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Pastoral.

TICKS.

THE "CASH VALUE" OF DIPPING OR SPRAYING CATTLE TO FREE THEM FROM TICKS. IMPORTANT OFFICIAL EVIDENCE OF IMMENSE GAINS SECURED AND ENORMOUS LOSSES AVOIDED BY FREEING CATTLE FROM TICKS.

In order to secure some direct evidence from stock-owners regarding the benefits derived from the tick-eradication work carried on in the Southern States of North America, a circular was sent out to a large number of representative cattle-owners by the Department of Agriculture, asking for replies to various specific questions concerning the results of the work. The questions are given below, with their summarised answers. These afford most impressive evidence, not only of enormous losses prevented but also of immense gains obtained by the dipping of animals to free them of ticks.

Question.—What were the approximate annual losses of cattle from tick-borne diseases before the tick-eradication work was started? Answer: 15·3 per cent.

Question.—What has been the annual loss of cattle from tick-borne diseases since tick eradication started? Answer: 1·3 per cent.

Note.—The answer to this question should be compared with that to the first question, when it will be seen that the tick-eradication work has resulted in the losses being reduced from 15·3 per cent., *i.e.*, practically to vanishing point.

Question.—What was the average value of three-year-old steers in your county before the tick-eradication work was started? Answer: 16 dollars 15 cents (£3 7s.).

Question.—What is the average value of three-year-old steers now? Answer: 25 dollars 28 cents (£5 5s.).

Note.—In comparing the replies to the two preceding questions, allowance has to be made for the recent general advance in the price of cattle. When this is done, the result shows that there still remains an appreciation in value of 40 per cent. which can be properly said to be due to the absence of ticks.

Question.—Is there any difference between the average weight of cattle now and the average weight before tick eradication was started? How much? Answer: Yes. Average increase, 22 per cent.; average weight increase, 116 lb.

Note.—Taking the value of the animals at 3½ cents (1¾d.) per lb. (the average for three-year-old steers), the average gain, due to dipping, works out at 4 dollars (16s. 8d.) per head.

The above figures prove beyond all doubt that the cost of freeing cattle from ticks is not an "expense," but an "investment," which brings in most excellent "interest" in the form of a greatly increased value of animals treated.—"Journal of the Jamaica Agricultural Society."

£10,600 FOR A BULL CALF.

There was a sale of Holsteins at Worcester, Mass. (U.S.A.), recently, to which our American exchanges devote much space. Almost-incredible bids were registered, and 143 head sold for £60,000, an average of nearly £420.

"Kimball's Dairy Farmer" says that world-record animals were in evidence all the time, and world-record prices were paid with such abandon as to make an ordinary mortal dizzy.

A five-months-old bull calf, King Ormsby Jane Rag Apple, whose sire is the great bull, Rag Apple Korndyke 8th, and whose dam is Ormsby Jane Segis Aaggie, with a butter record of 46·33 lb. in seven days, sold for £10,600, the highest price ever paid for a bull.

The four-year-old heifer Wandermeere Belle Hengerveld (42·61 lb. of butter in seven days as a four-year-old) sold for £3,650. Two years ago this heifer was bought for £125.

Another cow sold for £3,600—Glen Alex Queen De Kol, the world's record two-year-old, that made 42·35 lb. of butter in seven days.

BREEDERS OF PUREBRED STOCK IN QUEENSLAND—BEEF AND DAIRY CATTLE.

The following revised list of breeders of purebred cattle is published for the purpose of informing those who desire to improve their stock where the best cattle can be obtained in the State. The Department of Agriculture and Stock takes no responsibility in relation to the entries in the list; but, when inquiries were first made, the condition was imposed that the entries were to be only of stock that had been duly registered, or that were eligible for registration in the different herd books. The entries received were, in some cases, somewhat too confusing for proper discrimination, it has, therefore, now been decided that only such cattle as have been registered will be included. The lists previously published in the *Queensland Agricultural Journal* have now been withdrawn for revision.

Name of Owner.	Address.	Number of Males.	Number of Females.	Herd Book.
P. Young	Talgai West, Ellinthorp	2	42	Milking Shorthorn Herd Book of Queensland
L. H. Paten	"Jeyendel," Calvert, S. & W. Line	8	21	Ayrshire Herd Book of Queensland
F. C. G. Gratton ..	"Towleston," Kingsthorpe	2	14	Holstein Cattle Club Herd Book
T. Mullen	"Norwood," Chelmer	3	20	Queensland Jersey Herd Book
J. H. Paten	Yandina	6	21	Ayrshire Herd Book of Queensland
Queensland Agricultural College	Gatton	4	38	Ayrshire Herd Book of Queensland
		..	2	Ayrshire Herd Book of Scotland
		2	9	Holstein-Friesian Herd Book of Australia
		2	31	Jersey Herd Book of Queensland
J. W. Paten	Wanora, Ipswich ..	10	42	Ayrshire Herd Book of Queensland
M. W. Doyle	Moggill	4	12	Queensland Jersey Herd Book
G. A. Buss	Bundaberg	1	15	Herd Book of the Jersey Cattle Society of Queensland
W. Rudd	Christmas Creek, Beaudesert	2	10	Milking Shorthorn Herd Book of Queensland
M. F. and R. C. Ramsay	Talgai, Clifton ..	5	27	Herd Book of the Jersey Cattle Society of Queensland
George Newman ..	Wyreema	9	37	Holstein-Friesian Herd Book of Australia

BREEDERS OF PUREBRED STOCK IN QUEENSLAND—*continued.*

Name of Owner.	Address.	Number of Males.	Number of Females.	Herd Book.
R. Conochie	Brooklands, Tingoora	9	21	Queensland Jersey Herd Book
W. J. Barnes	Cedar Grove ..	10	37	Queensland Jersey Herd Book
T. B. Murray-Prior ..	Maroon, Boonah ..	2	37	Queensland Shorthorn and Australian Herd Books
W. J. Affleck	Grasmere, N. Pine ..	6	31	Queensland Jersey Herd Book
A. J. McConnel ..	Dugandan, Boonah	19	36	Australian Hereford Herd Book
A. Pickels	Blackland's Stud Farm, Wondai	4	62	Illawarra Dairy Cattle Herd Book of Queensland
G. C. Clark	East Talgai, Ellinthorp	3	7	New Zealand Herd Book
H. D. B. Cox	Sydney (entered brother's name)	3	16	Commonwealth Standard Jersey Herd Book
J. T. Perrett and Son	Coolabunia	2	36	Illawarra Herd Book of Queensland
State Farm	Kairi	4	8	Ayrshire Herd Book of Queensland
		1	2	Holstein-Friesian Herd Book of Australia
E. M. Lumley Hill ..	Bellevue House, Bellevue	45	127	Australian Hereford Herd Book
W. F. Savage	Ramsay	1	12	Illawarra Herd Book of Queensland
Tindal and Son ..	Gunyan, Inglewood	50	400	Australian Hereford Herd Book
J. N. Waugh and Son	Prairie Lawn, Nobby	3	28	Queensland Jersey Herd Book
J. H. Fairfax	Marinya, Cambooya (2)	9	55	Ayrshire Herd Book of Queensland
C. E. McDougall ..	Lyndhurst Stud, Warwick (2)	25	100	Queensland Shorthorn Herd Book
J. Holmes	"Longlands," Pittsworth	6	20	Ayrshire Herd Book of Queensland
P. Biddles	Home Park, Netherby	1	20	Illawarra Dairy Cattle Association
A. Rodgers	Torran's Vale, Lanefield	1	9	Milking Shorthorn Herd Book
R. S. Alexander ..	Glenlomond Farm, Coolumboola	1	..	Holstein-Friesian Herd Book of Queensland
		2	..	Holstein-Friesian Herd Book of Australia
State Farm	Warren	3	83	Ayrshire Herd Book of Queensland
S. H. Hosking.. ..	Toogooloowah ..	2	15	Holstein Cattle Club Herd Book
W. J. H. Austin ..	Hadleigh Jersey Herd, Boonah	1	2	Queensland Jersey Herd Book
Ditto	ditto	..	6	Commonwealth Standard Herd Book
H. M. Hart	Glen Heath Stud, Yalangur	7	21	Ayrshire Herd Book of Queensland
C. Behrendorff ..	Inavale Stud Farm, Boonah	3	9	Holstein-Friesian Herd Book of Queensland
F. A. Stimpson ..	Ayrshire Stud Farm, Fairfield, South Brisbane	17	68	Ayrshire Herd Book of Queensland

Poultry.

REPORT ON EGG-LAYING COMPETITION, QUEENSLAND AGRICULTURAL COLLEGE, SEPTEMBER, 1917.

The total number of eggs laid for the month was 9,505. Very changeable weather has been experienced, including heavy rains which caused some discomfort to the birds. Broodies have been troublesome amongst the heavy breeds. Mr. J. M. Manson's pen put up the highest score in the light breeds with 159, with E. Chester second with 152 eggs. In the heavy section, E. A. Smith leads with 151 and R. Burns and W. Smith tie for second place with 149 eggs. E. A. Smith and E. F. Dennis are equal, with 29 each, for highest individual score for the single-pen test. The Dixie Egg Plant's barren hen (F.) was removed and another bird substituted. The following are the individual records:—

Competitors.	Breed.	Sept.	Total.
	LIGHT BREEDS.		
E. Chester	White Leghorns ...	153	792
*G. H. Turner	Do.	142	705
G. Chester	Do.	145	679
W. Becker...	Do.	121	676
F. W. Leney	Do.	140	674
C. Porter	Do.	140	671
W. R. Crust	Do.	133	664
T. A. Pettigrove, Victoria	Do.	140	655
Moritz Bros., S.A.	Do.	134	648
Oakland Poultry Farm	Do.	133	647
*J. M. Manson	Do.	159	642
*J. Zahl	Do.	135	623
T. Taylor	Do.	124	621
Kelvin Poultry Farm	Do.	141	619
Quinn's Post Poultry Farm	Do.	148	618
*J. R. Wilson	Do.	126	612
J. G. Richter	Do.	134	607
*A. T. Coomber	Do.	130	600
T. B. Hawkins	Do.	113	600
A. Sbillig	Do.	140	599
J. Fulton	Do.	138	597
Mars Poultry Farm	Do.	110	581
C. Knoblauch	Do.	124	581
*A. W. Bailey	Do.	114	579
*Mrs. J. R. D. Munro	Do.	132	579
A. H. Padman, S.A.	Do.	123	579
R. Holmes	Do.	120	550
*Dixie Egg Plant	Do.	127	541
*T. Fanning	Do.	142	536
F. Clayton, N.S.W.	Do.	126	535

EGG-LAYING COMPETITION—*continued.*

Competitors.	Breed.	August.	Total.
LIGHT BREEDS—*continued.*			
J. L. Newton	White Leghorns ...	123	531
Mrs. W. D. Bradburne, N.S.W. ...	Do.	129	530
G. Williams	Do.	122	524
L. G. Innes	Do.	131	522
G. Howard	Do.	140	522
E. Cross	Do.	137	515
Miss M. Hinze	Do.	103	503
J. Holmes	Do.	128	501
G. J. White	Do.	127	499
*A. E. Walters	Do.	124	496
Mrs. S. J. Sear	Do.	138	494
*C. C. Dennis	Do.	109	487
S. C. Chapman	Brown Leghorns... ...	141	487
Mrs. Carruthers	White Leghorns ...	117	481
C. H. Singer	Do.	131	475
C. P. Buchanan	Do.	135	471
E. A. Smith	Do.	127	471
J. Ferguson	Do.	125	470
*Dr. E. C. Jennings	Do.	121	410
HEAVY BREEDS.			
*R. Burns	Black Orpingtons ...	149	744
A. E. Walters	Do.	133	697
W. Smith	Do.	149	696
*Mars Poultry Farm	Do.	145	671
W. S. Hanson, N.S.W.	Do.	147	633
F. A. Claussen	Rhode Island Reds ...	110	630
*E. F. Dennis	Black Orpingtons ...	139	610
Cowan Bros., N.S.W.	Do.	124	579
P. C. McDonnell, N.S.W.	Do.	118	561
D. Kenway, N.S.W.	Do.	102	557
Mrs. J. H. Jobling, N.S.W.	Do.	129	544
H. Jobling, N.S.W.	Do.	116	538
*E. A. Smith	Do.	151	515
King and Watson, N.S.W.	Do.	125	505
*Oakland Poultry Farm	Do.	129	504
C. B. Bertelsmeier, S.A....	Do.	142	499
R. Burns	S. L. Wyandottes ...	120	478
E. Morris	Black Orpingtons ...	121	474
*Kelvin Poultry Farm	Plymouth Rocks ...	139	463
*Miss M. Hinze	Black Orpingtons ...	148	462
J. M. Manson	Do.	132	452
C. C. Dennis	White Wyandottes ...	126	449
F. Clayton, N.S.W.	Rhode Island Reds ...	85	442
*F. W. Leney	Do.	122	403
Totals	...	9,505	41,105

* Indicates that the pen is entered in the single hen test.

