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Agriculture.

SOURCES OF POTASH.

For the past fifty years the potash supplies of the world have been obtained from Germany. Since the war this source of supply has been closed, but still the demand for it is very great and urgent, and various means have been suggested to obtain at least small quantities from wood and other ashes. It seems strange, however, that, considering the vast area of Australia (2,974,581 square miles), and the great variety of mineral deposits found in all the States of the Commonwealth, no potash yielding deposits have as yet been discovered.

In a Bulletin issued by the Utah Experiment Station, U.S.A., it is stated that "the fact that the German deposits have supplied the world with potassium for more than half a century does not mean that there are no potassium deposits in our country, for such is not the case. We have very large deposits of potash, feldspars, and micas, of leucite, alunite, &c., all containing potassium, but these substances are insoluble in water, and up to the present time the expense attached to converting the potassium contained in most of these substances into an available form has prohibited their use as a source of potassium. Due to the European war the quantity of potassium salts imported into the United States in 1915 was only about one-tenth of that imported in 1915, the last normal year. This has greatly increased the price, and this increased value has given a great impetus to the search for potassium salts in this country."

ALUNITE AND OTHER MINERAL SOURCES.

Alunite, which is a natural potassium aluminum sulphate, occurs extensively in Colorado, Arizona, Nevada, California, and Utah. At the present time the latter deposit seems to be the largest and best. In its natural state this mineral is insoluble in water, but by gentle heat it is rendered soluble, and after leaching with water the solution is evaporated to dryness and ordinary alum is obtained. At higher and long continued heating sulphur trioxide is evolved and lexivigation of the roasted mass then yields a very pure potassium sulphate. The Mineral Products Company, located at Marysvale, Utah, is turning out daily about one hundred tons of potassium sulphate extracted from this source.

Efforts are being made to discover a process whereby the potassium of leucite may be rendered commercially available. During the last year the brine of a salt lake in Nebraska has yielded a considerable amount of potassium salts. Cave deposits have been located in various places in the West—in Idaho, Utah, and Nevada. In the western part of Millard County, Utah, White Valley, an old alkaline lake bed is located, and efforts are being made to develop this region as a source of potassium. An analysis of a sample taken from the top 18 inches of this bed gave the following results:—" Soluble salts 11·84 per cent.: calcium (Ca) 0·46 per cent.; magnesium (Mg), 0·20 per cent.; carbon dioxide (CO_2), 2·10 per cent.; sulphates (SO_4), 1·34 per cent.; chlorine (Cl), 5·54 per cent.; potassium (K), 0·99 per cent.; and sodium (Na) (by difference), 1·21 per cent."

The result of other analyses and description of the area are as follows:—" The old lake bed, the receptable for untold ages of the washing and leaching from the potash ledges of the mountains near by, is in dimensions about 3 by 14 miles, and the assays show about 4 per cent. of potash in the clay and water menstruum at a depth of 20 feet. The underground permanent water is struck at about 17 feet, and above this point the potash content is slightly less; indeed, the clear underground menstruum, settled for 24 hours and then filtered, carried ·70 plus per cent. of potash in chemical solution itself. Estimated at 4 or 4½ per cent. with, perhaps, hundreds of feet in depth, there are here many thousands, nay millions, of tons of clay or mud deposit worth 10 dollars per ton in every quarter section, and hundreds of millions of potash in the aggregate deposit, a matter of vast concern as a resource to our State or Commonwealth.

" The material consists essentially of clay, silica, calcium carbonate and magnesium carbonate, together with 6 per cent. of soluble salts (in another report 7 per cent., and in another 4¼ per cent. soluble salts). These latter consist of sodium sulphate, sodium chloride, and potassium sulphate, together with a very small proportion of calcium sulphate, magnesium sulphate, and sodium carbonate."

Salt beds are being exploited in very many localities. It is likely that at some future time the salt deposits of the arid West will compete with Stassfurt in the production of salts of potassium.

The "Agricultural News" of Barbadoes has the following note on the possible new sources of potash:—"The scarcity of potash has stimulated inquiry into the possible new sources of this mineral. One of the latest suggestions is the production of potash salts from olive oil residue (the blackish turbid liquid deposited at the bottom of the sink under oil presses), which contains about 1·5 per cent. or slightly more. It is stated in the "Journal of the Department of Agriculture of Victoria" for October, 1916, that by evaporation and combustion of 100 gallons of this residue, 30 to 35 lb. of ash are recovered. Roughly, 10,000 gallons of this liquid would produce, on the figures given, approximately 1½ tons of ash, the potash content of which would make it worth £2 10s. per ton at the present high price of potash."

We publish the above brief notes on this important subject, in the hope that Australian geologists and chemists will take the matter up, as has been done in New Zealand. If success were to attend their researches, Australia need not depend on Germany for her supplies of potash.

SCHOOL OF INSTRUCTION FOR FARMERS' SONS AT GATTON COLLEGE.

Arrangements have been made by the Department of Agriculture and Stock for the holding of a School of Instruction for farmers' sons and young farmers under eighteen years of age from 25th June to 14th July, inclusive. The arrangements with regard to railway fares will be the same as for last year. The total cost of instruction and board will be £3 3s. This is a very reasonable cost, considering that the course includes all the different dairying and farming operations; and we hope to see a good muster of the sons of the backbone of the country—the farmers—take advantage of the good opportunity afforded them of getting valuable instruction and guidance in their future work.

MARKET GARDENING.

MANURE FOR THE VEGETABLE GARDEN.

Amateurs are often troubled about what fertilisers to use and how much. The most simple way out of the difficulty is to buy a good general garden manure, one that contains the three ingredients of phosphoric acid, potash, and nitrogen. Now as to quantity, in the first place we have to remember that ½ lb. to the square yard is 2,400 lb., or over a ton to the acre, which is such a very heavy dressing that it could only be afforded on small areas and with intense cultivation. Still, ½ lb. seems a small quantity to the novice, who wants to give that much to each plant. This is not only not necessary, but is an almost certain way to kill or check the plants. If the beds are in good order, moderate manuring only is required, and if they are not, two or three light dressings are far preferable to one heavy dosing; in fact, it is a standing rule that plants, like weak children and sick people, are injured and

not strengthened by too much and too strong food. Many an amateur, in fact, kills his plants with too much strong manures. "I thought I would have a grand crop of lettuces," said a man recently; "I got fine plants and 1 cwt. of superphosphate, and I put a jam-tinful of super. for each plant, but nearly every one died, and the rest are miserable, stunted things." If he had used a small teaspoonful of the super. for each plant, and mixed this with the soil for 6 inches all round, he would probably have obtained the results he wished, especially if he had watered them once a week, as they grew, with weak extract of cowdung or fowl manure.

It is well to recall the fact that there are 2,240 lb. in a ton, and 4,840 square yards in an acre. Therefore, to apply a pound of manure to a yard is equal to over 2 tons 3 cwt. to the acre. A quarter of a pound to the square yard is over 10 cwt. to the acre, and an ounce to the square yard is over 1½ cwt. to the acre. It may be roughly stated that it will not be wise to go beyond half a pound to the square yard of any artificial manure at one application, and an ounce to the square yard of sulphate of ammonia, nitrate of soda, or potash is as much as anyone ought to use.

It must be remembered that the condition of the manure is a very important consideration in deciding how much may be applied. Thus, bonedust treated with sulphuric acid is bone superphosphate, or the "dissolved bone" of English writers, and the difference is that in the latter case the phosphate of lime is rendered soluble in water and there is free sulphuric acid present. Now, we might apply 10 tons of bonedust to the acre of cabbages without injuring them. We would simply be wasting the bonedust, but if we applied 10 tons of superphosphate our crop would in all probability suffer. So in the case of stable, cow, sheep, or fowl manures. Too heavy dressings of these substances applied fresh are injurious, but if they are thoroughly well rotted and rendered mellow with age, they can be applied in almost any practicable quantities. Then, again, some crops are gross feeders, and will thrive in manure which would kill more delicate plants.

PARSNIPS.

Frequently we hear of the failure of parsnip seed to germinate. This may be accounted for by the seed not retaining its vitality long. In the old country two-year-old seed is considered very unreliable. In this country care should be taken only to obtain fresh seed. Again, some amateur gardeners take very little trouble about preparing a seed bed, the necessary deep, fine tilth being neglected. On a rich, sandy soil, it is easy to fulfil the conditions necessary to ensure the germination of the seed. Deep forking prevents curving or "forking." Then, as to manuring: As a rule, no dung should be applied directly to the crop, or "forking" may result. If a soil is poor, 2 cwt. of farmyard manure per square rod (30¼ square yards) dug, or ploughed in, will be advantageous. As parsnips take a long time to grow, the object of manuring

is to supply a sufficiency of fertilising material available for the whole season of growth. A writer in the "Journal of the Board of Agriculture" says that during the working of the land the following artificials should be ploughed or dug in: 4½ lb. of superphosphate and 5½ lb. of basic slag per rod, or an equivalent in the form of a mixture of superphosphate and steamed bone flour, or superphosphate and ground mineral phosphate.

Just before sowing the seed, sulphate of ammonia, at the rate of ¾ lb. per rod, should be worked into the top soil, and after singling, a further dressing of sulphate of ammonia, at the same rate, should be applied between the rows.

Parsnips should be sown early in the season from March to May at the rate of 6 to 7 lb. of seed per acre (1 oz. per rod, or, say, 200 feet of drill), in rows 15 to 18 inches apart, about 1 inch deep and lightly covered. In about a month from sowing, when the plants show the "true" leaf, as well as the "seed" leaf, they should be thinned out to about 6 or 9 inches apart.

THE JERUSALEM ARTICHOKE.

Rarely is this excellent, delicate vegetable to be obtained in the markets or in the Brisbane shops. It appears to be little known to or appreciated by market gardeners, and although the tubers are greedily eaten by pigs, greatly to the latter's benefit, pig-breeders, unlike their American brethren, have not yet appreciated the value of this artichoke as pigfood. The only thing remarkable about the plant is its English name. It is not by any means an artichoke. The true artichoke is a chard or thistle, of which the bottoms of the flowers and the riblike sepals are used as food. The botanical name for this true artichoke is *Cynara scolymus*; the so-called Jerusalem artichoke is the *Helianthus tubersus*.

CYNARA SCOLYMUS.

The name of "Jerusalem" is simply a corruption of the word *Girasole*, which the Italians give to both the sunflower and the Jerusalem artichoke. Its original home is North America. The stems, leaves, and flowers bear a great likeness to the Japanese sunflower, and, in fact, is a tuber-bearing sunflower, whose value lies in its tubers, which grow clustered in large numbers around the roots, and resemble knotty English potatoes. The plant grows to a height of 5 or 6 feet. As to soil, it is not at all exacting,

HELIANTHUS TUBEROSUS.

and will do well in almost any soil provided it is not low-lying or ill-drained. In such soil, the tubers will quickly rot away.

It is essentially a drought-resisting plant. The cultivation is extremely simple and does not call for any extra care or skill. All that is needed is that the land be ploughed or dug deeply, and thoroughly

pulverised. The tubers are then planted at a shallow depth 3 feet apart each way, but at 18 inches apart in the rows heavy crops may be obtained. It takes about three or four bags of seed to plant an acre, and the return are considerably superior to those of English potatoes. From 500 to 1,000 bushels per acre have been produced.

The best time to plant is early in the spring or in July and August. The tubers will lie uninjured in the ground until the soil is warm enough to cause them to sprout. In ordinary seasons the crop will be ready for digging in from five to six months. If not required for immediate use, they may be left in the ground and taken up at any time. If dug, they will not keep very long without shrivelling up and becoming soft. In the case of field cultivation on the farm, it is well not to gather more than are required for immediate consumption or for market. Plough two or three furrows across the rows and turn in the pigs. They will gather all they want. There will be quantities of small tubers left in the ground, even after the pigs have been pastured on the field. Consequently, in the early spring a bountiful crop of young plants will spring up. When these plants are a few inches high they should be ploughed out into rows 3½ feet apart, and then thinned out to a stand of one plant to every 18 inches. In this manner the artichokes will always be good, and a good supply of pigfood be obtained.

As a vegetable, boiled, steamed, fried in butter, they are a great delicacy, having an aromatic nutty flavour, and savour something of the asparagus. The tubers are irregularly shaped, being some long (3 inches), others oval or round.

ANOTHER GOOD WHITEWASH FOR OUTHOUSES.

