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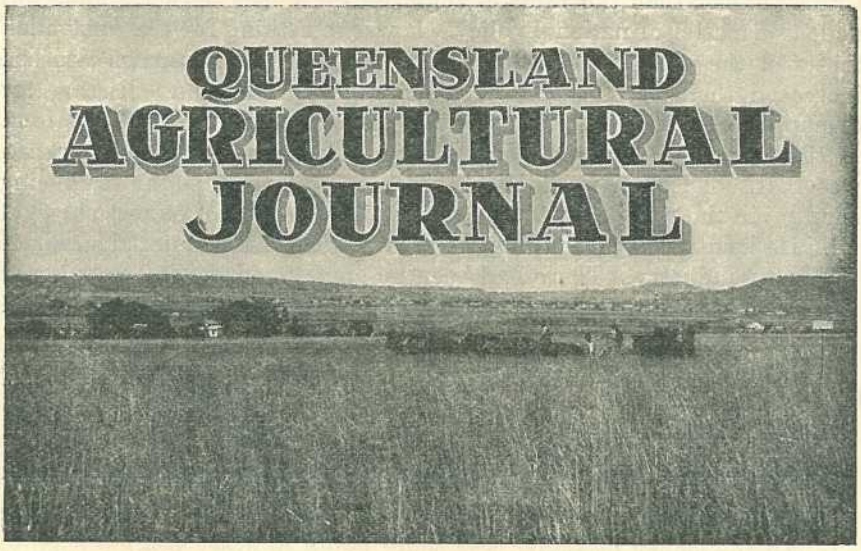

VOL. XLVIII. 1 JULY, 1937. PART 1

Event and Comment

The Premier's Work in London.

ON his return from his mission to Great Britain, the Premier, Hon. W. Forgan Smith, LL.D., met with a rousing reception at the South Brisbane railway station from an immense assemblage of citizens, which was representative of every section of the community. "I can assure you that I am very glad to be back here to co-operate with you all in the work of making this great State a greater State still," remarked the Premier, who then went on to say that his business in London had been strenuous work. The Federal Treasurer (Mr. Casey), the High Commissioner (Mr. Bruce), and himself, assisted by the Agent-General for Queensland (Mr. Pike) and Mr. Townsend, of the Customs Department, made a strong combination in the Sugar Conference. Australia emerged with a quota of 400,000 long tons, together with a proportionate increase each year during the agreement on any increased consumption in the free market. In addition, duties had been stabilised for five years. Queensland sugar would have a preference in the British market equivalent to 4s. 6d. a hundred-weight in Australian currency. If the British Government contemplated any alteration at the end of the five years it was pledged to give eighteen months' notice. The agreement would be of advantage to the sugar industry, and would stabilise sugar growing and allied interests in Queensland. The industry now could look forward with greater contentment, and would be enabled to view its problems in the light of known facts.

Great Britain before the war was dependent entirely on imported sugar. To-day it supplied 25 per cent. of its requirements under a bounty higher than the value of sugar on the world market. That was done as a matter of national policy. It was something for the Australian critics of the sugar industry to ponder over. Other countries also had increased their areas under beet for sugar production. Russia, for example, estimated that this year its output would be 3,000,000 tons. If this figure, given by the Russian representative at the conference, was realised, Russia would have become the largest sugar producing country in the world. A few years ago Russia did not export sugar at all. He mentioned these things to show the need for rationalisation in the sugar industry. There had been no curtailment in any way in the agreement. All would agree that the best had been done by the Australian delegation in the circumstances.

The Premier said that Mr. Casey and he had co-operated on all matters raised at the conference. There was no disagreement whatever. The result was due very largely to that co-operation. It demonstrated the advantage of the closest co-operation between the Commonwealth and the State or States concerned in negotiating any trade treaties.

All the money necessary was being found in every leading country of Europe for the armament programme, but when proposals were put forward for the conservation of human life there was great disagreement among the financial experts and economists.

"If money can be found for armaments, why is it not possible to find money for the development of a great country like Australia?" asked Mr. Forgan Smith, amid applause.

"I assert that there is no one within reach of my voice who believes in war. We want to live in amity and peace with our fellow men. The problem of civilisation is to give food, clothing and shelter for all industrious people and sufficient leisure to develop those treasures of the mind that lie latent in us all. It is along those lines that progress and development can take place whereby we can add our quota to the upward trend of civilisation.

"It is pleasing to note that Great Britain is peace minded," the Premier added. "There is no desire on the part of anyone of importance to embroil the world in another tragedy. The British Commonwealth of Nations in my opinion is the strongest influence for peace and civilisation existing in the world to-day.

"The development of peacemindedness is an essential. It is not a matter so much for a Government; governments necessarily reflect the attitude of the people, but if individuals themselves are peaceminded and support an economic and sociological policy which brings about that end then you too are contributing to the work of civilisation. . . . It behoves all people to keep their heads and understand the conditions in which they live and do their work in their allotted sphere here in Australia.

"In my travels I take particular notice of the conditions under which the people live; all the people I am interested in, all the people engaged in useful service, whether working by hand or brain or both, and I say definitely there is no country I have yet visited where better conditions obtained than in Australia," continued the Premier.

"Those things which have brought this about are not done by accident. Money does not grow annually like wattle on a bush. Those things we enjoy at present are the fruit of the work that has been done to date, but none of us can live on the past or on what we have done in the past.

"Our work is one of gradual progression and climbing ever upward towards our ideal goal so that it is our duty to preserve the measure of freedom we now enjoy and contribute our part in our day and generation to make this a better and brighter country for all our people."

Science in Dairying.

OPENING the second dairy science school for butter factory employees, which will continue in session in the dairy science laboratory, Department of Agriculture and Stock, during July, the Minister, Hon. Frank W. Bulcock, said the real basis of the future prosperity and success of the dairying industry in Australia was the degree to which appeal was made to the palate of the consumer, plus the degree to which, by technical operations and proper supervision, economic loss could be eliminated. Economic loss could largely be overcome by technical application and research. Without that technical knowledge the dairy industry could not expand to the extent that its importance demanded. The crux of the whole position was in the factory. With properly trained technical staffs in the industry they could reasonably hope to make the progress they should, if they had proper and unrestricted access to the overseas market. But unless Australia continually improved dairy production, and the levels and general gradings of dairy exports, she would be confronted not with an increasing but with a declining market.

Dairy operatives must be competent in every section and able to supply a product comparable with that shipped from other countries. There was a general recognition of the value of the technician in agriculture, and this, perhaps, applied particularly to dairy production. In the final analysis, quality determined access to the markets of Britain, and it was essential that those engaged in the export of dairy products should have a thorough understanding of the economics of the industry. Mr. Bulcock remarked further that he was sometimes apprehensive about the future of our export trade, but with the knowledge that technical excellence could be attained in every factory operation that feeling of anxiety was soon dispelled.

Red Spider.

ROBERT VEITCH, B.Sc.Agr., B.Sc.For., F.R.E.S., Chief Entomologist and Director of Research.

THE red spider* is a species of mite frequently found on a wide range of economic and weed host plants, banana, bean, cotton, cucumber, deciduous fruit, grape vine, melon, papaw, pea, pumpkin, tomato and strawberry being among the cultivated plants subject to severe infestation. This species must not be confused with the red mite, a common but relatively unimportant pest of deciduous fruit. One important distinguishing feature is the fact that the red spider is a web-spinning species, whereas the red mite does not possess the faculty of producing the fine silken threads so characteristic of a red spider outbreak. The species may also be separated in the laboratory by the relative lengths of the four pairs of legs in the adults, the front pair of legs in the red mite being much longer than the other pairs, whereas in the red spider such a disparity does not exist.

Life History and Habits.

The round, somewhat transparent, eggs, which cannot be seen without the use of a hand lens, are laid among the silken threads on the under sides of the leaves of selected host plants, each adult female being capable of laying from sixty to seventy eggs at the rate of two to six a day during her adult life of two weeks. These eggs are laid irregularly on the infested foliage, and hatch after an incubation period of four or five days. The mites on hatching are six-legged, colourless and rather transparent, but after feeding they acquire a greenish-yellow tinge. The female mites vary very appreciably in colour, yellow, green and brick-red individuals occurring, the otherwise uniform colour being broken by the presence of two dark spots, one on each side of the body, the occurrence of these spots being responsible for the designation of two-spotted mite which is sometimes applied to this species. The adult female possesses four pairs of legs, a short, rounded body, and mouth parts that enable it to suck the sap of the plant on which it is feeding, the length of the adult being about one-sixtieth of an inch. The adult male is somewhat smaller than the adult female, is less rounded, and is rather salmon-coloured, the darker spots being less conspicuous than in the female. During the height of summer the life cycle is completed in less than a fortnight.

As a result of the feeding of this mite small, pale spots appear on the infested foliage, which thereby acquires a mottled and unhealthy appearance. As the infestation becomes more intense the whole leaf acquires a light, unhealthy colour and withers, reddish-brown blotches not infrequently appearing, premature leaf fall and consequent weakening of the plant being the inevitable outcome of severe infestation. The under surface of infested leaves often has the appearance of having been dusted with a fine white powder, this impression being conveyed by the presence of large numbers of cast skins.

The red spider reaches its maximum abundance during warm, dry weather; heavy rain and a fall in temperature lead to a rapid decline in its numbers.

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* *Tetranychus telarius L.*

Control.

Spraying infested plants with lime sulphur at a strength appropriate to the plant to be treated and to the prevailing weather conditions produces satisfactory results against this pest. Lime sulphur sprays are unsuitable for some of the host plants of the red spider, and in such cases dusting with sulphur is sometimes employed. Reports on the results of sulphur dusting are, however, somewhat conflicting. The control of this pest should be undertaken at an early stage in the infestation, and whether spraying or dusting is employed every effort should be made to cover the under surface of the foliage, which is, of course, the seat of infestation. Furthermore, treatment should be carried out in such a manner as to ensure that no injurious residues occur on the marketed product. Spraying with a strong jet of water is sometimes recommended as suitable for relieving a few sturdy garden plants from red spider attack.

The fact that red spider breeds on quite a number of weeds suggests another line of control, namely, the elimination in so far as is practicable of whatever weeds are known to harbour the pest. Such weeds growing among or in the vicinity of the cultivated plants, or on or near the ground to be planted, are best destroyed by cultivation.

CARE OF SICK ANIMALS.

Stockowners are frequently required to diagnose and treat sick animals and, from their constant observation of stock in good health, are quick to notice any abnormal behaviour due to sickness. A knowledge of the normal temperatures, pulse and respiration rates of various animals is most valuable in arriving at a correct diagnosis of the trouble. The temperature of all young animals is somewhat higher than that of older animals, and various influences—such as periods of oestrum, time of day, external temperature, and so on—may alter the temperature of the mature animal. The temperatures of healthy farm animals are:—horse, 99.5—101 degrees; cow, 100—101 degrees; sheep, 103 degrees; pig, 102.5 degrees.

The temperature of an animal is usually measured in the rectum, and a self-registering thermometer such as is commonly used in human practice may be used. Care should be taken to see that the column of mercury is shaken down. A small quantity of vaseline smeared on the bulb as a lubricant to assist the passage of the instrument is desirable, and it is inserted with a circular motion between the fingers, forward in a line with the backbone, and allowed to remain for a few minutes before it is withdrawn carefully and the reading taken. If the temperature of an animal is found to be about 2.5 degrees above normal it is said to have a low fever, if it reaches the vicinity of 4 degrees above normal a moderate fever is indicated; and, if in the neighbourhood of 6 degrees above normal, it has a high fever.

In some diseases, such as tetanus and sunstroke, the temperature may be as much as 10 degrees above normal. Having decided by use of the thermometer whether the sickness is of a febrile or nonfebrile nature treatment and nursing must be considered.

Good nursing is of the utmost importance. The patient should be provided with a soft bed, shade from sun, wind, or rain, and a rug in cold weather. A supply of water and green feed should also be provided if possible.

Medicines are usually administered by the mouth in the form of a drench, and it is necessary to be careful and patient in the use of this method. The head of the animal should not be raised above a horizontal position, and only small quantities of the drench poured into the mouth at a time, allowing time for swallowing. Pinching the throat to induce swallowing should not be practised, and the head should be lowered if the patient commences to cough.—W. DIXON, Inspector of Stock.

Sown Pastures and their Management.

C. W. WINDERS, B.Sc.Agr., Assistant Agrostologist.

(PART I.)

THE NEED FOR SOWN PASTURES.

ECONOMIC livestock production is dependent upon productive permanent pasture, which is the cheapest form of stock food. Whilst in Queensland much of the native pasture of the open downs, and of the more open types of forest country, has always been of good grazing value, the denser eucalypt forests, the rain forests (or "scrubs"), and the brigalow "scrubs," in their natural state, carry little or no grass and are practically useless for grazing purposes. The rapid conversion of heavily-timbered country into grazing land involves the sowing down of pastures. Since the latter part of the last century the timber of hundreds of thousands of acres of country has been replaced by artificially sown pastures, and the possibilities of expansion in this direction are enormous. The replacement of unproductive native pastures by superior pasture types also calls for artificial seeding.

In another direction, too, there is scope for the sowing down of pastures of a semi-permanent type. Continuous cultivation of cropped lands assuredly causes a very serious depletion of soil fertility, and also produces adverse changes in soil structure. These retrograde changes can best be arrested, and the soil more or less restored to its original condition, by alternating crop production and the grazing of semi-permanent pastures. The beneficial effects of including semi-permanent pasture in a cropping system are intensified if the pasture consists wholly or in part of leguminous plants such as lucerne and clovers.

Yet another function for which sown pastures may and should be more widely utilised is the prevention of soil erosion and soil drift.

