	Rockhampton ...	9·25	34	4·36	4·67
Herberton	9·88	34	6·86	5·22	Woodford	7·43	34	3·49	8·81
Ingham	16·78	29	3·15	15·39					
Innisfail	21·02	40	6·03	18·19					
Mossman	18·81	13	9·25	13·72	*Darling Downs.*				
Townsville	11·91	50	5·23	5·75					
					Dalby	3·34	51	3·09	2·31
Central Coast.					Emu Vale	3·22	25	1·24	0·83
					Jimbour	3·80	33	1·48	3·21
Ayr	12·37	34	6·55	8·09	Miles	3·92	36	2·77	2·42
Bowen	10·55	50	5·12	6·99	Stanthorpe ...	3·60	48	1·20	1·07
Charters Towers ...	5·78	39	2·26	8·81	Toowoomba ...	4·99	49	2·28	2·94
Mackay	15·32	50	4·78	15·91	Warwick	3·61	34	1·29	1·25
Proserpine	18·40	18	3·12	14·96					
St. Lawrence ...	10·03	50	2·05	18·30					
					Maranoa.				
South Coast.									
					Roma	3·44	47	3·59	1·41
Biggenden	5·46	22	4·04	5·37					
Bundaberg	9·26	38	7·54	7·41					
Brisbane	6·42	71	3·62	4·04	*State Farms, &c.*				
Childers	8·03	26	6·13	5·52					
Crohamhurst ...	12·56	30	7·26	12·41	Bungeworgorai ...	2·32	7	2·41	1·35
Esk	5·66	34	2·88	3·96	Gatton College ...	4·37	22	2·39	2·34
Gayndah	4·83	50	2·13	4·94	Gindie	4·04	22	3·91	3·12
Gympie	6·81	51	2·88	6·41	Hermitage ...	2·97	15	1·40	1·83
Glasshouse M'tains	9·17	13	4·67	8·38	Kairi	8·80	7	Nil	5·19
Kilkivan	5·80	42	1·14	4·15	Sugar Experiment Station, Mackay	17·14	24	3·71	12·70
Maryborough ...	7·42	50	3·14	7·34	Warren	7·19	7	2·44	4·80

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 1921, having been compiled from telegraphic reports, are subject to revision.

GEORGE E. BOND,
State Meteorologist.

Editorial Notes.

1922 Cotton Season.

Cottongrowers are reminded of the importance of waiting until their product is quite mature before commencing picking. The boll should be fully opened. Ripe cotton means higher profits and time saved in harvesting. The Australian Cotton Growing Association has arranged to receive and gin this season's crop. Machinery is now in course of assembly and installation and structural work is well forward. The Association will be prepared to receive unginned cotton at the Rockhampton Ginnery on 18th March, and at the Hamilton (Brisbane) Ginnery on 1st April.

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The Commercial Side of Farming.

Everyone interested in the welfare of rural industry, and therefore who thinks nationally, knows that the unsatisfactory conditions with which agriculture is burdened to-day are due in a very large measure to lack of effective co-operation. Agriculture is not merely farming; it is a business, an industry, and on its commercial side it has two important aspects. From a national point of view it is desirable that food should be produced at the most reasonable price to the consumer compatible with a fair profit to the producer. From the farmer's point of view it is essential that he should be able to market successfully that which he produces not only in lean seasons when supply is less than the demand, but also in seasons of plenty when conditions are reversed. He should always be stimulating demand, and the best stimulus is reasonable prices. To sell at reasonable rates it is important that produce should reach the consumer loaded only with the lowest possible intermediate charges. The cost of production and distribution must be reduced to a minimum. In turn the cost of purchasing machinery, fertilisers, and other equipment and commodities necessary for the carrying on of the farmer's business should also be reduced to a minimum. And to ensure this reduction both ways, agricultural co-operation is the only effective means. The advantages that lie in the bargaining power of combination are obvious. By combination in both buying and selling the farmer would receive: (1) the benefit of wholesale rates, and (2) reduction of intermediate costs of distribution. The days of single purpose co-operation are passing. What is seriously engaging the thought of those concerned most closely with rural economics is not only the co-operation of individual farmers but also the effective co-operation of co-operative concerns. The whole strength of the co-operative movement depends upon the reality, the extent, and continuity of combined action. In no other way can farmers secure the best terms on both the buying and selling sides of their business. By no other road can they reach a position of commercial strength which will enable them to meet the biggest buyers of their produce on level ground. An unalterable condition of the acquisition and retention of that power is their absolute loyalty to their own business ventures. The weakness of co-operative concerns to-day is that farmers are often not loyal to the enterprises they themselves have created. Not that they, less than any other section of the community, are wanting in the moral quality of loyalty, but, for some reason or other, they apparently cannot see how much it is to their advantage to maintain effective and continuous combination for the sake of the commercial power it would confer upon them. If farmers get together, stick together, and act together in all things for the betterment of their industry, it will not be long before they will be in a position to effectively control their business on both sides from the bucket to the selling floor, from the paddock to the pantry, and reap rewards for their labour that would be reasonable and just.