Mr. A. E. Howling, Taringa, referring to a recipe for whitewash, which appeared in last month's Journal, sends us the following simpler preparation, as given in the "Gardeners' Monthly," which he has used on outside walls facing the east and the west, and finds it stands the weather splendidly:—

Take a half-bushel of lime, put it in a barrel and pour enough boiled water upon it to allow the lime to slack without burning; cover in the steam, and when the lime is dry run it through a medium-sized sieve. Take a bucket half-full of this powder, and pour as much sweet milk upon it as will fill the bucket three-fourths full. Either new or skimmed milk will do, but buttermilk must not be used. To every bucket of this mixture add 1 lb. of silicate of soda (water glass) and stir the whole thoroughly. If too thick, add more milk; if too thin, add the slacked lime until it is of suitable consistency. This can be applied outside or inside on smooth or rough surfaces with almost any kind of brush, and does not require skilled labour in its application. This produces a dull white colour. For a grey or black colour, add lampblack; for reddish-brown or pink, venetian red; Spanish brown gives another shade, and ultramarine any required shade of blue. The wash may be applied to wood, brick, stone, or plaster anywhere. If oil paint has previously been used, the slacked lime should be used with half-whiting.

Pastoral.

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	2	6	Ayrshire Herd Book of Queensland
		2	3	Holstein-Friesian Herd Book of Australia
		3	13	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-Frisian 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 Bock
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-Frisian Herd Book of Queensland
State Farm	Warren	3	83	Ayrshire Herd Book of Queensland
S. H. Hosking	Toogooloowah ..	2	15	Holstein Cattle Club Herd Book

Poultry.

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

The fourteenth egg-laying competition held at the Queensland Agricultural College commenced on 3rd April. The total number of eggs laid during the twenty-eight days was 3,239. Mr. E. Chester's white leghorns win the monthly prize in the light breeds with 118 eggs, while the black orpingtons owned by Mr. A. E. Walters score in the heavy section. The following are the individual scores:—

Competitors.	Breed.	April.
LIGHT BREEDS.		
J. Chester, Logan road, South Brisbane	White Leghorns ...	118
*J. R. Wilson, Eudlo	Do.	108
W. R. Crust, Alderley P.O. ...	Do.	104
G. Chester, St. George street, Woolloongabba ...	Do.	104
A. H. Padman, 47, Pirie street, Adelaide, S.A. ...	Do.	97
W. Becker, Bridge street, Toowoomba	Do.	91
T. B. Hawkins, Redbank	Do.	86
T. Taylor, Thompson Estate, South Brisbane ...	Do.	79
E. Cross, Harlin road, Ipswich	Do.	76
R. Holmes, Harlaxton, Toowoomba	Do.	76
*A. W. Bailey, Arthur terrace, Red Hill ...	Do.	75
Oaklands Poultry Farm, Banyo	Do.	75
*G. H. Turner, Aratula	Do.	73
Chris Porter, Monture Estate, Wondai... ...	Do. ...	72
*J. Zahl, Boonah	Do.	72
Mars Poultry Farm, Sunnybank	Do.	69
D. Fulton, E. Park Estate, East Brisbane ...	Do.	68
Mrs. W. D. Bradburne, Kogarah, N.S.W. ..	Do.	67
Mrs. S. J. Sear, Highgate Hill, South Brisbane	Do.	65
T. A. Pettigrove, Northcote, Victoria	Do.	64
J. G. Richter, Aratula	Do.	63
A. Schilling, Maryborough	Do.	60
Mrs. J Carruthers, Booval	Do.	59
C. H Singer, Taringa	Do.	59
Geo. Williams, Boundary street, Ipswich ...	Do.	58
*T. Fanning, Ashgrove	Do.	57
W. Thomas, 15-mile Siding, South Coast Line ...	Do.	54
*A. T. Comber, Bundaberg	Do.	50
F. W. Leney, Warwick	Do.	44
*C. Knoblauch, Hawthorne street, South Brisbane	Do.	44
F. Clayton, Bracktown, N.S.W.	Do.	38
L. G. Innes, Kennedy terrace, South Brisbane ...	Do.	37
C. P. Buchanan, 258-260, Queen street, Brisbane	Do.	32
J. L. Newton, Doctor's Creek, Haden	Do.	30
*Mrs. J. R. D. Munro, Warwick	Do.	30
E. A. Smith, Paddington, Brisbane	Do.	23
J. Holmes, Frederick street, Toowoomba ...	Do.	19
Kelvin Poultry Farm, Scott road, Kelvin Grove	Do.	17
Moritz Bros., Kalangadoo, S.A.	Do.	16
S. C. Chapman, Murphy's Creek	Brown Leghorns ...	16

EGG-LAYING COMPETITION—*continued.*

Competitors.	Breed.	April.
LIGHT BREEDS—*continued.*		
Miss M. Hinze, Milton road, Milton	White Leghorns ...	13
*Dixie Egg Plant, Newmarket, Brisbane ...	Do.	12
*Dr. E. C. Jennings, Ipswich	Do.	12
J. Ferguson, Logan road, South Brisbane ...	Do.	9
G. J. White, Haden	Do.	6
*J. M. Manson, Milton road, Milton	Do.	5
*C. C. Dennis, Kelvin Grove, Brisbane	Do.	1
*A. E. Walters, West End, South Brisbane ...	Do.	0
G. Howard, Mount Morgan	Do.	0
HEAVY BREEDS.		
A. E. Walters, West End, South Brisbane ...	Black Orpingtons ...	81
W. Smith, Grove Estate, Brisbane	Do.	80
F. A. Claussen, Wattle street, Hendra	Rhode Island Reds ...	76
*R. Burns, Sladevale, *viâ* Warwick	Black Orpingtons ...	76
H. Jobling, Cessnock, N.S.W.	Do.	74
D. Kenway, West Pennant Hills, N.S.W. ...	Do.	64
*Mars Poultry Farm, Sunnybank	Do.	54
Cowan Bros., Burwood, N.S.W.	Do.	40
W. S. Hanson, Lake Macquarie, N.S.W. ...	Do.	39
P. C. McDonnell, Beecroft, N.S.W.	Do.	38
Mrs. Jobling, Plattsburg, N.S.W.	Do.	26
*G. W. Holland, Paddington, Brisbane	Do.	25
F. Clayton, Blacktown, N.S.W.	Rhode Island Reds ...	14
E. Morris, Paddington, Brisbane	Black Orpingtons ...	13
C. B. Bertelmeier, Kensington, S.A.	Do.	11
*F. W. Leney, Warwick	Rhode Island Reds ...	10
*Kelvin Poultry Farm, Kelvin Grove, Brisbane...	Plymouth Rocks ...	8
King and Watson, St. Mary's, N.S.W.	Black Orpingtons ...	6
*E. A. Smith, Paddington, Brisbane	Do.	1
R. Burns, Sladevale, Warwick	S.L. Wyandottes ...	0
*Miss M. Hinze, Milton road, Milton	Black Orpingtons ..	0
C. C. Dennis, Kelvin Grove, Brisbane	White Wyandottes ...	0
*E. F. Dennis, Kelvin Grove, Brisbane	Black Orpingtons ...	0
Total	...	3,239

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

RESULTS OF SINGLE HEN TEST.

Competitors.	A.	B.	C.	D.	E.	F.	Total.
J. R. Wilson	20	15	18	19	21	15	108
A. W. Bailey	17	7	12	13	10	16	75
G. H. Turner	0	18	16	14	10	15	73
J. Zahl	16	10	20	3	15	8	72
T. Fanning	6	10	7	13	4	17	57
A. T. Coomber	9	4	17	8	2	10	50
Mrs. Munro	19	5	5	0	0	1	30
Dixie Egg Plant	2	0	0	10	0	0	12
Dr. Jennings	0	0	1	1	9	1	12
J. M. Manson	0	0	0	0	0	5	5
C. C. Dennis	0	0	0	0	0	1	1
A. E. Walters	0	0	0	0	0	0	0

RESULTS OF SINGLE HEN TEST—*continued.*

Competitors.	A.	B.	C.	D.	E.	F.	Total.
HEAVY BREEDS.							
R. Burns	9	0	19	0	22	26	76
Mars Poultry Farm	9	16	4	20	4	1	54
G. W. Holland	8	0	0	0	17	0	25
F. W. Leney	0	0	0	0	9	1	10
Kelvin Poultry Farm	0	0	0	8	0	0	8
E. A. Smith	1	0	0	0	0	0	1
Miss M. Hinze	0	0	0	0	0	0	0
E. F. Dennis	0	0	0	0	0	0	0

INCUBATORS AND THEIR MANAGEMENT.

By J. BEARD, Instructor in the Poultry Industry, Queensland.

In April last Mr. J. Beard, at Toowoomba, gave the following advice to poultry breeders concerning incubators. He said:—"In choosing an incubator be sure you get a machine of sufficient capacity to meet your requirements. It is much better to be obliged to set 50 eggs into a machine of 100-egg capacity than to have 100 eggs you want to hatch put into a machine of 50-egg capacity. In deciding what incubator to buy, try to get the fair and unbiased opinion of a man who is a successful incubator operator. Find out what kind of machines other successful breeders use. Study carefully the testimonials of people who have successfully used the machine. If you do this and are guided by your own best judgment, you cannot go wrong. When you receive your incubator, study carefully the printed instructions which come with it. Before you start the machine be sure that you have mastered the instructions and that you know thoroughly what the manufacturers consider best as to method of running and location of machine. The most important things to consider in selecting the location of machines are, freedom from excessive vibration, and freedom from coal gas or decaying vegetable matter and a solid level floor on which to set the machine. It is very important that the body of the incubator be level, otherwise the egg chambers will not heat evenly. After studying your instructions carefully and setting the machine in a well ventilated place, but not in the draft, run it empty for a day or so until you have it adjusted so as to maintain an even temperature of 102 or 103 degrees in the egg chambers. After you understand the operation of the machine and can maintain the desired temperature in the empty incubator, the eggs may be put in.

"Beginning on the second day, the eggs may be turned twice daily. These turnings should be as nearly twelve hours apart as possible. The trays should be turned from end to end each time you turn or cool the eggs. The time to allow for cooling the eggs should be five minutes on the first day, increasing the time as the hatch progresses towards the latter end of the hatch, and if mild weather prevails, thirty minutes would not harm the hatch. Eggs should be tested twice during the hatch, the first test being made on from the sixth to the tenth day, the second test on the fourteenth or eighteenth day. At the first test, remove from the tray all infertile eggs and dead germs. Mark those which are doubtful and let them remain in the machine until the second test. If they do not develop before that time, they should be removed, as well as all other dead germs. Stop turning the eggs as soon as the chicks begin to break the shells. Push the tray back as far as it will go, or if there are two trays, push one back and the other forward, leaving a space for the chicks to fall into the nursery below. Close the machine and let it alone until the hatch is over. If it has been regulated properly, it is perfectly safe to leave it, and it will do no harm if the temperature runs to 105 degrees when the chicks are hatching, but it should not go higher. When all the chicks have hatched, the ventilator should be thrown wide open, egg trays and shells removed from the machine, and the door left open a little, about one-eighth of an inch. Allow the chick to remain in the machine from 24 to 36 hours after hatching, then remove to the brooder, which should be running perfectly if artificial heat is used, before they are placed in it.

NATURAL INCUBATION.

"I prefer the nest in the ground filled up at the bottom with a little loose, moist loam. Pack the earth into the corners of the nest, and dish out the centre to make the nest a shallow concave, but do not dish out too much as the eggs are liable to roll to the centre and be broken by the hen. The corners of the nest should be just sufficient to keep the eggs from rolling out from under the hen. On the moist earth scatter a little tobacco dust or some tobacco stems, then add a thin layer of soft hay, not straw. Always set more than one hen at the one time, and at the end of seven days test out the infertile eggs under each hen. Say, if you had three hens sitting at the same time and the fertility should run low, you would be able to put the whole of the fertile eggs under two hens and start off again with the other. If you have two hens coming off at the same time, and the weather is favourable, you could run the two clutches together and reset the other hen along with the other, and after your next test you would be able to spell the one that had brought off the previous clutch of chicks.

CHICKS

require no food for the first thirty-six hours, but must be provided with fine sand to scratch about in. The first meal to be given should consist of coarse oatmeal or rolled oats for a couple of days, then add specially

prepared chick food, which can be bought at most of the large stores in your town from the agents in Brisbane. After a couple of weeks, should you find this feed too expensive, you could wean them off on to crumbly mash. By this method they cannot select certain seeds in particles which they prefer, and waste the remainder as they will in dry feed. No matter how accurately we figure out our dry feed return, we cannot force them to eat the less palatable after they have filled up on the choice grain. Second, because a soft properly compounded food needs no accessories except green food, which is imperative in either case, and it saves much energy which would be expended by the chicks in grinding it. Bear in mind, we are raising these chicks for profit, not pets. We must therefore force them, to the limit of their ability, to eat, digest, assimilate, and grow. Above all things, never give your chickens hard boiled eggs for the first start off. This has already been supplied by the absorbed yolk before leaving the shell.