DETAILS OF SINGLE HEN TESTS.

Competitors.	A.	B.	C.	D.	E.	F.	Total.
LIGHT BREEDS.							
G. H. Turner	98	109	137	125	107	129	705
J. M. Manson	113	100	94	101	105	123	642
J. Zahl	122	88	124	59	129	101	623
J. R. Wilson	116	101	96	109	93	97	612
A. T. Coomber	108	49	119	111	99	114	600
A. W. Bailey	36	91	115	114	111	112	579
Mrs. J. R. D. Munro	134	86	89	87	67	116	579
Dixie Egg Plant	94	108	108	112	109	10	541
T. Fanning	62	95	102	93	81	103	536
A. E. Walters	60	73	77	97	103	86	496
C. C. Dennis	94	82	25	92	94	100	487
Dr. E. C. Jennings	31	48	78	86	107	60	410
HEAVY BREEDS.							
R. Burns	96	98	132	110	147	171	744
Mars Poultry Farm	101	130	99	121	110	110	671
E. F. Dennis	110	99	115	125	125	36	610
E. A. Smith	84	77	62	121	91	80	515
Oakland Poultry Farm	122	70	67	63	119	63	504
Kelvin Poultry Farm	81	71	67	121	49	74	463
Miss M. Hinze	85	69	72	83	88	65	462
F. W. Lency	69	69	39	60	109	57	403

TRUE TO TYPE.

The question of trueness to type has given us a good deal of thought and trouble. In all the breeds entered for the competition there is evidence of a very great deal of variation. Were this variation confined to differences between breeders, it could be understood, but it is found that the individual birds of a single breeder vary very considerably in type. Under these conditions, decision in this matter has been difficult, and those who have been declared ineligible are chiefly those whose birds show a decided lack of uniformity. Whether this is due to indiscriminate out-crossing caused by selecting birds from various sources without regard to their suitability to breed with the general flock, or whether it

is due to the infusion of the blood of other breeds with the object of gaining some fancied improvement in one direction or another, or whether the variation is due to a legitimate attempt to try different types to test their capabilities, it is hard to say. The point that stands out pre-eminent is that there is not even an approximate general conception of what the utility type of the various breeds should be, and this is certainly a matter of importance for the poultry clubs to take up; otherwise the breeds will lose identity. This year a very lenient view of the matter has been taken. Of those excluded, many have one or two good birds, but were spoilt by the inclusion of several birds of inferior quality. The following pens are ineligible for the true to type prizes:—

H. Jobling, N.S.W.	Black Orpingtons
F. Clayton, N.S.W.	Rhode Island Reds
R. Burns	Black Orpingtons
T. B. Hawkins	White Leghorns
T. A. Pettigrove	White Leghorns
C. Knoblauch	White Leghorns
D. Fulton	White Leghorns
W. R. Crust	White Leghorns
T. Taylor	White Leghorns
C. C. Dennis	White Leghorns
J. Zahl	White Leghorns
W. Bailey	White Leghorns

Dairying.

THE DAIRY HERD, QUEENSLAND AGRICULTURAL COLLEGE, GATTON.

MILKING RETURNS OF COWS FROM 27TH AUGUST TO 26TH SEPTEMBER, 1917.

Name of Cow.	Breed.	Date of Calving.	Total Milk.	Test.	Commercial Butter.	Remarks.
			Lb.	%	Lb.	
Auntie's Lass ...	Ayrshire ...	5 July, 1917	1,097	3·9	51·52	
Lady Prim... ...	Holstein ...	3 Aug. ,,	1,056	3·7	45·79	
Sweet Meadows ...	Jersey ...	8 Aug. ,,	543	6·2	39·89	
Queen Kate ...	Ayrshire ...	30 June ,,	967	3·4	38·42	
Confidence ...	,, ...	25 June ,,	712	4·0	33·44	
College Damsel ...	Holstein ...	12 July ,,	1,021	2·8	33·21	
Lilia	Ayrshire ...	11 June ,,	881	2·8	28·64	
Hedges Dutchmaid	Holstein ...	9 Sept. ,,	684	3·4	27·16	
La Hurette Hope	Jersey ...	22 Aug. ,,	534	4·1	25·72	
Miss Bell	,, ...	27 June ,,	436	4·7	24·15	
Lady Melba ...	Holstein ...	14 Feb. ,,	568	3·6	23·95	
Nina	Shorthorn...	6 Sept. ,,	529	3·7	22·93	
Netherton Belle ...	Ayrshire ...	17 July ,,	541	3·5	22·15	
Princess Kate ...	,, ...	28 June ,,	477	3·8	21·24	
Hedges Madge ...	Holstein ...	22 Mar. ,,	425	4·2	20·97	
College Bluebell ...	Jersey ...	28 June ,,	565	3·1	20·48	
Lady Dorset ...	Ayrshire ...	14 Aug. ,,	555	3·1	20·05	

The Orchard.

CITRUS CULTURE.

(Paper read by ALBERT H. BENSON, Director of Fruit Culture, at the Fruitgrowers' Conference, held at Palmwoods, 6th October, 1917.)

In response to the request of your Committee to say a few words on the value of spraying, fertilising, and of experiment plots, I have thought it best to put the matter in writing in as brief and concise a form as possible, as, unless I do so, I may be tempted to go into details that will take up far too much of the time of this Conference, as each of these subjects is a very comprehensive one.

SPRAYING.

The object of spraying is to distribute as evenly and economically as possible the various remedies that are used for the destruction of insect and fungus pests. In practice, this is best accomplished by distributing these materials in a liquid state by means of a powerful force-pump which will either force the spraying material into every crack and crevice of the trunk or main branches of the tree or will distribute it in the form of a mist-like spray that will reach every portion of the tree or plant that is to be treated. There are many excellent plants suitable for the work now on the market, from the knapsack sprayer, which is carried on the back of the operator, to powerful motor-driven pumps. The latter, where the orchard is large enough to warrant the expenditure, should always be used, as, owing to their power, they can distribute the spraying material much more rapidly, economically, and effectively than can be done by hand-power machines.

The efficacy of the spraying depends on three primary considerations:—

1. That the work be carried out in a thorough manner.
2. That the spraying be done at the right time.
3. That the right spraying materials are used.

With regard to the first, nozzles throwing a fine spray with considerable force should be used for spraying both the trunks and main branches—in fact, all the inside of the tree—so that the spraying material may be forced into every crevice, as well as the outside of the tree, so that every twig and leaf shall be reached. It is not necessary to drench the tree; it should be completely covered by the spraying material, but as little as possible should be allowed to run off. It is what sticks to the tree that does good—not what runs off.

With regard to the second essential, that of spraying at the right time, this is of the first importance, and it is a matter that deserves much more careful attention than it frequently gets. The best time to spray depends, of course, on the pest it is desired to destroy or prevent. Thus, the damage that is caused by all leaf-eating insects is reduced to a

minimum by spraying the plants or trees on which these insects are feeding with a material that will adhere to the foliage, and which, when eaten by these insects, will poison them. The best of all remedies for this particular class of insect is the spraying with arsenate of lead, used at a strength of from 3 to 4 lb. of the paste to 100 gallons of water, or 1½ to 2 lb. of the dry powder to the same quantity. In the case of all scale insects the best time to spray is when the young insects are hatching out, and this can be learnt by careful observation. When the young scales are first hatching out they are exceedingly easy to destroy, as they have no scale protection on their bodies; consequently, very weak sprays kill them immediately on coming in contact with them. When the insects have developed their scale covering, much more powerful sprays are needed. The sprays that are most useful for dealing with this particular class of insect are those that kill them by actually touching them, or those that kill them by covering them with a mixture which prevents their breathing. Of the former, the best remedies at present are the so-called residual oils, of which the red oils are a well-known type. These oils must not, however, be used excepting during a period that the tree is in active growth, as if the tree is dormant, and particularly if it is suffering from the effects of dry weather, there is a possibility of these oils being absorbed by the bark of the tree, which will have the effect of causing a quantity of the leaves to fall and possibly injure the smaller twigs. A strength of 1 in 40 of red oil will do more good when young scales are hatching out than a 1 in 20 solution when these scales are fully matured. The lime-sulphur wash is also an excellent remedy for scale insects. When used at its winter strength of 1 part of the standard solution (32° Beaume) to 8 to 10 parts of water, it will destroy fully matured scales, but the young scales are destroyed with comparatively weak solutions of 1 part of the standard solution to 30 to 35 parts of water. Washes in which resin and caustic soda form the principal ingredients are also valuable for destroying scale insects. These washes act in two ways—they actually destroy by touching the insects, and further, they form a glaze over the insects which prevents them breathing, and thus destroys them. These sprays, however, are not now anything like as commonly used as the red-oil sprays or the lime-sulphur. The latter remedy is also extremely valuable for the destruction of all types of spinning and other mites, such as the red spider, the Bryobia mite, and the well-known Maori mite, as the fumes of sulphur which are given off by this spray are extremely efficacious in destroying all these insects. In the case of Maori, these insects usually appear in large numbers about the end of December, and if they are dealt with at once by means of a weak lime-sulphur spray or by means of a soda-sulphur spray, the damage that they would cause were they left alone can be entirely prevented, and instead of having large numbers of blackened oranges, the crop will be clean and bright.

SPRAYING FOR FUNGUS DISEASE.

Many sprays which are efficacious in the case of insects—such as arsenical poisons, oil washes, resin and soda sprays—are of little if any use for the treatment of fungus diseases, as they have not the power to

destroy the spores of the latter and are therefore useless for preventing either infection or for keeping the diseases in check once they have become established.

Fungus diseases, therefore, require special treatment and the use of sprays that are approved fungicides. Several materials possess fungicidal properties to a marked degree, such as sulphuric acid, sulphide of iron, carbolic acid, formalin, kerol, lysol, &c., and are used for special purposes, but are not as generally useful as copper salts, such as bluestone and carbolate of copper or of the various sulphides of lime, soda, or potash. Bluestone is used in conjunction with lime to form Bordeaux mixture, or with soda to form Burgundy mixture, and both of these mixtures form excellent sprays for such diseases as Irish Blight, Black Spot of grapes, Black Spot or Brand of the orange, Melanose, Canker, and removal of mosses or lichens from the trees, but are not, in my opinion, equal to the sulphide washes for such diseases as Dieback or Twig Blight, the so-called Exanthena, gumming, &c. The sulphide washes have also one great advantage over copper sprays, and that is they possess powerful insecticidal qualities where used as winter sprays at an increased strength or at a summer strength when young scales are hatching out. I am, therefore, very partial indeed to the use of these particular sprays, and I consider that, as an all-round spray, nothing has yet been discovered that equals the lime-sulphur wash, as it can be used in a concentrated form on the trunks and main branches of the trees during the winter, and also in the case of deciduous trees all over the tree after pruning, and such application is extremely effectual in the destruction of all scale insects and all classes of bark fungi, and undoubtedly has beneficial effects in preventing or checking gumming. Used at the summer strength it is, as I have already described, an excellent remedy for the destruction of young scales, mites of all kinds, and as a general fungicide.