General Notes.

SHEEP AS A SIDE LINE.

Writing in the Mackay "Daily Mercury" (18th February, 1922), a correspondent says:—"For many years our State Government sheep expert, Mr. W. G. Brown, has reasoned with and urged on settlers on the coast to take on a small flock of sheep as a side line. The great majority of those who took Mr. Brown's advice and followed his teaching have good reason to congratulate themselves and thank him. The small percentage of failures has been mostly due to the fault of the settlers. Right at our door we have proof positive that sheep will do well on the coast, and proof not alone that they can be fed but that they can be bred. The L Islands have carried sheep for some years, and, judging by some I have seen from there, the

Messrs. Bussetin are going intelligently to work to develop a very fine class of sheep. But, long before sheep were put on L Islands, Captain Adderton had established a flock on Lindeman Island, the most northern of the group of which the L Islands form the southern part, and descendants of that flock are still on the island. Thus, Lindeman Island has been constantly under sheep for a period of about twenty-five years. Actually the grazing quality of the island has vastly improved; and the sheep, though largely of the Merino strain, have not deteriorated. The present owner, who bought out Captain Adderton, has, however, introduced Border Leicester rams, and the result should be a great improvement in frame and weight of fleece. Lindeman Island is certainly ideal for coastal sheep-raising. It has a perfect harbour, and is within easy reach of Mackay, Proserpine, or Bowen. It has abundant and permanent water, and a rich black basaltic soil. It is splendidly grassed, and is capable of carrying safely up to 5,000 sheep. I was present during shearing, and had practical demonstrations of the freedom from seed in the wool. But there are opportunities right here, on the mainland, for intelligent farmers to keep a small flock of sheep as a side line, and these farmers need not be afraid to breed lambs for market or home consumption. The lantana farmers, of whom, unfortunately, we have a large proportion, would be well advised to leave sheep alone."

KUDZU—A REMARKABLE FODDER VINE.

At Mr. Hugh McMartin's farm, Glen Pullen, Indooroopilly, may be seen a patch of kudzu, a leguminous plant for which great possibilities are claimed. In the United States it has a great name as stock feed and as a milk-producer. The plant at Glen Pullen has made remarkably rapid growth. In appearance it is not unlike a cowpea, but sends out long runners which root readily at the nodes. The plant is said to be a good yielder on poor soils and is so vigorous and spreads so rapidly as to soon smother weed growth. Introduced by the New South Wales Department of Agriculture about three years ago it is comparatively little known in Australia. The plant, it is said, was originally brought from Japan to America at the time of the St. Louis Exhibition for decorative purposes. In Florida (U.S.A.) it is grown on trellises about 10 feet apart, and animals are fed between the rows. It is hard to start for the first year, but after that there is no holding it. It is claimed that when established it can sustain six cows to the acre. In Florida it has yielded 10 tons of fodder per acre.

Analysis (Professor Piper, U.S.A.).—Water 69.4, ash 2.2, crude protein 5.5, fat 1.0; carbohydrates fibre 8.3, free extract 13.6.

SHOW DATES, 1922.

Inglewood: 14th and 15th March.
Pittsworth: 23rd March.
Killarney: 29th and 30th March.
Dalby: 29th and 30th March.
Toowoomba: 4th to 6th April.
Sydney Royal: 10th to 19th April.
Chinchilla: 11th and 12th April.
Herberton: 17th and 18th April.
Miles: 19th April.
Nanango: 20th and 21st April.
Goondiwindi: 25th and 26th April.
Longreach: 2nd and 3rd May.
Wondai: 3rd and 4th May.
Grafton: 3rd to 6th May.
Toogoolawah: 4th and 5th May.
Blackall: 9th and 10th May.
Boonah: 10th and 11th May.
Emerald: 16th and 17th May.
Roma: 16th and 17th May.
Ipswich: 17th and 18th May.
Springsure: 23rd and 24th May.
Wallumbilla: 23rd and 24th May.
Maryborough: 23rd to 26th May.
Lowood: 25th and 26th May.
Beaudesert: 31st May.
Bundaberg: 1st to 3rd June.
Marburg: 2nd and 3rd June.
Gin Gin: 7th and 8th June.
Gladstone: 13th and 14th June.
Mount Larcom: 16th and 17th June.
Rockhampton: 22nd, 23rd, and 24th June.
Nambour, 5th and 6th July.
Rosewood: 19th and 20th July.
Caboolture: 20th and 21st July.
Barcaldine: 25th and 26th July.
Crow's Nest: 26th July.
Wellington Point: 29th July.
Royal National: 7th to 12th August.
Belmont: 9th August.
Murrumbidgee, 22nd to 24th August.
Zillmere: 1st and 2nd September.
Gympie: 7th, 8th, and 9th September.
Wynnum: 9th September.
Sherwood: 16th September.
Rocklea, 23rd September.
Esk Campdrafting: 4th and 5th October.
Pomona: 4th and 5th October.