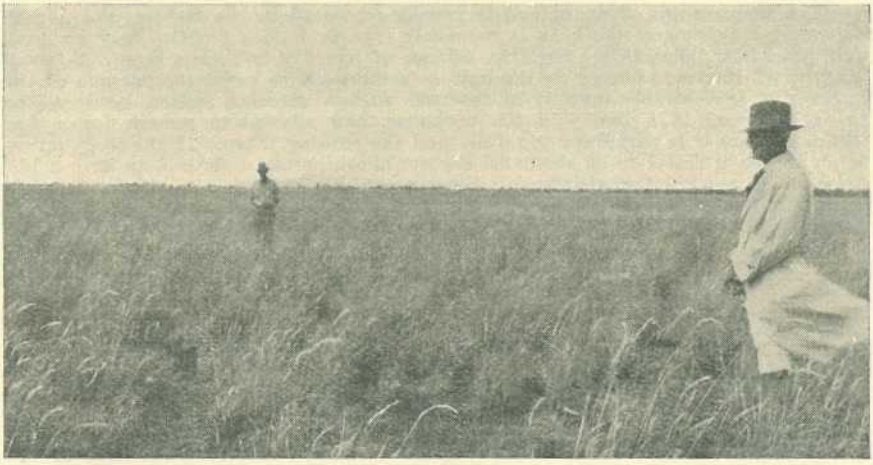


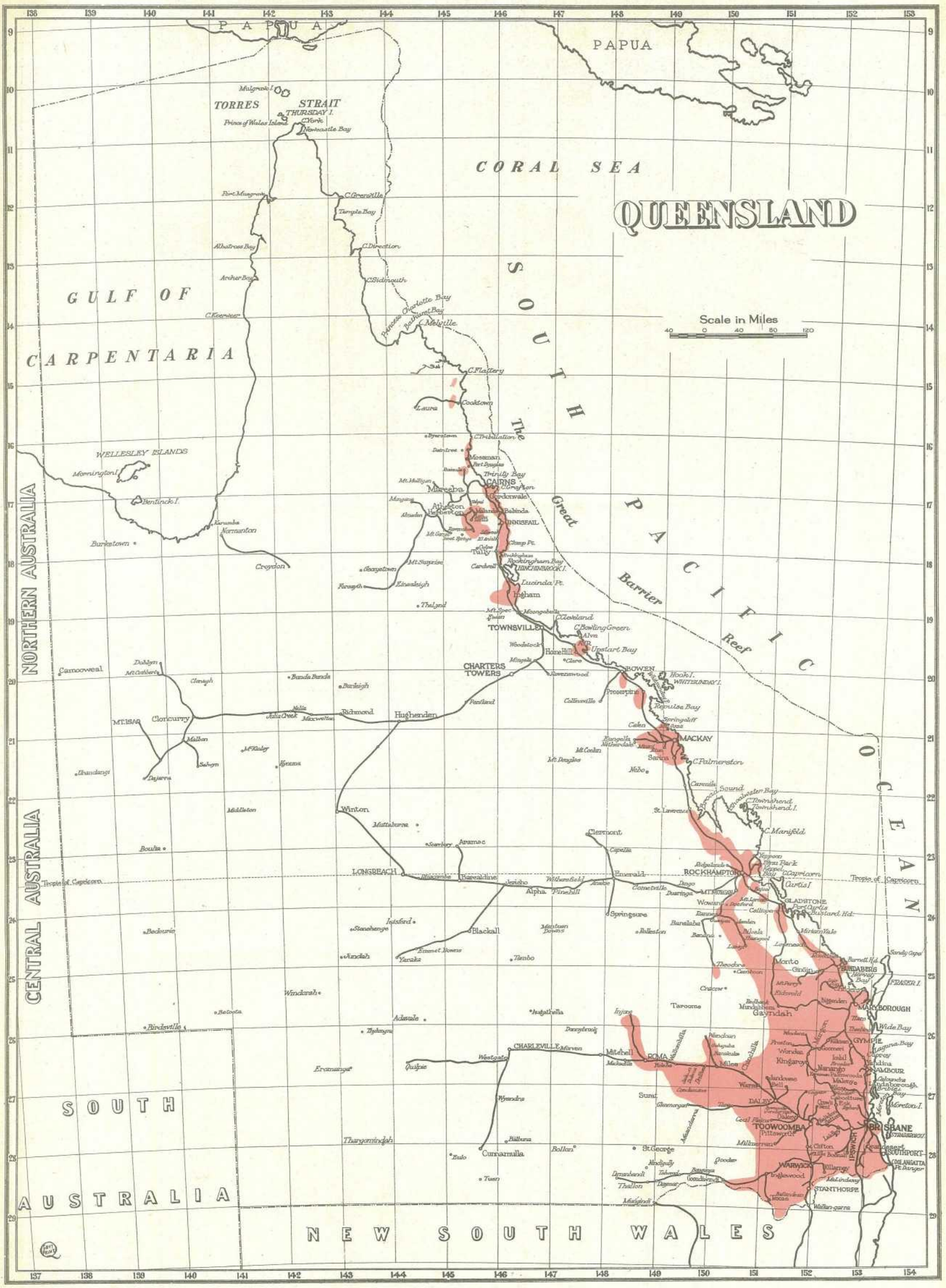
Plate 1.

Bull Mitchell grass (*Astrebla squarrosa*) on a mixed Mitchell grass plain in Western Queensland.

[*Photo., W. D. Francis.*

Plate 2.
Typical grassland forest, South Burnett.

Plate 3.
Brigalow and Belah scrub carrying a heavy coating of native grasses eighteen months after ringbarking.
[*Photo., J. A. Lunn.*



MAP SHOWING THE MAIN AREAS (MARKED IN RED) IN WHICH SOWN PASTURES ARE UTILISED.

In addition to their usefulness in the above respects,—viz., as cheap food for livestock, as a factor in maintaining agricultural soils in good condition, and as a soil conserving agency—sown pastures are valuable for reclaiming certain types of poor lands, for surfacing playing fields, etc., and for a variety of other purposes.

PASTURE TYPES IN QUEENSLAND.

The major pasture areas of Queensland are embraced in the following classification:—

I. Native pastures, consisting for the most part of Mitchell grass and blue grass downs (occupying large areas in Western Queensland) and tropical forest grassland extending from Cape York Peninsula to the southern border of the State. (Plates 1 and 2.)

II. Semi-natural pastures of native species self-established in forest country after clearing, ringbarking, or poisoning of the standing timber has been effected. (Plate 3.)

III. Artificially sown pastures, laid down by landholders.

Native pastures occupy a total area of about 300 million acres in Queensland. Less than one million acres is under artificially sown pastures, and of this total the area carrying permanent winter pastures is but a few hundred acres. The grasses sown for summer grazing purposes are (for the most part) not native to Australia, but are introductions from countries which experience climatic and soil conditions resembling those in parts of Queensland that are devoted to dairying and other semi-intensive grazing industries.

Although they represent only a small proportion of the State's pastures, sown pastures are of considerable importance, particularly to the dairying industry. Most of Queensland's beef cattle and sheep are raised on the immense area of native pastures; but, with the anticipated expansion of the chilled beef and fat lamb export industries, which will demand a continuity of supply of animals in "full bloom," the area under sown pastures is likely to be greatly extended at the expense of native pasture, crops, or forest.

The areas of the State in which unirrigated sown pastures are used are virtually coincident with the areas indicated on the accompanying map (Plate 4) as being devoted to agriculture and dairying, although it is probable that the area could be extended in many directions, particularly in the Maranoa district.

KINDS OF SOWN PASTURES.

In the agricultural districts and areas adjacent thereto the types of sown pastures which can be utilised are as follows:—

I. Permanent and semi-permanent pastures, composed of perennial and/or self-regenerating annual species. They are expected to persist for a number of years, and may be intended either for spring-summer-autumn grazing (e.g., paspalum and Rhodes grass pastures), or for autumn-winter-spring grazing (e.g., Phalaris and Wimmera ryegrass pastures).

II. Temporary pastures of annual species, sown to tide animals over periods of stress in permanent pastures or for soil improvement purposes. Such temporary pastures can be so arranged as to take the place entirely, or nearly so, of permanent sown pastures.

Since there is practically no regularly irrigated pasture in Queensland, the types of sown pasture which succeed in any particular district are determined largely by climatic conditions within that district; but, as the rainfall is everywhere chiefly of summer incidence and the winters not unduly cold, permanent summer-growing pastures predominate and usually suffice to maintain production from late spring until early autumn. The usefulness of permanent winter-growing pastures is strictly limited; first, by the paucity and unreliability of the winter rainfall, and, secondly, by the hot conditions of summer.

Temporary pastures are more commonly used to provide winter and early spring grazing than they are for summer grazing, though, in some predominantly agricultural districts, summer-growing annuals, such as Sudan grass, are largely used as an alternative to permanent pasture.

A large proportion of the artificially sown pastures established in Queensland is found in the coastal areas originally covered by rain-forest. The rain-forest areas correspond with rich basaltic and alluvial soils, and on such soils, in areas with an average rainfall of over 40 inches per annum, such as the Atherton Tableland and those portions of the coastal fringe on which dairying is conducted, a South American native, *Paspalum dilatatum*, finds conditions suitable to its vigorous development. It should be remarked, however, that the hottest and wettest coastal district (i.e., the far north coast) is somewhat unsuitable for paspalum and there grasses such as Para grass (*Brachiaria mutica*) and molasses grass (*Melinis minutiflora*) are the chief cultivated pasture grasses.

In addition to the rain-forests of the coastal areas, there occur in the country lying between the coastal ranges and the crest of the Great Dividing Range, "scrubs" of a drier type. Softwood areas of this nature occur on basaltic soils and on rich alluviums, and in most of the settled districts the original timber has been felled and burnt and the land sown to Rhodes grass (*Chloris gayana*) for grazing by dairy cattle. Rhodes grass and paspalum have also been sown extensively after the clearing of heavily-wooded blackbutt forests lying close to the coast; and, on the cleared sections of the brigalow scrub areas of Queensland, Rhodes grass has been sown with good results.

Whilst the grasses mentioned above, together with lucerne, provide the bulk of the sown pasturage in Queensland, many other plants are of value in special situations and for special purposes. A number of these are described in a later section.

ESTABLISHMENT OF PASTURES.

Seed Quality.

When purchasing seeds of any description, farmers and graziers should satisfy themselves that their purchases at least reach the standard prescribed in the regulations under the Queensland Pure Seeds Acts, which are administered by the officer in charge, Brisbane seed testing station, Department of Agriculture and Stock.

The following sets out the absolute minimum percentage of germination in good seed:—

Kind of Seed.	Minimum Germination. Per Cent.	Kind of Seed.	Minimum Germination, Per Cent.
Grasses—		Millets, &c.—	
Cocksfoot	60	Japanese millet	75
Couch grass	40	*Setaria italica* (panicum)	75
Giant panic grass (blue panic)	40	White panicum	75
Italian ryegrass	65		
Molasses grass	20		
Paspalum	30	Cereals—	
Perennial ryegrass	60	Barley	80
Phalaris	55	Maize	80
Prairie grass	65	Oats	80
Rhodes grass	30	Rye	80
Wimmera ryegrass	65	Wheat	80
Clovers, &c.—		Miscellaneous—	
Alsike clover	75	Seed canary grass	65
Berseem clover	65	Cowpea	70
Black medic	70	Field pea	75
Burr medic	60	Peanut	60
Clustered clover	40	Rape	70
Lucerne	75	Sheeps Burnet	60
Red clover	75	Sorghum	70
Subterranean clover	70	Sudan grass	65
Townsville lucerne	40	Tares, vetches	60
White clover	70	Velvet bean	60

Not more than 2 per cent. of inert matter (i.e.), broken seed less in size than one-half of a complete seed, or chaff, dust, stones, or any material other than seeds, should be present in any seeds except in the following cases:—

Kind of Seed.	Maximum Inert Matter, Per Cent.
Cocksfoot	3
Paspalum	4
Prairie	5
Rhodes grass	6

A maximum of 1 per cent. of weed seeds, or seeds of any kind other than the kind under consideration, is allowable.

The presence of the following seeds is totally prohibited:—

Dodder, datura (thorn apple), castor oil, and diseased or insect infested seeds.

The prohibited seed list and proportion of weed seeds allowed are at present under revision; when available these lists will be found to be much more stringent than is set out above.

The Department of Agriculture and Stock carries out free examination of samples of seed purchased by farmers for their own use, and if a farmer is not satisfied that the purity and germination of seed bought by him are up to the standard, he should at once send a sample to the

Head Office of the Department in Brisbane. The particulars which should be set out in ink on the package containing the sample are as follows:—

(*a*) Name under which seed was purchased;
(*b*) The number of bags from which the sample was drawn, and the number of bags in the consignment;
(*c*) The marks of identification, if any, on such bags;
(*d*) The name and address of the sender, with date of sampling; and
(*e*) The name and address of the sender's supplier, with date of delivery.

The samples should be addressed as follows:—

Seed Sample for Examination.
The Officer in Charge,
Seed Testing Station,
Department of Agriculture and Stock,
BRISBANE, B.7.

When sending samples, it is of the utmost importance that they be drawn by the sender from seeds in his actual possession, care being taken to make them truly representative of the bulk.

To enable this to be done satisfactorily they should be drawn alternatively from the top, middle, and bottom of the bags, the proportion of bags to be sampled being as follows:—

1 to 19 bag lots—A portion from each bag.
20 to 39 bag lots—A portion from not less than 20 bags.
40 to 59 bag lots—A portion from not less than 28 bags.
60 to 79 bag lots—A portion from not less than 32 bags.
80 to 99 bag lots—A portion from not less than 36 bags.
100 to 199 bag lots—A portion from not less than 40 bags.
200 bags and over—A portion from not less than 20 per cent.

If, when drawing samples, it is observed that great variation occurs in the bulk, two or more samples should be obtained, each representing bags whose contents are similar.

After the sample has been drawn as above indicated it should be emptied out on to a large piece of paper, thoroughly mixed, and then a quantity not less than the prescribed weight for such samples should be drawn for purposes of forwarding to the seed laboratory. A duplicate sample should be kept for reference.

In the seed testing station, great pains are taken to ensure absolute accuracy of work. It therefore follows that all this care is wasted unless the person forwarding samples for examination takes some trouble to ensure that the samples drawn truly represent the bulks from which they are obtained. The minimum weight of such samples is as follows:—

8 oz. for large seeds such as beans, cereals, etc.
4 oz. for lucerne, millet, sudan and such like seeds.
3 oz. for grass seeds.

In the case of seeds not mentioned above, the weight set out for the seed of nearest size, should be forwarded.

In the case of seeds obviously containing weed seeds or other foreign ingredients, not less than double weight mentioned should be sent.

Farmers and others, who grow seed for their own use or for sale purposes, should have some knowledge of what factors are responsible for variations in the agricultural value of seeds.

Immaturity of seed is a common cause of poor establishment in the field, and often is due to harvesting too early. Uneven ripening of seed, as well as a desire to harvest before any of the dead-ripe seed shatters, are responsible for the harvesting of much unripe seed. Some seeds, even though harvested when apparently ripe, require a resting or maturing period after harvesting and prior to sowing. Paspalum seed, for instance, germinates poorly if sown directly after harvesting: but if stored for some months its germinability is markedly increased. The storage period for any seeds cannot, however, be prolonged indefinitely. Under suitable conditions a small percentage of wheat seeds may retain its viability for about thirty years, but most seeds lose their germinability at a much younger age. The following figures have been supplied by F. B. Coleman, officer in charge, Brisbane seed testing station, and relate only to seed stored under the very best conditions available in Brisbane (i.e., in a brick building, airy, free from insects and from rapid changes in temperature). In all cases the seed was properly dry and free from decay. Any departure from these ideal storage conditions will result in greater loss of germination than is shown below. Humid conditions and/or prolonged lack of fresh air are particularly conducive to loss of viability.