Briefly, the systematic spraying of the trees during the winter with lime-sulphur and where scale insects are very numerous a subsequent spraying in spring with a weak solution of red oil will usually be found all that is necessary; but if any kind of mites or fungus diseases are very prevalent then a week lime-sulphur wash is preferable to the oil. In order to obtain the best results from spraying, the systematic pruning of the tree should be carried out in conjunction therewith, as, in the first place, proper pruning and thinning-out of the tree enables the spraying material used to be distributed to better advantage; and, secondly, the cutting away and burning of all diseased wood is one of the very best means that can be taken to keep down the various fungus diseases of citrus and other fruit trees.

FERTILISING.

The object of fertilising land is to replace the plant-foods that have been removed from the soil by the growing of crops, as it is found in practice that the selling off the land of large quantities of fruit annually gradually results in the depletion of the plant-food in the soil, as such fruit, when sold, takes away in its ash considerable quantities, particularly of such substances as nitrogen, phosphoric acid, and potash,

which must be returned to the land in the form of a fertiliser if the inherent fertility of the soil is to be maintained. The bulk of our coastal soils, except those on which dense scrub was originally growing, or soils of an alluvial nature such as those adjoining the banks of creeks and rivers, are usually low in plant-food; consequently, sooner or later, they require fertilising in order to keep up their fertility and productive powers.

Generally speaking, all such lands are comparatively poor in available phosphoric acid, potash, or nitrogen. One of these ingredients only may be deficent, or it may so happen that there is a deficiency of all three. In the latter case, complete fertilisers must be applied—that is to say, fertilisers containing all these ingredients in an available form. On the other hand, when only one or two of these essential plant-foods are lacking, then this essential plant-food or foods must be made good. Of these plant-foods, nitrogen can be returned to the soil either in the form of green-crop manure or in the form of a commercial fertiliser, such as nitrate of soda, sulphate of ammonia, dried blood, or nitrate of lime, or in the form of organic manures, such as meatworks fertilisers, bonedust, &c., where it is combined with phosphoric acid. Phosphoric acid can be returned to the soil in the form of bonedust, meatworks manures, Thomas' phosphate, superphosphate, or ground phosphatic rocks. In the case of superphosphates, the phosphoric acid is readily available; in other words, it is soluble in water and can be taken up by the plant at once. In the case of bonedust, finely ground meatworks manures, and Thomas' phosphate, the phosphoric acid is in a less soluble form but still readily available, but in the case of rock phosphates it is only very slowly available. Potash can be returned to the soil in the form of potassic salts, such as sulphate or chloride, which are obtained from big deposits that are met with in Germany. Just at present, owing to the war, this source of supply is cut off, consequently potash salts are extremely hard to obtain. Large quantities of potash are, however, annually lost in Queensland in the excrements of our domestic animals, which are frequently, in fact usually, allowed to be wasted. Were these conserved, as is done in the older countries, we should not now be feeling the deficiency of potash which is apparent in many of our poorer soils to-days. Lime is not, properly speaking, a manure, except in soils that are absolutely deficient in this material, but on account of its valuable properties, such as the rendering of any plant-food present in the soil more readily available, its sweetening sour soils, its encouragement of bacterial action in the soil, and its ameliorating effects on heavy soils and its consolidating effects on light soils, it is frequently looked upon as a fertiliser, and for all fruit districts in Queensland it is undoubtedly essential. Lime can be applied to soils either in the form of freshly burnt limestone, air-slacked burnt lime, or ground unburnt limestone. In the first form it is extremely valuable for neutralising the acidity in the soil and has also a powerful action in breaking down stiff, clayey soils; but its action is somewhat too severe in the case of naturally sweet soils and those in a perfect mechanical condition, as it is apt to injure the organic conditions of

the soil and to retard for a time nitrification. Air-slacked lime can be applied practically to all soils, as during the process of slacking the lime is converted into a fine powder which can be spread easily and evenly over the ground.

The difference between caustic or freshly burnt lime and air-slacked lime is that the former when slacked takes up from the air a quantity of carbonic acid gas, so that 56 lb. of freshly burnt pure lime will weigh 100 lb. when slacked. The slacked lime is in the form of a hydrate of lime combined with a certain amount of carbonate of lime and the hydrate rapidly becomes converted into carbonate. Ground limestone is a carbonate of lime. In other words, finely ground limestone is practically the same substance as caustic lime once it has become thoroughly air-slacked and has become reconverted into the carbonate. With regard to the value of the different forms of lime, roughly speaking, 1 ton of freshly burnt limestone is equivalent to 2 tons of air-slacked lime or 2 tons of finely ground limestone, so that the purchaser can easily determine which is the cheapest form in which to purchase lime. Air-slacked limes or finely ground limestone are not as quickly acting in the case of heavy soils as freshly burnt lime, but they are more generally beneficial in their action in that they promote nitrification, improve the mechanical condition of the land, and also tend to correct any acidity that may be present therein. Caustic lime must never be applied in conjunction with other manures, particulary those containing nitrogen either in the organic or most inorganic forms, as it tends to free the nitrogen and cause serious loss. Finely ground limestone, on the other hand, can be used with any other manures without any danger whatever. With regard to manuring generally, quick-growing crops such as vegetables require the fertilisers used to be in a readily available form, so that the plants can get them right away, but in the case of fruit trees it is always advisable to use a certain proportion of the fertilising material in a less available form, as thereby the action of the manure is spread over a longer period and the trees are not overfed at one time and underfed at another. It is not necessary for me to enter fully into the details of manuring at this Conference, as full particulars respecting this subject can be obtained from the pamphlet issued by the Chemist of the Department of Agriculture and Stock, which goes very fully into the whole question.

EXPERIMENT PLOTS.

I am very strongly in favour of the establishment of farmers and fruitgrowers' experiment plots by the Department, as I consider that such plots are a practical means of bringing home to the farmers or fruitgrowers of any particular district the value of particular methods of culture, pruning, fertilising, the treatment of disease, or any other points on which growers require special information. Such experiments do not need to be extensive and need not cost the country a very great deal of money. At the same time, careful records must be kept and, whether the experiments are successful or otherwise, full and definite details of same should be published and be available for the information

of all growers. There are many matters that are constantly exercising the attention of growers that can be dealt with collectively rather than individually; in other words, a series of experiments carried out at one centre in a district will prove of value not only to every farmer or fruitgrower in that district but also will be of more or less value to fruitgrowers in other districts. Already certain experiments have been carried out by this Department in years past, such as the manurial experiments that were carried out by the Agricultural Chemist and the writer in connection with the growing of pineapples and bananas—experiments which definitely fixed the important question of manuring these crops. Many experiments were also carried out in the treatment of varions fruit pests both with respect to spraying and cyaniding, and I am of the opinion that there is still ample scope for numerous experiments to be carried out in the different fruitgrowing districts throughout the State, as we have still many matters on which we require very much fuller and better information than we possess at present. For instance, owing to the very great increase in the planting of bananas in Southern Queensland during the past six or eight years, there has been a tendency to plant this fruit on any class of land and to set out plants irrespective of their freedom from disease or suitability for such land. The result has been that the flask-worm or nematode, that was first described by Dr. Bancroft some thirty-eight years ago, has been spread throughout most of the banana-growing districts of the State, and I am sorry to say it is doing a considerable amount of damage. This particular pest is an extremely difficult one to combat, and, so far as is known, no treatment other than the rotation of crops has been found efficacious in any part of the world. The matter, therefore, is of such importance that experiments are to be conducted, both in the Southern and in the Northern parts of the State, in order to determine whether any remedial methods can be found that will in any way tend to lessen the damage caused by these insects. The question of the systematic pruning of fruit trees is also a matter that requires careful experimental work. And, in addition to these two instances, there are many matters which can be dealt with experimentally with probable benefit to our producers.

From these remarks you will therefore know that I fully appreciate the value of experiment plots, and as far as means permit I shall encourage such experiments.

CITRUS CULTURE.

(Paper read by S. C. Voller, Assistant Instructor in Fruit Culture, at the Fruitgrowers' Conference, held at Palmwoods, 6th October, 1917.)

As this Conference sits only for one day, and there must naturally be many matters of interest and importance to deal with, I purpose making my address as concise and direct as possible.

I am appearing on this occasion in response to a long-standing request from the Palmwoods growers for a lecture on "Citrus Culture." This was desired because there are a good few who have started in this line during recent times, and, having young orchards coming along, they wish for what light I can give them on the subject. This being right in the line of my official duty, I have much pleasure in acting.

QUEENSLAND'S CAPABILITIES.

There can be no doubt in the mind of any well-informed person as to the capabilities of our State for citrus production. During the years that have passed since the first of our early pioneers planted seeds or trees, the rapidly expanding area of cultivated land on the whole length, almost, of the Eastern coast has given, and is still giving, ample proof of what can be done, while further inland our Western country stands waiting for the call, should it ever come, and is ready to respond. And what a response is possible! We may well be pleased, even proud, of what has been done in some directions on the coast; we are justified in expecting greater things here by far than we have yet reached; but, in my opinion, in the West will some day be seen the real answer to the question as to what we can do in citrus production. When the day of really large requirements comes, much as we know we can do on the coastal areas, the West can beat us in both quantity and quality. The areas of land are there, the quality of soil, and the climate backed up by good bore water, capable of turning out unlimited quantities of fruit as good as anything on earth. That is my opinion of Queensland, and we have had in support of it proof put forward by more than one place. The Roma district and the country at Barcaldine may be mentioned in this connection.

The finest Navel oranges I ever saw anywhere came from the West. The best lemons I ever saw in Queensland were at Barcaldine. One could go on in this strain to further length, but it is not necessary.

SOILS.

We have, fortunately, a pretty wide range of soils that will grow citrus fruits successfully. As you all know, the coastal soils vary considerably. We have all sorts between the deep, rich, red soils of such districts as the Blackall Range and practically pure sand in other places. Colour does not matter. The things that do matter are quality, texture, depth, natural drainage, and a level lay-out of land surface if you can possibly get it. Granted the right texture and good depth you will have good drainage within a reasonable limit. You may have good quality and texture without depth, and in that case you must either drain artificially or plant somewhere else if you do not want to fail. Quality is desired because poor land requires all the more feeding; free texture, or freedom from sticky, binding character, is absolutely necessary to allow of good, deep, free rootage below and good growth above; drainage you must have or your trees will never succeed as they should.

We have lots of good land in many directions, but it will answer all practical purposes in connection with this address if I tell you that,

according to my judgment, right here in Palmwoods you have that which it will be hard to beat anywhere. This is said, of course, without prejudice in any way against any other part of the State.

DRAINAGE.

A word or two on drainage. Many people think that land is well drained because it has a good slope. This is all right from the point of view of one who wishes to get rid of surface water, but in the case of the agriculturist the idea is utterly wrong. No orchardist has any use for the rainfall that only rushes over the surface of his land and goes right away. The moisture is needed, of course, in the soil, and the drainage capacity desired in that soil is such that the rainfall can go in and down through the whole body of it and find an easy exit below for whatever surplus there may be. In these conditions the soil naturally retains what it needs; and it can hold, even in very free compositions, just what it needs, generally speaking.

A slope with the right texture and depth of soil will generally be found safe as to drainage. A slope, especially a long one, that holds beneath the surface any obstruction such as clay or rock, both of which frequently occur in bars or layers, is useless because the excess of moisture works down hill and is thrown out in wet or boggy patches by the obstruction mentioned. You cannot succeed with citrus fruits in shallow or badly drained soil: bad drainage means stagnation, and stagnation means poison, and you can guess the result. I am particularly emphatic on this drainage question because I have had some extensive and valuable experience in connection with it. At my own home, over forty years ago, underground drains were put in, in part of our orchard, to counteract the effect of a defective subsoil. This was an almost impervious granitic formation, the soil itself being also granitic. Before this, young trees absolutely refused to grow. They could not do it, but stood there in actual misery. When the drains were put in, a sudden remarkable change took place. There was a positive transformation, and those trees never looked back. I can say for your information that those drains hold good to-day.