PUBLICATIONS RECEIVED.

The *Agricultural Gazette of New South Wales*, for January, has among its main topics a description of "Foot Rot" of wheat, caused by the fungus *Helminthosporium*. Others matters discussed include "Cheesemaking on the Farm," "Reconstructing Milk and Cream," "Onion-growing in New South Wales," "The Energy Value of Some Dried Fruits," and "Cottage Landscape Gardening."

Bananas as Pig Feed.—Among the general notes is a reference to the value of bananas as pig feed. "The experience of farmers in the Tweed River district seems to show that pigs do well if fed on bananas, especially if the fruit is given with skim milk. Green bananas become soft if they are boiled for twenty minutes, and, although rather insipid in taste, are readily eaten. Pigs fatten well when fed in this way."

Paper Mulch for Pineapple Growing.—Another interesting note is a reference to a paper read at the annual meeting of the Hawaiian Pineapple Packers' Association. "Experiments have shown that the use of mulching paper materially increases pineapple production per acre. The idea of a paper mulch for sugarcane was patented some years ago, but no experiments with pineapples were conducted until 1919. It is estimated that there are now 461 acres planted with paper, of which 68 acres will fruit in 1922. The paper mulch appears to consist of a strip of paper in which are cut holes large enough for the pineapple plants to grow through. The first yields from the method were obtained last year, and it was found that the plants in paper grew uniformly larger, greener, and more healthy, and the fruit larger (equal to a little over 3½ tons per acre) and better conditioned. The paper mulch prevents the growth of weeds and the packing of the soil under heavy rains, thus greatly reducing the cost of intercultivation. In an experiment at the Hawaiian Pineapple Association's experiment station, the plant growth on paper mulch was three times greater in weight, and much healthier than on other plots."

The Scientific Reports of the Agricultural Research Institute, Pusa, 1920-21 (Calcutta), are very valuable, and cover a wide area in the field of rural economics.

The Journal of the Department of Agriculture, Union of South Africa, for December, has an account of "An experiment in Egg Production," embracing an interesting report on the building-up of tested laying-strains.

The Journal of the Department of Agriculture of South Australia (January) has listed among its more important features an account of the rise and progress of the South Australian fruitgrowing areas on the River Murray.

The Journal of the Ministry of Agriculture (United Kingdom) for January has among its principal contents: "Suffolk Sheep," "Berkshire Pigs," and a report of the International Labour Conference at Geneva, detailing various phases of the labour problem as applied to agriculture. The report concludes: "Probably agriculture is, of all industries, least susceptible to international regulation, but something is accomplished if this fact comes to be realised after full discussion between the parties concerned—the employers, the workers, and the Governments. From the purely national point of view, again, British agriculture stands to gain if the restrictions on the unlimited use of labour which are dictated by humanity and have become customary under our social conditions can be thus incorporated in the practice of other competing countries."

The Aberdeen-Angus Review (December) is replete with information about the great Scottish cattle breed.

The Journal of the Department of Agriculture of Porto Rico have published in bulletin form:—"An Annotated List of Sugar Cane Varieties," "The Minor Sugar Cane Insects of Porto Rico," and "Changes Wrought in the Grapefruit in the Process of Maturation."

The South African Farmers' Advocate for January discusses very seriously the general agricultural outlook. Market difficulties have, it seems, created a crisis in the Union, and the Australian rural producer is not the only storm-beaten voyager on a sea of trouble. "Kikuyu Grass' is the title of a very informative article on an aggressive drought-resisting plant that is already well known in Australia. The article explains "characteristics of Kikuyu which are not generally known, its growth in conjunction with clover, its uses for feed and other purposes, how to get the best results from it, the conclusions drawn from recent experiments, and other interesting particulars."

The Philippine Agricultural Review (No. 2, vol. xiv., 1921) presents additional data on Adlay, a grain that is receiving a considerable amount of attention in the Philippines. "Altogether it has been demonstrated beyond a doubt that adlay is a palatable and wholesome food for the table, and there is every reason to believe that with a proper mixture of wheat flour it can be used for all purposes for which wheat flour is used."

Answers to Correspondents.

THE GERBERA.

A.S.D. (Cooroy)—

Suggestion much appreciated, and will be adopted. The Curator of the Botanic Gardens (Mr. E. W. Bick) is prepared to assist readers of the Journal in matters relating to horticulture.

A very interesting and instructive paper on the gerbera was prepared by Mrs. Grenning, of Zillmere, and read before the members of the Queensland Horticultural Society. It was published in the "Agricultural Journal" of January, 1920, page 18. Mrs. Grenning is one of the most successful growers of gerberas.