TIME FOR HATCHING.

"Hatch all your heavy breeds in July and August, light breeds in August and September. By adopting this principle you will avoid the warts or chicken-pox and other diseases that chickens are subject to.

FOR AUTUMN HATCHING.

"I would advise March only as the month to hatch in. If you go later, then the cold weather is on top of you and retards the growth of the chicks.

FOR BROODERS.

"I prefer the lampless ones to the ones artificially heated, especially for a mild climate like Queensland.

FEED FOR EGG PRODUCTION.

"Best results are obtained by feeding moist mash in the morning and grain in the evenings, with green stuff of some kind at midday. No set rule can be observed as regards the quantity of the constituents of the mash, as bran and pollard vary so much in quality. If the meals are of fair average quality, the usual proportion is one of the former and two of the latter, with 30 per cent. of finely chopped green stuff. If lucerne chaff is used it should be steamed overnight in a wooden cask. To this should be added a small handful of salt in proportion of, say, 1½ lb. to every 100 lb. of mash. Take care to use boiling water, as it greatly improves the chaff. Close the cask well with bags, so that the heat will be retained, and it will make a better mash and much easier to mix. Give oilcake, 2 lb. for each 100 birds, every second morning, and meat about 1 oz. per bird, each morning the oilcake is not

used. The oilcake and meat should be soaked in boiling water over night. Mix in a big tub or trough. Put the green food in first, then bran and oilcake, and finish off with pollard and mix into a crumbly mass. The birds should be given as much as they will eat. The best plan is to go round a second time, and if they require more, give it to them. After a couple of weeks you will learn just what quantity they require. The food is given in a clean wooden trough with flat bottom, judging the size by what number of fowls you have in the pen, and about half an hour after feeding go round the pens and remove any food that may be left. During the cold weather and while the birds are moulting, meat and oilcake may be given every day as it will help to brace them up.

"It is not wise to give them too much during hot weather. Green food of some kinds should be given at midday. If none is available, soaked lucerne chaff, dried off with a little bran and pollard, is greatly relished by the fowls. Wheat should be the principal food in the evenings, but to change every few days to oats and cracked maize will be greatly relished by the birds, and will keep them in good health. No set rule can be given in feeding grain, as some birds eat fully twice as much as others, but they should have as much as they can eat. If you see grain lying about the pens, reduce the supply.

FEEDING STOCK BIRDS.

"Here a moderate supply of eggs is required as they are for hatching purposes and are wanted to produce strong hardy healthy chicks with sound constitutions. For these reasons discontinue the regular morning mash, and only give it by way of a change one or two mornings a week. The food, therefore, will be mostly grain. Take care, however, that the birds are not fed too often on the one kind of grain, and it will be quickly noticed which kind they prefer. Breeding birds must be supplied with plenty of green stuff, and they will produce strong, fertile eggs. No food of any kind should be left in the pen. Have the birds ever on the move. If the soil is of any other nature than sandy, you must provide scratchings for the birds.

EGGS FOR EXPORT.

"I feel certain that at the present time it is of little use considering this question at all until such times that we have a very large surplus to handle, and a surplus that will have the appearance of lasting for a definite period. It would be useless to think of at the present time, considering the ruling price of eggs for the last two years in Brisbane. The average for 1915 for extra special was 1s. 3½d. per dozen; 1916, 1s. 5½d. per dozen. With these prices ruling, export is almost, if not quite, out of the question."

The Orchard.

ORIGIN OF THE NAVEL ORANGE.

The following notes on the Navel Orange will doubtless be of interest to some of our correspondents who, of late, have been seeking information concerning this variety of the Citrus family. They appeared in the issue of the "Agricultural News" of Barbados for 27th January, 1917:—

ORIGIN OF THE NAVEL ORANGE.

In 1913-14, an agricultural expedition to Southern Brazil was organised by the United States Department of Agriculture, to collect all available information concerning the navel orange, particularly at Bahia, from which point the parent Washington navel trees were sent to the United States. The observations and conclusions of the expedition (briefly referred to in the "Agricultural News" for 4th November, 1916), which should not be without interest to persons concerned with citrus cultivation in the West Indies, are summarised in the "Monthly Bulletin," California State Commission of Horticulture, as follows:—

All available evidence proves that the navel orange of Bahia originated about 1820 as a bud sport from the *selecta* variety, and was first propagated by a Portuguese, the first man to use this method of plant propagation in Brazil.

The Washington navel orange was introduced into the United States by the United States Department of Agriculture in 1870 from Bahia, Brazil. The first trees sent to California by the department were planted on the L. C. Tibbets ranch at Riverside about 1875, and these two trees are still living, the property of the city.

The navel orange groves of trees of our west and of several foreign countries are directly descended from the Tibbets trees. The great commercial success of the navel orange industry in California is the foundation upon which the successful citrus industry of this State as a whole has been built.

The oldest navel orange trees found in Brazil were more than forty years of age. They are now producing the largest and best crops of any trees found in that district.

The method of tree renewal for treating diseased trees in Bahia is a success. The replacing of diseased trees by growing a new top is universally practised in that region.

The use of manure in maintaining the citrus trees in productive condition, and improving the quality of the fruit is an established and successful practice. The liberal use of manure is considered to be absolutely essential to profitable citrus production. The average annual production is about 100 navel oranges per tree.

Scale and other insect enemies of the citrus are evidently controlled by natural parasites.

The Bahian navel fruits are very different in appearance, quality, and other commercial characteristics from Californian fruit. For this reason we may safely conclude that no one can foretell exactly the behaviour of plants under new environmental conditions. Consequently all food-plants introduced should have a wide and careful trial, and in our opinion all foreign food-plants should be tried without too fixed ideas as to their probable behaviour in any particular region.

The shipment of bud wood or trees from Brazil is attended with both difficulty and danger. Great care must be used in packing and condition of storage and shipment in order to preserve the buds in living condition. The bud wood should be inspected with the greatest possible care in Brazil and in the United States in order to prevent the introduction of insect enemies, fungoid disease or other parasitic pests.

The discovery of the Bahia navel orange by a traveller in Brazil is a good illustration of the importance of careful observation of food-plants in foreign countries by all travellers. All information about new food-plants found in this way is likely to prove of value. Through the Office of Seed and Plant Introduction of the United States Department of Agriculture, such information can be followed up, and if desirable, supplies of bud wood or seed be obtained for trial in this country.

We found a total of about 76,000 navel orange trees near Bahia. The orchards are located on hilltops or hillsides. The orange growers are prosperous and an effort is being made by the local government to extend the culture of this variety.

A permanent cover crop of Para grass in connection with the liberal use of cow manure was the most successful method of culture observed, under the conditions of an average annual rainfall of about 50 inches.

Citrus bud sports are common in the orchards observed. The origin of the navel orange from this cause is proof of the importance of this condition in the improvement of citrus fruits.

Horticulture.

STRAWBERRY CULTURE.

LOCATION AND SOILS.

Hill lands are less liable to frosts than lowlands, but level land is especially desirable where irrigation can be practised. With regard to soil, it appears that in Europe and the United States of America, clay loams are more productive than sandy loams, whereas in Australia the largest crops are raised on rich, light, or sandy loams. The strawberry thrives best in a cool or temperate climate, such as is found in Southern Queensland on the Blackall Range, and on the coast lands, as at Wellington Point, Redland Bay, and other places on the sea-coast. Newly cleared forest and scrub soils give better results than old soils. Strawberries are not an exhausting crop on the land. Nevertheless, on account of the rapid growth of the plant, they require an abundance of fertilisers.

MANURES.

Well-rotted farmyard manure is one of the very best fertilisers for strawberries, as stated by Mr. W. French, Wellington Point. Unfortunately, this class of manure is now very scarce, and the same authority recommends the use of bonedust at the rate of 10 cwt. to the acre in field cultivation. By putting this well down below the surface, it greatly encourages the roots to strike downwards, and the lower they get down, the more moisture they obtain, and are thus not affected by heat or drought half so much as when the roots are encouraged close to the surface. After the first crop is gathered a fertiliser consisting of superphosphate, sulphate of potash, and sulphate of ammonia is used in the following proportions:—Two parts superphosphate, 2 parts sulphate of potash, and 1 part sulphate of ammonia. This mixture is sown in a furrow about 2 inches deep run along the rows by a small hand plough, and is covered by running the plough the reverse way. In the present scarcity of potash, wood ashes at the rate of 50 to 100 bushels per acre should be applied in field culture. The fertiliser should be profitably supplemented by two or three top-dressings of nitrate of soda, each at the rate of 1 cwt. per acre when the first fruit is forming, and, thereafter, at intervals of about two weeks, or the nitrate of soda could be applied at frequent intervals dissolved in water.

PLANTING IN THE FIELD.

Draw out drills with the plough as deep as possible, 2 feet 6 inches apart, and put the manure in the trench. If artificial manure is used, draw a long-toothed rake along the furrow to mix the soil and manure thoroughly. In a fortnight, it will be ready for planting. Plant four rows in a bed. By having narrow beds, trampling upon the planted soil

is avoided. Set the plants about 1 ft. apart in the rows. Planting close in the garden necessitates replanting every year, whereas, in field culture, more room is given.

PLANTING THE STRAWBERRY.

"While it is impossible," says Mr. French, "to fix a hard-and-fast time to transplant, as the seasons differ so much, I shall have to leave it to the grower's own judgment. If the ground is in good order, and the weather showery, start about the 1st of March, and, as a preference, with young runners. Some growers say they get the best results from old crowns split up, but that is not my experience. I plant about 2 feet 6 inches between the rows and from 1 foot to 18 inches in the rows, to allow the horse and scuffler room to work, so as to keep the soil always open, a matter of great importance. In transplanting, some recommend shortening the roots by one-half. This practice is all right in the cooler countries, where the ground is, practically speaking, always moist and cold below. It is also a good practice, in cases where the roots are allowed to get dry, or are injured in any way. In such cases, a clean cut would be beneficial. When planting, I allow the roots to hang down straight in the hole, the deeper the better, on account of coolness and moisture, provided the crown is not smothered."

SMALL GARDEN CULTURE.

Trench the beds 5 feet wide and 18 inches deep. If the subsoil is of a clayey nature, leave it at the bottom of the trench, but, if fairly good, mix it with the top spit along with plenty of vegetable matter, rubbish, &c. Let it lie for a month or more to mellow. Then fork and pulverise well until the soil is free from lumps. Now let it rest for a week or two. If farmyard manure is procurable, scatter it on the surface 2 or 3 inches thick, and fork it in well so as to mix the soil and manure thoroughly. In a fortnight it will be ready for planting. Plant four rows in a bed, and set the plants about a foot apart. Planting close in the garden necessitates, as above stated, replanting every year, although several varieties can stand for two years, giving good results by keeping the soil between the rows constantly cultivated.

QUEENSLAND AGRICULTURAL JOURNAL.

Journals for February, 1916, have been received during the month of May from—

C. Ashton, Mundubbera.

H. Beelley, Sunnyside, Springsure.

H. J. Hobbs, Aspley.

W. J. Rolfe, Gargett.

Anonymous.

As the requirements for this issue of the Journal have been sufficient, we thank our subscribers for their prompt response to our request.

Viticulture.

THE SUMMER BUD OR "YEMA" GRAFT OF THE VINE—No. 2.

THE GRAFT IN VICTORIA.

From the description first reproduced above,* and acting on verbal advice, several Rutherglen growers tried the graft. Mr. P. A. Wyatt, at that time Travelling Viticultural Assistant of this Department, demonstrated it to numerous growers, with the result that a good many vines were thus grafted in February, 1909. The encouraging results of these first trials led to their renewal on an increasing scale each season with greater success. As was to be expected, each grafter applied such modifications and improvements as practical experience suggested to him, until a method was evolved, differing somewhat from either of those already described, and which is now very generally followed throughout the district.