In another instance I planned and superintended a complete drainage scheme for another property, involving considerable outlay in both labour and material. Here it was a case of fighting the enormous soakage underground from surrounding granite ranges, which, being porous, absorbed most of the rainfall, only to throw it up again in the lower country in the shape of springs and bogs. You can guess what drainage means to an orchard when I tell you that in this case the outlet-pipe of the system was 12 in. in diameter inside, and I have known that pipe run full for a fortnight. It was not a case of shallow or inferior soil here by any means, but an unusual intake in soakage. The result here has remained permanently good, as it is pretty near thirty years since I did that job.

PREPARATION OF LAND.

Wherever it is possible to do it the land should be well prepared before planting the trees. Deep and thorough working, as well down

into the subsoil as you can go, will be well repaid. We need deep rootage, and the only way to secure that is to make it possible for the roots to go down. In some soils they can and do do this with very little aid from deep working. In other soils—such as some of our rich, greasy scrubs—the chances are against good deep rooting. This is mainly due to the fact that the stumps and roots absolutely prevent the breaking up of the land, so that trees are planted without this; and also that later on, after the roots and vegetable matter in the soil have disappeared, the land, under the marked changes of weather, sets so close as to be almost impenetrable. On all our scrub lands where trees have been planted it will pay the grower well to start in with deep and thorough cultivation both ways as soon as the stumps can be got rid of—that is, of course, supposing the land is level enough. This will very largely make up for the lack of preparatory work before planting.

PLANTING.

Granted the right class of soil properly prepared, I would advise planting from 25 to 30 ft. apart on the square. The closer distance for lemons, limes, and mandarins, and the greater for oranges, including Sevilles. If the soil is of the right sort, and properly worked up, it will not be necessary to open a huge grave in which to plant the tree. A couple of feet square opened out according to the rootage of your trees, and well broken in the bottom with the bar, will be quite good enough. The roots of young trees should be carefully studied and trimmed as may be needed. You may safely trim off all small fibrous stuff at the top if such there should be, and use the stronger and main roots, placing them as carefully as you can to ensure their getting a good start down into the soil. You do not want a growth of young roots on the top of the ground. I have always been against this. We want the roots to grow and work outward below our well-cultivated surface. They can be made to do this. In some classes of poorer soils manure may be added at planting time, when it should be judiciously mixed with the soil as it is filled in. Richer soils will not need this, perhaps, till later on when the trees begin to bear.

The question of depth of planting must not be overlooked. On slopes where the soil is pretty certain to be lost to some extent by washing, I would say: Plant as deeply as you dare, leaving the upper part of the holes not quite filled, like a saucer. Keep the surface like this if you can for the first few seasons. On good level land, with no danger of washing, I advise the exercise of common sense and moderation. You can plant trees so high out of the ground that you spoil them; on the other hand, I have seen many young trees so deeply planted that they could not grow, and they did not grow.

In marking out for planting, use a No. 12 wire long enough to do half, or a good part, if not the whole of the row. Measure the distances for your rows along the headlands, put in strong pegs there, have a ring at each end of your wire, and a dab of solder on the wire every 27 or 30 ft., or whatever distance you intend planting; draw the wire

tight and drop the ring over the pegs at the ends, and you cannot go wrong in placing your trees. Each dot of solder means a tree, and you cannot make a mistake, and you lose no time dodging about. After planting, follow up reasonable light cultivation to kill weeds and conserve moisture.

PRUNING.

The work of pruning is a matter of the greatest importance, and it begins with the early youth of the tree. Properly trained nursery stock will not require much treatment, and, unless the young trees have long or irregular tops, it is not a good thing to cut them about when planting out. Begin your cutting when the shoots come and you will avoid a partial dying back of the top which frequently occurs on trees cut back at planting. When the growth starts make up your mind that you are going to control the trees properly. The first thing of all in pruning is to understand your tree, the next that you are master of that tree, and then things fall into line as you exercise that mastery. The young tree should be trained with a foundation of three or four good, sound limbs as evenly placed as possible, and to get them it is sometimes advisable to cut the head clean off the young tree. Trunks should be established about knee high. Do not start your first main limbs too close together, as in later years the tree may split if bearing heavy crops. As growth goes on and the tree increases in size, it will be found that the heads of the original limbs develop until they may in turn be divided into sections, each having its own head or top and outer growth to be considered and arranged for.

This will include the opening out and freeing from small and useless growth inside of the tree on the main limbs and their continuations further up. Avoid the multiplicity of prongs in the forks like hayforks, or the development of "gridirons" amongst the branches. We often see plenty of this amongst the orchards. The bulk of our orchards are badly neglected in the matter of pruning, and it cannot be too well remembered by all our growers that the objects of pruning are to conserve power, to avoid waste, to direct the energy of the tree properly, and to produce a fair and profitable crop of good-quality fruit, instead of an enormous amount of small, inferior, and useless stuff. It does not pay any orchardist to grow small or poor fruit. It does pay to grow really good stuff and keep on growing it, and one of the greatest helps to this is systematic pruning. I would earnestly urge, as we have done for years, all our growers to pay more attention to this matter. Over and over again people have said that I was too severe in my pruning work, but I know what it works out to, and my advice to-day is: Don't be afraid to cut once you know what you are at. Especially is it necessary to prune unmercifully in connection with some of the diseases we have amongst the trees. Speaking in a general way of pruning, it may be said that the man who understands his trees will always work, and very often almost unconsciously, with the model of what the tree ought to be carried in his mind. Then, as the work goes on and tree after tree is dealt with, you will find the "scheme" of the work showing out very effectively.

It may also be said that good pruning conduces to good health because it avoids the crowding up of a lot of scrubby wood and, at the same time, the breeding up of a lot of troubles that are encouraged in the unpruned tree. Further than this, there is the outstanding enormous benefit gained in connection with spraying. No man on earth can make a decent job of spraying in a lot of the badly grown trees we meet with. It cannot be done, and therefore the owner of such trees is always at the mercy of his enemies and never has much chance of getting clean fruit. You can spray with half the stuff, half the trouble, in half the time, and make ten times the good job of it in the case of trees that have been well pruned. I am not in favour of pruning extensively while the trees are in bloom, or when there is a burst of young growth on, but beyond that I would not hesitate to prune at any time. Probably the best time of all is when the crop has been gathered early enough to have the trees still dormant.

Reference may also be made here to root pruning. We know the value of root pruning in regard to other things besides citrus trees. Grape vines especially call for careful attention in this respect, and pay for it when they get it. Practically, all fruit trees are the better for some control being exercised over their root growth. I have already stated that I do not want the roots of my young trees on the top of the ground. For forty years or more I have followed a style of cultivation that did not allow of purely surface roots running over my orchard. My advice is to deal thoroughly with these in all cases where the lay of the land allows good cultivation. On steep slopes, especially with variations of soil, you have a different problem, and a queer one at that. To my mind, the reason why roots of citrus and many other trees come to the surface is to breathe, to drink, and to feed. In uncultivated places you find the roots right on the surface. In well-cultivated land there is no need for them to come right to the surface, and they won't do it, because moisture, food, and air are all sent down to them; and then, in addition, they get the advantage of a good natural soil mulch. In regard to the roots the same may be said as was said of pruning the trees—that you are the master, and you must study your tree and all its surrounding conditions and control it accordingly. It appears to me that in view of the attack of root borers in citrus trees, as has been discovered in recent times in certain parts, we shall very likely find ourselves up against a very peculiar problem in root pruning. A word or two may be said here of the interesting work done in the North Coast districts recently, and still being carried on, by Mr. Scerri. Many of our growers know of his pruning both above and below ground. Probably the most pronounced of his work is done in root pruning, and it will be a matter of interest to all growers to note the results of this. In our opinion time will be necessary in this direction.

CULTIVATION.

Your orchard can never rise to its best without good cultivation. Many orchards are planted where such work is an impossibility, and sooner or later, in one way or another, they must inevitably suffer. Good cultivation should begin before the trees are planted, and this

initial part should consist of deep working and thorough preparation of the soil so that your young trees will make themselves at home from the start. I cannot, in this paper, go into too many details; but it may be said that, with a pretty wide choice of implements, it is not a matter of serious difficulty for a man to begin with good work and keep it up afterwards. Good ploughing—and this to a decent depth, too—in the winter, light ploughing and other styles of work through the summer, and careful attention by hand labour under the trees themselves is what is needed. Sometimes a summer ploughing will do the world of good in turning in a fine growth of weeds or a mixture of weeds and crop. It does not appear to me as necessary for a man to be always tearing his orchard soil about with some kind of tool or implement. Sometimes you can do harm by an inopportune tearing up by interfering with some of Nature's wonderful processes of dealing with a lot of stuff that had, perhaps, been recently turned in with the plough.

Sometimes a man will do better by using a set of harrows only, instead of a plough, when the question of the conservation of moisture is an urgent one. Sometimes, especially in drier areas, one can plough on a sudden chance fall of rain such as may occur with a storm, and do a lot of good too. Sometimes you will do most good by leaving your soil and your trees in peace for a while. But do not turn this into an excuse for neglect. Neglect is the basis of pretty well all trouble in orchard work, as it simply opens the door for all our enemies to march right in. In regard to the question of cultivation on steep slopes, all we can say is that a man must use his judgment and be guided by circumstances. All soils are not the same; some, even on slopes, wash away more easily than others, while some may be retained and worked with far greater success than others. There can be no doubt that there is and always will be a difficulty here, because, sooner or later, if you persist in trying to cultivate properly you will be caught and will lose your soil; while, on the other hand, if you do not cultivate you get trouble in other directions. The relationship between good deep cultivation and good deep rootage must never be lost sight of. Without the right method of soil-working you cannot properly control your roots. Finally, good cultivation means that your trees can get the best out of your land; and that is what should be aimed at.

WHAT TO PLANT.

A word of advice may well be given on this matter. New growers will do well to avoid going in for too many sorts. If you are going to grow for commercial purposes, then go for one or two good lines in fair quantity so that you can meet good orders for what consumers want. Do not go in for fancy work. Such sorts as Valentia Late, Dunning's Navel, Jaffa, Mediterranean Sweet, Sabina, and Siletta will give plenty to pick from in oranges, and I would only choose about three at the outside. In mandarins a couple of good ones is plenty. As to lemons, care will be needed mainly because, on the coast, our lemons are so scabby. Apart from that, if a lemon is grown on the coarse side,

it will do for candied peel, and for good shop stuff for drinks the market is pretty safe. Sevilles, in my opinion, will yet come in to their own in Queensland, and when they do their value to the grower will be discovered in no uncertain way. I put this down as one of the most profitable of the citrus family, granted a fair market value, and taking many points in connection with production into consideration. I would advise the planting of good, sound worked trees only, of all kinds. The grower has much to gain and little, if anything, to lose by this.

DISEASES AND PESTS.

The name of these is legion, and on this occasion I can only deal briefly with this section of my subject. They may best be described under Mr. Benson's old classification of a good many years ago as follows:—

Insect Pests.

1. *Insects that Live by Suction.*—In this class all scale insects, aphides, mites, and sucking-bugs, are included. Most of you are well acquainted with the general list of these enemies, and I need not do more now than refer you for further detailed information to the pamphlets issued by the Department of Agriculture and Stock. The same remark will also apply in the matter of remedies. These are all set out in proper order, and I would only say here that to the old list must be added such spraying compounds as the oil sprays now on the market.

2. *Insects that Destroy Foliage, Skin of the Fruit, &c.*—This class includes all those insects that actually devour their food, other than those to be presently dealt with, as distinct from those already mentioned which live by suction. For the whole of these there is one great remedy —viz., to poison their food. In my own opinion two things stand out above all else that I know of for this purpose. These are arsenate of lead and Bordeaux mixture. With the latter I have had some splendid results against caterpillars, grasshoppers, and particularly against the corn moth in citrus crops. Both these mixtures deserve attention from our growers, and of Bordeaux mixture it may be said that while it is acting as a poison it is invaluable as a fungicide amongst citrus.

3. *Insects Boring into the Fruit.*—Our old friend the fruitfly comes in here, followed by such as the peach moth and corn moth.