Kind of Seed.	Age of Seed.			
	1 Year. Germination Per Cent.	2 Years. Germination Per Cent.	3 Years. Germination Per Cent.	4 Years. Germination Per Cent.
Paspalum dilatatum	55	62	45	12
Prairie grass	70	60	Nil	Nil
Rhodes grass	50	40	26	15
Millets—				
Giant and dwarf setaria (giant panicum) (Hungarian millet)	88	76	56	20
Japanese millet	97	95	84	58
White panicum	91	81	74	65
Lucerne	91	80	59	50
Sorghum	91	85	69	47
Sudan (*Sorghum Sudanensis*) ..	94	90	82	59

Insect pests, such as weevils, often destroy large quantities of seeds and should be exterminated by fumigation. Unsound seed is to be avoided. Seeds which are cracked, chipped, or broken are very likely to have their embryos damaged, and even if the seed is capable of germinating, any breaks in its surface will admit fungi and so tend to lower the germination capacity.

The seeds of many legumes, including clovers, are peculiar in that a proportion has extremely hard and impermeable seed-coats, which delay germination for some considerable time. Under natural conditions

this delayed germination of portion of the seed shed may be of considerable advantage; but under cultivated conditions a ready germination is almost always desirable. For this reason seeds of certain legumes are often scarified by scratching the surface with sandpaper, etc., or are treated with certain chemicals. Any treatment which increases the permeability of the seed-coat without injury to the seed itself permits of the quicker germination of hard seeds.

Certain pasture plant seeds carry the tiny fruits of disease-causing fungi. Much of the paspalum seed harvested since 1935 has been infested with spores (or fruits) of the fungus causing ergot. When this seed is sown the fungus is introduced to the area and, given favourable conditions, will develop and attack the seedheads of the new plants. Paspalum seed, containing visible "ergots" as a contamination, should not be used for sowing. Another grass which carries a disease in the seed is prairie grass. The disease referred to is smut and when it attacks a plant of prairie grass much or all of the seed may be rendered useless. The fruits of the smut fungus may be destroyed by treating the healthy seed with a disinfectant, as will be explained in a later section.

The Value of "Strain" in Pasture Plants.

When considering the purchase of seeds for pasturage one usually has the choice of several lots of seed of the same kind with varying prices. A solution of the problem is easily obtained by consideration of the fact that when purchasing animals one would ask for the pedigree. Seeds are life and the buying of good seeds with a pedigree is a sound proposition.

Many pasture plants are now grown in countries far removed from their original homes. Rhodes grass, for example, is a native of Africa which, within the past half century has been distributed to all other continents. It is only to be expected that in course of time the type developed in any particular area should differ in some respects from the types developed under different conditions of climate, soil, or management. In the case of Rhodes grass, for instance, lines raised from certain Queensland-grown seed are leafier than most African lines of the grass. Even at present a limited export trade in Rhodes grass is enjoyed by Queensland. Different types may, of course, develop within a small country, e.g., the perennial ryegrass grown in the Hawkes Bay district of the North Island of New Zealand is quite different from the perennial ryegrass grown in the Canterbury district of the South Island. The different types which occur within a species are known as "strains."

In countries in which pasture research is highly developed (e.g., New Zealand and Great Britain) commercial and other lines of seed of the locally most important grasses and clovers have been collected from many local and foreign sources and the best strains separated out by field trials. The seed-producing areas growing superior strains are in many instances permitted to be registered with the Department of Agriculture concerned and a certificate relating to the origin of the seed is issued. Thus we have on the market New Zealand Government certified perennial ryegrass and white clover seeds, New South Wales Government certified *Phalaris tuberosa* seed, etc. By purchasing certified seeds, the farmer is assured of obtaining seed harvested from areas which have been shown to the satisfaction of responsible authorities to be constituted of desirable pasture types.

A certain amount of work on the testing of strains of pasture plants has been, and is being, carried out in Queensland. The present position is summarised in the following table:—

Species.	Chief Seed Lines and Origin.	Remarks.
Rhodes grass	*Queensland grown	Strain work in progress
Couch grass	*New South Wales grown	..
Molasses grass	*Queensland grown	..
Giant panic grass (blue panic grass)	*Queensland grown	..
Paspalum	*Queensland grown	Ergot-free seed desirable
	*New South Wales grown	
Prairie grass	*Queensland grown	..
Cocksfoot	*New Zealand Government certified Akaroa	Strain work in progress
	Victorian	
	European	
Perennial ryegrass	*New Zealand Government certified permanent pasture	
	*New Zealand Government certified mother seed	
	*Victorian Government certified	
	New Zealand, Victorian, and New South Wales, uncertified	
Wimmera ryegrass	*New South Wales grown	
	*Victorian grown	
Phalaris	*New South Wales Government certified	
	New South Wales uncertified	
Millets and "Panicums"	*Queensland grown	
	*New South Wales grown	
Sudan grass	*Queensland grown	Strain work in progress
	*New South Wales grown	
Sorghums	*Queensland grown	
	*New South Wales grown	
Oats	*Southern States	
Barley	*Queensland grown	
	*New South Wales grown	
Italian ryegrass	*New Zealand Government certified	
	*New Zealand uncertified	
Seed canary grass	* Queensland grown	
Rye	*New South Wales grown	
Wheat	*Queensland grown	
	*New South Wales grown	
Lucerne	*New South Wales grown	
Sheeps Burnet	*Imported	
Townsville lucerne	*Queensland grown	
Burr medic	*Southern States	
Black medic	*Southern States	
Clustered clover	*Southern States	
Alsike clover	*Canadian grown	
Red clover	*New Zealand grown	
White clover	*New Zealand Government certified	
	New Zealand ordinary	
	European	
Subterranean clover	*Various Governments certified strains	
Peanut	*Queensland grown	
Velvet bean (including Mauritius bean)	*Fiji, New Guinea, and Papua	
Cowpea	*Queensland grown	
Rape	*Imported	
Field pea	*Southern States	
Berseem clover	*Imported	

* Recommended for use in Queensland in preference to other lines of seed of the same species.

[TO BE CONTINUED.]

A Top-dressing Experiment on the Pastures of the Sandy Ridges of the Lockyer Valley.

J. K. MURRAY, B.A., B.Sc.Agr., N.D.D.(1); W. W. BRYAN, M.Sc.Agr.(2); and W. G. STEELE, Q.D.A.(3).

Introduction.

THE Lockyer Valley, in common with much of the West Moreton district, consists of black soil flats interspersed with sandstone ridges of the Walloon series. The flats are, for the most part, cultivated, while the ridges, which have been partly cleared, are used for the pasturing of cattle. The soils on these sandstone ridges are generally poor and shallow, podzolic in character, and carry a rather open stand of low fertility demanding plants, Bitter Blue or Pitted Blue grass (*Bothriochloa decipiens*) being the dominant grass. The carrying capacity of these pastures is low, a beast to 10 acres being a fair average.

In an attempt to improve the value of these pastures, a top-dressing experiment was laid out on a section of typical grassland at the Queensland Agricultural High School and College at the end of 1928. The purpose of the experiment was to study the increase in bulk and quality of the existing pasture plants, the encouragement of higher fertility demanding plants, and the stimulation of legumes, of which a few native species were known to occur.

The area selected (Macarthur 6 paddock) was a ridge with a fairly uniform southerly aspect, which was cleared of the original timber (mostly Ironbark—*Eucalyptus crebra*) in 1901 but not entirely stumped, and cleared of a second growth of ironbark in 1924-25, since when it has been used for grazing and burnt off approximately every two years—a fairly general local practice. The average annual rainfall is 28·6 inches with a decided summer maximum, approximately 17 inches falling within the period November to March, inclusive. The rainfall during the period of the experiment was a fair average, as shown by the following table:—

	1928. Points.	1929. Points.	1930. Points.
January	—	224	599
February	—	598	356
March	—	415	130
April	—	437	—
May	—	7	—
June	—	147	—
July	—	65	—
August	—	102	—
September	—	19	—
October	139	273	—
November	177	152	—
December	352	239	—

Treatments.

The fertilizers used were sulphate of ammonia, superphosphate (20·5 water soluble P_2O_5), and basic superphosphate, both singly and in some combinations. Basic superphosphate as a regular dressing was suggested

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on account of the somewhat acid nature of the soil. The fertilizers were applied as uniformly as possible with a standard type of fertilizer spreader.

Nineteen plots, each of approximately 1 acre, were laid out, systematically in a single range, each treatment being replicated once. Fertilizer applications were made in October, 1928 (after a burn) and December, 1929,—i.e., at the beginning of the rainy season, as follows:—

Plot No.	Treatment.	Applications in Cwt.		Total Application.
		October, 1928.	December, 1929.	
1	C	..	..	..
2	N	1N	1N	2N
3	2P + N	2P + 1N	2P + 1N	4P + 2N
4	C	..	..	..
5	P + N	1P + 1N	1P + 1N	2P + 2N
6	P	1P	1P	2P
7	C	..	..	..
8	7P	2P	5P	7P
9	BP	2BP	2BP	4BP
10	C	..	..	..
11	N	1N	1N	2N
12	2P + N	2P + 1N	2P + 1N	4P + 2N
13	C	..	..	..
14	P + N	1P + 1N	1P + 1N	2P + 2N
15	P	1P	1P	2P
16	C	..	..	..
17	7P	2P	5P	7P
18	BP	2BP	2BP	4BP
19	C	..	..	..

C = Control (no manure).
N = Sulphate of ammonia.
P = Superphosphate.
BP = Basic superphosphate.
Numbers represent cwts. per acre.

Early in 1930 it was noticed that the plots treated with sulphate of ammonia showed a better colour and a greater bulk of material than plots whose treatment had not included nitrogen. It was decided, therefore, to make a botanical analysis over the whole area in order to obtain an accurate picture of the developments that were taking place. This analysis was begun in February, 1930, and continued in March.

Sampling Method.

The method used was that of estimated percentage area. On each plot fifty throws of a mesh 2 links by 2 links, divided into 4, were made. The throws were made at random about points systematically arranged so that the whole of each plot was sampled. One throw was made on each plot in turn so that the effect of the time taken to complete the analysis might be overcome—a single series of throws was completed each half day. In each throw the total ground cover and cover of each species were estimated and the herbage then cut about an inch from the ground, this material being used to obtain weights and chemical composition.

Botanical Composition.[4]

The pasture is of complex type, fifty species having been recorded, though only twelve species occur with frequencies greater than 1 per cent. The average composition of the pasture was as follows:—

(4) The original determination of species was done by Mr. C. T. White, F.L.S., Government Botanist, who visited the College for the purpose on several occasions.

Average Botanical Composition of Sandy Ridge Pasture at Gatton College.

	Per cent.
Percentage Cover	53.8
Fimbristylis diphylla	22.24
Bothriochloa decipiens	20.32
Eragrostis elongata	10.09
Eremochloa bimaculata	10.08
Brachiaria distachya (?) ..	6.88
Aristida spp.	5.25
Heteropogon contortus	4.73
Eragrostis leptostachya ..	3.74
Sporobolus elongatus	2.53
Cyperus spp.	1.56
Panicum effusum	1.24
Tripogon loliiformis	1.17
Eragrostis parviflora	0.97
Sida subspicata	0.87
Cynodon dactylon	0.87
Portulaca sp.	0.85
Cheilanthes tenuifolia	0.79
Epaltes australis	0.72
Jasminum suavissimum	0.66
Glycine tabacina	0.57
Digitaria divaricatissima ..	0.55

Traces of the following:—

Lagenophera solenogyne
Chloris truncata
Chloris divaricata
Chloris gayana
Chloris acicularis
Bothriochloa intermedia
Cymbopogon refractus
Paspalidium jubiflorum
Digitaria Brownei
Paspalum distichum
Themeda australis
Eriochloa punctata; Helichrysum apiculatum; Myoporum debile; Wahlenbergia gracilis.
Zornia diphylla
Cassia mimosoides
Indigofera baileyi
Evolvulus alsinoides
Boerhaavia diffusa
Calotis lappulacea
Tragus racemosus
Phyllanthus multiflorus
Glossogyne tenuifolia; Justicia procumbens; Aneilema gramineum; Portulaca oleracea; Rumex brownii; Eleusine indica.

(Results obtained from botanical analyses of 950 samples.)

For a more critical study of the pasture, the species were grouped as follows:—(1) Better type grasses; (2) Poor grasses; (3) Legumes; (4) Miscellaneous Herbage Plants; (5) Weeds; and (6) Cyperaceæ, the last group being formed on account of *Fimbristylis diphylla*. The components of the various groups are—

(1)
Eragrostis elongata
Eremochloa bimaculata
Brachiaria distachya (?)
Eragrostis leptostachya
Panicum effusum
Tripogon loliiformis
Eragrostis parviflora
Cynodon dactylon
Digitaria divaricatissima
Bothriochloa intermedia
Chloris acicularis
Chloris divaricata
Chloris gayana
Chloris truncata
Digitaria Brownei
Eleusine indica
Eriochloa punctata
Paspalidium jubiflorum
Paspalum distichum
Themeda australis

(2)
Bothriochloa decipiens
Aristida spp.
Heteropogon contortus
Sporobolus elongatus
Tragus racemosus
Cymbopogon refractus

(3)
Glycine tabacina
Cassia mimosoides
Indigofera baileyi
Zornia diphylla

(4)
Boerhaavia diffusa
Calotis lappulacea
Helichrysum apiculatum
Portulaca oleracea

(5)
Sida subspicata
Portulaca filifolia
Cheilanthes tenuifolia
Jasminum suavissimum
Aneilema gramineum
Evolvulus alsinoides
Epaltes australis
Glossogyne tenuifolia
Justicia procumbens
Lagenophora solenogyne
Myoporum debile
Phyllanthus multiflorus
Rumex brownii
Wahlenbegia gracilis

(6)
Fimbristylis diphylla
Cyperus spp.

The average botanical composition and percentage cover for the various treatments were then found to be—

Treatment.	Percentage Ground Cover.						
	Total.	Group Number.					
		(1)	(2)	(3)	(4)	(5)	(6)
N ..	Observed 58·57	41·56	27·39	1·49	1·91	2·21	23·97
	Calculated 48·58	35·11	37·46	1·22	1·58	4·48	20·46
N + P ..	Observed 54·7	34·07	34·42	0·47	0·87	2·5	26·54
	Calculated 52·5	34·06	37·25	0·89	0·47	3·73	22·91
N + 2P	Observed 54·37	33·73	35·65	1·02	0·7	5·06	23·0
	Calculated 49·69	31·87	39·03	1·08	0·97	4·62	21·41
P ..	Observed 53·37	29·61	36·72	0·94	0·45	12·96	27·69
	Calculated 54·2	37·83	33·9	0·83	0·6	2·71	23·73
7P ..	Observed 51·77	41·84	25·84	0·79	0·47	2·70	23·29
	Calculated 55·83	42·99	29·15	0·93	1·07	2·19	22·53
BP ..	Observed 55·42	40·87	26·61	0·87	1·37	3·52	25·02
	Calculated 55·76	44·38	27·75	1·08	1·42	2·67	21·04
Control ..	52·26	37·24	34·38	0·99	1·06	3·09	21·86

(Calculated percentages were obtained in each case by taking the percentage of the two nearest control plots and using the formula—

Calculated percentage Plot 1 $= \frac{2C_1 + C_2}{3}$ where the order of plots is C_1. 1. 2. C_2.)