Simultaneously with this the graft was being extensively practised at Mildura, with most encouraging results. To Mr. J. Rounce, now an officer of the New South Wales Agricultural Department, belongs the credit of its success in this district. He had experience of this graft in England before coming to Australia, as he informed the writer after a lecture delivered in 1908, at which the graft, as practised in Spain, was described and illustrated. He had seen it applied to roses and several other garden plants. Mr. Rounce practised it on the vine with remarkably successful results, and within the past few years he has reconstituted considerable areas on resistant stock by this method. The manner in which he executes the graft differs a good deal from that which has become so popular at Rutherglen, as will be seen presently.

The "Yema" graft is, in fact, remarkably elastic; it permits of a good deal of variation, according to the individual fancy of the grafter. The two methods about to be described and figured do not pretend to exhaust all the possibilities. The graft may yet be varied in other details.

As to which is the better of the two, it would be rash to attempt a definite statement. The writer has known percentages of 98 and 99 of completely successful unions by both methods. Both methods seem to give equally perfect unions. So far as the final result, there would seem to be little difference between the two, though Mr. Rounce's modification, permitting, as will be seen, the suppression of tying or binding the graft, should enable the grafter to operate more rapidly. These two typical modes of executing the graft will now be described in detail. Afterwards, a few points of importance in connection with summer grafts in general, irrespective of the style of graft, will be considered.

* *See* "Queensland Agricultural Journal" for May, 1917.

THE RUTHERGLEN METHOD.

This is illustrated in Fig. 5, which shows how the scion-bud is removed from the cane, and Fig. 6, where the preparation of the stock, the fitting in of the scion-bud, and the binding necessary to hold it in position, until knitted, are shown.

A suitable bud must first be selected. It should be situated on a cane of somewhat smaller diameter than the stock on which it is to be grafted. It must also fulfil the conditions specified under the heading "scion requirements." The scion-bud is removed, as shown in Fig. 5. An oblique cut, penetrating to about the middle of the cane, and rather more than half an inch below the bud, is first made (*a*, Fig. 5). Commencing at *b*, a curved cut is then made as shown by the dotted line (Fig. 5), which, junctioning with the first cut, removes the scion-bud. This cut should be fairly deep, so that, after removal, the piece bearing the bud shows the pith along the whole section. It is now rather thicker than is desirable, and requires paring down on the inner, or wood side, and shortening by the cut shown at *c* (Fig. 5), which is made at a more acute angle with the axis of the cane than that at *a*. The paring should be carefully done, so that the bud-scion, when finished, is cut to an absolutely plane surface, only showing two small spots of pith on the inner or wood side, above and below the transverse woody partition, which is to be found at every bud. The section should appear as shown (Fig. 5), C.

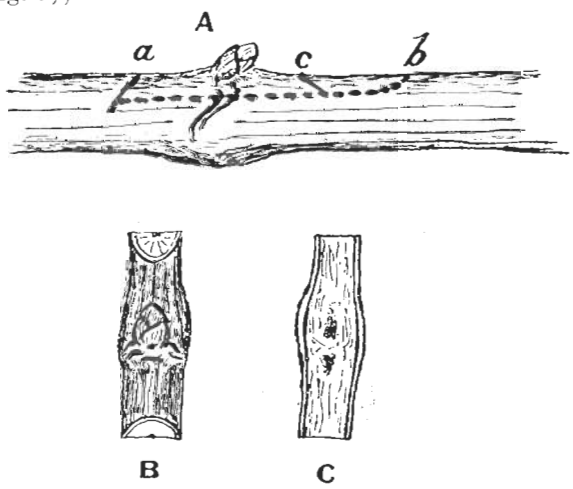

FIG. 5.

A, removal of scion-bud as practised at Rutherglen; B, outer view of bud immediately after removal; C, view of same from inner (wood) side, after trimming and when ready for insertion in stock.

Fig. 6 shows how the stock is prepared. Four cuts of the budding knife are required; A shows the stock after the first two have been executed, and B after the completion of the whole four. The stock is now ready to receive the scion.

The first cut should be exactly similar to that made at *a* (Fig. 5), when taking the scion. It is essential for an accurate fit that this cut

should be made at the same angle, both on stock and scion; a way of insuring this is by cutting the scion, in the first place, a little longer (below the bud) than is really required. By holding it against the uncut stock in as nearly as possible the position it will ultimately occupy, it is easy, by a single cut of the budding knife, through the base of the scion-bud, and into the stock to the required depth, to obtain absolute identity of angle.

The remaining three cuts will be readily understood on reference to B (Fig. 6). It will be noted that cut No. 4 is continued for about a third of an inch, after junctioning with No. 3, so as to provide a sort of flap, under which the sharply bevelled apex or toe of the scion can be pushed whilst the heel is made to fit neatly in the niche or cavity prepared for it. The scion-bud, definitely placed in position, is shown in C (Fig. 6). A fifth cut can usually be made with advantage at *c* (Fig. 6), slightly shortening the flap which covers the toe of the scion-bud. This very small cut is made obliquely, but in reverse sense to that which completed the scion-bud *c* (Fig.5), and in such a way that the section of the cambium layer which it exposes is as near as possible to that made by the

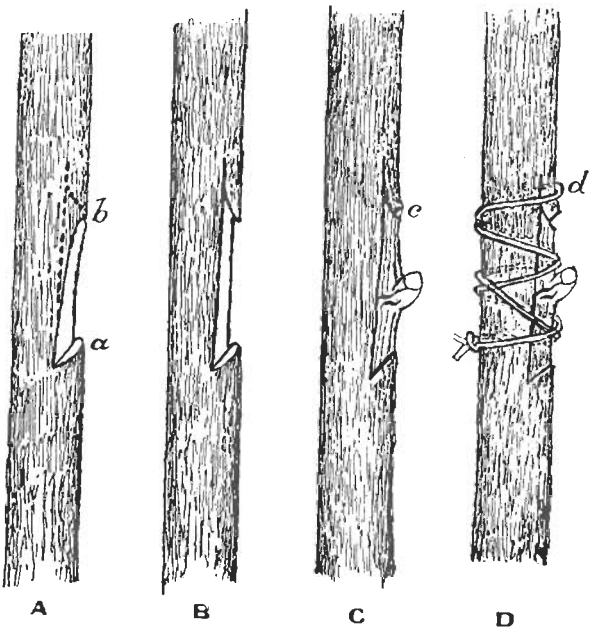

FIG. 6.—THE RUTHERGLEN METHOD.
A and B shows the four cuts which prepare the incision in the stock; C, scion bud placed in position; D, method of tying.

third cut in the lifting of the scion *c* (Fig. 5). Though these two cambium sections are not in absolute contact (as all the others should be), only a very small interval separates them. They are close enough for this small gap to be easily bridged over by callus, the formation of which is remarkably active under the very suitable conditions of warmth, moisture, and aeration prevailing in the interior of the mound.

The scion-bud should be of such a size that the cambium sections of stock and scion coincide in the greatest measure possible. The more completely this condition is realised, the better the chance of the graft taking. On no account should the scion be too large—overlapping is fatal to success, the rapid formation of callus tending to lift the scion-bud out of its proper position. If any departure from an accurate fit is permissible, the scion should be too small rather than too large; callus then forms outside and not inside the graft, holding the bud in, instead of forcing it out. An exact fit, however, is the ideal which should be aimed at. Another reason for avoiding too large a bud is that there is a tendency for the scion to be slightly flattened out by the pressure of the string used in tying; this may cause one, or even both sides of a large bud to overlap, with the undesirable result just described.

In a trellised vineyard, the bud should be placed in the direction of the wire, and not perpendicularly to it, which would result in the young vine growing out of the line the following spring. The bud should also be placed, as far as is possible, on the lee side of the stock as regards winds likely to cause damage in spring.

The graft having been properly fitted, it must be tied, so that stock and scion will be held firmly in position until knitted. Tying is indispensable in the case of the Rutherglen form of graft, with its rather long and thin scion-bud. Tying may be done in various ways—that shown at D (Fig. 6), is perhaps the most convenient. Bagging twine, preferably split up, so that two or three strands are used, instead of the whole twine, is a convenient tie. It is better than raffia, which, being flat, interferes rather more with callus formation. A common mistake with beginners is to plaster the graft with raffia, string, or other substances. The tie is really only needed to keep cut surfaces in contact until knitted—otherwise it hinders rather than promotes the formation of callus. Protection by waxing, &c., is no doubt necessary in the case of an apple, which is grafted above ground; not so with the vine, which is usually grafted underground. The mound of loose earth (Fig. 3) provides ample protection against drying out of the scion.

Opinions differ somewhat as to the best length to give the scion-bud —that shown in Figs. 5 and 6 is the most usual. Some experienced grafters favour a lesser length, their advice being to make the graft as short as is conveniently practicable.

MR. ROUNCE'S MODIFICATION.

This method, which has been so successful in the Mildura district, will be readily understood on reference to Fig. 7. The scion-bud is removed in practically the same manner as is shown in Fig. 1, two cuts sufficing—the first is exactly similar to the corresponding one in the Rutherglen graft. When making the second cut, an oscillatory movement should be given to the knife so as to cut without splitting when passing through the twisted fibres underlying the bud. If skilfully removed, the section will be a plane surface, and the scion-bud ready for immediate

insertion in the cavity prepared to receive it, without any paring or trimming.

In preparing the stock, three cuts are all that are needed. The cavity is somewhat similar to that made in the last graft, but deeper. The graft is, in fact, very similar to the Spanish "Yema," as shown in Fig. 1, but deeper and shorter. If neatly executed, and with scions thoroughly suited to the size of the stock, the buds are so firmly held that no tie is necessary. The operation of grafting is thus considerably simplified, both by the suppression of several cuts, and by enabling tying to be dispensed with, so that a greater number of vines can be grafted in a given time than by the graft previously described. As regards the perfection of the unions, there does not seem to be much to choose between the two methods; with both they are remarkably perfect.

STOCK REQUIREMENTS.

When planting the vines, care should be taken to see that there is a straight portion of stem where the bud can conveniently be inserted, about 2 or 3 inches above the level of the soil. The most convenient size

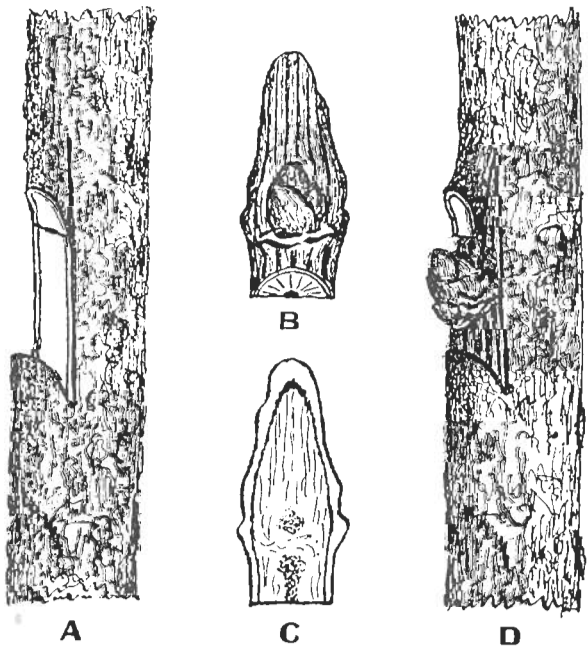

FIG. 7.—MR. ROUNCE'S MODIFICATION.

A, preparation of stock; B, outer view of scion bud; C, inner view of same; D, the completed graft.

is when the diameter of the stock is about half an inch. When larger, the operation is less convenient. Smaller stocks can, however, be successfully grafted. One very successful grafter remarked to the writer that

he was not afraid how small the stock was, provided he could find scion-buds small enough. Vines planted in August are usually fit for grafting the following February, save in an exceptionally dry season.

In order to insure success, the stock must be well in sap. In other words, it must have plenty of life in it. Should there be a good fall of rain during January, conditions are usually ideal for this graft during the month of February, but even in the absence of summer rain, with vines planted on properly prepared land, and adequately cultivated during spring and early summer, there will be plenty of sap for success.

SCION REQUIREMENTS.

As has been shown, the scion should be taken from a cane of rather smaller diameter than the stock on which it is to be grafted. The question arises whether lateral shoots are eligible as scions, or whether main canes only should be used. Seeing that laterals are really quite as capable of producing fruit as main canes, there should be no objection to their use, provided they are well constituted and not too pithy. Needless to say, the same rigorous care is necessary in the selection of the scion buds as in the case of scions for ordinary spring grafting. They should, in the first place, be only taken from vines picked on account of the quality and quantity of the fruit they yield. In the second place, only fruit-producing canes must be used; water shoots and suckers should on no account be employed. Of course, laterals must only be those growing on fruit-bearing canes; any others are useless.