4. *Insects Boring into the Tree.*—Here are included the larvae of several species of beetles which do serious damage to citrus trees by boring into either the trunks, limbs, or roots. Briefly, I may say that against this class of pest we put good, careful pruning, because before an attack you can see all through your trees and also spray all through them easily, and the beetles may be thus caught at the start; also, after an attack you can more easily detect it, and follow up the enemy at once with little or no difficulty. Further than that, well-pruned trees do not offer the same attraction to any pests that scrubby ones do. Next, destroy all elephant and longicorn beetles that may be seen on the trees at any time. They may be destroyed by catching them, or they may be poisoned by sprays, as they feed on the young bark and leaves. The root borer, at present causing some anxiety in some parts, is, in my

opinion, deserving of the most careful attention, as can be seen at a glance at samples of his work which I have here for your notice.

Fungus Pests.

To quote Mr. Benson's pamphlet: "Parasitical fungi of many kinds attack all portions of citrus trees—the fruit, leaves, branches, trunks, and roots all being more or less subject to their ravages. The humid climate of our Eastern seaboard is conducive to this development, whereas they are conspicuous by their absence in the warmer and drier parts. If neglected, they cause considerable damage; but, fortunately, we have remedies the application of which reduces the loss to such an extent that they are not any serious menace to the industry."

These are Mr. Benson's words, and I would like to call your special attention to them where he says: "We have remedies the application of which reduces the loss," &c. I agree with this, but at the same time I want to say this now, that if these remedies are not applied, the citrus-growers have fungus troubles silently, slowly, but surely developing and spreading that will give all the trouble and loss you will ever need without the aid of any other enemies.

1. *Fungi Attacking the Fruit.*—These are with us; mainly Melanose, Black Brand or Black Spot, Brown Spot (found here on both mandarins and oranges, though mentioned by some authorities as Brown Spot of the Mandarin), and Blue Mould. The treatment for all these may be put in a nutshell, thus: Merciless pruning, according to circumstances; the prompt burning of all prunings; and periodical spraying with Bordeaux mixture or lime-sulphur mixture. Generally speaking, we prefer the latter because it kills more enemies of other kinds at the same time than the Bordeaux mixture does. Both are first-class sprays for the particular line of treatment, and where trouble is at all severe they should be repeated two or three times in the year.

2. *Fungi Attacking Trunk and Branches.*—There are quite a number of these more or less troublesome, some being deadly in their attack. They are seen appearing in various colours and forms. In colour they range from deep black, just like blotches of ink, to almost white. In form they are at times like rusty blotches, sometimes leathery; again at times of a cankerous appearance; and they may also be found like streamers or strands of cobweb running along the branches and down the main wood or trunk. The same remedies apply here and are promptly effective.

3. *Fungi Attacking the Roots.*—More than one of these may be found in citrus orchards, and generally in land such as scrub or semi-scrub having plenty of stumps and roots in the soil for some time after planting. Where any attack is found, cut out affected roots, working back on to clean bark and wood; dose the soil with lime in which is mixed a handful or two of coarse salt. Don't put this down in lumps or heaps, but sow it on and mix with the soil by working in. Another fine cure for root fungus is salt water. Dissolve a double handful or so of coarse salt in a kerosene tin of water and distribute this evenly over

the surface and let it soak in. The quantity to be used depends on the size of the tree. In addition to fungus pests there are certain mosses and lichens which grow on our trees, and these may be mentioned as coming under the same treatment in spraying.

Useful Fungi.

It may not be generally known to citrus-growers that amongst our best friends are two or three small fungi that attack scale insects and clear them off the tree frequently. The most remarkable instance I have ever seen of this action was at Redlynch, in the Cairns district, where growers were almost relieved of the necessity for spraying by reason of the wholesale attack on scale by these fungi. These friends are in colour red (like little dots of red coral), sometimes grey, and again, in other cases, blackish.

NEW DISEASE OF THE PINEAPPLE REPORTED.

Mr. D. B. Mackie, Entomologist to the Bureau of Agriculture, Manila, writes in the "Philippine Agricultural Review," vol. X., No. 2, 1917:—

"The attention of the Bureau of Agriculture has been called to the presence of a disease affecting pineapples in the Archipelago which, if allowed to spread and become distributed, may prove a serious menace to this crop. The disease has been noted on the varieties known as Smooth Cayenne and Queen. It causes a hypertrophy of the tissues which gives them a rough corrugated appearance. It has also been noticed that the suckers prepared for shipping which show these same corrugations often develop a heart-rot, which causes the entire heart to become shiny and easily pulled out. Whether this rot is characteristic of the disease is not yet known, but it has been noticed on about 10 per cent. of the suckers which also showed the corrugation.

"In Hawaii there is a disease of pineapples which the Territory has subjected to a local quarantine. A rule of the territorial regulations states that all persons and corporations are prohibited from carrying, transporting, or shipping from the islands of Kauai or Oahu any pineapple, fruit, plant, or sucker, and none of them shall be allowed to land at any port in the Territory. For a violation of this regulation a fine not to exceed 500 dollars (£100) is imposed.

"Correspondence with the Hawaiian authorities leads this Bureau to believe that the disease which has been reported from Binan, Laguna, and from Pinelands, Nueva Ecija, is the same which has proved so troublesome in the Hawaiian Islands.

"As little seems to be known of the disease, affected plants should be pulled out and burned; also particular care should be exercised to see that no infected suckers are used for propagation or for distribution. While the pineapple can hardly be termed a commercial crop in the Philippines, one company cultivates it on an extensive scale, and has proved that its culture is a commercial possibility."

The plate gives an idea of the appearance of the diseased stock.

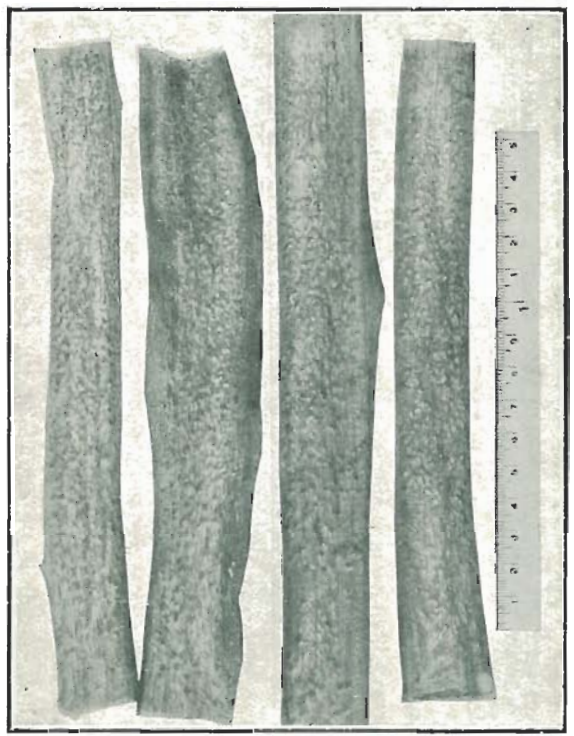

PLATE 33.

(A) Diseased Leaves of Pineapple, showing corrugations.

(B) Diseased Pineapple Sucker, showing heart rot.

Botany.

RECORDS OF A FEW ALIEN PLANTS.

By C. T. WHITE, Acting Government Botanist.

At the October meeting of the Queensland Royal Society, Mr. C. T. White, Acting Government Botanist, read the following notes accompanying an exhibit of plants met with as strays from cultivation, &c.:—

"Of late several plants have been brought in or sent in for identification as having been met with as naturalised or strays from cultivation; in some cases the specimens have been brought in under the impression they were natives. It seems desirable to put some of these on record, as, apart from the purely botanical interest, the matter is of some importance, for a species that to-day may be represented by only two or three stray plants may to-morrow be a naturalised weed of considerable aggressiveness. Only the other day at the back of some Brisbane wharves I saw one or two plants of *Inula graveolens*—the stinkwort. This had not been seen before, so far as I know, in Queensland, but in the Southern States several thousands are spent almost yearly on its eradication.

ORDER LEGUMINOSÆ.

MEDICAGO MINIMA, Linn.

Lesser Medick Burr. Specimens were handed over to me by Mr. E. W. Bick, who stated that it was coming up here and there in the Brisbane Botanic Gardens. The plant is similar in growth to the common Medick burr (*M. denticulata*), but the pods (burrs) are smaller and the whole plant covered with silky hairs.

CASSIA TORA, Linn.

An annual glabrous undershrub. Leaves petiolate, 4-8 foliolate with a gland between or above the lowest pair of leaflets. Flowers few, in very short axillary racemes. Stamens 10; the anthers of the upper 3 imperfect. Pod linear, slender, curved, 4-6 in. long, 1½-2 lines broad.

A cosmopolitan tropical plant. Mr. H. G. Ladbrook, Johnstone River, writes (19/7/17)—"Was introduced as a green manure, and now grows on roadsides, emitting from leaves, &c., an offensive smell." Some naturalised species of Cassia are amongst our most prevalent weeds.

ORDER ASCLEPIADEÆ.

CRYPTOSTEGIA GRANDIFLORA, R. Br.

Madagascar rubber. This well-known garden plant has firmly established itself as a weed in certain parts of Northern Queensland. In forwarding specimens for identification, Mr. A. C. Stevens, acting land commissioner, Rockhampton, wrote (25/9/17)—"I beg to report that yesterday, at the request of Mr. Mackellar, I visited the Rifle Range at

North Rockhampton to see the growth of a vine-like bush or plant known as 'Madagascar Rubber.' The plant has a strong tap-root and is hard to pull up, but could probably be eradicated by grubbing. It is now fairly thick on parts of the Rifle Range, and if not destroyed the whole reserve will become infested in a short time. I understand that this plant has only recently made it appearance on this reserve, though it has been growing in other parts of the town for some years. I have noticed that when growing among timber it grows like a vine to a considerable length, supported by the tops of trees.'' It is very abundant about Townsville, and is also very common on the Gilbert River.

ORDER BIGNONIACEÆ.

TECOMA CAPENSIS, Lindl.

This well-known South African plant, so common in Queensland gardens, is found here and there in the scrubs about Brisbane. It is to be found growing along Ithaca and Enoggera Creeks, and specimens have been brought in to me by Mr. W. Macmillan from the head waters of the latter. In the open it is of shrubby growth, but, when growing in the scrub, climbs up the trees to a considerable extent.

ORDER SOLANACEÆ.

SOLANUM SEAFORTHIANUM, Andr.

When collecting along Woogaroo Creek recently with my friend, Mr. H. A. Longman, we found several plants of this climbing Solanum growing in the heart of the scrub, the seed evidently having been carried by birds. It is very common in gardens, and is to be often seen about deserted homesteads.

ORDER LABIATEÆ.

MENTHA VIRIDIS, Linn.

Spearmint or common garden mint. Found growing as a stray along several of the creeks at Tambourine Mountain, Southern Queensland (*Longman* and *White,* February, 1917).''

CHANGING THE COLOUR OF HYDRANGEAS.

There are several methods of turning hydrangeas from their ordinary pink colour to blue, but they all require time. Here is one method which should not fail to effect the object in view. The plants must be prepared a year in advance of flowering, and all traces of the old soil, in which they have grown, removed. Pot the plants in peat, adding two-fifths leaf mould and one-fifth sand, 10 per cent. of powdered slates, 3 per cent. sulphate of iron—or a larger quantity of iron alum—and 10 per cent. of ammonium sulphate. Lime should not be used, and it is necessary to employ rainwater for the roots. Water the plants during the growing period with water containing ¼ oz. of sulphate of iron to the gallon.—''Farmers' Advocate,'' Durban.

Viticulture.

THE MILITARY IMPORTANCE OF WINE.

Several articles on Viticulture and the wine industry in Australia have been published in this Journal during the year. The writer of these articles, Mr. G. A. Gattino, struck a good note in his paper (May, 1917) entitled "Viticulture and the Wine Industry after the War," in which he wrote—"Wine is to-day a real necessity to all fighters. Wine raises the morale of the fighters, dissipates their sad thoughts, and comforts the soul. Wine is necessary to recoup their enormous loss of energy, when the nervous system is under such tension that it can only be imagined by those in the firing line."