It will be seen that fluctuations of some size occur between the various treatments, but that these are more or less in accordance with the variations in the nearby controls, as instanced by the calculated figures. In no case does there appear to be any significant change in botanical composition as the result of treatment. The time factor, no doubt, is partly responsible for this result, and a further botanical analysis of the area after the lapse of several years might show a different result.

The low percentage of legumes present is a notable feature of the survey. The use of phosphate had failed to stimulate their development up till the cessation of the analyses.

Yields.

The material cut within each mesh throw was weighed to the nearest ½ gram on the plot (green weight). Each sample was then placed in a paper bag well ventilated with holes and hung in a dry shed for approximately a fortnight. The sample was then weighed (air-dried weight), heated in a hot-air oven at 110 degrees C. for two hours, and again weighed when cool (oven-dried weight).

Chemical Composition.

The samples from each plot, after oven drying, were chaffed, thoroughly mixed, and a representative sample taken and analysed for

nitrogen and phosphates, the methods of analysis being those given in "Methods of Analysis of the Association of Official Agricultural Chemists" (Washington, 1925), 19, p. 7, and 7, p. 3, respectively. All analyses were duplicated.

Results.

Plot and Treatment.	No. of throws.	Average weight per throw (grms.).			*N per acre (lbs.)	*P_2O_5 per acre (lbs.)
		Green weight.	Air dried weight.	Oven dried weight.		
1·C ..	47	68·862	30·654	27·702	1138	513
2·N ..	47	125·489 (74·001)	51·976 (34·19)	47·002 (30·977)	1841 (1211)	489 (521)
3·2P + N	47	117·468 (79·141)	53·014 (37·726)	48·285 (34·252)	1896 (1283)	823 (529)
4·C ..	50	84·280	41·262	37·527	1356	537
5·P + N	50	116·920 (83·637)	55·928 (40·077)	50·737 (36·381)	1978 (1328)	921 (577)
6·P ..	50	95·120 (82·993)	43·856 (38·893)	39·697 (35·234)	1568 (1301)	895 (617)
7·C ..	50	82·350	37·708	34·088	1273	656
8·7P ..	50	70·730 (77·877)	31·793 (34·499)	28·589 (31·142)	1175 (1182)	755 (595)
9·BP ..	50	71·540 (73·403)	31·763 (31·290)	29·169 (28·197)	1239 (1091)	609 (534)
10·C ..	50	68·930	28·081	25·251	1000	472
11·N ..	50	99·950 (74·893)	44·021 (30·724)	39·806 (27·667)	1583 (1104)	701 (518)
12·2P + N	50	116·720 (80·937)	.6·525 (33·368)	42·089 (30·084)	1924 (1207)	949 (563)
13·C ..	50	86·820	36·011	32·500	1312	608
14·P + N	50	130·440 (82·693)	49·355 (34·003)	44·204 (30·656)	1661 (1402)	692 (569)
15.P ..	50	84·610 (78·187)	34·264 (31·094)	30·869 (28·813)	1287 (1494)	560 (530)
16·C ..	50	73·930	29·986	26·969	1585	490
17·7P ..	50	77·890 (72·513)	31·233 (29·285)	28·047 (26·357)	1109 (1446)	460 (501)
18·BP ..	50	67·220 (71·177)	26·857 (28·583)	23·979 (25·745)	1120 (1307)	567 (513)
19·C ..	50	69·800	27·882	25·133	1168	525

(* Lb. per acre = oven dried weight in grams per throw × % × 55.)
Calculated figures are shown in brackets after recorded amounts.

These results were analysed according to "Student's" method, and significant differences compared with check were found to be as follows:—

Treatment.	Difference Between Treatment and Check in				
	Green Weight.	Air Dried Weight.	Oven Dried Weight.	N. per acre.	P_2O_5 per acre.
N only	None	None	None	None	None
P only	None	None	None	None	None
P + N only	47·1%	41·1%	41·1%	42·9%	51·25%
BP only	None	None	None	None	None
All plots with P and BP ..	21·1%	19·1%	19·2%	None	30·8%
All plots with N	57·8%	43·2%	43·2%	44·4%	39·6%
P and BP only	None	None	7·7%	None	None

It will be noticed that the only significant differences were obtained from N + P combinations, the significant differences observed under the headings "All plots with P and BP" and "All plots with N" being due to the effect of the P + N plots which were included therein. The N + P plots showed significant increases in gross yield, in nitrogen yield, and in phosphate yield.

It is also to be noted that, with the exception of the "P and BP only" combination, there was no difference between air-dried and oven-dried weights, in so far as significances are concerned. For such pasture air-drying, even in the humid conditions of late summer, appears to be sufficient. Green weights give an indication of trends in such a mixed pasture, but differences in this case tend to be exaggerated.

As the increased yields of nitrogen and phosphorus over the two months of sampling are only of the order of the increase in total bulk, it is apparent that in a native pasture of this type there was, for the period in question, no increased assimilation of either nutrient. The pasture was more bulky but no richer as the result of the top-dressing. This result agrees with the suggestion made verbally by Professor A. E. V. Richardson to the authors—that our native species, having been developed under conditions of low nitrogen and low phosphates, are unable to make full use of additional supplies of these materials.

Economic Aspect.

An increase in yield of approximately 40 per cent. resulted during the months of February and March from the use of nitrogen and phosphate in combination. No other determinations were made. The carrying capacity of untreated land is generally considered to be one beast to 10 acres. The increased carrying capacity might thus be four beasts per 100 acres. If the value of a bullock be taken at a figure of £8, and 25 per cent. of the stock can be marketed each year, the increased return for these two months of maximum growth would be £8 per 100 acres per annum.

Against this must be set the cost of top-dressing. With fertilizer prices at, say, sulphate of ammonia 14s. per cwt., and superphosphate 5s. per cwt., and allowing 1s. 6d. per acre for costs of application (the standard fertilizer spreader used will cover 12 acres per day), the cost of top-dressing amounts to £1 0s. 6d. per acre (1P + 1N), which is £102 10s. per 100 acres. Making all allowances, this figure is greatly in excess of the pasture increment.

Even granting that smaller applications of manures might present a more favourable aspect, and allowing for residual effects over a period of a few years, the application of the tested fertilizers to such pastures is not economic.

Summary.

A poor natural mixed pasture on the sandy ridge country of the Lockyer Valley was top-dressed with a series of artificial manures. The experimental area was botanically analysed by the estimated percentage area method, and cuttings taken to estimate total yield and yield of nitrogen and phosphate.

The only treatment to give an increase was nitrogen and phosphate in combination. This increase was of the order of 40 per cent. in the yield taken over two summer months. There was no increase in percentage of nitrogen or phosphates.

No change in botanical composition was noticeable as the result of top-dressing.

It would appear that top-dressing of such a pasture, of low carrying capacity, is not an economic procedure.

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Plant Nutrition.

E. H. GURNEY, A.A.C.I., Agricultural Chemist.

PLANTS resemble animal life in that they require food for their growth, and the food should be provided not only in sufficient quantity, but in a suitably balanced form. In reviewing plant nutrition, other factors besides plant food have to be taken into consideration. Suitable environment, which includes both soil and climatic conditions, is a most important factor in influencing the growth, successful or otherwise, of any particular plant species.

About fourteen elements are commonly present in plants, and from these elements, with the aid of sunlight, green plants have the power of building their very complex structure. Plants obtain certain of their food requirements from the soil, and the general assumption has been that most soils contain the various plant food materials, though some soils may be insufficiently supplied with nitrogen, lime, potash, and phosphoric acid. Later investigation, however, has made it plain that a deficiency in some of the chemical elements existing in the soil, may cause poor and diseased plant growth.

Plant food is present in the soil in two forms which are respectively available to plants or unavailable. As a result of experiment and research, methods have been discovered by which the amount of available plant food in the soil may be improved or maintained. By cultivation different soil granules are exposed to the weathering action of the air which converts some unavailable into available plant food. The ploughing in of farmyard manure, green-manure crops and waste crop vegetable matter, all increase the humus content of the soil. The humus, during decomposition, yields acids which convert insoluble plant food into a soluble form, capable of being taken up in the soil moisture, and a considerable amount of plant food contained in the organic substance referred to is returned to the soil. Lime, when applied to the soil, besides neutralising soil acidity, is also capable of converting some insoluble soil plant food ingredients to an available form. These methods of soil treatment tend to an improvement of tilth, and good soil tilth is of great value in providing plants with the most suitable condition for obtaining nutriment. It permits of the free entrance and circulation throughout the soil of both air and water and also of easy penetration of plant roots through the soil. These conditions do not prevail in a hard, compact, poorly cultivated soil, in which plants are unable to make the best use of the available plant food.

In the past it has been considered that the majority of soils contain sufficient for plant requirements, with the exception of nitrogen, phosphorus, potassium, and calcium, and that the soil supply of these four elements may require in some cases supplementing by the addition of manures and fertilisers to produce successful crops.

Later investigations in connection with plant growth show that an insufficient supply of some of the less prevalent elements in the soil, or the failure of plants in assimilating such elements, is sometimes the cause of unsuccessful crops, or the cause of disease in plants.

A few remarks may be made regarding the plant nutrients—nitrogen, phosphoric acid, and potash. In connection with nitrogen it is considered that plants generally take up their nitrogen requirements in

the form of nitrate. Nitrogen increases the growth of plant and foliage, and deepens the green colour of the leaves. It also increases the size of the leaves. The pale yellowish tinge that occurs sometimes in green foliage may be caused through an insufficient supply of nitrogen to the plant, though this yellow tinge may be caused by other deficiencies. Plant leaves in sunlight have the power of fixing the carbon dioxide of the air and converting it into sugar which, being soluble, is circulated to different parts of the plant in the plant sap. Excessive supplies of nitrogen will cause an excessive succulence of growth rendering the plant less resistant to disease.

The fertilisers used for supplying nitrogen in Queensland are:—nitrate of soda, which is very quick-acting (the nitrogen being in the form of nitrate); sulphate of ammonia, which also is quick-acting; and blood manure which is fairly quick-acting, as its nitrogen is soon converted into the nitrate form in the soil. The nitrogen in bonedust and meatworks fertiliser is slow acting, as decomposition of the bone in the soil has to take place before the nitrogen is in an available form for plants.

Phosphoric acid as a plant food ingredient influences the production of seed, stimulates root growth and generally hastens the maturity of crops. A number of Queensland's soil types are insufficiently supplied with phosphoric acid; and, on such soils, good results have been obtained from the application of phosphate fertilisers. Superphosphate supplies phosphoric acid in a water soluble form and is therefore quick-acting. As bonedust has first to be decomposed, its phosphoric acid does not become available so readily to plants. Nauru phosphate is also a slow-acting fertiliser, and the effects from its application are more noticeable in the year after application.

In regard to potash, this plant food ingredient influences the production of carbohydrates, and the pulp of fruit and woody structure of plants. Potash is essential for the leaves of plants as it is required in the leaf process, mentioned before, of the conversion of carbonic acid into a carbohydrate, and also for the translocation of this carbohydrate throughout the plant. The potash fertilisers commonly used in Queensland are sulphate and muriate of potash, both of which are quick-acting fertilisers. Wood ashes also contain various amounts of potash, but coal ashes contain practically none.

The necessity for having a balanced supply of the food ingredients mentioned, may be explained, as follows:—A large supply of nitrogen causes excessive and a very succulent foliage growth with low disease resistance. Potash influences the production of carbohydrates and woody substances, and for that reason potash will counteract the effect of too much nitrogen. Potatoes may be mentioned as a crop which noticeably shows ill results through an application of unbalanced fertilisers; for, if a fertiliser with high nitrogen content and somewhat low potash content is applied to this crop, it will cause excessive leaf growth, but there will be insufficient potash throughout the leaves to influence the production of enough carbohydrates for the growth of satisfactory tubers. It will be seen then, that, with the application of a large amount of nitrogenous fertiliser, it will be advisable also to apply an ample amount of potash fertiliser.

Lime (containing the element calcium) though liable to be washed out of the surface to a considerable extent, is present in most soils in

sufficient quantities to meet the actual food requirement of plants. Lime is applied to the land more for the purpose of reducing soil acidity, and the obtaining of good soil tilth, than for plant food. In addition it must be mentioned that some crops such as lucerne and cabbage, require the presence of ample lime in the soil, whereas maize and sorghum will flourish on soils of a more acid nature.

Plant food material applied in fertilisers is rendered more available, if farmyard manure is applied at the same time as the fertilisers, even though the farmyard manure may be available in only a relatively small amount.

Investigations respecting the plant requirements of elements other than those previously mentioned have shown that a deficiency of some elements, even though they may only be required by plants in mere traces, causes poor plant growth and plant disease.

Chlorosis, that is the abnormal yellowing of the plants' green leaf, may be caused through the deficiency of certain plant nutrients. Iron is necessary for the formation of the green colouring matter (chlorophyll) of the leaf, and a deficiency of this element will cause chlorosis. There may be an abundance of iron in the soil, but if the soil has a high lime or manganese content, the assimilation of the iron by the plant will be prevented. This form of deficiency has been remedied in many cases by spraying with iron sulphate, or by applying the iron sulphate to the soil. It has been reported that in some cases, the spraying with iron sulphate and the application of iron sulphate to the soil, did not improve the condition of chlorotic apple trees; but that the injection of iron salts into the trunk of the tree was beneficial. The driving of iron nails into the trunks has also produced effective, though slower, results.

Copper is another element that may have considerable effect in maintaining healthy plant growth. In an investigation in connection with a type of chlorosis and "die-back" of fruit trees, it was found that the trouble was not remedied by the application of potash, iron, manganese, magnesium or sulphur; but that the application of copper sulphate to the soil surrounding the affected trees, at the rate of $\frac{1}{4}$ to 2 lb. per tree, restored the trees to a normal condition.

That plants require for their most successful growth some of what may be termed the less abundant elements is recognised, and the element boron has been applied to some crops with favourable results. Zinc also has been reported as having been successful in controlling chlorosis of some plants.

The action in plant growth of these less abundant elements has been designated by such terms as "catalytic" or "complementary"; but it has to be stated that the elements boron and zinc, in any slight excess, have a very deleterious effect upon plants.

There are elements required by plants which in some soils, may exist in ample quantities, whilst other soils may be supplied only poorly with them. There are some plants, too, which require more than others of a particular element; and in this connection, magnesium and manganese, may be mentioned.

Magnesium is generally present in the soil in sufficient quantity for plant requirements; nevertheless, there are occasions when the application of magnesium salts have proved beneficial to crops. Thus

magnesium is applied in some fertilisers for tobacco. In some citrus orchards in New South Wales chlorosis is considered as possibly due to magnesium deficiency.

Manganese also is usually present in sufficient quantity in the soil; and, in some cases, in such quantity as to prevent the assimilation of iron by plants. But, in some countries, experiments with the application of manganese salts has improved the quality of citrus fruit; and, in some of the experiments, has reduced chlorosis among the citrus trees.