Buds should only be taken from canes which are properly ripened, the green or yellow colouration having changed to brown; unripe buds are, it is true, capable of uniting, but they are not nearly so sure; with them one cannot rely upon a high percentage of success. Buds should be free from laterals; in practice it is often found that a bud which has failed, or has taken in an unsatisfactory manner, shows the fragment of a small lateral alongside of it, which was cut back at the time of grafting. Where the Yema graft is to be practised on a large scale, it would be well to prepare the canes to be used as scions by breaking out the laterals in November-December, when they are still quite small and easily suppressed. Well-developed laterals are less liable to have secondary laterals in the axil of the leaf, for which reason they are very convenient to use. If the main canes of the vines used as scion bearers are stopped early in November, stout laterals will be thrown out, which will be well ripened by February.

Needless to say every precaution must be taken to avoid drying out of the scion canes. The season best suited for this graft being the hottest time of the year, only a few hours' requirements should be cut

at a time, and these should be rolled in a piece of wet bag; they should not, however, be cut into short lengths and kept floating in a bucket of water as is sometimes done.

The graft is, in fact, more practical if scions are obtainable in the same vineyard where they are to be grafted than if they have to be brought a distance; in the latter case they must be packed in such a way as to guard against desiccation in transit, and before use the canes should be placed for a day with their butt ends in clean water.

NEGLECTED INDUSTRIES.

THE UTILISATION OF WASTE RAISIN SEEDS IN THE UNITED STATES.

An investigation has recently been made by the United States Government which has proved that the seeds removed from raisins yield technically useful products that fully justify the expense involved in separating them. In the raisin-seeding industry, which in recent years has grown to such proportions in California, vast quantities of seed accumulate annually. From 30,000 to 40,000 tons of raisins are seeded every year, and it is estimated that there should be approximately 3,000 to 4,000 tons of the seed available annually. The utilisation of this waste has received some attention by the producers in recent years, but thus far with little success. It appears that a brandy has been made by fermenting the sugary matter that adheres to the seeds, and that a high-proof alcohol has been distilled after the fermentation. It is also reported that some fixed oil has been obtained from the seeds. The investigation shows that four important products can be obtained from the waste seeds—namely, syrup, fixed oil, tannin extract, and meal.

If the entire annual output of 3,000 to 4,000 tons of seed were used, there would be obtained 550 to 750 tons of syrup, 340 to 450 tons of fixed oil, 330 to 440 tons of tannin extract, and 1,600 to 2,200 tons of meal. Commercially, the manufacture of syrup can be accomplished with comparative ease and readiness. Owing to the solubility of the sugars in water, the process of preparation resolves itself into simple extraction and concentration. Comparatively small quantities of water are necessary completely to dissolve the sugary matter from the seeds. The washing could possibly be most readily accomplished in large centrifuges, while the saturated solution requires only to be evaporated to produce the syrup. As the most convenient form of concentrating, vacuum pans

are considered to be the most efficient and expedient. A clear transparent syrup with the characteristic taste and flavour of the raisin can be produced from the seeds. Its uses are many, and should justify its production from this waste material. The fixed oil has been mentioned as found in considerable quantities in the seeds of raisins, and also in the seeds of grapes which occur as by-products in the manufacture of wine and grape juice. After washing off the sugary matter and drying and screening the seeds, they need only to be ground for the production of the fixed oil. Two methods of extraction are feasible—by pressure and by solvents. Hot extraction by means of hydraulic presses would possibly yield, it is said, the maximum of fixed oil. Cold pressure having a tendency to extract the oil incompletely would leave more fat in the press cake. Extraction by means of solvents such as benzine, carbon bisulphide or low-boiling gasoline, or preferably carbon tetrachloride, is practised commercially because of the more complete exhaustion than by pressure, especially of materials with low oil content. The use of carbon tetrachloride has been recommended because of the non-inflammable, non-explosive properties of these solvents. The clear amber-coloured fixed oil, useful in paint and soap manufacture, and possibly in other industries, is capable of being produced in large quantities from the waste seeds.

The important application of the oil in commerce, coupled with the large output available annually, should justify its production. After the preparation of the syrup and the extraction of the oil from the seeds, the extraction of tannin has been recommended. The production of tannin extract is practicable only in the case of raisin seeds, since wine residues are probably largely depleted of their tannin content. The tannin, being soluble in water, can be extracted in a practical way by boiling the meal in large vats, the solution being transferred to vacuum pans for concentration to a moist extract. If a dry extract is preferred, it can be obtained by simply allowing the moist extract to dry in the air. The large quantity of tannin extract which can be produced from raisin-seed meal, and which is well adapted for the tanning of leather, becomes the third important commercial product capable of being made from raisin seeds. The final residue, the meal, seemingly already exhausted of all its constituents of value, still possesses useful qualities. On account of its high protein content its usefulness as part, at least, of a cattle food is undoubted.—"Journal of the Royal Society of Arts."

Botany.

ILLUSTRATED NOTES ON THE WEEDS OF QUEENSLAND.

By C. T. WHITE, Acting Government Botanist.

No. 8.

"GIANT PIG WEED" (*Trianthema portulacastrum*, Linn.)

Description.—A spreading rather succulent herb. Stems much branched, glabrous or slightly pubescent. Leaves opposite or nearly so, one smaller than the other, tapering at the base, rounded, and often with a small point at the apex. Leaf-stalk dilated and connate at the base, forming a deeply triangular membraneous pouch in which are situated the solitary flowers. Capsule small, almost concealed in the stipular pouch, and containing about eight seeds. A weed of the tropics. Has recently made its appearance in Queensland.

Mr. D. Macpherson (Instructor in Agriculture, Bowen) writes: "The weed is a most troublesome one in Bowen farms. For want of a better name, I call it Giant Pig Weed. Stock are said to be very fond of it." As I know of no other local name given to the plant and as it is closely allied to and similar in appearance to the common Pig Weed, I would suggest the use of Mr. Macpherson's name as a vernacular.

Distribution.—E. D. Merrill speaks of it as a common weed of cultivation and of open waste places about towns in the Philippine Islands. Dr. S. H. Koorders says that except on the highlands it is a common roadside weed over the whole of Java. It is a common weed in the West Indies, subtropical United States, and Tropical America generally. In India it is spoken of as a troublesome weed that springs up everywhere.

Uses.—"The young leaves are used as Spinach; when somewhat old mixed with others and used as greens. The root is considered cathartic and given in powder to the extent of two teaspoonfuls twice daily with a little ginger; the fresh root also is given as a cathartic mixed with ginger." Balfour—"Cyclopaedia of India," 3, p. 931. Its palatability for stock has already been referred to.

Eradication.—Like Pig Weed and plants of similar habit, it can only be kept in check by constant hoeing and cultivation, which should be done before seeding.

Botany of the Species.—The plant is to be met with in botanical literature under several different names. The following are those it has received at different times:—

1753. *Trianthema portulacastrum*, Linn. Sp. Pl. 223.
1767. *Trianthema monogyna*, Linn. Mant. Pl. 1: 69.
1813. *Trianthema obcordata*, Roxb. Hort. Beng. 34.
1828. *Trianthema decandra*, L. *var. obcordata*, DC. Prod. 3: 352.

PLATE 15.—"GIANT PIG WEED." (*Trianthema portulacastrum*, Linn.)

Tropical Industries.

QUEENSLAND SUGAR MILLS.

CRUSHING DATES.

The following is a list of crushing dates as given in the "Australian Sugar Journal" of 10th May, 1917:—

Mossman Mill	31st May
Mulgrave Mill	About 30th May
Goondi Mill	Early in June
Macknade Mill	Early in June
Victoria Mill	Early in June
Pioneer Mill	15th May
Inkerman Mill	4th June
Cattle Creek Mill	6th June
Marian Mill	30th May
Plane Creek	About 11th June
Pleystowe Mill	6th June
Racecourse Mill	6th June
Doolbi Mill	1st week in June
Invicta Mill	5th June
Qunaba Mill	1st week in June
Waterloo Mill	5th June
Baffle Creek	Middle of July
Isis Central Mill	1st week in June
Maryborough Sugar Factory	Early in July
Millaquin	2nd week in June

THE COMING HARVEST.

For the present season cutting will commence early this year, about May, and will end about December. Queensland growers will receive, provided the crop anticipations of 260,000 tons prove correct, £5,811,000 for their output instead of £4,680,000, or £1,131,000 more than they would have received under former conditions. And the consumer will not be called upon to pay a fraction more than the prevailing price of 3½d. per lb.

Some of the Queensland estimates place the season's output as high a figure as 300,000 tons, but this may be an exaggeration. There is, however, every reason to expect that the supply will equal the consumption, and if the growers obtain, as they anticipate they will, relief, on appeal, from some of the more onerous conditions of the Dickson award, the result of the year's operations will probably lead to further acreage being placed under cultivation.

Entomology.

PARASITES OF THE CANE BEETLE.

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

" With reference to the question of insect enemies attacking the imago or beetle stage of our cane beetle, it may be of interest to record the occurrence of a new tachinid fly bred at Gordonvale Laboratory last January from a specimen of the grey-back cockchafer.

" This parasite, which strongly resembles a large house-fly, is nearly three-eighths of an inch long and of strikingly handsome appearance; the head and thorax being dull golden, the latter striped longitudinally with two broad blackish bands, which on the prothorax are ornamented by a central streak of the same rich hue.

" The basal half of the scutellum is blackish, while the dark reddish-brown abdomen is barred transversely with three silvery-white bands, and bears towards its extremity a number of stout bristles.

" It was found that a female of *Lepidiota albohirta* infested by a single maggot of this tachinid was able, notwithstanding, to mature and deposit fourteen eggs before succumbing to its injuries.

" This beetle, however, was collected from forest land, so, although living for a fortnight in confinement, may, of course, have been parasitised just prior to its capture. The eggs of such parasitic diptera are deposited externally, being firmly glued to the body of the host in such position as to render removal difficult, and enable the tiny larvæ when hatched to bore at once through the skin of their victim preparatory to feeding on its internal tissues.

"In the present instance, judging by the size of albohirta, we may reasonably assume that the parasite in question normally lays two or more eggs on a single beetle, in which case the resultant maggots would probably soon inflict serious injuries, and by entirely destroying the ovaries of their unfortunate host, effectually prevent it from ovipositing.

" In view of the fact that the cockchafer caught last January harboured only one dipterous larva, it appears likely that the eggs of this useful fly are subject to attack from hymenopterous parasites belonging to the family Proctotrypidæ, which operate as a natural check on its increase.

"Our grey-back cane-beetle is, I think, very liable to victimisation by dipterous parasites, owing to its habit of remaining on the feeding trees all day in a motionless or semi-torpid state, and fully exposed to the assaults of such insect enemies.

" The only other dipteron obtained at Gordonvale from the adult form of albohirta is a small fly measuring five-sixteenths of an inch in length, with dull yellow thorax and legs, dark reddish-brown abdomen, and blackish head. This insect, which was first noticed in 1914 but has not yet been identified, appears to belong to the *Tachinidæ,* and is evidently an abundant species. Numerous specimens were bred here last season, the number of maggots found in a single beetle varying from three to a dozen.

" It no doubt helps to thin the ranks of our notorious cane-beetle very materially, although, unfortunately, like the preceding, this fly probably suffers from the attacks of hyperparasites.

" Both these diptera, however, are of considerable scientific interest, since they infest the perfect insect, which, in our case, happens to be peculiarly susceptible to injuries from foes of this kind.

"Alluding very briefly to other dipterous parasites bred by us during the past two years from various species of root-eating scarabæid larvæ affecting cane. I may mention that these include no less than eight different kinds of Dexidæ, and four of Asilidæ, the former resembling in general shape gigantic blowflies, and being frequently adorned with brilliant metallic tints of greenish-gold, blue, or deep crimson, while the latter (Asilidæ), familiarly known as 'robber flies,' are predaceous insects possessing stoutish moderately long bodies, which for the most part are hairy and of obscure colouration.

"These dexids and asilids infest the grubs of about eight species of our cane beetles, but apparently are too rigorously controlled by insect and other enemies to be of much economic value in Queensland.

" In addition to the foregoing, our scarabæid grubs frequenting cane fields are preyed upon by at least one species of elaterid larvæ; and by three kinds of 'digger wasps' (Scoliidæ), which in their turn are kept in check by hyperparasites belonging to the families Bombylidæ and Mordellidæ."

General Notes.

MOUSE PLAGUES.

BY HEBER A. LONGMAN, Queensland Museum.