The following article on the military importance of wine appeared lately in a South Australian publication (October, 1917), "Garden and Field," which bears out Mr. Gattino's contention, that wine (not spirits) is a necessity for soldiers:—

"It is perhaps safe to say that scarcely at any period in the past has a vintage been awaited with greater anxiety on all sides by the populations of the principal winegrowing countries of Europe, both from the commercial point of view, on account of the failure of last year's vintage, and from the military standpoint, by reason of the imperative necessity for a bountiful supply of natural red wine for the fighting forces of our allies.

"In proof of this it may be stated that France has already requisitioned for her military needs the astonishing total of some 200,000,000 gallons of this year's wine (representing one-fifth of her own entire annual production) as well as more than 40,000,000 gallons from her Algerian colony, and storage has already been arranged for this enormous volume of wine, representing in value no less than £20,000,000 sterling, by the taking over of special warehouse accommodation in every department of France.

"So essential is the regular supply of pure wine considered for the well-being of the troops that similar exceptional precautions are being taken to safeguard the crop in Italy, not only for her soldiers at the front but also for their sick and wounded comrades in the hospitals. That these early steps in protection of this year's produce of wine for military uses in the respective countries should be deemed necessary is the more remarkable in face of the fact that this vintage, though not abnormally abundant, has proved to be a full average one at least in all the more southern countries of Europe; and, further, that while France will have for her own consumption the large quantity of her wines that formerly went to Germany, Italy will likewise retain within her own borders that large proportion of her vinous products which in pre-war times found a ready outlet in Germany, and to a much smaller extent in Austria-Hungary."

Apiculture.

PRODUCING SALEABLE HONEY.

By ARTHUR C. MILLER.

It is easy enough to "keep bees," but to make them pay is a different matter. About the first bit of instruction given to the novice is to get his colonies strong as early as possible, and as most of the instructions have been written by beekeepers in the regions where clover affords the main yield, the instructions have all centered on securing that crop. But there are vast regions where clover is not the main crop and other regions where it does not grow, and where to work to get the colonies strong, early, is labour wasted. To meet with the greatest success the colonies should be strongest when the most desirable flow comes, be it early or late. Langstroth used to say: "Keep your colonies strong," and taken intelligently his advice is right.

There are many ways of doing it; so many that they are confusing to the average beekeeper. The prime requisite is a young and vigorous queen of a good strain, and the secondary is good combs. Given these and not too much manipulation the colonies will be ready when the flowers are.

Different sections produce different honeys—some fine, some good, and some indifferent or poor; so the first thing for the would-be successful honey-producer to do is to find out at what season the good honeys are secured. This is easily done by sampling the new honey whenever the bees are storing a surplus and tracing the bees to the flowers whence they get it. It is often quite as important to learn when the poor honey is gathered in order that the good may be secured separately from it.

When it comes to determining what honey is "good" many beekeepers will find themselves decidedly puzzled. They think one good while other persons do not like it. One palate is pleased with a strong flavoured honey; another wants something almost flavourless—just merely sweet.

In most regions good honey is secured from several sources, some, perhaps, coming early in the season, others late, and not infrequently poor honey coming in between. Perhaps the beekeeper does not secure enough of any one kind to supply his customers on one sort, and later gives them of the later crop only to have fault found because the honey tastes differently. The remedy is to hold all of the honey until the end of the season and then "blend" it.

No fixed rules can be given for blending. The proper proportions will have to be determined by experiment. Keep trying until it seems right, then "try it on the dog," which is to say, pass samples of the blend around among people and get their opinion. Eventually a combination will be secured which fits the palate of the community.

It sometimes happens that all the honeys of a region are too strong in flavour to be pleasing for steady consumption, and then it is necessary to buy a mild honey from some other region and soften the flavour by blending the strong with it.

The above advice will be understood to refer to extracted honey. This form of honey is steadily crowding out comb honey, and for several reasons. First, successful production of comb honey calls for more skillful beekeeping; secondly, it calls for a location where the honey flow is rapid and profuse; and, thirdly, it calls for more pains and care in preparation for market and in delivery than the average beekeeper seems able to give it. Also, many consumers do not like the wax and want the honey so that it can be used as syrups are used.

But even in locations where the honey flows are not conducive to successful production of comb honey on an extensive scale it is often possible to secure some choice comb honey which commands fancy prices.

The writer has proved the value of the advice above given. He has developed a blend of honeys which seems perfectly adapted to the local market. It is liked; repeat orders and new customers are the order of the day, and the honey sells for 20 per cent. more than any other honey on the market. And yet the region where it is produced is not considered a good honey section. As a whole it is not, but some parts of it at some seasons of the year give honey of exceptionally fine flavour, some of them a trifle too pronounced for steady eating, but ideal when used in the right proportion in a blend.

And in a few sections he secures a modest yield of comb honey from each hive, but this honey is a natural blend, the bees getting it from three or four sources at the same time, and the quality is so fine that it commands a very high price and is all engaged a year in advance. It pays to go to a lot of trouble to secure it, and even the modest per-colony yield returns in cash much more than the large per-colony yields of some other sections.

Study the honeys of your neighbourhood and work your colonies to secure all they can of the best.

Providence, Rhode Island, U.S.A.

WHITEWASH FROM PRICKLY-PEAR.

In certain parts of Uruguay the farm buildings are a fine white colour even during the wet season. To obtain this appearance a whitewash is used, made of the sliced leaves of the prickly-pear, which, when macerated in water for twenty-four hours produce a solution of creamy consistence. To this lime is added and well mixed in. When the solution is applied to any surface, be it wood, iron, or other material, a beautiful pearly white appearance is produced which endures through rain and frost for many years. The editor of the "Cyprus Agricultural Journal" says that the solution has been tested in Cyprus with good results. It may be noted that this use of the prickly-pear is common in the West Indies.—"Agricultural News," Barbados.

Entomology.

The General Superintendent of the Bureau of Sugar Experiment Stations has received the following notes from the Entomologist, Dr. J. F. Illingworth, upon investigations of the grub pest:—

Though this is the slack season in the activities of the grubs, we have been very busy in framing up our lines for attack, when they do become active again. The following list will not only serve to illustrate the comprehensiveness of these lines, but it will also indicate clearly the necessity for considerable additional assistance, if they are to be soon carried out. This assistance will be referred to again later:—

1. A study of the distribution of species with relation to soil, timber, cultural methods, &c.

2. Mapping of infested and non-infested regions.

3. Morphological study of reproductive organs of beetles, with relation to the period of ovipositing and the number of eggs produced.

4. Morphological study of the fungous parasites.

5. Breeding of the various local parasitic and predaceous insects in cages.

6. Introduction and breeding of beetle parasites from other countries.

7. Experimental methods for the rapid multiplication and wide distribution of our fungous parasites.

8. Introduction of bacterial and fungous enemies of the beetles from other countries.

9. A further study of various light-traps for the beetles.

10. A further study of repellents.

11. Field and laboratory experiments in the use of poisons for the grubs.

12. Field experiments to determine the relation of fertilisers to resistance; using green manure, stable manure, meatworks, nitrate of soda, &c.

13. A study of the effect of trash left on the field during the period of ovipositing of the beetles.

14. Also, having the ground covered with Mauritius beans during this period—planting cane in March.

15. Another experiment: Working the fallow soil during January and February and planting in March.

16. Experiments in late planting: Using plots planted in November and December, which are to be worked through the period of ovipositing.

17. Experiments to determine how far the beetles fly.

18. A study of varieties of cane best suited to grub resistance.

19. Experiments showing the value of lime on grub-infested soil.

20. Development of a general reference collection in the laboratory.

This list might be considerably extended; but, since several of the topics are so important that we might profitably occupy all of our time with one of them, it would appear best not to make the list too far-reaching. It is hoped, however, that we may soon have the assistance of students, who, while they are carrying out investigations along these various lines, will be gaining in practical experience and power, which will inevitably prove of great worth, both to the State and to themselves. Pests of tropical crops are omnipresent, and the call for trained men to cope with them will ever be insistent. Certainly, the expenditure for the permanent equipment of our new Experiment Station could not be put to better use.

Some recent observations that will prove of interest: Beetles were found, fully developed, in the soil at Greenhills, 24th July. These were in the hardest kind of soil, over 2 ft. from the surface, where they must wait for the rains to penetrate to them before they can emerge. It is very probable that a number of these must succumb if the rains are long delayed. Along the line of our investigations of the relation of humus to grub infestation, I learned, at Deral, that the grubs had been so abundant that a child picked up at the rate of about 8 lb. of grubs in a day; and still the cane showed no injury from them. The river-bottom land of that locality is exceedingly rich in humus, having been recently cleared from the scrub, and is subject to overflows.

MUSHROOM KETCHUP.

Put the mushrooms, fully opened or large buttons, into a pan, breaking them in pieces. Strew salt over them; let them stand for four or five days; then mash them and squeeze them through a cloth; boil and skim the liquor; throw in black and red pepper, a little ginger, and some eschalot. Boil all together, and, when cold, bottle.

General Notes.

SOCIETIES.

Elimbah.—Elimbah Farmers and Settlers' Progress Association. H. L. Hall, secretary.

ALGAROBA OR CAROB SEED.

We have received several inquiries concerning algaroba seed. We believe that there are some trees already bearing in Queensland, and would be glad to hear from growers if they have any seeds for disposal, as there appears to be a growing demand for them.

CURING HAMS.

As soon as the hams are cut, tie them up by the hock for three days. Then make a pickle thus: 1 oz. of saltpetre, 8 lb. coarse sugar, ½ oz. salt prunella, 8 lb. common salt, 1 oz. juniper berries, and 1 gallon of strong beer. Boil all together, and when cold pour it over the hams. Turn them every day for a fortnight. This pickle is sufficient for two hams.

Answers to Correspondents.

LOUIS HOEY, Brandon, Townsville—

FERTILISING INGREDIENTS REMOVED FROM AN ACRE OF LAND BY A 30-TON CANE CROP.

1. What proportion of nitrogen, potash, phosphoric acid, and water would be removed from an acre of land from which 30 tons of cane have been harvested?—*Answer:* The amounts of fertilising ingredients vary according to locality and cane variety. A 30-ton crop of D 1135 removed per acre in lbs.—

	Trash. Lb.	Top. Lb.	Crushable Cane. Lb.
Nitrogen	40	33	64
Potash	15	44	25
Phosphoric acid	7	10	23

2. Plans of modern farm buildings—milksheds, dairy, piggeries, and poultry-yards—have been forwarded as requested.

3. For roofing: Ruberoid or, if timber is plentiful, ironbark or pine shingles. Split shingles are preferable to sawn, as the former will not warp. Ironbark shingles discolour the rain water for a considerable time.

The Markets.

PRICES OF FARM PRODUCE IN THE BRISBANE MARKETS FOR OCTOBER, 1917.

Article.		OCTOBER.
		Prices.
Bacon	lb.	9½d. to 10d.
Barley	bush.	2s. to 5s. 6d.
Bran	ton	£6 3s.
Broom Millet	„	£20 to £25
Butter	cwt.	149s. 4d.
Chaff, Mixed	ton	£4 to £6
Chaff, Oaten	„	£7 to £7 10s.
Chaff, Lucerne	„	£5 to £6
Chaff, Wheaten	„	£3 15s. to £4
Cheese	lb.	9½d. to 10d.
Flour	ton	£12
Hams	lb.	1s. 3d. to 1s. 4d.
Hay, Oaten	ton	£6 15s. to £7 15s.
Hay, Lucerne	„	£4 to £4 10s.
Honey	lb.	5d.
Maize	bush.	3s. 9d. to 3s. 10d.
Oats	„	1s. 6d. to 2s. 6d.
Onions	ton	£23 to £24
Peanuts	lb.	5d. to 6d.
Pollard	ton	£7
Potatoes	„	£13 10s. to £19 10s.
Potatoes (Sweet)	cwt.	2s. to 3s.
Pumpkins (Cattle)	ton	£5
Eggs	doz.	7d. to 9d.
Fowls	per pair	4s. to 6s. 3d.
Ducks, English	„	4s. to 4s. 6d.
Ducks, Muscovy	„	5s. to 7s. 6d.
Geese	„	7s. to 8s.
Turkeys (Hens)	„	9s. to 11s.
Turkeys (Gobblers)	„	15s. to 20s.
Wheat	bush.	3s. 6d. to 4s. 9d.