VENT PICKING BY POULTRY.

Every year numerous pullets are lost as a result of vent picking, an acquired vice, which is easily checked when correct control measures are adopted in the early stages. If neglected or overlooked until it is firmly established, control is much more difficult. This vice is confined chiefly to pullets and starts shortly after they commence laying. At times outbreaks will occur among older hens, but in these it is usually less extensive.

Vent picking starts as the result of one bird picking the vent of another bird when it is expelling an egg. The picking causes bleeding and frequently protrusion of the oviduct follows. Once the birds acquire the taste of blood, they are ever on the alert for victims. The pecked bird may be able to get away from the attacker, but in all probability egg laying will keep the wound open and it often becomes septic, resulting in a whitish watery discharge from the vent. Eggs laid by the injured bird will frequently be smeared with blood.

Treating seriously injured birds is of little value, because they seldom make a complete recovery. If considered advisable, however, the injured parts of birds that have been pecked may be painted with Stockholm tar twice daily.

All nest boxes should be darkened by hanging bag curtains in the front of the openings. These curtains encourage the birds to lay in the nests, and, to some extent, reduce the liability to pecking.

As pecking is usually the outcome of idleness, a handful of small grain should be scattered twice daily in the litter on the floor to keep the birds busy scratching for food. If the quantity of litter is insufficient, open a bale of straw in the centre of the shed and allow the birds to scatter it over the floor. The litter supplied should cover the floor to a depth of about 4 inches. At the present time litter is costly, but it would be cheap in comparison with the value of the birds that may be lost from vent picking without its aid. Where litter is not available, some relief may be obtained by feeding a very small meal of wet mash twice each morning for several days. The feeding times could be at approximately 8 a.m. and 11 a.m., and the quantity fed at each meal need not exceed 4 lb. dry weight per 100 birds.

—*J. J. McLachlan.*

Veterinary First-Aid Chests.

TREATMENT OF COMMON AILMENTS IN STOCK.

ROSS NOTT, B.V.Sc., Government Veterinary Officer.

SINCE many cases of sickness in animals can be treated by the use of simple remedies immediately the illness is noted, it is very necessary that a supply of these should be kept always on hand in the form of a veterinary first-aid chest. In order that farmers and graziers may make proper use of these drugs, the following notes have been collected which summarise the uses of the drugs and the treatment for common ailments of stock.

It should always be kept in mind, however, that in every case where a contagious or infectious disease is suspected, graziers and farmers should report the outbreak immediately to their nearest Veterinary Officer, Stock Inspector, or to the Department of Agriculture and Stock, Brisbane, in order that measures may be taken for treatment and control.

Boracic acid is a mild antiseptic, and is used for eye lotions, mouth washes, and dusting powder for wounds.

Zinc oxide is useful as a dusting powder for wounds. An ointment can be made by mixing one part of zinc oxide with four parts of lard or vaseline.

Lysol is a powerful disinfectant, used for the treatment of suppurating wounds, and the sterilisation of instruments.

Mercury-perchloride tablets (corrosive sublimate) are a powerful disinfectant and antiseptic, used for the washing and irrigation of wounds. As, however, it will corrode all metals, it should not be used for the disinfection of instruments.

Camphorated oil is a mildly stimulating and soothing liniment. It is used for massaging the udders of cattle affected with mammitis (inflammation of the udder.)

Strong tincture of iodine is a strong antiseptic, used for the dressing of cuts and wounds. For use, one part of the tincture should be added to three parts of methylated spirits.

Zinc Sulphate tablets, each containing 10 grains, are used in the treatment of sore eyes where there is an opacity on the front of the eyeball. One tablet dissolved in 2½ oz. of boiled water and half a teaspoonful of boracic acid makes an efficient eye lotion.

Oil of turpentine, when administered internally with oil, will prevent fermentation. It may be applied externally as a disinfectant, and is useful for applying to wounds in conjunction with olive oil, or raw linseed oil.

Aromatic spirits of ammonia (spirits of sal volatile) is a general stimulant. The dose for a horse is 1 to 2 oz.; for sheep, ½ oz. to 1 oz.; for cattle, 1 to 2 oz. It is used as a stimulant in the treament of colic, but should be well diluted to prevent the irritation of the mouth.

Spirit of nitrous aether (sweet spirit of nitre) is a stimulant. It prevents griping, lowers the temperature, and is used in the treatment of colic and kidney trouble. The dose is the same as that for spirits of sal volatile.

Powdered nux vomica is a nerve stimulant, and is used for restoring tone to the bowels. It is beneficial in treating debility and other diseases in which the patient is weak. The dose for horses and cattle is one teaspoonful twice a day.

Sulphate of iron is a tonic and is also used in the preparation of the antidote to prussic acid poisoning.

Tincture of perchloride of iron is a tonic and is also used in the preparation of the antidote to arsenic poisoning.

Measures:—1 fluid dram = 1 teaspoonful; 1 fluid oz. = 1 tablespoonful; 2 fluid oz. = 1 wineglassful; 2 tumblerfuls = 1 pint; 20 fluid oz. = 1 pint.

In addition to the drugs and medicines mentioned, the following materials are generally obtainable from the home:—Copper sulphate (bluestone), turpentine, raw linseed oil, ginger, starch, treacle, honey, mustard, washing soda (carbonate of soda), baking soda (bicarbonate of soda), household cloudy ammonia, Condy's crystals, common salt, etc.

Digestive Disorders.

Colic in Horses.—(*a*) Impaction (stoppage of bowels); sand colic.—Give the following drench:—Raw linseed oil, 1-1½ pints; turpentine, 2 oz. Shake up thoroughly before giving. Follow three hours later with this draught, which can be repeated every three hours, if necessary:—Spirits of nitrous aether, 1oz.; aromatic spirits of ammonia, 1 oz.; treacle, 1 cupful; water, 1 pint. If there is no improvement in the case in 24 hours the whole treatment should be repeated.

(*b*) Flatulent (windy) Colic.—Give this drench:—Raw linseed oil, 1-1½ pints; turpentine, 2 ozs.; aromatic spirits of ammonia, 1 oz. (or household cloudy ammonia, ½ oz.).

(*c*) Spasmodic Colic.—Drench with the following mixture:—Aromatic spirits of ammonia, 1 oz.; spirits of nitrous aether, 1 oz.; treacle, 1 cupful; water, 1 pint.

Note.—In all cases of colic, the medicinal treatment should be supplemented with enemas of warm, soapy water. To do this a length of hose ½ in. in diameter and 6 ft. long, with a funnel in one end, is required. The hand, washed and oiled, carefully carries the free end of the hose as far forward as possible into the passage, and 3 to 4 gallons of the solution is slowly introduced through the funnel. The enema should be repeated every three or four hours if necessary.

The farmer should note that the condition often termed by him "stoppage of water" is generally a form of colic and should be treated as for impaction.

Indigestion in Cattle—(*a*) Impaction of the paunch; constipation; stoppage.—The following mixture should be used as a drench:—Epsom salts, 1-1½ lb.; household cloudy ammonia, ½ oz.; ginger, 2oz.; treacle, 1 lb.; warm water, 2 pints. (To mix, dissolve the salts in 1 pint of water and treacle in the other pint, mix together, and add the rest of the ingredients.) This drench should be repeated in 24 hours if necessary. In cases of impaction this should be followed up by a heaped teaspoonful of powdered nux vomica given night and morning for three days.

(*b*) Hoven or Bloat.—The following drenches are suitable:—No. 1—turpentine, 2 oz.; household cloudy ammonia, ½ oz.; cold thin gruel, 2 pints. No. 2—Condy's crystals (small teaspoonful) dissolved in a quart of warm water. The medicinal treatment should be supplemented by gagging and light exercise. In severe cases the paunch should be punctured on the left side, a trocar and canula or a clean sharp pocket knife being used for the purpose.

Digestive Disorders in Sheep.—The same treatment should be given as for cattle, one-quarter of the dose of the various drugs being used.

Indigestion in Pigs.—The following purgatives are suggested:—Castor oil, 1-4 oz. (according to size) in warm milk; or linseed oil, 2-8 oz. (according to size); or Epsom salts, 2-6 oz. (according to size). The purgative drench may be supplemented by putting the pig on to small, sloppy feeds.

Other Common Conditions.

Wheat Gorge and Laminitis (Founder) in Horses.—As soon as this condition is observed a drench made up of a solution of bicarbonate of soda (baking soda) should be given. The dose is one cupful of soda dissolved in a quart of water. This drench should be repeated, if necessary, every two hours. The patient should be allowed plenty of drinking water. Three hours after the first drench a draught containing—raw linseed oil, 1-1½ pints; and turpentine, 2 oz. should be given. The soda drench should be given night and morning on the two following days. Where stiffness of movement is present, the horse's heels should be lowered with a rasp and the animal stood in water during the day. It should be taken out at night and put on soft standing. A light ration should be given, but no grain.

Ergot Poisoning (Cattle).—A drench of any purgative mixture should be given without delay in order to get rid of the offending matter. A mixture of 1 lb. Epsom salts and 1½ oz. ginger, dissolved in one quart of warm water, would serve the purpose. If recovery is slow a tonic should be given, such as:—Sulphate of iron, 2 drachms; powdered nux vomica, 1 drachm; Epsom salts, 2 oz.; powdered gentian, 2 drachms. This should be mixed into a powder and given with treacle night and morning for 3 days.

Milk Fever.—The udder should be washed with lysol solution (tablespoonful of lysol to a pint of water). A boiled teat syphon, which has been attached to the enema syringe (the latter should also be put into disinfectant if it has been used for other cases) should be inserted into the teat and air injected into the quarter until it is quite firm. This should be repeated for each quarter. The teats should be tied with tape, which should be removed in two hours' time. The injection of air should be repeated in three hours if the animal has shown no signs of recovery. The patient should be kept propped up on its brisket after the injection.

Mammitis (Inflammation of the Udder).—The animal found suffering from this trouble should be isolated. Hot fomentations should be applied to the affected quarter, and it then should be massaged with camphorated oil (warm). This should be done three or four times daily, and it is important that the quarter should be stripped out many times during the day.

Further, the patient should be given a purgative drench as has been suggested for impaction of the paunch. The hands of the attendant should be disinfected before proceeding to milk healthy cows.

Inflammation of the Eye.—The eye should be examined carefully for the presence of foreign bodies, such as a piece of chaff. If any are present a few drops of castor or olive oil should be put into the eye sac, and the foreign substance removed with forceps. The following eye lotions are recommended:—

(1) Acid-boracic (two teaspoonfuls to the pint of boiled water). To this can be added 10 tablets of zinc sulphate (each tablet contains 10 grains).

(2) Where a white film is present over the eyeball, use perchloride of mercury solution (one tablet to six pints of boiled water).

Arsenic Poisoning.—The animal should be given as a drench a mixture containing 1½ oz. tincture of perchloride of iron in a wine-glass of water, and ½ oz. of carbonate of soda in a half tumblerful of water. This should be repeated, if necessary, at intervals of two hours. Lime water also should be given.

Prussic Acid Poisoning.—A mixture containing 1 oz. carbonate of soda in 1 pint of water, added to ½ oz. sulphate of iron in 1 pint of water, should be given as a drench.

Treatment of Surgical Conditions.—(*a*) Bleeding.—This is best controlled by pressure. The most common method is to place a pad of cotton wool or clean linen cloth soaked in turpentine on the wound, and bandage tightly over it. If there happens to be a large vessel cut, and its end exposed, it can be clamped with artery forceps: A small pair of pliers which have been well boiled will do in an emergency. For severe bleeding a tourniquet may be applied (to a limb) above the wound. This may be improvised by tying a cord round the leg loosely, and then twisting a stick in it till it is so tight that it stops the circulation. It should be removed as soon as possible.

(*b*) Abscesses.—The swelling should be clipped and hot fomentations, or a blister of mustard and warm water (the consistency of table mustard) should be applied. When pointing occurs the swelling should be opened up at its lowest point so as to ensure drainage. It should be syringed out frequently with iodine solution made by adding tincture of iodine to water till a deep sherry-coloured mixture is obtained.

(*c*) Wounds in general.—In all cases cleanliness is essential. The hair should be clipped around a wound, which should then be washed with warm water and soap with a view to removing any foreign matter. The wound should be bathed with a disinfectant solution, e.g., lysol (1 tablespoonful to 1 pint of water); perchloride of mercury (1 tablet to 1 pint of water); tincture of iodine; turpentine. If practicable, a pad soaked in the disinfectant should be applied and a bandage put over it. Later dry dressings could be used. A useful one is made of equal parts of starch, zinc oxide, and boracic acid. A useful fly repellant is—lysol, ½ part; turpentine, 1 part; olive oil or raw linseed oil, 20 parts.

(*d*) Punctured wounds of the foot.—These require special treatment. The wound should be well opened up so as to allow it to drain freely. It should be swabbed out with pure turpentine or lysol, and it

is essential that the wound should be kept clean. It should be fomented daily with a bran poultice, to which lysol or other disinfectant has been added.

(*e*) Lacerated wounds of the skin.—These should, where possible, be sewn after cleansing.

(*f*) Udder injuries, cracked teats, etc.—All wounds and contusions should be kept clean and smeared with ointment, e.g., zinc oxide ointment.

(*g*) Proud flesh on limbs.—This should be dressed daily by rubbing with a piece of copper sulphate (bluestone), and then bandaged tightly.

Administration of Medicines.

Liquids are most suitably given as a drench. Care should be taken in giving oil drenches to horses. The medicine should be well shaken, and given in small quantities. Rubbing, pinching, or other interference with throat or neck parts should not be indulged in. In drenching pigs a satisfactory method is to use an old piece of hose. Oil should be mixed with warm milk to make it run freely.

Powders are best given by mixing with treacle, honey, or jam to form a thin paste, which is then smeared on the back teeth and tongue with a thin flat stick.

SHEEP LANDS FOR GRAZING HOMESTEAD SELECTION.

KATANDRA RESUMPTION.

Portions 8 and 9, parish of Katandra, comprising part of Katandra resumption will be open for grazing homestead selection at the Land Office, Hughenden, on Thursday, 5th August, 1937.

The portions are situated from 16 to 20 miles south-easterly from Whitewood, on the Hughenden-Winton railway, and comprise very open downs country grassed with Flinders, Mitchell, Blue, Button, and other grasses and are suitable for woolgrowing and fattening.

Portion 8 is sufficiently watered, but more water will need to be provided on portion 9.

The areas of the portions are 35,931 acres and 36,091 acres respectively.

Each selection will be for a term of 28 years and the annual rents for the first 7 years are 2d. per acre and 1¾d. per acre respectively.

Each selection will be subject to the condition that the selection must be stocked with the applicant's own sheep within 3 years.

Free lithographs and full particulars may be obtained from the Lands Department, Brisbane, the Land Agent. Hughenden, and the Government Tourist Bureaux, Sydney and Melbourne.