THE CORAL TREE (ERYTHRINA INDICA).

D.McK. (Weir View, Goondiwindi)—

The Curator of the Brisbane Botanic Gardens (Mr. E. W. Bick) advises—

"The Coral Tree described is *Erythrina indica*. It is indigenous and abundant in Northern Queensland, New Guinea, and India. It strikes readily from strong cuttings, planted in late winter or early spring, and may also be grown from seed. It should be more largely planted, being a splendid quick-growing shade tree, and, although deciduous, when in full flower is a glorious mass of colour. It is frequently met with, grown as a shade tree, in the North and South Coast districts of New South Wales. In addition to *E. indica* there are three other indigenous species. *Erythrina vespertilio* (Bat's Wing Coral Tree, referring to the shape of the leaf), is found from the Gulf of Carpentaria down to the Clarence River in New South Wales, and inland on the Maranoa. Leichhardt, in the account of his exploration expedition to Port Essington, reports having met with it throughout. The other two species are found in the far North—one (*E. phlebocarpa*) on the Cape York Peninsula, and the other (*E. insularis*) on the islands of Torres Straits.

"There is a large number of other species of this fine tree, some of which are very beautiful—notably *E. tomentosa*, from Abyssinia; *E. Cristagalli*, from Brazil; *E. caffra*, from South Africa; and *E. Parcelli*, one with beautifully variegated foliage, from the South Sea Islands."

PEANUTS.

W.J. (Hill Top Farm, Glen Eagle)—

The Director of Agriculture (Mr. H. C. Quodling) advises—

"The clean, bright appearance of peanuts to be seen in the shops is characteristic of nuts grown on certain classes of sandy-loam soil, where there is an absence of colouring matter likely to cause discoloration or staining of the shells. Another reason is that the crop has been well harvested and cured under favourable weather conditions.

"Peanuts are also improved in appearance when preparing them for market by grading, brushing, and polishing. Attachments for these purposes are fitted to modern types of peanut-threshing machines, two of which latter are in use in North Queensland.

"Harvesting should be effected as soon as the plants, and the peanuts themselves, show unmistakable signs of maturity. If the harvesting of a ripe crop is delayed, the threadlike rootlets to which the peanuts are attached commence to decay, and, if this occurs, loss in handling is unavoidable.

"A leaflet on peanut-growing and harvesting has been forwarded."

TREE LUCERNE (CYTISUS PROLIFERUS).

T.F.I. (Caloundra)—

The so-called tree lucerne known to this Department—*Cytisus proliferus*—is grown to some extent as a hedge plant, for which it is well suited, as the plants trim well if trained when young. The leaves are not very palatable to stock.

GREASY HEEL.

J. MACA. (Peachester)—

Greasy heel is not infectious, but there is a predisposition to the complaint on the part of certain animals.

SUDAN GRASS.

A.T.J. (Wondecla, *viâ* Cairns)—

The Director of Agriculture (Mr. H. C. Quodling) advises:—

"Great care must be exercised in feeding Sudan grass to stock. It cannot be fed with safety until the plant is well out in head, and animals should be gradually accustomed to it. Cases of poisoning have occurred through turning cattle in to graze on Sudan grass paddocks, particularly where the growth was immature. From analyses made by this Department's Agricultural Chemist it would appear that sufficient hydrocyanic acid is present in green immature growth to kill cattle; whereas when the plant is in a fairly advanced condition (well out in head) there is little or no danger."

PINEAPPLES AS PIG FOOD.

G.M.B. (Beerburrum)—

The Agricultural Chemist, Mr. J. C. Brünnich, advises:—

"Waste fruit can generally be fed advantageously to stock, but, when considering that pineapples contain from 83 to 90 per cent. of water and only from 10 to 17 per cent. of dry matter, consisting chiefly of carbohydrates (sugars, &c.) and only very little protein or flesh-forming food, it will be understood that very large quantities are necessary to form a proper ration, and that concentrates rich in protein must be given at the same time to give a properly balanced ration. Pineapples contain per 100 lb. only .4 lb. of digestible protein and from 10 to 13 lb. of carbohydrates, and as pigs require for every 100 lb. of live weight a ration containing 3.6 lb. of dry matter, and .45 lb. of protein, about 100 lb. of fruit would be required to give nearly the necessary amount of protein, and about 28 lb. of fruit to give the necessary amount of dry material.

"Usual rations for pigs, consisting of pollard, green lucerne, sweet potatoes, and skim milk, supply the necessary food in 14 lb. of the mixed ration for 100 lb. of live weight, and from this figure it is easily seen that pineapples could not be consumed in sufficient quantities to give a complete ration. Blood meal or meat meal, which contains about .64 lb. of protein in every 1 lb., would be a valuable aid to supply the necessary nitrogenous material, if used in small quantities.