VEGETABLES—TURBOT STREET MARKETS.

Asparagus, per dozen bundles	6s. to 10s.
Cabbages, per dozen	1s. to 3s.
Cauliflowers, per sack	3s. to 5s.
Celery, per bundle	...
Beans, per sugar bag	6s. to 12s.
Peas, per sugar bag	7s. to 12s.
Carrots, per dozen bunches	1s. 5d. to 1s. 6d.
Beetroot, per dozen bunches	9d. to 1s.
Lettuce, per dozen	1s. to 2s.
Parsnips, per bundle	7d. to 10d.
Sweet Potatoes, per cwt.	2s. 6d. to 2s. 9d.
Table Pumpkins, per dozen	7s. to 8s.
Marrows, per dozen	1s. 6d. to 7s.
Rhubarb, per dozen bundles	...
Tomatoes, per case	5s. to 12s.
Cucumbers, per case	9s. to 10s. 6d.

SOUTHERN FRUIT MARKETS.

Article.	OCTOBER. Prices.
Bananas (Queensland), per crate	10s. to 11s.
Bananas (Tweed River), per case	...
Bananas (Fiji), per case	10s. to 14s.
Bananas (G.M.), per bunch	...
Bananas (G.M.), per case	...
Guavas, per case	...
Lemons (Local), per case	4s. to 10s.
Mandarins, per case	6s. to 12s.
Mangoes, per case	10s. to 12s.
Oranges (Navel), per case	14s. to 16s.
Oranges (Seville), per bushel-case	7s.
Oranges (other), per case	11s. 8d.
Papaw Apples, per half-bushel-case	8s. to 12s.
Passion Fruit, per half-case	8s. 5d. to 9s. 5d.
Pineapples (Queens), per double-case	7s. to 10s.
Pineapples (Ripleys), per double-case	6s. to 8s.
Pineapples (Common), per double-case	6s. to 8s.
Tomatoes (Queensland), per half-bushel-case	6s. to 8s.
Cucumbers, per bushel	7s. to 9s.
Strawberries (Queensland), per tray	...

PRICES OF FRUIT—TURBOT STREET MARKETS.

Article.	OCTOBER. Prices.
Apples, Eating, per bushel-case	21s. to 24s.
Apples, Cooking, per bushel-case	18s. to 20s.
Bananas (Cavendish), per dozen	1d. to 4½d.
Bananas (Sugar), per dozen	1d. to 4½d.
Cape Gooseberries, per quarter-case	8s. to 10s.
Citrons, per hundredweight	11s.
Cocoanuts, per sack	12s. to 15s.
Cumquats, per quarter-case	4s. to 5s.
Custard Apples, per tray	...
Lemons (Lisbon), per case	6s. to 7s.
Limes, per tray	...
Mandarins, per case	3s. to 9s.
Mangoes, per case	4s. to 9s.
Oranges (Navel), per case	12s. to 12s. 9d.
Oranges (Seville), per hundredweight	3s. 6d. to 10s.
Oranges (other), per case	6s. to 8s.
Papaw Apples, per quarter-case	1s. to 2s. 3d.
Passion Fruit, per quarter-case	10s. to 13s. 6d.
Pears, per quarter-case	19s. to 21s.
Peanuts, per lb.	5d. to 6d.
Persimmons, per quarter-case	...
Pineapples (Ripleys), per dozen	1s. 6d. to 3s. 6d.
Pineapples (Rough), per dozen	1s. to 3s.
Pineapples (Smooth), per dozen	1s. 6d. to 3s. 5d.
Strawberries, per tray	1s. to 3s. 6d.
Tomatoes, per case	5s. to 12s.

TOP PRICES, ENOGGERA YARDS, SEPTEMBER, 1917.

Animal.	SEPTEMBER. Prices.
Bullocks	£26 10s. to £29 5s.
Bullocks (Single)	...
Cows	£14 7s. 6d. to £18
Merino Wethers	53s. 9d.
Crossbred Wethers	41s. 9d.
Merino Ewes	14s. 3d.
Crossbred Ewes	33s. 9d.
Lambs	43s. 3d.
Pigs (Porkers)	66s.

Statistics.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF SEPTEMBER, 1917, IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALLS DURING SEPTEMBER, 1917 AND 1916, FOR COMPARISON.

Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	Sept.	No. of Years' Records.	Sept., 1917.	Sept., 1916.
North Coast.	In.		In.	In.
Atherton	0·54	15	0·48	2·05
Cairns	1·65	34	1·00	4·50
Cardwell	1·44	44	1·12	2·36
Cooktown	0·56	40	0·12	1·47
Herberton	0·46	29	0·02	1·42
Ingham	1·09	24	1·25	0·75
Innisfail	3·58	35	2·51	6·49
Mossman	1·34	5	1·18	3·36
Townsville	0·81	45	0·23	0·03
Central Coast.				
Ayr	1·79	29	0·22	0·19
Bowen	0·87	45	0·18	0·84
Charters Towers ...	0·85	34	0·71	0·03
Mackay	1·59	45	0·70	0·11
Proserpine	2·15	13	1·45	3·32
St. Lawrence ...	1·38	45	2·59	0·27
South Coast.				
Biggenden	1·66	17	7·02	2·34
Bundaberg	1·81	33	3·54	4·23
Brisbane	2·09	66	5·21	2·81
Childers	1·98	21	3·98	3·24
Crohamhurst ...	2·53	25	5·81	5·18
Esk	2·26	29	7·16	2·85
Gayndah	1·58	45	5·28	1·46
Gympie	2·10	46	3·57	4·03
Glasshouse M'tains	1·71	8	5·00	3·13
Kilkivan	1·75	37	4·17	1·69
Maryborough ...	1·94	45	3·63	3·81
South Coast—continued:				
Nambour	2·28	20	5·30	5·06
Nanango	1·83	34	7·11	2·98
Rockhampton ...	1·35	29	3·68	0·92
Woodford	2·12	29	4·14	3·77
Darling Downs.				
Dalby	1·78	46	5·82	0·87
Emu Vale	1·79	20	4·51	2·25
Jimbour	1·62	28	6·58	0·50
Miles	1·41	31	5·92	0·45
Stanthorpe ...	2·47	43	7·28	1·80
Toowoomba ...	2·19	44	6·62	3·63
Warwick	1·88	29	6·90	1·32
Maranoa.				
Roma	1·54	42	7·07	0·77
State Farms, &c.				
Bungeworgorai ...	...	...	...	0·77
Gatton College ...	1·54	17	7·50	1·84
Gindie	0·85	17	3·57	0·06
Hermitage ...	1·45	10	6·56	1·54
Kairi	1·07	4	0·66	1·76
Kamerunga ...	1·13	26	0·70	4·44
Sugar Experiment Station, Mackay	1·49	19	0·60	0·44
Warren	0·93	5	3·70	0·53

NOTE.—The averages have been compiled from official data during the periods indicated; but the totals for September this year and for the same period of 1916, having been compiled from telegraphic reports, are subject to revision.

GEORGE G. BOND, Divisional Officer.

ASTRONOMICAL DATA FOR QUEENSLAND.

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

TIMES OF SUNRISE AND SUNSET AT BRISBANE AND THE PHASES OF THE MOON

1917.	SEPTEMBER.		OCTOBER.		NOVEMBER.		DECEMBER.	
Date.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.
1	6·2	5·34	5·29	5·47	4·59	6·5	4·46	6·28
2	6·1	5·34	5·28	5·48	4·58	6·6	4·46	6·28
3	6·0	5·35	5·27	5·48	4·58	6·7	4·46	6·29
4	5·59	5·35	5·26	5·49	4·57	6·7	4·46	6·30
5	5·58	5·36	5·25	5·49	4·57	6·8	4·46	6·31
6	5·57	5·36	5·24	5·50	4·56	6·9	4·46	6·32
7	5·55	5·36	5·23	5·50	4·55	6·9	4·46	6·32
8	5·54	5·37	5·22	5·51	4·54	6·10	4·46	6·33
9	5·53	5·37	5·20	5·51	4·54	6·11	4·47	6·33
10	5·52	5·38	5·19	5·52	4·53	6·11	4·47	6·34
11	5·51	5·38	5·18	5·52	4·52	6·12	4·47	6·34
12	5·50	5·39	5·17	5·53	4·52	6·13	4·47	6·35
13	5·49	5·39	5·16	5·53	4·51	6·14	4·47	6·35
14	5·48	5·40	5·15	5·54	4·51	6·15	4·48	6·36
15	5·47	5·40	5.14	5·54	4·50	6·16	4·48	6·36
16	5·45	5·41	5·13	5·55	4·50	6·17	4·48	6·37
17	5·44	5·41	5·12	5·55	4·49	6·18	4·48	6·38
18	5·43	5·42	5·11	5·56	4·49	6·19	4·49	6·39
19	5·42	5·42	5·10	5·56	4·48	6·19	4·49	6·40
20	5·41	5·42	5.9	5·57	4·48	6·20	4·50	6·40
21	5·40	5·43	5·8	5·57	4·47	6·21	4·50	6·41
22	5·39	5·43	5·7	5·58	4·47	6·22	4·51	6·42
23	5·37	5·44	5·6	5·59	4·47	6·22	4·51	6·42
24	5·36	5·44	5·5	5·59	4·47	6·23	4·52	6·43
25	5·35	5·45	5·4	6·0	4·47	6·24	4·52	6·43
26	5·34	5·45	5·3	6·0	4·46	6·24	4·53	6·43
27	5·33	5·45	5·3	6·1	4·46	6·25	4·53	6·44
28	5·32	5·46	5·2	6·1	4·46	6·26	4·54	6·44
29	5·31	5·46	5·1	6·2	4·46	6·26	4·55	6·44
30	5·30	5·47	5·0	6·3	4·46	6·27	4·56	6·45
31	...	...	5·0	6·4	4·46	...	4·57	6·45

The times given are for the whole of Queensland, New South Wales, and Victoria, where the same Standard Time is observed.

			H.	M.	
1 Sept.	○	Full Moon	10	28	p.m.
8 ,,	☽	Last Quarter	5	5	,,
16 ,,	●	New Moon	8	28	,,
24 ,,	☾	First Quarter	3	41	,,

The Moon will be at its greatest distance from the earth at midnight on the 14th, and at its least distance on the night of the 30th.

1 Oct.	○	Full Moon	6	31	a.m.
8 ,,	☽	Last Quarter	6	14	p.m.
16 ,,	●	New Moon	12	41	,,
24 ,,	☾	First Quarter	12	38	a.m.
30 ,,	○	Full Moon	4	19	p.m.

The moon will be furthest from the earth on the 12th, and nearest to it on the 28th.

7 Nov.	☽	Last Quarter	3	4	a.m.
15 ,,	●	New Moon	4	28	,,
22 ,,	☾	First Quarter	8	29	,,
29 ,,	○	Full Moon	4	41	,,

The Moon will be furthest from the earth on the 9th, and nearest to it on the 24th.

7 Dec.	☽	Last Quarter	12	14	a.m.
14 ,,	●	New Moon	7	17	p.m.
21 ,,	☾	First Quarter	4	7	,,
28 ,,	○	Full Moon	7	52	,,

The Moon will cause an *Annular Eclipse* of the *Sun* on December 14th, but it will not be visible in Queensland. On the 28th there will be a *Total Eclipse* of the *Moon* between 7.38 and 7.55 p.m. It will be partly eclipsed for an hour and a-half before and after totality.

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

At St. George, Cunnamulla, Thargomindah, and Oontoo the times of sunrise and sunset will be about 18 m., 30 m., 38 m., and 49 minutes, respectively, later than at Brisbane at this time of the year.

At Roma the times of sunrise and sunset during September, October, and November, may be roughly arrived at by adding 16 minutes to those given above for Brisbane.

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.

RECRUITING.

ORGANISATION AND STAFF.

Federal.—Director-General of Recruiting: The Honourable Donald MacKinnon, M.L.A. Secretary: Captain W. A. Robinson.