The Importance of "Type" in Merino Flocks.

J. L. HODGE, Instructor in Sheep and Wool.

LORD Barnby, when visiting Australia on a wool publicity mission, referred to the importance of breeding to type and suggested that this was preferrable to undertaking elaborate woolclassing. This was not intended as a reflection on woolclassing, as some people thought; but apparently Lord Barnby desired to stress the importance of fixing a type in the flock and thereby *simplifying* woolclassing.

The importance of the advice given cannot be overestimated. Generally speaking, insufficient care is taken in mating the flocks of the State. The fixing of a type, or even the attempt to do so, is often sadly neglected. Far too many people are under the impression that rams of any type will do, whereas, in reality, the selection of a certain type of ram to mate with the ewe flock should be one of the major considerations of the year. It must be recognised at once that there are no short cuts to this desirable achievement and the question arises: How is this fixing of a type to be brought about in the shortest number of years?

Firstly, the ewes must be regularly culled, having in view the exact type of sheep required for a particular district. Apart from the covering, ewes would be discarded for other faults such as lack of size, malformation of any kind, devil's grip, or want of constitution or conformation, these being amongst the most commonly found faults in the average flock.

A line of classed ewes, having been secured, the ram should be chosen on the assumption that like gets like; but, taking into account also the rapid manner in which merino wools fine up under western conditions, it will be wise to select rams several counts stronger in the wool fibre than that of the ewes with which they are to be joined. A violent contrast such as really strong woolled rams on fine ewes, is not on any account to be recommended. This would be only an abortive attempt to do in one year that which, under the most favourable of conditions, cannot be accomplished under four or five years. The mating of sheep of very

fine wools with those of very strong wools results in the progeny throwing all ways instead of the medium, which was to be desired.

Many graziers fail to regard the purchase of rams from the right business angle. Granted the knowledge necessary to select the right type of rams, it needs only a simple sum in arithmetic to estimate the financial advantages to be derived from the choice of a higher grade of animal rather than the so-called cheapest flock rams. These rams are *not* the cheapest, and one crop of lambs should be sufficient to convince the grazier of a "penny wise, pound foolish" attitude. No additional expenditure on the property can be better justified than an extra amount spent in rams; provided, of course, that the grazier, or the expert he employs for the purpose, has the knowledge necessary to make the right selection.

The quickest way then to establish a type of merino sheep on the property is to combine an annual culling with the selection of better rams. Either of these operations is important and will give results, but one is incomplete without the other.

The selection of the stud from which the rams are to be purchased is of outstanding importance. The type desired must, of course, be procurable there. The age of a stud should be taken into consideration, because provided the stud has not slipped back, the prepotent power in the rams, or the probability of rams reproducing progeny like themselves, is more likely to be firmly established.

It is important in the fixation of type that, being suited by a particular stud, the grazier should stick to that stud unless a very good reason can be given for a change.

The joining of flock ewes with the rams there leads to what is called indiscriminate breeding. Apart from the culling of the ewes and the selection of the rams no attempt whatever at selective breeding is made. If the paddocks are available, it is safe to assume that, even amongst the flocks, something useful and profitable could be done in this way. Again on the assumption that like gets like, it appears to be well worth while to select carefully the ewes to mate with rams likely to suit them from a wool point of view, and thereby bring about some measure of selective breeding.

By way of helping the grazier in this respect, the Department of Agriculture and Stock has made a start with some stud breeders in the matter of typing the flock rams before sale. In the past, it has been a common practice, in cases in which rams of a certain type have been recommended, for the stud master to give a run of rams at a certain agreed price. This results frequently in a buyer getting fine medium and strong rams in direct opposition to the advice tendered with regard to type. The result is deeper and deeper culling and a loss of years in the establishment of the type suitable for the property and district.

In the selection of rams, it does not follow that, because a certain type is recommended for one district the same advice would be equally applicable to another part of the State. For far-western and central conditions, it should be the object of the grazier to produce a strict medium, and to accomplish this and keep it, it is necessary, as before pointed out, to use rams slightly stronger than the ewes with which they are to be joined. In areas nearer to the coast the production of

finer wool may be encouraged, provided that constitution is in no way sacrificed. It should always be remembered that of the two—price per head, or price per lb.—the sheep showing the former result should be chosen especially for the West and Central parts of the State where constitution plays such a big part in times of drought.

It may be thought from the foregoing that the writer holds a brief for the strong type of merino as against the finer wools. Such is not the case except where it is definitely proved that sheep of the stronger type are more likely to do well under adverse conditions. After all it is not a matter always of what individual graziers would like to breed, but a case of the choice of a particular type being made imperative in a particular district.

In the best interests of the sheep industry, it is not desirable for cull ewes to be passed on to a neighbour as breeders. It would be far better for them to be fattened and sold for the purpose of slaughter. There is no law against the selling of cull ewes as breeders; but the prospective buyer would be well advised to steer clear of such in the formation of his flock.

On certain properties where the culling of a definite percentage every year takes place, and the use of good rams has long been a definite policy, a good line of ewes may be secured. These, then, will require culling before the rams are joined.

Like everything else on the land, the question of fixing a suitable type on a certain property in a given district resolves itself into what is profitable and what is not. A bad sheep eats just as much as a good one; but the economic consideration goes further than that, inasmuch as a bad ewe reproduces her kind, or more probably still produces a lamb inferior even to herself.

The practice of culling therefor is definitely profitable to the grazier. A well constructed jetting or branding race is admirably suited to the purpose. The nearer ewes are to being full-fleeced the better for culling purposes. Culling should also apply to the ewe hoggets. Only those conforming to the type decided upon, and filling the bill in every other way, should be retained as future breeders.

Constitution is of paramount importance and, after that comes the covering. Density, length of staple, colour and quality are all necessary in the selected breeder. Quality does not necessarily refer to coarseness or fineness of the fibre, but embraces such characteristics as breeding and softness in handling. Quality, therefore, may be found in a strong wool just as often as in a fine wool.

No known domesticated animal responds so quickly to careful and selective breeding as the sheep. It is equally true that there is no shorter cut to increased returns than in the elimination of the unprofitable and the retention of the profitable animal.

From every point of view, the culling of the ewe flock, and the introduction of better rams with the object of fixing a type, has everything to commend it and nothing against it.

Having established a good flock, care should be taken to feed them adequately. Half the troubles in the flocks are brought about by overstocking at some period of the year. Under-nourished sheep lend themselves readily to the infestation of internal parasites, and are not

constitutionally able to withstand the attack. Then again, it is not possible for a half-fed sheep to produce either the fleece or the lamb which would be expected in the case of a properly nourished animal.

It should be apparent that not only should the quality and type of the flock be brought about in the manner indicated, but that having the flock, it is in the interest of the grazier to maintain the health of every animal in it at the highest point.

SELECTING NEW BANANA AREAS.

With the approach of winter, intending banana growers would be well advised to pay more than a little attention to the aspect of the areas shortly to be felled for the 1937 planting.

Of late years, bananas have been grown extensively and successfully on inferior forest country; but, in most instances, suitable aspects, assisted by good cultural methods, have been the chief reasons for success.

The ideal aspect, of course, is the north-east or northerly slope, with standing timber on all four sides to give the necessary shelter from strong winds. These aspects ensure the maximum amount of winter sunshine.

With sites facing any further into the east than north-east, great care should be taken that, as far as possible, the area is sheltered from the cold south-east winds. An efficient windbreak on the south side of an easterly patch should, therefore, be provided for in the clearing plan. The site chosen should be so situated that tall timber or hills at the top of the proposed area will not shut out the winter sun at an early hour.

A westerly slope is preferable to south-east, south, or south-westerly slopes, if heavy belts of timber block the not very frequent strong westerly winds. Many good bananas have been grown on westerly slopes of this description, chiefly because the areas in question receive the sun during the whole of the afternoon.

All southerly slopes should be definitely avoided, more particularly if there is open country for any distance around the proposed area, but if a southerly slope has to be used it must be well sheltered. Much more timber will have to be felled than is actually required for planting, to obviate the long shadows which standing timber at all close to the patch throws over the plantation. The limited period during which they are exposed to the sun is the chief objection to all southerly slopes. Southerly slopes possess some slight advantages over other aspects, in that they usually bear for a longer period and the fruit is less subject to banana thrips rust.

However, when one considers that a good warm-slope plantation will produce from one to three bunches to every one on the cold-slope areas, production costs, particularly to the grower on leased ground, enter so largely into the picture that intending growers with a choice of ground should always choose a warm situation to gain the best results from their work.

—*J. R. Horsley.*

Tomato Culture.

H. J. FREEMAN, Senior Instructor in Fruit Culture.

TOMATO growing is an important industry in Queensland. The fruits of the tomato plant serve a wide range of uses, for they may be eaten raw, as sliced tomatoes, or in salads. They may be made into soups, sauce, pickles, jam, preserves, and their possibilities for use in combination with other foods are only limited by the housewife's creative fancy.

Tomatoes are grown under a great variety of systems. They are almost universally grown in home gardens, and in fact few gardens are so small that there is not sufficient room for at least six or more plants. Indeed, it is surprising how far a few plants will go towards supplying the average family with an abundance of wholesome fresh fruit.

Commercially tomatoes are produced by market gardeners who may be found near any populated group, from the smallest to the largest towns.

Botanically the tomato belongs to the family Solonaceæ. It is a near relative of the potato, and is susceptible to many of the diseases of the latter. Usually it is easy to grow in our climate as a plant; but as a commercial field crop it requires care, skill, and knowledge of local climatic and soil conditions. Bountiful crops are often obtained on newly burnt off scrub land, but for continuity of commercial production land that is easily cultivated by either horse or motive power is the desired site, all other necessities being taken into consideration. Though some excellent results have been obtained from year to year from the old system of planting, i.e., allowing the plants to spread out over the surface of the ground, the necessity for early maturity and heavier crops, the prevalence of diseases and pests, and the consequent vital necessity to spray or dust, now warrants that very careful consideration be given to either the staking or trellising methods used by progressive growers and explained later in this pamphlet.

When interested commercially, irrigation in some form or other is almost indispensable, for to depend upon the natural rainfall often means that one has a crop only when everyone else has one, with the corresponding glut prices, or total failure, according to whether the season is wet or excessively dry. Since the pamphlet refers to tomato growing mainly from a commercial viewpoint, this factor cannot be too strongly stressed. The commercial grower must also be prepared to spray or dust, thus guarding against the several diseases and pests capable of ruining his crop. To neglect these precautions renders the cultivation of the tomato hazardous to a degree.

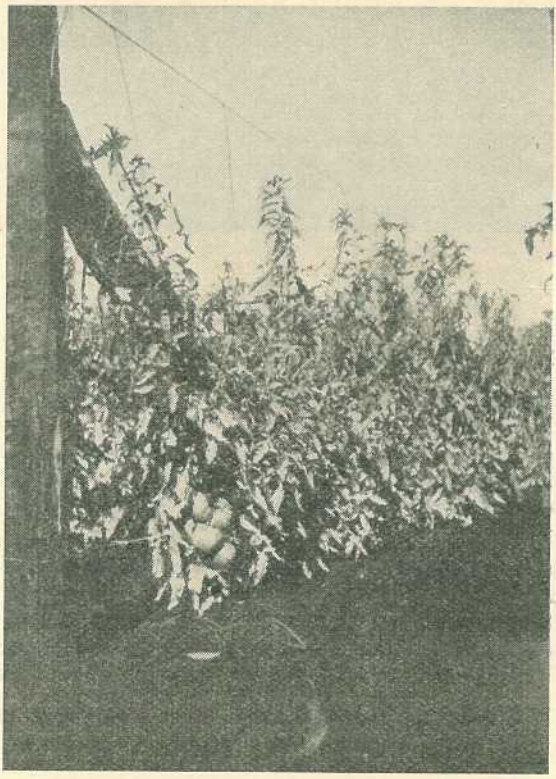


Plate 5.
TRELLISED TOMATOES.—Note young top growth.

SOIL REQUIREMENTS.

Although the tomato has a wide range of adaptation to various soil types, the actual sites selected for tomato areas must not be subject to frost, and should have reasonable shelter from high winds. The ideal soil is a fine alluvial loam with good fertility and efficient drainage, though some excellent crops are obtained frequently from basaltic soils in elevated areas.

The soil should be deeply cultivated and should not be subject to "caking" under any conditions. It should have good moisture-retaining properties, obtained by the possession of a liberal humus content. Whilst some soils are recognised as being ideal, it should be borne in mind that

tomatoes will grow in almost any reasonably good soil, provided a few precautions are observed and the weather conditions are favourable. It is not considered that a very rich soil is most desirable, for such often induces a tremendous leaf growth at the expense of fruit production. Such growth is particularly succulent and appears most susceptible to the attack of fungus diseases. Definitely a more suitable soil is one of good medium fertility, in really good cultural order, and to which the necessary fertilizer elements are supplied as required.

Plate 6.
A fine cluster of young fruit.

SEED-BEDS AND PLANTING.

The best of planning and management resulting in soil developed to a high state of fertility will be of little use if poor seed or plants are secured. Perhaps no one thing is more essential to a successful crop than securing good seeds or plants from good seed stock.

Several methods of raising seedlings are employed, each having its advantages or disadvantages as the case may be.

Perhaps the most common is to raise the plants in prepared seed-beds. Congregated thus the seedlings can, of course, be more easily sprayed and watered than is possible when the seed is sown in the field. It is vital that the plants be kept disease-free and vigorous. Tomatoes are very liable to soil troubles, such as nematodes and fusarium wilt,

therefore seed-beds should always be made on new soil. If necessary, the soil should be sterilized by one of the recognised methods prior to planting.

Various ways of sterilizing soil, such as with formalin and cheshunt compound may be employed. For the average farmer probably the simplest and most efficient is to apply intense heat to the soil prior to sowing the seed, and the following extract, taken from the departmental pamphlet "Tobacco Growing in Queensland," explains this fully.

"Before further preparing the seed-beds for sowing, the soil should be sterilized. There are several methods of doing this, such as by steaming, the application of boiling water, solutions of formalin or similar agents, but the most effective in general estimation and recommended for Queensland growers is by the application of direct heat from the firing of tree branches, brushwood, or similar heat-giving material, piled on the beds to such an extent as will, when fired, produce sufficient heat in the soil to cook a 4-oz. potato buried 3 inches deep, or an egg buried 5 inches deep. It is difficult to state the exact amount of material for burning purposes, but the equivalent of poles 3 inches in diameter laid side by side is regarded as likely to prove satisfactory. Successful sterilization of the soil is most readily accomplished when the amount of moisture therein is what is regarded as satisfactory for cultural operations. Excess of moisture is as undesirable as a deficiency, since in either case the penetration of the desired heat in the soil is less easily permitted.

"Properly burnt beds show a more or less reddish tinge of colour, while the soil is rendered more friable and breaks easily to a fine powder. The object of burning the beds as well as the soil for a couple of feet surrounding them is to destroy any fungus spores, weed seeds, insect or other life therein, that may cause damage to the young plants.