The periodical occurrence of mouse plagues has engaged the attention of investigators in various parts of the world. The problem is of the greatest importance in countries like Australia and America, where there are wide stretches of agricultural land controlled by a comparatively small number of settlers. In America such plagues have proved a serious scourge, and publications dealing with the matter have been issued by the United States Departments of Agriculture. In one of these, issued in 1908, and written by Stanley E. Piper, particulars are given of the measures taken to check the plague in Nevada. The outbreaks there are exceptionally severe because they occur in rich lands, more or less restricted by surrounding desert conditions. The trouble has even lasted

PLATE 16.—ALFALFA FIELD DESTROYED BY FIELD MICE. GENERAL CONDITION OF FIELDS IN HUMBOLDT VALLEY, NEVADA, IN NOVEMBER, 1907.

for three or four years, and it was found necessary to take very stringent measures. The mice which occasionally increase in Australia are not, of course, the same species as run riot in America. Particulars of the more common native and introduced species of rodents found in Australia are given in a booklet by the writer which was recently issued by the Commonwealth Quarantine Service.

PLATE 17.—A COMMON FIELD MOUSE (*Pseudomys novæ-hollandiæ*, Waterhouse). [After Gould.

The following particulars of the methods adopted in Nevada to control their mouse plagues are summarised from Mr. Piper's paper. He states that such methods as rolling the land with heavy cylinders, trampling it with droves of sheep, or injecting water or steam into burrows, are inadequate for the suppression of large plagues. Digging trenches or pits wider at the bottom than the top, into which the mice fall, and other methods of trapping, only account for a small proportion. In France and Russia and the States attempts have been made to establish bacterial disease, but these have not proved a marked success.

Poison is claimed to be the cheapest and most certain means at present known of controlling mouse plagues. Phosphorus is condemned on account of its dangerous character and its destructiveness to birds and mammals. As the result of extensive experiments and practice, strychnia sulphate was found to be the most satisfactory poison. Strychnia sulphate, when prepared in the following ways, was found to be the cheapest poison available:—

1. *Poisoned Alfalfa Hay.*—Chop 30 lb. of good, fresh alfalfa (lucerne) hay into about 2-in. lengths with a feed cutter. Then place the hay in a large metal receptacle and sprinkle with 3 gallons of fresh water. Thoroughly dissolve 1 oz. of strychnia sulphate in 2 gallons of water by heating in a closed vessel; sprinkle over the dampened hay and mix well.

2. *Poisoned Green Alfalfa (Lucerne).*—Heat 1 oz. of strychnia sulphate in half a gallon of water until thoroughly dissolved, add to 1 gallon of cold water, and sprinkle this solution slowly over 45 lb. of fresh green alfalfa, cut into lengths of 2 or 3 in. Mix until the free solution is taken up.

3. *Poisoned Crushed Wheat.*—Dissolve 1 oz. of strychnia sulphate in 2 gallons of water by heating. Sprinkle the solution over 60 lb. of rolled or crushed wheat in a metal receptacle and mix well. If the preparation is to be kept for several days, two tablespoonfuls of powdered borax may be added to prevent fermentation.

The poisoned hay was found of best use in the winter, when green food was absent. Men were employed to drop small quantities (about a teaspoonful) at the mouth of burrows. In some fields it was calculated that there were 10,000 to 24,000 mouse holes to the acre, and it is said that a systematic treatment of the land resulted in the destruction of 85 to 95 per cent. of the mice.

Poisoned green alfalfa proved very successful, as the mice had been in the habit of feeding on the lucerne. Poisoned crushed wheat was distinctly better than the whole grain, but this is *not to be recommended* for field use, because a *large number of useful birds fell victims to the poisoned grain.* With the poisoned green alfalfa and alfalfa hay no accidents to birds or domestic animals were reported.

PLATE 18.—THE BLACK RAT (*Epimys rattus*, Linn). [From life.
The full length of the tail is not shown.

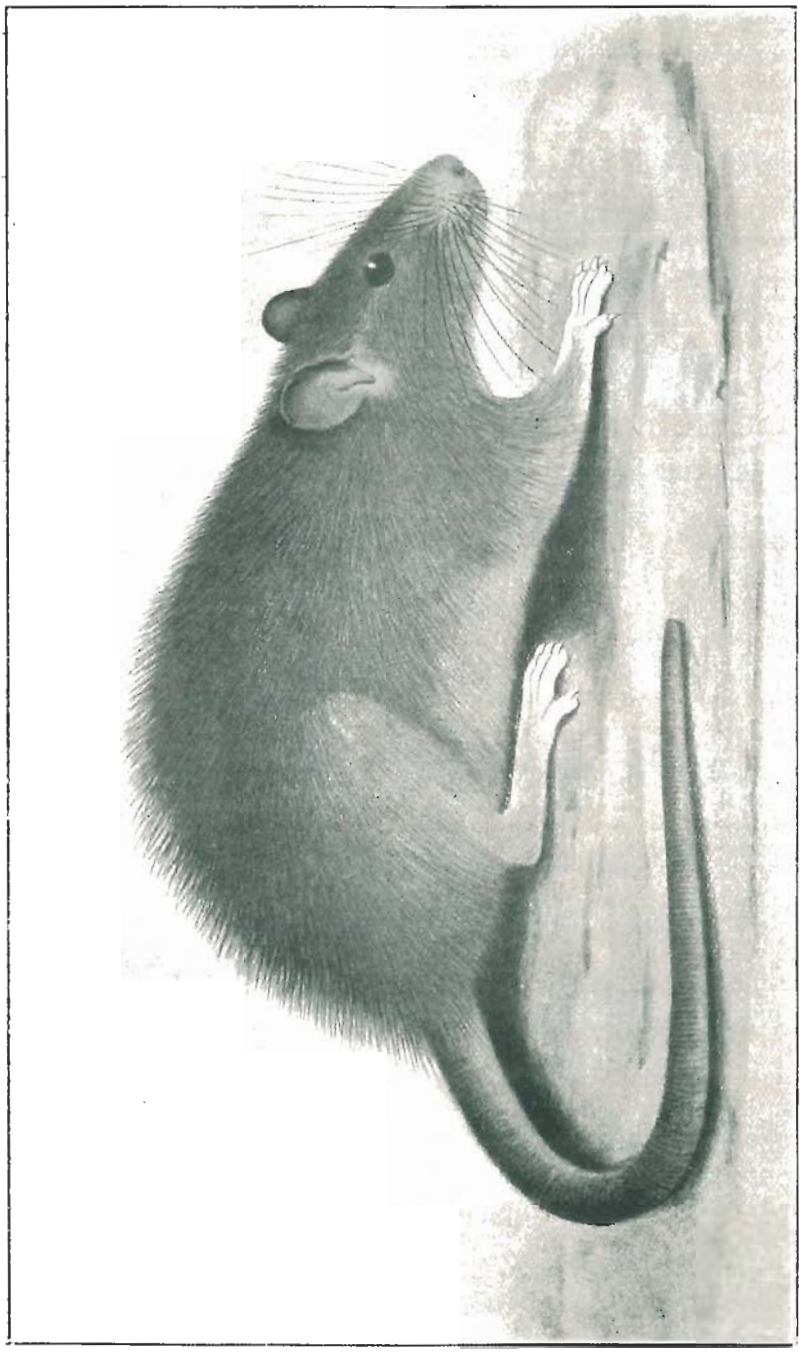

PLATE 19.—THE BROWN RAT (*Epimys norvegicus*, Erlx). [After Hossack.

In order to prevent plagues various measures are recommended. Winter burning, flooding, and pasturing off growth are aids. When land is being ploughed dogs should be encouraged to kill the mice turned up. Rank grasess and weeds along fences and ditches should be destroyed as far as possible, and then the mice will be exposed to the attacks of their natural enemies. Above all, the birds which prey upon mice should be encouraged.

Queensland to-day is losing many thousands of pounds because so many of our native birds, which would prey on these pests, have been destroyed. Owls, hawks, the kestrel, and the crow take an enormous toll of mice, and near the coast flocks of gulls have been known to destroy them. The wild turkey or Australian bustard, which is a valuable insect destroyer, feeds also on lizards and mice, and is probably worth more to the farmer alive and in the field than when cooked and on the table. The nankeen kestrel, the smaller eagles, and other members of the hawk family, and the owls are invaluable helpers during a plague of mice. Australia has no weasels or skunks to prey on mice. Although few people care to encourage snakes, yet it should be mentioned that the young of the harmless carpet snakes are great feeders on mice, just as the adults are useful in keeping a barn clear of rats.

[Mr. Longman's "Notes on Classification of Common Rodents," with list of Australian species, published under the authority of the Commonwealth Minister for Trade and Customs, is most informative and well illustrated. From it we select photographs of the Black Rat, which, although now rare in England, is quite as common as the Brown Rat in Australia, and the Common Field Mouse.]

INFECTION FROM RAW COTTON.

In April last we drew attention to the fact that there never has been an instance of any disease being contracted by the use of Queensland cotton either in upholstery or when made up into mattresses or pillows. On the other hand, we suggested that kapok, being a product of countries where coloured labour is employed in its preparation, under no medical supervision, might easily convey disease germs, although we certainly have not heard of any specific cases. In an article in the "Journal of the Royal Society of Arts" (19th June) on the "Development of the Textile Industries," we find the following notes on "Smallpox and Cotton":—

"An outbreak of smallpox in a Lancashire mill has been attributed, upon circumstantial evidence, to contagion carried by raw cotton, and the millowners have been prevailed on to destroy their stock of cotton-waste. Cotton has been accused in a similar way in at least one other instance, but there has been no proof absolute such as is obtainable in respect of anthrax from wool. English mills use well over 2,000,000,000 lb. of raw cotton annually, and import it from countries where smallpox is always more or less rife. It may, therefore, be held that were the transmission other than the rarest of occurrences the spread of the disease must have arrested attention long ago. The particular

cotton suspected is Mexican, and may actually be a portion of the produce seized by the insurgents, for which the rightful owners have not been paid. In view of the quantities of material involved, and their concentration upon certain centres, the impressive fact about the importation of textile materials is the extreme rarity of cases of infection with any zymotic disease. If one material more than another might be expected to carry disease that one should be rags, yet the advices from the rag centres are most reassuring. The last published report from the Medical Officer of Health in Batley disclaims any knowledge or suspicion of infectious diseases imparted from rags. Much the same thing has been said by the Health Officer for Dewsbury, and the registrars of these districts find that zymotic diseases are about the only ones of which rag sorters never die. It may be added that the workers of the woollen district are by no means well vaccinated."

SOCIETIES, SHOW DATES, ETC.

Gayndah Pastoral, Industrial, Agricultural, and Horticultural Society.—The show dates have been changed from 5th and 6th June to 26th and 27th June.

Proserpine.—Proserpine Agricultural, Pastoral, and Industrial Association. Arthur George Clarke. Show dates 17th and 18th August.

LONDON QUOTATIONS.

Copra: South Sea, £50 per ton.

Rubber: Fine, hard Para, 3s. per lb.; plantation, 2s. 11⅞d. per lb.

Middling Uplands cotton, American, 12·36d. per lb.

Sisal hemp: British East African, £70 to £75 per ton; Mexican, £77 per ton.

Mauritius hemp, £49 to £53 per ton.

In the year 1912 sisal hemp was worth £24 per ton in Queensland, and the cost of production was £12 per ton, leaving a profit of £12 per ton. A sisal plantation to-day at war prices would prove a fortune, even if expenses were double what they were years ago.

Answers to Correspondents.

TREATMENT FOR WORMS IN FOWLS.

E. M. LEGGETT, Gayndah—

If the number of birds kept is few they may be treated individually by giving pills made of lard or butter to which add santonine, one grain, areca nut, seven grains, or equal quantities of oil of turpentine and olive oil, thirty drops of this mixture to be given at a dose. Either medicine to be followed in two hours with one tablespoonful of olive oil. Lesser quantities according to age.

If a large number of birds is to be treated it will take up too much time treating individually; therefore, the medicine should be given in the morning mash. This may be done by dividing the usual quantity of mash into two parts. To one part add one teaspoonful oil of turpentine, or one grain santonine and seven grains areca nut to each bird; and to the other part add one teaspoonful of castor oil to each bird. The mashes to be given at intervals of two hours, a lesser proportion of the medicine to be given to chickens according to age.

Preventive measures must be taken at the same time as the medical treatment, otherwise the birds will be immediately reinfested by eggs or embryos of worms, taken up with the food or water. It is, therefore, advisable after treating the birds to remove them on to fresh ground, and to thoroughly clean the houses and runs and disinfect same with some strong solution.