"A complete ration for every 100 lb. live weight would consist of 2 lb. of pollard, 15 lb. of pineapples, and 4 oz. of blood or meat meal.

"The 4 oz. of blood could be replaced by about 9 oz. of linseed meal or of peanut meal, or 1 lb. of sunlight oil cake."

SULPHATE OF LIME.

W.B. (Palmwoods)—

The Agricultural Chemist, Mr. J. C. Brünnich, advises:—

"Sulphate of lime of gypsum is used in place of crushed limestone or lime carbonate, particularly in the case of heavy low-lying soils inclined to be alkaline. Sulphate of lime has a more powerful action than ordinary limestone in improving the physical condition of clayey soil. Sulphate of lime could not replace quicklime to neutralize acidity in soils due to large amounts of organic matter."

CHEESEMAKING AND MARKETING.

K. McD. (Yaamba)—

The Chief Dairy Expert, Mr. E. Graham, advises as follows:—

"The local market price for cheese of first-grade quality is 9d. per lb. wholesale, and it is not expected that the price will be reduced in the near future. The value of cheese in the oversea market is now much lower than the rate prevailing during the war period, and the value of cheese in London ranges to-day from 90s. to 96s. per cwt. c.i.f.

"The natural pastures and artificially introduced Rhodes grass of your district are considered suitable as pastures for utilisation and production of milk for cheese purposes. The prevailing climatic conditions are such that provision would have to be made for the cooling of milk, otherwise the milk would probably develop too much natural acidity when kept overnight to allow of the manufacture of cheese of first quality.

"The cheese factory building, equipment, and plant to treat the amount of milk yielded by 200 cows would cost approximately from £750 to £1,000. The quantity of milk yielded by 200 cows would necessitate the installation of a small boiler for the purpose of heating the milk and providing water for cheese-factory purposes, cleansing vats, dairy utensils, floors, &c.

"There are several avenues through which instruction and advice may be obtained in the manufacture of cheese. The subject of cheesemaking may be taken up at the Queensland Agricultural College, Gatton, where an Instructor of Dairying is employed for the purpose of imparting advice and instruction in the theory and practice of cheesemaking.

"Another means whereby an insight into cheesemaking may be obtained is by the employment of a qualified cheesemaker in the factory for a season, and by someone on the dairy farm working under him and acquiring a knowledge of the work.

"There are also Cheese Instructors engaged under this Department who visit factories and give instruction and demonstration of the procedure to be followed in the conversion of milk into cheese. It is to be recognised, however, that a practical knowledge of cheesemaking is an essential to success, and this can be best acquired by the adoption of either of the former methods referred to."

SPEAR GRASS AND SILAGE.

J.J.S. (Queenton) writes:—"It is intended to chaff spear grass and place it in a silo. The silo is small (depth 9 ft.), circular, cement walls, and sunk in ground. Will the fermentation process destroy the injurious spear seeds so that the silage may be eaten by cattle without injury?"

The Director of Agriculture, Mr. Quodling, advises:—

"1. Yes. The chemical changes which take place in silage in a silo will soften the awns of the spear grass, and in this way obviate the otherwise-harmful effect of a full diet of this description. The germinating capacity of grass and other seeds is also destroyed.

"If you have maize, sorghum, sugar-cane, or some other succulent crop available, it is recommended to chaff it and mix it well in the silo with the chaffed spear grass. This latter can by no means be recommended where other fodders are available. Far more satisfactory results, after the expense of constructing the silo, will be obtained by growing a suitable fodder crop to fill it.

"Spear grass will make ensilage of a kind if cut in the soft succulent stage, just when it comes out into head, but even at this time it is not at all nutritious and does not carry very much leaf. The kind and condition of the fodder at the time it is put into a silo has a direct bearing on its subsequent quality. The best ensilage is made from succulent crops cut at a certain stage of development, *i.e.*, in the case of maize, when the grain is in the thick milk or soft dough stage; and in sorghums, when the seed is in a similar condition. Grasses, as a rule, lack that soft succulent condition necessary in a fodder to produce the best results.

"It usually takes between two and three months for ensilage to reach a certain stage of maturity, and to pass the so-called 'new' stage. If you find it necessary to use the silage, it will be quite practicable to do so, say, six weeks after it is put into the pit.

"Whenever fodder shows signs of wilting, or drying-out between the time of cutting in the field and chaffing it into the silo, it is advisable to moisten it, either with molasses in water or with weak brine. A 5-gallon drum fitted with a tap and filled with the liquid, and allowed to drip on to the chaffed fodder as it is about to be discharged, is a handy method to follow. Grass is benefited also by this moistening process.

"You are recommended to tramp the fodder thoroughly into the silo, and, when the latter is actually filled, to give the top a good watering and cover with a thickness (about 1 ft.) of well-trampled earth, and then cover as a protection from rain."