Time to Burn.

"The time to burn the seed-bed is preferably a few days or a week before it is desired to sow the seed.

Final Preparation.

"After the fire has burnt out and the soil has become sufficiently cool, all unburnt pieces of wood and large charcoal should be removed, and the beds and paths, disarranged when placing the firing material thereon, trimmed up to proper shape. The fine ashes from the firing should now be thoroughly incorporated with the soil of the seed-beds, which at the same time should be reduced to the desired degree of fineness by digging and raking, back and forth, to a depth of 3 inches and finally levelled off."

It is not a wise policy to raise seedlings twice in succession in the same bed. Seed-beds should be made in a sheltered position, open to the sun, well dug, and cultivated to a fine tilth. The surface texture should be fine, smooth, and reasonably firm. If the soil is very loose the surface will rapidly dry out and the germinating seed suffer as a consequence. The beds should be thoroughly moistened prior to planting the seed, thereby minimising the amount of watering necessary until the seedlings are showing above the surface of the bed. The seed should be sprinkled upon the slightly-firmed surface and covered lightly with sifted sandy loam, and this gently firmed by light pressure with a flat board. Some growers then apply a light covering of dry straw, stating that such action

assists germination. It would certainly help to keep the beds damp. Should this be done, a careful watch must be kept and the straw removed immediately the tiny seedlings appear above the ground. Only in extreme instances is artificial shade necessary. Subsequent treatment is to water the beds when necessary, and to spray the young plants with Bordeaux mixture at regular intervals in order to keep the young growth covered. Most growers transplant when the young seedlings are from 6 to 8 inches high.

In most instances sowing of seed should be made during April and May, if it is desired to market late winter and early spring crop. In districts where frost or cold winds are not a menace, and where irrigation is available, the sowing of seed can be made at almost any time. This, of course, is only practised where conditions are suitable to allow as nearly as practicable for a continuity of the harvest of the fruit. Normally six weeks should lapse between the sowing of the seed and the planting out of the seedlings.

Before setting the plants in the field it is essential that they be subjected to the process of "hardening off," which is brought about by gradually withholding water for a week or ten days before transplanting. Through this action the plants will tend to become tougher. This somewhat hardened growth is better able to withstand possible chilling temperatures, drying winds, shortage of water, bright burning sunlight, and the shock of transplanting.

Immediately prior to transplanting, the beds should have a good watering and the plants should be removed during the ensuing two or three hours. They must be kept moist and fresh whilst the planting proceeds. All leaves, except the undeveloped crown leaves, should be pinched or cut off to mimimise transpiration until the root system is re-established. The best method of planting is to dibble the holes and water in each plant. The plants should be set as nearly as possible at a depth ranging from 3 to 6 inches, according to the size of the seedlings. Transplanting provides an opportunity for the selection of the best plants and for the discarding of the small, spindly, or malformed ones. Only the best should be used. A well-grown plant is an important factor towards a profitable crop.

A second method of planting tomatoes is to sow three or four seeds direct in the field at distances and in rows where the plants are to be grown. This is an improvement on the seed-bed method for the reason that there are no broken roots to give ingress to fusarium wilt and no setback, as at transplanting time. However, sufficient rainfall is always necessary to make satisfactory germination and growth. Attack from cutworms must also be guarded against, but if the grower can overcome these disadvantages then planting direct in the field has many points to recommend it. With a good strike some thinning is necessary.

Possibly the most efficient method of all for the grower who will take pains to eliminate every risk is to prepare tubes of bitumen roofing material and grow the seedlings in these. The procedure is as follows:— Wooden trays are constructed about 3 feet by 2 feet to hold the tubes. The tubes are made of pieces of bitumen roofing material rolled up and held together by a loop of string. One end should be plugged. The grower from whom this idea originated uses plugs cast in cement, but short pieces of round timber would do equally well. The tubes should be filled with compost and stood upright in the trays, and two or three seeds put in each.

The first advantage of this method is readily apparent, for the trays of seedlings can be kept clear of cutworms and other pests, and if necessary carried to shelter during inclement weather.

When the seedlings have produced their first rough leaves the trays are carried to the plot, a hole dibbled, the plug removed, the string cut, and the tube containing the plant planted in the hole and removed, leaving the plant with its roots quite undisturbed *in situ*. Eventually, one plant is left, the remainder being pinched out.

Plate 7.

A GROUND CROP, REDLAND BAY.—Note apparent difficulty in harvesting as compared with a staked or trellised crop.

The second advantage is that the seedlings can be planted out safely in any reasonable weather, since the roots suffer no disturbance, and, remaining unbroken, are less liable to be attacked by fungi. By the time of planting, the plants have also attained a fair size when they are exposed to the attacks in the field of cutworms, &c., and risk of loss from pests is less.

It is claimed that tomatoes grown by this method are several weeks ahead of those planted in the usual way. The trays, tubes, and plugs will all last for years, and, since most of the preparation can be done during odd moments or on wet days, there is really no extra trouble incurred. It is actually an adaptation of the gardener's practice of pricking out his seedlings into thumb pots preparatory to planting them out in the flower beds, and this can be recommended strongly.

An ounce of seed germinating 95 per cent. should produce approximately 2,000 plants.

PLANTING SYSTEM AND PRUNING.

One must differentiate between the methods used for obtaining a quick crop off newly burnt off scrub or lantana land and those followed by the established market gardeners. In the former the plants are usually set out 4 to 6 feet by 6 feet apart (approximately 2,000 plants to the

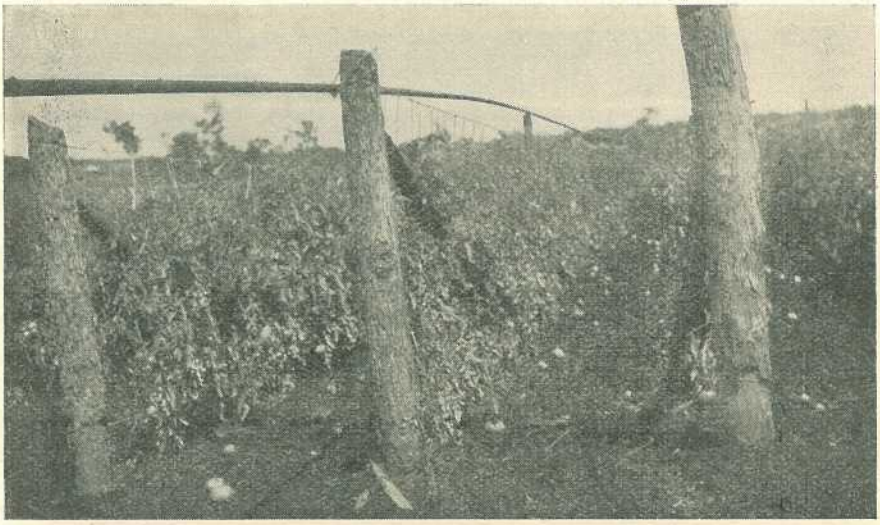


Plate 8.

AN IRRIGATION PIPE LINE.—A great advantage in successful tomato production.

acre), in the more or less uncultivated ground, and are allowed to spread, unpruned, over the land. The same practice is adopted by some growers working on ploughed tomato fields, but of recent years this policy has not been advocated especially upon land that is easily cultivated. The main objection is that the resulting crop may be anything from extremely good to a total failure, according to the weather and disease and pest incidence. Much fruit is often lost through slug and insect damage, or scalded from resting on the hot ground.

Plate 9.

TRELLISED SYSTEM.—Young plants midway between the lower and upper wires.

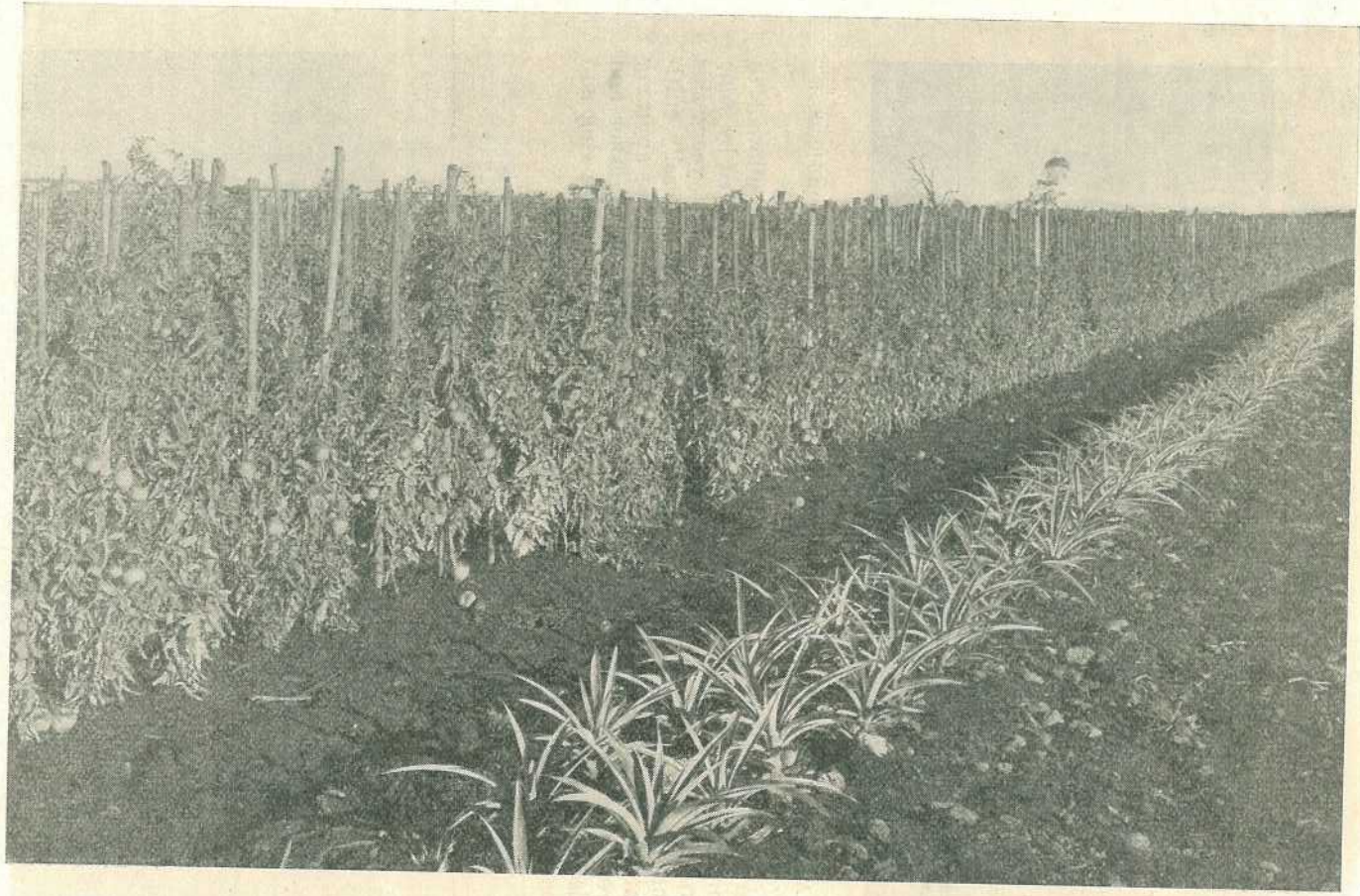


Plate 10.

STAKED TOMATOES.—Carrying a good crop. Note height of plants.

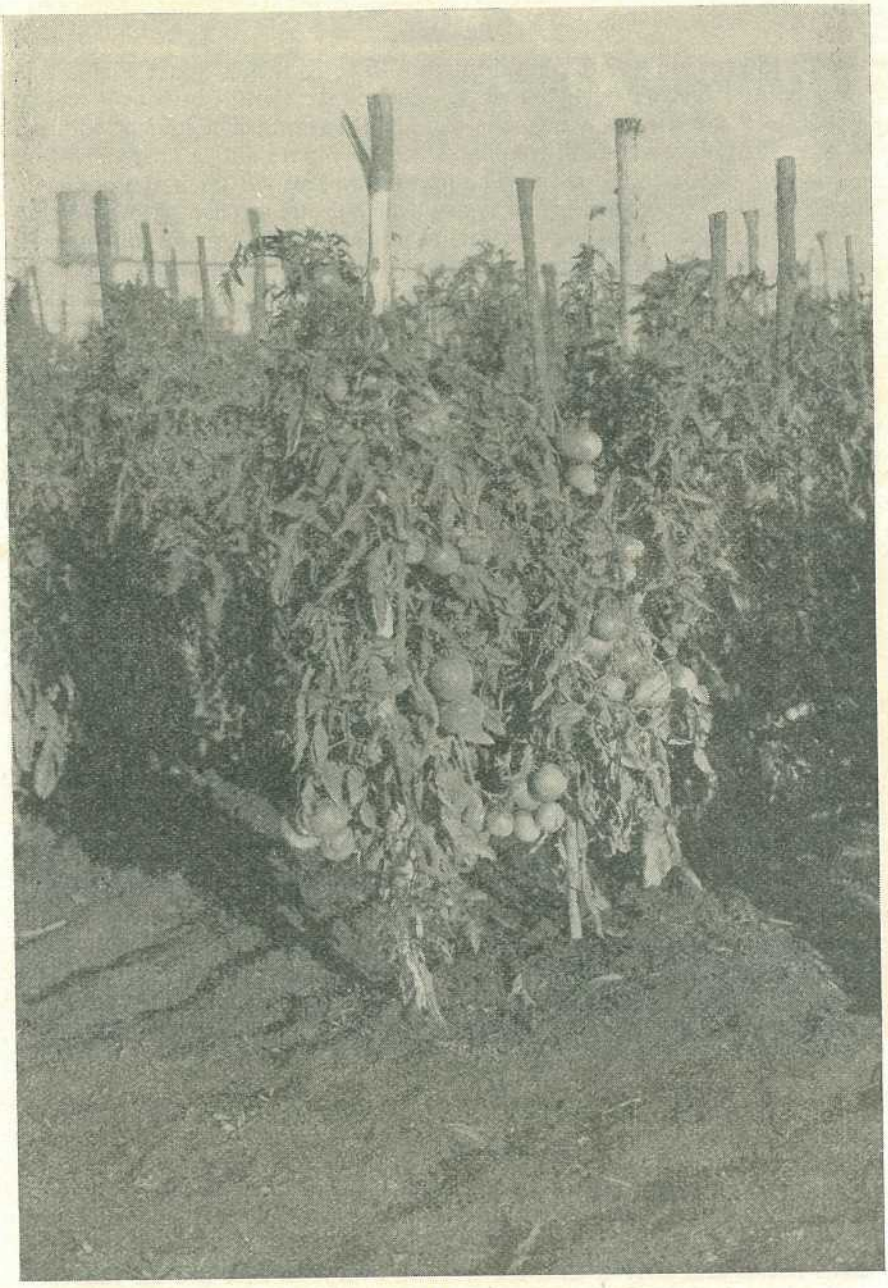


Plate 11.
STAKED BREAK O'DAY.—Showing a good crop.