A little kerosine in their drinking water will also act as a good preventive.

LIME IN AGRICULTURE.

The Queensland Cement and Lime Company in Brisbane, and the Australian Co-operative Fertilisers, Limited, have communicated the following with reference to the prices of pulverised lime in connection with those companies, which we publish for general information:—

"Brisbane, 18th May, 1917.

"LIME IN AGRICULTURE.

"DEAR SIR,—In the May issue of the "Queensland Agricultural Journal," under the above heading, are tabulated prices which are represented as the retail rates of ground limestone, and the information is quoted as being supplied by the firms whose names are made use of.

"For your readers' correct information we would mention that the Under Secretary of the Department of Agriculture wrote to each of the undersigned on the 20th February, and asked for the retail prices of pulverised lime for publication in the 'Queensland Agricultural Journal.' The Queensland Cement and Lime Company replied that they were referring the matter to the Australian Co-operative Fertilisers, Limited, who were their sole distributing agents for this product. There were no prices of pulverised lime quoted to the Department by the Queensland Cement and Lime Company for publication.

"Apparently it is the figures quoted in a business way to the Department as a contract price for three years, and which were refused by the Department, were published as the retail price in truck loads. Further, although it was distinctly stated that the Department must supply the bags delivered at Gore, yet in the reference to this company in the Journal, the information is conveyed that the company will supply ground limestone at £1 per ton in bags and in truck loads, which is contrary to fact. The second firm whose figures are quoted in the list is the Australian Co-operative Fertilisers, Limited, who are credited with supplying pulverised lime at £2 5s. per ton. The letter of the 20th February from the Department was promptly replied to by this firm, under date of the 24th February, stating, in perfect definiteness, that the Q.C. and L. Company's product was marketed by the A.C.F., Limited, and that the retail price was for 6-ton truck lots, £2 5s. per ton, freight paid to any station in Southern Queensland, and as far north as Nambour; and that north from there to 40 miles north to Bundaberg the rate was the same—viz., £2 5s. per ton for 6-ton truck lots freight paid, and that the demand was supplied to those districts from the A.C.F., Limited, own works at Degilbo lime quarries.

"The omission of the mention of freight being prepaid is entirely misleading.

"The Department invited us to supply the information, and it was supplied unhesitatingly; but through the incorrect way that it has been set out to the readers of the "Agricultural Journal," a false impression has been created, which we trust will be removed by the above statement of facts.

"As far as we are aware, we are the only two companies in Queensland who are pulverising the limestone for agricultural uses, and the limestone that is being used for the purpose is the best that is available.

"The pulverising machinery, both at Gore and Degilbo, was installed solely for preparing an agricultural lime fertiliser, and the article that is available is exactly what the Department of Agriculture has been advocating the use of.

"Queensland Cement and Lime Company, Limited,
"A. C. ELPHINSTONE, General Manager.

"Australian Co-operative Fertilisers, Limited,
"B. SHEARER, Manager.

"To the Editor,
"Queensland Agricultural Journal, Brisbane."

The Markets.

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

Article.		MAY. Prices.
Bacon	lb.	9d. to 1s.
Barley	bush.	2s. 3d. to 2s. 6d.
Bran	ton	£5
Broom Millet	,,	£23 to £24
Butter	cwt.	149s. 4d.
Chaff, Mixed	ton	£3 10s. to £4 5s.
Chaff, Oaten	,,	£5 5s. to £6
Chaff, Lucerne	,,	£4 10s. to £5 15s.
Chaff, Wheaten	,,	...
Cheese	lb.	9d. to 9½d.
Flour	ton	£12
Hams	lb.	1s. 3d. to 1s. 4d.
Hay, Oaten	ton	£4 10s.
Hay, Lucerne	,,	£3 5s. to £3 7s.
Honey	lb.	4½d. to 5d.
Maize	bush.	2s. 4d. to 2s. 6d.
Oats	,,	3s. to 4s.
Onions	ton	£9 to £10
Peanuts	lb.	2d. to 2½d.
Pollard	ton	£6 12s. 6d.
Potatoes	,,	£5 to £5 5s.
Potatoes (Sweet)	cwt.	2s. 6d. to 3s.
Pumpkins (Cattle)	ton	£2 10s. to £2 15s.
Eggs	doz.	1s. 8d. to 2s. 3d.
Fowls	pair	3s. to 4s. 6d.
Ducks, English	,,	3s. to 3s. 6d.
Ducks, Muscovy	,,	4s. to 5s. 3d.
Geese	,,	7s. to 7s. 6d.
Turkeys (Hens)	,,	7s. 6d. to 8s.
Turkeys (Gobblers)	,,	13s. to 17s.
Wheat	bush.	3s. 6½d.

VEGETABLES—TURBOT STREET MARKETS.

Asparagus, per bundle	...
Cabbages, per dozen	4s. to 10s.
Cauliflowers, per dozen	...
Celery, per bundle	...
Cucumbers, per dozen	9d. to 1s. 6d.
Beans, per sugar bag	4s. to 7s.
Peas, per sugar bag	7s. to 11s.
Carrots, per dozen bunches	10d. to 1s.
Chocos, per quarter-case	1s. 3d. to 2s.
Beetroot, per dozen bunches	8d. to 9d.
Marrows, per sack	5s. 6d. to 6s.
Lettuce, per dozen	1s. to 2s.
Parsnips, per bundle	6d. to 9d.
Sweet Potatoes, per sugar bag	1s. 6d. to 1s. 9d.
Table Pumpkins, per sugar bag	3s. to 4s.
Tomatoes, per quarter-case	3s. to 6s.
Vegetable Marrows, per dozen	...
Turnips, per dozen bunches	10d. to 1s.
Rhubarb, per dozen bundles	...

SOUTHERN FRUIT MARKETS.

Article.	MAY. Prices.
Bananas (Queensland), per case	6s. to 12s.
Bananas (Fiji), per case	15s. to 16s. 6d.
Bananas (G.M.), per case	16s. 6d. to 18s.
Custard Apples, per 12 to 15 tray	5s. to 6s. 6d.
Lemons (Local), per bushel-case	2s. 6d. to 5s.
Mandarins, per case	10s. to 12s.
Oranges (Navel), per case	7s. 6d. to 10s.
Oranges (other), per case	3s. 6d. to 5s. 6d.
Papaw Apples, per half-bushel-case	7s. to 9s.
Passion Fruit, per half-case	1s. 6d. to 6s. 6d.
Persimmons, per half-case	1s. 6d. to 3s. 6d.
Pineapples (Queens), per case	10s. to 12s.
Pineapples (Ripleys), per case	8s. to 10s.
Pineapples (Common) per double-case	4s. to 6s.
Tomatoes (Queensland), per half-bushel-case	1s. 6d. to 3s. 6d.

PRICES OF FRUIT—TURBOT STREET MARKETS.

Article.	MAY. Prices.
Apples, Eating, per case	11s. to 12s.
Apples, Cooking, per case	10s. to 11s.
Bananas (Cavendish), per dozen	1d. to 3½d.
Bananas (Sugar), per dozen	2½d. to 3½d.
Citrons, per hundredweight	10s.
Cocoanuts, per sack	12s. to 15s.
Cumquats, per quarter-case	...
Custard Apples, per tray	4s. to 5s. 6d.
Granadillas, per quarter-case	...
Grapes, per lb.	5d. to 6d.
Lemons (Lisbon), per quarter-case	5s. to 5s. 6d.
Limes, per quarter-case	3s. to 4s. 6d.
Mandarins, per quarter-case	6s. 6d. to 8s. 6d.
Nectarines, per quarter-case	.
Oranges (Navel), per case	9s. to 10s.
Oranges (other), per case	1s. 8d. to 4s. 6d.
Papaw Apples, per quarter-case	1s. 6d. to 2s. 6d.
Passion Fruit, per quarter-case	5s. to 7s. 6d.
Peaches, per quarter-case	...
Pears, per quarter-case	9s. to 10s. 6d.
Peanuts, per lb.	3d. to 3½d.
Persimmons, per quarter-case	4s. to 5s.
Plums, per quarter-case	...
Plums (prime eating), per case	...
Pineapples (Ripleys), per dozen	5s. to 8s.
Pineapples (Rough), per dozen	5s. to 6s.
Pineapples (Smooth), per dozen	5s. to 7s.
Quinces, per quarter-case	3s.
Rosellas, per sugar bag	1s. 6d. to 2s.
Tomatoes, per quarter-case	3s. to 6s.
Watermelons, per dozen	...

TOP PRICES, ENOGGERA YARDS, APRIL, 1917.

Animal.	APRIL. Prices.
Bullocks	£20 to £24 5s.
Bullocks (Single)	
Cows	£12 2s. 6d. to £16
Merino Wethers	43s.
Crossbred Wethers	46s.
Merino Ewes	36s
Crossbred Ewes	42s. 6d.
Lambs	46s. 6d.
Pigs (Stores)	

Statistics.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

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

Divisions and Stations.	Average Rainfall.		Total Rainfall.		Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	April.	No. of Years' Records.	April, 1917.	April, 1916.		April.	No. of Years' Records.	April, 1917.	April, 1916.
North Coast.	In.		In.	In.	*South Coast*—continued:	In.		In.	In.
Atherton	4·34	15	4·85	2·26					
Cairns	11·99	34	8·95	6·36	Nambour	4·38	20	2·85	9·27
Cardwell	10·05	44	6·04	4·65	Nanango	1·80	34	0·42	6·36
Cooktown	9·48	40	6·42	9·36	Rockhampton ...	2·27	29	0·82	2·79
Herberton	4·42	29	3·60	2·76	Woodford	3·90	29	1·13	14·45
Ingham	8·86	24	7·98	4·22					
Innisfail	22·15	35	15·70	19·83	*Darling Downs.*				
Mossman	7·99	1	9·78	8·57					
Townsville	3·81	45	3·25	0·05	Dalby	1·29	46	1·94	1·81
					Emu Vale	1·16	20	0·29	2·34
Central Coast.					Jimbour	1·33	28	1·24	3·31
					Miles	1·46	31	0·87	2·19
Ayr	2·85	29	2·80	0·26	Stanthorpe ...	1·75	43	0·37	3·97
Bowen	3·12	45	1·58	0·96	Toowoomba ...	2·44	44	1·74	7·92
Charters Towers ...	1·77	34	0·19	1·71	Warwick	1·35	29	0·06	2·77
Mackay	6·90	45	3·27	5·98					
Proserpine	6·56	13	9·44	4·11					
St. Lawrence ...	2·83	45	2·17	3·05	*Maranoa.*				
South Coast.					Roma	1·31	42	0·67	1·78
Biggenden	1·68	17	0·39	1·75	*State Farms, &c.*				
Bundaberg	2·78	33	1·99	3·96					
Brisbane	3·62	64	0·75	8·95	Bungeworgorai ...	0·79	4	0·28	0·65
Childers	2·33	21	1·71	3·56	Gatton College ...	1·73	17	0·53	4·83
Crohamhurst ...	5·42	25	2·63	16·63	Gindie	1·27	17	0·04	1·19
Esk	2·60	29	1·73	6·91	Hermitage ...	1·25	10	Nil	3·25
Gayndah	1·29	45	0·84	2·79	Kairi	3·42	4	4·09	5·32
Gympie	3·13	46	1·32	2·80	Kamerunga ...	11·91	28	9·46	7·48
Glasshouse M'tains	3·89	8	2·15	13·77	Sugar Experiment Station, Mackay	4·97	19	5·24	8·03
Kilkivan	2·08	37	1·03	3·41	Warren	1·30	4	0·51	1·03
Maryborough ...	3·27	45	1·21	4·97					