Orchard Notes for April.

THE COAST DISTRICTS.

In the orchard notes for March the attention of citrus growers was called to the necessity of their taking the greatest possible care in the gathering, handling, sweating, grading, and packing of the coming crop of fruit, as the returns for the labour expended in the upkeep of their orchards will depend entirely on the condition in which the fruit reaches the market. Many growers fail to realise the very important fact that the success of fruitgrowing does not depend merely on the proper working and management of the orchard, so essential for the production of a good crop of high-class fruit, but that the manner in which the fruit is handled and placed on the market is of even greater importance. In no branch of fruit culture is this more evident than in the case of citrus fruits, as no fruit pays better for the extra care and attention necessary to enable it to be marketed in the best possible condition. Every season there is more or less loss in the consignments sent to the Southern markets, the percentage depending mainly on the weather conditions, the loss in a wet year being much heavier than that in a dry year.

A very large percentage of the loss is due to what is known in the trade as specking—viz., a rotting of the fruit caused by a mould fungus, and this loss can be prevented, provided necessary precautions are taken. Although this matter was dealt with last month, it is of such vital importance to our citrus growers that it is necessary to again refer to it.

In the first place, growers must clearly understand that specking cannot occur on perfect fruit, the skin of which is free from injury of any kind. The fungus causing specking can only obtain an entry into the fruit through an injury to the skin; it will thus be seen that the remedy for specking is to take every possible care not to injure the skin of the fruit in any way.

Few growers realise how easily the skin of citrus fruits is injured, especially that of fruit grown under moist and humid conditions, when the skin is full of moisture and so tender that the least sign of rough handling causes serious injury, as the cells of the skin are so brittle that they are easily broken, and when so broken a ready means of entry for the mould fungus is provided, and specking follows in due course.

The remedy for specking is in the hands of the grower, who must learn so to gather, handle, and transport the fruit from the orchard to the packing-shed, that it does not receive the slightest injury, and further, that when it has reached the packing-shed it must be carefully placed in shallow bins or on trays and be exposed to the air for at least seven days, so that the surplus moisture in the skin may be removed, and the skin thus become toughened and less easily injured. This drying of the skin is known as "sweating," and during the time the fruit is being sweated it should be kept under observation, and all fruit showing signs of specking or injury from fruitflies, sucking or boring insects, mechanical injury or bruising, should be removed.

In order to prevent injuring the skin when gathering, all fruit must be cut and not pulled. Gloves should be used to handle the fruit, and when cut it should be placed in padded baskets or other suitable receptacles. Any fruit that falls or is injured in any way should be rejected, as it is not fit to send to a distant market. At the same time, if the injury is only slight, it can be sent to a local market for quick sale.

For Southern markets only perfect fruit should be selected, and further, it must be graded for size, colour, and quality, and properly packed, only one grade of fruit being packed in a case. The cost of cases, freight, and marketing is now so high that only the best fruit will pay to send to the Southern States, and even the best fruit must be properly graded and packed in order to produce the best returns.

All orchards, vineyards, and plantations not thoroughly clean should receive immediate attention, as from now till the next rainy season the ground must be kept in a thorough state of tilth and free from weeds in order, in the first place, to retain moisture in the soil, and, in the second, to enable birds, ants, and predaceous insects to get at and destroy the pupæ of fruitflies and other pests harbouring in the soil.

Banana and pineapple plantations must be put into good order, and kept free from weed growth.

Land to be planted with trees should be got ready, as, if possible, it is always advisable to allow newly cleared land time to sweeten before planting.

Strawberries can still be planted, and the earlier plantings must be kept well worked and free from all weeds in order to get a good crop of early fruit.

Scrub land intended for bananas can be felled now, as there will be little more growth, and it will have ample time to dry off properly in time for an early spring burn. Do not rush scrub falling, as it is work that pays for extra care. Lopping will improve prospects of successful fire.

Keep a keen lookout for fruitflies, and on no account allow any fallen fruit of any kind to lie about on the ground unless you are looking for trouble with the ripening citrus crop. Keep the fly in check, and there will not be any very serious losses; neglect it, and there will not be much fruit to market.

The advice given with respect to the handling and marketing of citrus fruit applies equally to custard apples, pineapples, bananas, and other fruits. In the case of bananas handled by the Southern Queensland Fruitgrowers' Association, Limited, grading is now compulsory, and it will undoubtedly tend to stabilise the market for this fruit.

THE GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

Practically the whole of the fruit crop will have been gathered by the end of March, but several of the later-ripening varieties of apples grown in the Granite Belt may be kept for a considerable time, provided they are free from fly or other pests and are stored under proper conditions. Varieties such as Jonathan can be kept for some months at a temperature of 31 to 32 deg., and later varieties, such as Granny Smith and Sturmer, can be kept till apples come again if stored at the same temperature. At the same time, although storing the fruit at this temperature under artificial conditions enables them to be kept for many months, the fruit can be kept for a considerable period, and marketed from time to time as desired, by storing it in a specially constructed apple-house in or adjacent to the orchard where grown.