States.—State recruiting committees, State organising secretaries. Federal electorate executive committees, local recruiting committees, recruiting officers, organisers.

STATE RECRUITING COMMITTEES.

A State recruiting committee in each State will be nominated by the Director-General of Recruiting.

The Director-General of Recruiting will correspond direct with them, and they with him, on general matters affecting the civil organisation.

These committees will exercise authority and supervision over all electorate and local committees, and will guide and direct the general policy to be adopted in this organisation of each particular State subject to the direction of the Director-General of Recruiting.

STATE ORGANISING SECRETARIES.

The State organising secretaries will act as secretaries to State committees and will be vested with the authority to carry out the directions of the State Committee. They will co-ordinate the military and civil organisations.

They will be given a free hand in all matters, other than financial, pertaining to general organising methods, subject to the direction of the Director-General of Recruiting and of the State Committee.

Recruiting officers in Federal electorates will be under the immediate control of the State organising secretaries.

Organisers attached to the staff of recruiting officers will be subject to the immediate control of such officers and will form part of the staff of the State recruiting committees, and will be appointed by such committees. State committees will, in a general way, advise and direct electorate committees in matters of policy and procedure.

State organising secretaries will certify, where necessary, to the payment of salaries, allowances, and expenses of recruiting officers, staffs. and local committees.

They will furnish progress reports at stated times to the Director-General of Recruiting.

FEDERAL ELECTORATE COMMITTEES.

The Federal Electorate Committee in each Federal electorate shall consist of seven members. The members of these committees will be appointed at a duly convened conference of three delegates from each local war service or recruiting committee.

The Federal member for the electorate will be ex officio chairman of this committee. Members of the Senate for each State shall be ex officio members of any committee or group of committees that may suit their convenience as indicated by them to the State Organising Secretary. All State members whose electorates are altogether or mainly within the Federal electorate will be also ex officio members of this committee.

A vice-chairman will be appointed in every instance.

LOCAL RECRUITING COMMITTEES.

Local recruiting committees shall be formed in each government area, and, if considered desirable, as in the case of shires, in towns within the shires which are centres of population, or in the case of metropolitan municipalities in the different wards or subdivisions.

The existing war service committees and local recruiting committees will be the basis of local organisation, provided that such committees agree to immediately call public meetings in conjunction with mayors and presidents, with a view to increasing their membership. The committees should be increased to the greatest extent, with power to add to their numbers. They might aim at embracing all men and women in their districts who are prepared to assist in endeavouring to win the war.

An executive committee of seven should be appointed by each local committee.

RECRUITING OFFICERS.

One or more recruiting officers, not necessarily holding military rank, will be stationed in a central town or towns in each Federal electorate.

One of such officers shall be the secretary and organiser to the Federal Electorate Committee in each electorate.

When a civilian is appointed a recruiting officer he shall receive a salary at the rate of £250 per annum, with travelling expenses, when absent from his head station, at the rate of 10s. per day.

Recruiting officers are to exclusively devote their attention to recruiting organisation, and must not engage in any occupation whilst holding this position.

The area officer in each training area will carry out his area duties independently of the recruiting officer, who may be stationed in the same locality. He must however, be always prepared to assist the recruiting officer when required, and should lose no opportunity of enrolling recruits, notifying the recruiting officer of the action taken, and making the necessary arrangements as to medical examination and transit through such recruiting officer.

ORGANISERS.

Organisers may be appointed in each Federal electorate, and these men should be suitable discharged returned soldiers appointed as civilians, civilians not eligible for active servce, or civilians who, having volunteered for active service, have been rejected.

They must be men of recognised organising ability.

All recruiting sergeants shall be immediately withdrawn and their appointments terminated.

Organisers will be paid £4 per week, and 10s. per day travelling expenses when absent from their head station.

FINANCIAL ARRANGEMENTS.

The salaries, allowances, and expenses of the Federal Secretary and State secretaries, recruiting officers, organisers, and staff shall be paid by the district paymaster of each military district.

Each State Recruiting Committee shall be provided with a fund to meet emergency and minor expenses of the compaign. The endorsement of the State Recruiting Committee, certified by the chairman or vice-chairman and secretary, will be a sufficient authority for the payment of all expenses.

A general financial instruction thereon will be issued by the finance member of the Military Board.

ENROLMENT AND MEDICAL EXAMINATION OF RECRUITS.

Recruits may enlist at any time, and at time of enlistment may specify any definite subsequent date to meet their convenience on which they will go into camp.

All recruits should be medically examined, A.I.F. standard, and such examination will be deemed to be final.

In cases where an A.M.C. doctor is not available, the recruiting officer will make the necessary arrangements for the recruit to be examined by the nearest Government Medical Officer, and, if passed by him as fit, the recruit will be provided with a rail, coach, or boat warrant to the nearest centre where an A.M.C. doctor is stationed.

Recruits passed as fit will be sworn in, after which leave will be granted until the date specified as the time when the recruit is prepared to enter camp.

A leave pass will be issued to the recruit. Such pass to show date of enlistment and the date when recruit is to report for the purpose of entering camp.

The State Committee in each military district must be notified of every enlistment. A notice of enlistment card must be prepared in duplicate in respect to each recruit in accordance with pro forma issued herewith. One copy shall be filed in the office of each recruiting officer and the other forwarded to the Organising Secretary of the State Recruiting Committee.

In addition thereto, notice of each enlistment will be forwarded to each local committee concerned.

Farm and Garden Notes for December.

Too much care can scarcely be bestowed upon potatoes dug up this month to protect them from the sun. They should be dug or ploughed out as soon as the skin is firm, as they are liable to rot in the ground owing to the great heat.

Field.—The wheat harvest will be now nearing completion, and to all appearance, while the results are not likely to contribute a record, owing to the dry spell in the early stages of the crop, still the subsequent seasonable rains effected a wonderful change in the young crops. Nevertheless, succeeding dry weather had a bad effect on the crop, consequently the yield of the coming harvest will be far short of that of 1916, being roughly estimated at about 1,750,000 bushels. The estimates of the probable yield have varied so considerably that it will be well to wait until the entire harvest is over before speculating on the result. This State is a long way from becoming a wheat-exporting country. The principal factor operating against a still greater extension of the wheat-growing industry is that many farmers who formerly grew wheat and barley have turned their attention to dairying, which offers larger and quicker returns.

Given favourable weather, maize, panicum, imphee, kafir corn, and the various millets may be sown.

Cotton sown in October and November will be making great headway, owing to the September and October rains. Keep down all weed growth by scarifying as long as the growth will admit of horse work. Tree cottons, such as Sea Island and Caravonica, should be topped and pruned.

Kitchen Garden.—Gather cucumbers, melons, vegetable marrows, and French beans as soon as they are fit for use. Even if they are not required, still they should be gathered, otherwise the plants will leave off bearing. Seeds of all these may be sown for a succession. Sow cabbage and cauliflower seed. Great difficulty will be experienced in getting these to grow at this season, and the plants will consequently be more valuable in proportion. Tomatoes should be in full bearing, and the plants should be securely trained on trellises or stakes. Take up onions, and spread them out thinly on the barn floor until the tops wither sufficiently to pull off easily. They should then be graded into sizes, and sent to market or stored in a cool place. Where there is an unlimited supply of water, and where shade can be provided, lettuce and other salad plants may still be sown. All vacant ground should be well manured and dug two spits deep. Manure and dig as the crops come off, and the land will be ready for use after the first shower.

Flower Garden.—Keep the surface of the land well stirred. Do not always stir to the same depth, otherwise you are liable to form a "hard pan," or caked surface, beneath the loose soil. Alternate light

with deep hoeings. A few annuals may still be planted, such as balsams, calendulas, cosmos, coreopsis, marigold, nasturtium, portulaca, zinnia, and cockscomb. Plant out whatever amaranthus may be ready. These may still be sown in boxes. Clear away all annuals which have done flowering. Bulbs should have all the dead leaves cut away, but the green leaves should not be touched. Stake chrysanthemums, and, as the flower buds develop, give them weak liquid manure. Coleus may now be planted and propagated from cuttings. Dahlias are in various stages, but the greater part will have been planted by this time. Give them liquid manure, and never let them dry up. Lift narcissus about the end of the year, but do not store them. Plant them out at once in their new positions. Top-dress all lawns.

Orchard Notes for December.

THE SOUTHERN COAST DISTRICTS.

December is somewhat an off month for pines, though bananas should be improving both in quality and quantity. The purely tropical summer ripening fruits are not yet ready, and, consequently, there is only a limited supply of fruit in this part of Queensland during the month.

Early ripening varieties of grapes will mature, and care should be taken to market them in good order. The first fruit to ripen should be put up in small packages, as, if marketed in this manner, it will fetch a better price, but as it becomes more plentiful it can be packed in larger cases.

Pay particular attention during the month to all peaches, apples, pears, Japanese plums, or other fruits that are liable to be attacked by fruit fly, and see that no fly-infested fruits are allowed to lie about under the trees, and thus breed out a great crop of flies that will be ready to destroy the grape and mango crops as they mature.

If the month is dry see that the orchard is kept well worked so as to retain moisture in the soil, and, in any case, even should there be a good rainfall, it is necessary to cultivate in order to keep down weed growth, as if weeds are not kept in check now there is little chance of their being kept in hand once the January and February rains set in.

The planting out of pineapples, bananas, and most kinds of tropical fruits can be carried out during the month, especially if there is any rainy weather; but, if the weather is dry, it is better to defer the planting out of tropical fruits till January or February.

The cyaniding of citrus trees can be continued when necessary, and where Maori or orange mite is showing it should be checked at once, as Maori fruit is of no use for the Southern markets, and is unsuitable for export to the old country.

THE TROPICAL COAST DISTRICTS.

Clean up all orchards and pineapple and banana plantations as long as you have the chance of fine weather, so as to have your land in good order when the wet season commences, as once the rain sets in there is little chance of fighting weeds. Watch bananas carefully for fly, and market the fruit in good order. Handle the crop of pines carefully; don't let the fruit get too ripe, as an over-ripe Northern pine is tasteless. The fruit should be cut as soon as it is fully grown, as even when quite green the rough-leaf varieties have usually developed sufficient sugar to suit most persons' taste. Pack carefully to prevent bruising, and they will carry South in good order.

Only send high-class mangoes South—bad-flavoured sorts, and stringy, carroty, or turpentine flavoured varieties are not worth shipping. High-class fruit will pay to handle carefully, but there is no demand for rubbish, and I am sorry to say that fully 90 per cent. of the mangoes grown in the State must be classed under the latter heading.

Tropical fruits of all kinds can be set out during suitable weather. Fruit pests of all sorts must be systematically fought.

THE SOUTHERN AND CENTRAL TABLELANDS.

December is a busy month for the growers in the Stanthorpe district. Early apples, plums, peaches, nectarines, &c., will ripen during the month, and must be marketed as soon as ripe, as they do not keep long once they are gathered. Handle carefully, and grade better; there is far too much early rubbish slumped on to the local markets, which tends to spoil the demand as well as the price. Watch the orchards very carefully for codling moth and fruit fly, and take every possible precaution to keep these pests in check should they make their appearance, as the future cleanliness of the orchard depends very largely on the care that is taken now to keep these pests in check.

If the month is dry, keep the orchard and vineyard well cultivated. Watch the vines carefully so as to detect the first signs of Oidium or Anthracnose, and systematically fight these pests, remembering always that in their case prevention is better than cure, and that only prompt action is of the slightest value.

On the Darling Downs every care must be taken to keep the fruit-fly in check, and on no account must infested fruit be allowed to lie about under the trees, as this is far and away the best method of propagating the pest wholesale.

In the Central District the grape crop will ripen during the month. Handle the fruit carefully. Cut it when dry, and where it has to be sent long distances to market pack in 6-lb. baskets rather than in larger cases. Where dry keep the orchard and vineyard well cultivated, and where the citrus and other fruit trees require it give them an irrigation. Don't irrigate grapes once the seeds have been formed, as it tends to deteriorate the quality, and to make the fruit tender and consequently to carry badly.