NOTE.—The averages have been compiled from official data during the periods indicated; but the totals for April 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.	MAY.		JUNE.		JULY.		AUGUST.	
Date.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.
1	6·13	5·17	6·32	4·59	6·40	5·4	6·30	5·18
2	6·13	5·16	6·32	4·59	6·40	5·4	6·30	5·18
3	6 14	5·15	6·33	4·59	6·40	5·4	6·29	5·19
4	6 15	5·14	6·33	4·59	6·40	5·5	6·29	5·19
5	6·15	5·14	6·33	4 59	6·40	5·5	6·28	5·20
6	6 16	5·13	6·34	4·59	6·40	5·5	6·28	5·20
7	6·15	5·12	6·34	4·59	6·40	5·6	6·27	5·21
8	6·17	5 12	6·34	4 59	6·40	5·6	6·26	5·21
9	6·17	5 11	6 35	4 59	6·40	5·6	6 25	5 22
10	6 18	5·11	6·35	4·59	6 39	5·7	6·24	5·22
11	6·19	5·10	6·35	5 0	6·39	5·7	6 23	5·23
12	6 20	5·9	6·36	5·0	6·39	5·8	6 22	5·23
13	6 21	5·9	6·36	5·0	6·39	5·8	6 21	5 24
14	6·21	5·8	6·36	5·0	6·39	5·9	6·20	5·24
15	6·22	5·8	6·36	5 0	6·38	5·9	6·19	5·25
16	6 23	5·7	6·37	5·0	6·38	5·10	6·18	5·25
17	6 23	5·7	6 37	5·0	6·38	5·10	6·17	5·26
18	6·24	5 6	6·37	5·0	6·37	5·11	6·16	5·27
19	6·24	5·6	6·37	5·0	6 37	5·11	6·15	5·27
20	6·25	5·5	6·38	5·0	6 36	5·12	6 14	5·28
21	6·25	5·5	6·38	5·1	6 36	5·12	6·13	5·28
22	6·26	5 4	6·38	5·1	6·35	5·13	6 12	5·29
23	6·27	5 3	6·38	5·1	6·35	5 13	6·11	5·29
24	6·27	5 3	6·38	5·1	6 34	5·14	6·10	5·30
25	6·28	5·2	6 39	5·2	6 34	5·14	6·9	5·30
26	6·29	5 2	6 39	5·2	6·33	5 15	6·8	5·31
27	6·29	5·1	6 39	5·2	6·33	5·15	6·7	5·31
28	6·30	5 1	6·39	5·3	6·32	5·16	6·6	5·32
29	6·30	5·0	6·39	5 3	6 32	5·16	6·5	5·32
30	6 31	5·0	6·39	5·3	6·31	5·17	6·4	5·33
31	6 31	4·59	...	...	6·31	5·17	6·3	6·33

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

			H.	M.	
7 May	○	Full Moon	12	43	p.m.
14 „	☽	Last Quarter	11	48	a.m.
21 „	●	New Moon	10	47	„
29 „	☾	First Quarter	9	33	„

The Moon will be nearest the earth on the 14th, and at its farthest distance on the 28th.

5 June	○	Full Moon	11	7	p.m.
12 „	☽	Last Quarter	4	38	„
19 „	●	New Moon	11	2	„
28 „	☾	First Quarter	2	8	a.m.

The Moon will be nearest the earth on the 9th, and at its farthest distance on the 25th. It will cause a partial Eclipse of the Sun on the 19th, visible in the Arctic Regions but not in Australia.

5 July	○	Full Moon	7	40	a.m.
11 „	☽	Last Quarter	10	12	p.m.
19 „	●	New Moon	1	0	„
27 „	☾	First Quarter	4	40	„

The moon will be nearest the earth on the 7th, and at its greatest distance on the 22nd. There will be a *Total Eclipse* of the *Moon* from 6·51 to 8·27 a.m. on the 5th; but only the moon's entrance into the shadow of the earth will be seen in Eastern Australia.

3 Aug.	○	Full Moon	3	11	p.m.
10 „	☽	Last Quarter	5	56	a.m.
18 „	●	New Moon	4	21	„
26 „	☾	First Quarter	5	8	„

The moon will be nearest the earth on the 4th, and at its greatest distance on the 18th.

* 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 May, June, and July, and to the middle of August may be roughly arrived at by adding 20 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.

* These notes will not again be published until September, as they apply to the series from May to August.

Farm and Garden Notes for July.

FIELD.—The month of July is generally considered the best time to sow lucerne, for the reason that the growth of weeds is then practically checked, and the young lucerne plants will, therefore, not be choked by them, as would be the case if planted later on in the spring. If the ground has been properly prepared by deep ploughing, cross-ploughing, and harrowing, and an occasional shower occurs to assist germination and growth, the lucerne will thrive so well that by the time weeds once more appear it will be well able to hold its own against them. From 10 to 12 lb. of seed will be sufficient for an acre. This is also the time to prepare the land for many field crops, such as potatoes, maize, oats, and barley for green fodder; also rye, vetches, tobacco, cotton, sugar-cane, field carrots, mangolds, swedes, canaigre, &c. Early potatoes, sugar-cane, and maize may be planted in very early districts, but it is risky to plant potatoes during this month in any districts liable to late frosts or in low-lying ground. Under such conditions it is far better to wait until well into the following month. The greatest loss in potatoes and sugar-cane has been, on more than one occasion, experienced in September, when heavy frosts occurred in low-lying districts in the Southern portion of the State. During suitable weather, rice may be sown in the North. The coffee crop should now be harvested, and yams and turmeric unearthed.

KITCHEN GARDEN.—Should showery weather be frequent during July, do not attempt to sow seeds on heavy land, as the latter will be liable to clog, and hence be injurious to the young plants as they come up. The soil should not be reworked until fine weather has lasted sufficiently long to make it friable. Never walk over the land during wet weather with a view to sowing. The soil cakes and hardens, and good results cannot then be expected. This want of judgment is the usual cause of hard things being said about the seedsman. In fine weather, get the ground ploughed or dug, and let it lie in the rough till required. If harrowed and pulverised before that time, the growth of weeds will be encouraged, and the soil is deprived of the sweetening influences of the sun, rain, air, and frost. Where the ground has been properly prepared, make full sowings of cabbage, carrot, broad beans,

lettuce, parsnips, beans, radishes, leeks, spring onions, beetroot, eschalots, salsify, &c. As westerly winds may be expected, plenty of hoeing and watering will be required to ensure good crops. Pinch the tops of broad beans which are in flower, and stake up peas which require support. Plant out rhubarb, asparagus, and artichokes. In warm districts it will be quite safe to sow cucumbers, marrows, squashes, and melons during the last week of the month. In colder localities it is better to wait till the middle or end of August. Get the ground ready for sowing French beans and other spring crops.

FLOWER GARDEN.—Winter work ought to be in an advanced state. The roses will now want looking after. They should already have been pruned, and now any shoots which have a tendency to grow in wrong directions should be rubbed off. Overhaul the ferneries, and top-dress with a mixture of sandy loam and leaf mould, staking up some plants and thinning out others. Treat all classes of plants in the same manner as the roses where undesirable shoots appear. All such work as trimming lawns, digging beds, pruning, and planting should now be got well in hand. Plant out antirrhinums, pansies, hollyhocks, verbenas, petunias, &c., which were lately sown. Sow zinnias, amaranthus, balsam, chrysanthemum tricolour, marigold, cosmos, coxcombs, phloxes, sweet peas, lupins, &c. Plant gladiolus, tuberoses, amaryllis, pancratium, ismene, crinums, belladonna, lily, and other bulbs. Put away dahlia roots in some warm, moist spot, where they will start gently and be ready for planting out in August and September.

Orchard Notes for July.

THE SOUTHERN COAST DISTRICTS.

The notes for the month of June apply to July as well. The first crop of strawberries will be ripening during the month, though extra early fruit is often obtained in June, and sometimes as early as May, under especially favourable conditions. Look out for leaf-blight, and spray for same with Bordeaux mixture, also watch for the first signs of the grey mould that attacks the fruit, and spray with the sulphied of

soda wash. The larvæ of the cockchafer, that eats the roots of strawberries, should be looked for, and destroyed whenever found. Pruning of citrus and other fruit trees may be continued; also, the spraying with lime and sulphur. Where the ringing borer, that either attacks the main trunk or the branches at or near where they form the head of the tree is present, the main stems and trunks should either be painted or sprayed with the lime and sulphur wash during the month, as the mature beetles that lay the eggs that eventually turn to the borers sometimes make their appearance during the month, and unless the trees are protected by the wash they lay their eggs, which hatch out in due course and do a lot of damage. Keep the orchard clean, so that when the spring growth takes place the trees may be in good condition. There is usually a heavy winter crop of pineapples ripening during this and the following months, particularly of smooth leaves. See that any conspicuous fruits are protected by a wisp of grass, as they are injured not only by frost but by cold westerly winds.

THE TROPICAL COAST DISTRICTS.

See the instructions given for the month of June. Keep the orchards clean and well worked. Prune and spray where necessary.

THE SOUTHERN AND CENTRAL TABLELANDS.

Where pruning of deciduous trees has not been completed, do so this month. It is not advisable to leave this work too late in the season, as the earlier the pruning is done after the sap is down the better the buds develop—both fruit buds and wood buds; thus securing a good blossoming and a good growth of wood the following spring.

Planting can be continued during the month; if possible, it should be finished this month, for though trees can be set out during August, if a dry spell comes they will suffer, when the earlier planted trees, which have had a longer time to become established, will do all right—provided, of course, that the land has been properly prepared prior to planting, and that it is kept in good order by systematic cultivation subsequent to planting.

Do not neglect to cut back hard when planting, as the failure to do so will result in a weakly growth.

As soon as the pruning is completed, the orchards should get their winter spraying with the sulphur limewash, and either with or without salt, as may be wished. See that this spraying is thoroughly carried

out, and that every part of the tree is reached, as it is the main treatment during the year for San José and other scale insects, as well as being the best time to spray for all kinds of canker, bark-rot, moss, lichens, &c.

Where the orchard has not been ploughed, get this done as soon as the pruning and spraying are through, so as to have the land in good order for the spring cultivations. See that the work is well done, and remember that the best way to provide against dry spells is to keep moisture in the soil once you have got it there and this can only be done by thorough and deep working of the soil.

When obtaining trees for planting, see that they are on good roots, and that they are free from all pests, as it is easier to prevent the introduction of pests of all sorts than to eradicate them once they have become established. Only select those varieties that are of proved merit in your district; do not plant every kind of tree that you see listed in a nurseryman's catalogue, as many of them are unsuited to our climate. The pruning of grape vines may be carried out in all parts of the tablelands other than the Stanthorpe district, where it is advisable to leave this work as long as possible, owing to the danger of spring frosts.

Where grape vines have been well started and properly pruned from year to year, this work is simple; but where the vines have become covered with long straggling spurs, and are generally very unsightly, the best plan is to cut them hard back, so as to cause them to throw out good strong shoots near the main stem. These shoots can be laid down in the place of the old wood in following seasons, and the whole bearing portion of the vine will be thus renewed.

Where vineyards have been pruned, the prunings should be gathered and burnt, and the land should receive a good ploughing.

Queensland Agricultural College.

FOR SALE.

Grass Roots, Rhodes and Paspalum, are obtainable at 2s. 6d. per sack, f.o.b. Gatton.

There are no farm seeds for disposal at the College.

POULTRY.

The following breeds are available:—Brown Leghorn, White Leghorn, Indian Game, Black Orpington, Silver-Laced Wyandotte, Rhode Island Reds. In last-named breed, no birds will be available this year, and only a limited number of eggs at 21s. per setting f.o.b.

Prices:

Cockerels—10s., 15s., and 21s.
Pairs—Cockerel and Pullet, 30s. and 42s.
Trios—Cockerel and two Pullets, 42s. and 63s.
} f.o.b. Gatton.

Prices vary according to quality. Unless crates are returned promptly, an extra charge of 2s. for a single bird and 1s. for each additional bird will be incurred.

Settings of eggs of the above breeds are available from 1st July up to 30th November. Price, 10s. per setting, f.o.b. Gatton. Nine eggs in each setting guaranteed fertile. Should less than nine prove to be fertile, the infertiles will be replaced, if returned, carriage paid and unbroken.

(N.B.—An infertile egg is uniformly translucent when held up to a strong light. Settings should be allowed to settle twenty-four hours before being placed under the hen.)

IMPORTED HOLSTEIN BULL—Froxfield Dairyman (12611). Calved 26th March, 1912. Sire, Froxfield Duke Bob (155). Dam, Froxfield Doris (1150). Bred by J. F. N. Baxendale.

Jersey Bulls.

All cattle sold accompanied by pedigree.

Young Ayrshire and Jersey Bulls will be available for disposal in the course of the next few months.

Pigs.

Orders will be received for Yorkshire boars and sows, from 2 to 3 months old, at £2 10s. each.

All prices—F.O.B. Gatton.

FOR SERVICE.

CLYDESDALE STALLION—**Lord Cellus** (imp.).
Service fee, £3 3s. per mare and 1s. 6d. per week agistment.

AYRSHIRE BULLS—**Netherton King George** (imp.).
Stewart of Wanora.

JERSEY BULLS—**Star Turn** (imp.).
Service fee, 10s. per cow; agistment, 1s. per week.

CUTHBERT POTTS, Principal.