Such a store can be cheaply constructed in the side of a hill out of the soil of the district and slabs of timber. The soil will make excellent pisé for walls, and the roof may be constructed of slabs covered with soil. Such a store can be kept at a very even temperature, and if the air is changed during cool nights—not frosty nights—the temperature can be reduced to a low point—low enough to keep the fruit in good condition for many weeks.

All orchards and vineyards not already cleaned up must be put in order, and all weeds destroyed. Keep the surface of the soil stirred so as to give birds and insects a chance to get at any fruitfly pupæ, as it is necessary to destroy this pest whenever there is a chance of doing so.

Land intended for planting during the coming season should be got ready in order to expose the soil to the cold of winter, thus rendering it sweeter and more friable.

If there is any slack time in the course of the month, go over all surface and cut-off drains and put them in good order. Also, if during periods of heavy rain, soft or boggy spots have made their appearance in the orchard, do what draining is necessary, as badly drained land is not profitable orchard land, and the sooner it is drained the better for the trees growing upon it. Soft or boggy spots are frequently caused by seepage of water from a higher level. In this case a cut-off drain will be all that is necessary, but where the bad drainage is due to hard pan or an impervious subsoil, then underground drains must be put in. After draining, the land should be limed. Liming can be done now and during the following three months, as autumn and winter are the best times to apply this material.

When the orchard soil is deficient in organic matter (humus) and nitrogen, try the effect of green-crop manuring, planting the grey or partridge pea and manuring the ground for this crop with a good dressing of finely ground island phosphate or basic phosphate.

Where citrus fruits are grown, they should now be ready for marketing. If the land needs it, it should be given an irrigation, but unless the trees are suffering from want of water it is better to stick to the use of the cultivator, as too much water injures the keeping and carrying qualities of the fruit.

The remarks on the handling and packing of citrus fruits in the coast districts apply to the inland districts also, but these districts have an advantage over the coast in that, owing to the drier atmosphere, the skin of the fruit is tougher and thinner, and in consequence the fruit carries better.

Farm and Garden Notes for April.

FIELD.—Those areas already lying in fallow for subsequent sowing with wheat should be kept in good tilth, using field implements that have a stirring effect in preference to those which tend to reverse the surface soil. The surface should never be allowed to cake; consequently all showers must be followed by cultivation, as soon as conditions will permit of teams and implements working freely.

Early fodder crops, such as barley (skinless or Cape) and certain varieties of wheat may be sown during April:—Growers of winter fodders will be well advised to study the article dealing with dairy fodder plots which appeared in last month's journal.

Potatoes planted during February should be now showing good growth, and must be kept well cultivated by means of the scuffler. If sufficiently advanced, and any doubt exists as to the prevalence of blight, advantage should be taken of fine weather to give a second spraying of "burgundy mixture," a calm and somewhat cloudy day being chosen if possible for the spraying.

Where land has been previously well prepared, lucerne sowing should be carried out this month, and intending growers of this fodder will be well advised to ascertain the germinating qualities of seed submitted to them for purchase. The difference between a good and bad "strike" is often traceable to the poor class of seed sown.

Maize and cotton crops should now be in the harvesting stage, and, once matured, are better in the barn than the open paddock, where weevils and other insects are usually prevalent at this season of the year.

Root crops sown last month should now be making fair growth, and during the early period of such should be kept free from weeds, and, where necessary, thinned out. Sowings of mangels, swedes, field carrots, sugar-beet, and rape may still be made where conditions of moisture will permit.

As the sowing season is close at hand for certain varieties of wheat, *i.e.*, those which require a fairly long period to develop in, every effort should be made to bring the seedbed into the best possible tilth and to free it from foreign growths of all kinds. The grading of all seed-wheat is strongly recommended, and growers who favour certain varieties should adopt a system of seed selection from prolific strains with a view to the raising of larger quantities of pure typical grain for ultimately sowing in their larger fields.

Pickling of wheat to prevent smut (bunt) is necessary. Germination tests should be carried out prior to commencing seeding operations.

Sorghums which have matured and are not immediately required as green fodder should, wherever possible, be conserved as ensilage to provide for a reserve, to tide over the period when grasses and herbage are dry. Succulent fodder of this description is the best possible form of insurance against drought, and for maintaining dairy and other stock in thrifty condition.

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. In connection with these crops, growers are recommended to adopt some form of seed selection for the purpose of improving the quality of vegetables grown by them. Just at present, selections should be made from all members of the cucurbitaceæ (pumpkins, cucumbers, &c.). Tomatoes should also be selected for seed. 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.

ASTRONOMICAL DATA FOR QUEENSLAND.

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

TIMES OF SUNRISE AND SUNSET.

AT WARWICK.

1922.	JANUARY.		FEBRUARY.		MARCH.	
Date.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.
1	5·0	6·51	5·24	6·46	5·45	6·25
2	5·1	6·51	5·25	6·46	5·45	6·24
3	5·1	6·51	5·26	6·45	5·46	6·23
4	5·2	6·51	5·27	6·45	5·46	6·22
5	5·3	6·52	5·28	6·44	5·47	6·20
6	5·4	6·52	5·28	6·43	5·48	6·19
7	5·4	6·52	5·29	6·42	5·49	6·18
8	5·5	6·52	5·30	6·42	5·50	6·17
9	5·6	6·52	5·31	6·41	5·50	6·16
10	5·6	6·52	5·31	6·41	5·51	6·15
11	5·7	6·52	5·32	6·40	5·51	6·14
12	5·8	6·52	5·33	6·39	5·52	6·13
13	5·9	6·52	5·34	6·38	5·52	6·12
14	5·9	6·52	5·35	6·38	5·53	6·11
15	5·10	6·52	5·35	6·37	5·53	6·9
16	5·11	6·52	5·36	6·36	5·54	6·8
17	5·12	6·52	5·37	6·35	5·54	6·7
18	5·12	6·52	5·38	6·34	5·55	6·6
19	5·13	6·52	5·38	6·34	5·55	6·5
20	5·14	6·52	5·39	6·33	5·56	6·4
21	5·15	6·51	5·39	6·32	5·56	6·3
22	5·16	6·51	5·40	6·31	5·57	6·2
23	5·17	6·51	5·40	6·31	5·57	6·1
24	5·18	6·50	5·41	6·30	5·58	5·59
25	5·19	6·50	5·41	6·29	5·58	5·58
26	5·19	6·50	5·42	6·28	5·59	5·57
27	5·20	6·49	5·43	6·27	6·0	5·56
28	5·21	6·49	5·44	6·26	6·0	5·55
29	5·22	6·48	...	...	6·1	5·54
30	5·23	6·48	...	...	6·1	5·53
31	5·23	6·47	...	...	6·2	5·52

PHASES OF THE MOON, ECLIPSES, &c.

The times stated are for Queensland, New South Wales, Victoria, and Tasmania when summer time is not in force.

			H. M.
6 January	☾	First Quarter	8 24 p.m.
14 ,,	○	Full Moon	12 37 a.m.
20 ,,	☽	Last Quarter	4 0 p.m.
28 ,,	●	New Moon	9 48 a.m.

Apogee on 3rd at 8·54 a.m.
,, on 30th at 10·24 p.m.
Perigee on 15th at 9·48 a.m.

5 February	☾	First Quarter	2 52 p.m.
12 ,,	○	Full Moon	11 18 a.m.
19 ,,	☽	Last Quarter	4 18 a.m.
27 ,,	●	New Moon	4 48 a.m.

Perigee on 12th at 9·0 p.m.
Apogee on 27th at 12·48 a.m.

7 March	☾	First Quarter	5 22 a.m.
13 ,,	○	Full Moon	9 14 p.m.
20 ,,	☽	Last Quarter	6 43 p.m.
28 ,,	●	New Moon	11 3 p.m.

Perigee on 13th at 9·30 a.m.
Apogee on 26th at 5·36 a.m.

The splendid phenomenon of an annular or ring-shaped eclipse of the sun will be seen, if clouds do not intervene, in North Africa (including part of the Suez Canal) and in South America on 27th and 28th March.

The only other eclipse of the year will be the Great Australian Total Eclipse of the Sun on 21st September, of which special particulars will be given.

The apparent proximity of the moon and Delta Tauri early in the evening of 9th January will be of interest to those who possess telescopes or binoculars, also the occultation of Omicron Leonis on the 16th, about 1 o'clock in the morning. On 7th February Delta Tauri will be occulted by the moon about 4 o'clock in the morning, also another small star in the same constellation half an hour later, followed by another within three quarters of an hour after that.

The occultation of Jupiter by the moon on 16th February will unfortunately occur about sunrise at Brisbane, but may be observable at Oontoo, Birdsville, and other places in the far south-west.

The planet Jupiter will be coming into view before midnight in February and March; Venus will pass from west to east of the sun on 9th February; and Mercury from east to west on the 14th. Before the end of March Jupiter and Saturn will be prominent evening stars.

On 21st March the sun will rise almost exactly due east, and set due west, passing from south to north of the equator.

For places west of Warwick and nearly in the same latitude, 28 degrees 12 minutes S., add 4 minutes for each degree of longitude. For example, at Inglewood, add 4 minutes to the times given above for Warwick; at Goondiwindi, add 8 minutes; at St. George, 14 minutes; at Cunnamulla, 25 minutes; at Thargomindah, 33 minutes; and at Oontoo, 43 minutes.

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.