Staking or trellising are both methods that have much to recommend them. Briefly, the system is as under:—

Staking.

Hardwood stakes are placed in rows 15 to 18 inches apart with 3 feet 6 inches to 4 feet between the rows. Each stake should be 5 to 6 feet in length, and when driven into the soil should retain a height of at least 4 feet. This allows for approximately 8,000 plants and a corresponding number of stakes to the acre. The plants are trained from the outset to single stems. All lateral growths are pinched out as soon after forming as possible. The leaves from whose axils they grow are, of course, left. The single stems are tied every 12 to 18 inches to the stake by strips of soft rag or binder twine. The ties are made loosely so as not to constrict the expanding stem and are positioned beneath a leaf. The actual action consists in passing the tying material round the plant stem immediately below a leaf, crossing it over itself, and then passing it round the stake twice before knotting, so that the plant is attached to the stake by the loops of a loosely-made figure eight. Finally, the growing tip is pinched out when the plant reaches the top of the stake.

Plate 12.

PICKING TOMATOES.—Advantage of trellis system.

Trellising.

One method of trellising is to set heavy hardwood posts firmly in the ground 4 feet apart at each end of the field. These are solidly stayed and bored to carry two plain wires of, say, 12 gauge. Good hardwood stakes bored and driven into the ground every 12 feet are all that are required for intermediate supports. The top wire is strained at about a 4 feet 6 inches height, whilst the lower is strained at approximately 1 foot from the ground. The young plants are set out beneath the lower wire, trained to two stems and enabled to reach the top wire by means of strands of binder twine tied in "V" fashion thus:—

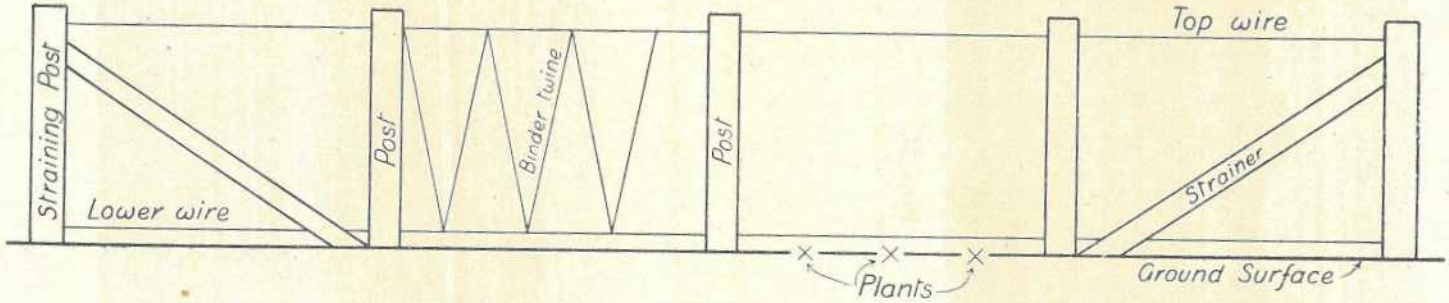


Plate 13.
Diagram showing material required and how to erect a trellis for tomatoes.

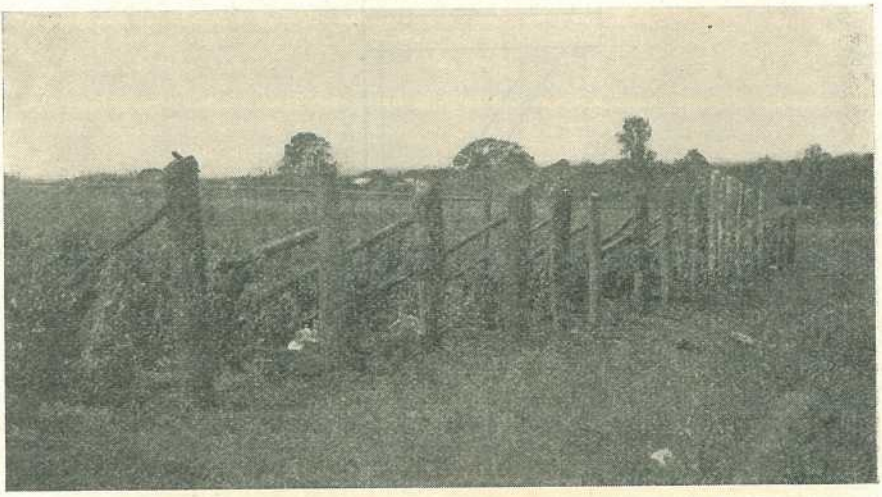


Plate 14.

TRELLISED SYSTEM.—Note position of strainers and distance between posts.

Plate 15.

A GENERAL VIEW OF A TRELLISED FIELD.—The first pick had been taken from this crop.

It is necessary to prune and eventually to pinch the head of the plant off as has been recommended in staking. The fruit produced by either of these methods is grown under the best possible conditions.

Plate 16.

A FINE SHOWING OF YOUNG FRUIT.—Note closeness of plants and height of growth.

Sprays and dusts for disease and pest control can be applied with greater economy and efficiency, the result being a high percentage of first quality fruit and a heavier crop. Cultivation also can be continued close to the plants, thereby conserving moisture and suppressing all objectionable weed growth. There is a minimum risk of damage to the fruit and the crop reaches maturity considerably in advance of fruit grown on plants unstaked or untrellised. Harvesting is quicker and more satisfactory, since the matured fruit ready to pick can be seen at a glance without having to pull the plants about. After the crop has been harvested, posts, stakes, and wiring can all be removed and stacked until required for erection on fresh land for the following season's planting.

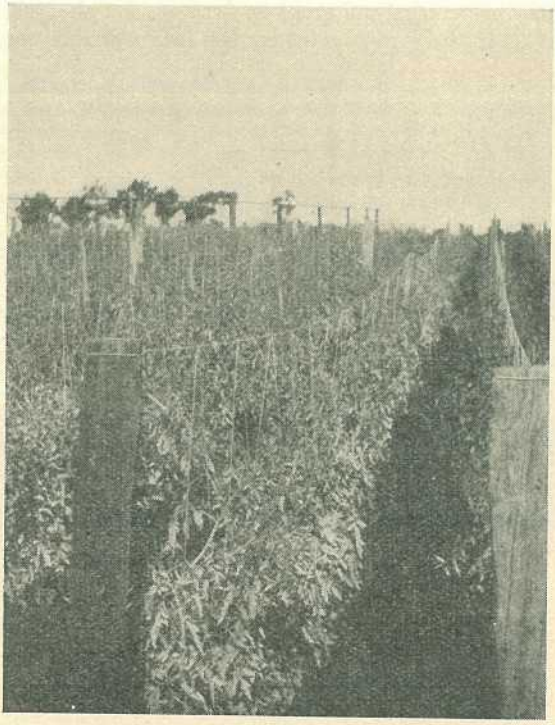


Plate 17.
TRELLISED TOMATOES.—Note spacing between rows.

FERTILIZING.

As mentioned previously the tomato does best in a soil of original medium fertility, but of good humus content. An excess of nitrogen such as is produced by very heavy dressings of stable manure alone tends to produce an abundance of succulent leaf growth at the expense of a satisfactory crop of fruit. This effect is neutralised by the application of from 150 to 300 lb. of a mixture consisting of 2½ parts of superphosphate to one of sulphate of potash per acre, which will definitely tend to check excessive vine growth, result in an earlier maturity of fruit, and materially increase the yields. It will be seen therefore that although the tomato requires a fertile soil, it is very sensitive to an unbalanced nutrient condition. On soils of moderate fertility a complete fertilizer, such as 4-12-12 or 4-16-12, applied at the rate of 300 to 500 lb. per acre should prove most beneficial. Such a formula as 4-12-12 is obtained by mixing together 420 lb. sulphate of ammonia, 700 lb. superphosphate, 560 lb. bonedust, and 560 lb. sulphate of potash, thus making 1 ton of fertilizer. The formula 4-16-12 would require a greater amount of superphosphate. (The chief fertilizer firms supply ready mixed fertilizer to these formulæ.) The fertilizer should be applied in the row and mixed well with the soil before setting the plants. Where very heavy applications are necessary, the fertilizer should be applied at the side of the row or broadcast, the purpose of this being to avoid injury to the roots and stems of the newly-planted seedlings. A side dressing of from 50 to

100 lb. of sulphate of ammonia or nitrate of soda applied one month after transplanting is often beneficial. The method of application is to open furrows about 2 or 3 inches deep on both sides of the rows, about 9 to 12 inches from the plants, and apply the fertilizer along these small furrows which should then be covered in with loose friable soil. Top-dressing with from 75 to 100 lb. per acre of water-soluble inorganic fertilizer, made up on a 4-11-10 formula, is practised with beneficial results under certain conditions. Such a formula is obtained by mixing together 490 lb. sulphate of ammonia, 1,265 lb. superphosphate, and 485 lb. sulphate of potash, making 1 ton. In average soils the application of lime to tomato ground does not seem directly to benefit the tomato crop, but is often indirectly beneficial as a result of its effect on other crops planted in rotation.

Plate 18.
A fine crop of trellised and irrigated tomatoes, Redland Bay.

It must always be remembered that the humus content of the soil must be kept up and rotating the land with a green crop appears to be the most satisfactory method to adopt. In considering this, regard to nematode control arises, for, unfortunately, the tomato is highly susceptible to these soil animals, and most of our areas devoted to market gardening are infested to a varying degree. A non-susceptible green crop is, therefore, most desirable and *Crotalaria goreensis* can be recommended for such purposes.

VARIETIES.

Every tomato grower should keep himself well informed in regard to varieties. Constant attempts are being made by individual growers and through departmental experiments to improve tomato varieties and to develop new and better types, the results sometimes being satisfactory. Considering such facts, a selection for Queensland home gardens could be made from the following:—Earliana, Bonnie Best, Break O' Day,

Plate 19.
The tomato packer at work.

Marglobe, and Ponderosa. A good list for the market gardener could be selected from the following, which are placed in order of maturity:—

Early Varieties: Earliana, Earliwinner, Kondine Red, Bonnie Best, Break O' Day, June Pink, and Chalk's Early Jewel.

Mid Season: Marglobe, Burwood Prize, Improved Stone, Bowen Buckeye, Norton, and Red Marhio.

Late Varieties: Targinnie Blue, Ponderosa, and Australian Large Red.

The following varieties are of wilt resistant strain:—Break O' Day, Marglobe, Red Marhio, Bowen Buckeye, and Norton. Much has been said in favour of wilt resistant varieties, and in districts subject to wilt damage more extensive plantings of these varieties could be recommended.

Between the earliest and the latest maturing varieties in the one season would be a difference of approximately thirty days, i.e., if all plants were planted on the same date. Earliana is one of the quickest to mature, whilst Ponderosa usually takes the longest of the recognised commercial varieties.

PESTS AND DISEASES.

In Queensland the main diseases affecting tomatoes are:—Irish blight, fusarium wilt, bacterial canker, target spot, septoria leaf spot, blossom-end rot, and the virus diseases spotted wilt, mosaic, and big bud, whilst the more important pests of tomatoes include cutworms, corn-ear worm, green vegetable bug, Rutherglen bug, tomato mites, and nematodes.

Information regarding these and other pests and diseases is obtainable from officers of the Division of Entomology and Plant Pathology, Department of Agriculture and Stock, at Brisbane, Stanthorpe, Toowoomba, Nambour, Rockhampton, and Atherton.

QUEENSLAND SHOW DATES FOR 1937.

July.

Nambour—	
Show	15th and 16th
Campdraft	17th
Esk	16th and 17th
Charters Towers	20th to 22nd
Laidley	21st and 22nd
Maleny	22nd and 23rd
Cairns	27th to 29th
Gatton	28th and 29th
Barcaldine	28th and 29th
Emerald	28th and 29th
Caboolture	30th and 31st

August.

Crow's Nest	4th and 5th
Home Hill	6th and 7th
Royal National, Brisbane	16th to 21st
Wynnum	27th and 28th

September.

Imbil	3rd and 4th
Ingham	3rd and 4th
Pomona	10th and 11th
Tully	10th and 11th
Rocklea	11th
Innisfail	17th and 18th
Malanda	22nd and 23rd

October.

Ravenshoe	8th and 9th
Millaa Millaa	1st and 2nd

November.

Murwillumbah	3rd and 4th

Green Manuring the Orchard.

R. L. PREST, Instructor in Fruit Culture.

MUCH has been said and written by agricultural experts throughout the world on the subject of green manuring generally in the orchards and the field; but, although the more progressive growers have adopted this annual practice, it is unfortunate that many have failed to realise how necessary it is to the success and longevity of their orchards.

By green manuring is meant the growing of suitable green crops in the orchard to be turned under to rot down as humus, and by this means improve the soil texture and assist in maintaining fertility. Growers will more readily appreciate the importance of this practice, when it is recognised that humus, the product of the decay of organic substances, is one of the most important ingredients in any fertile soil, and, generally speaking, is only present in inadequate amounts in most of the soils in our citrus growing areas.

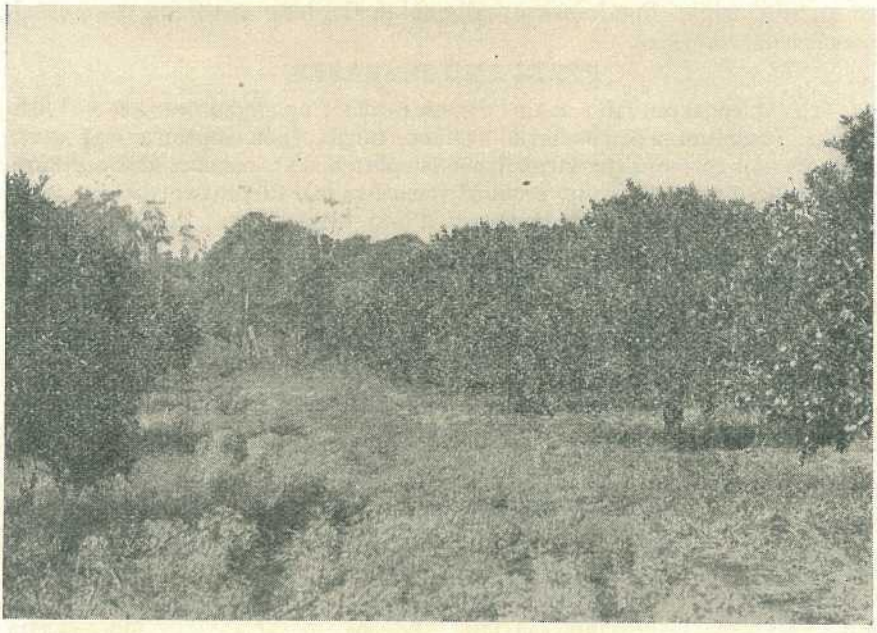


Plate 20.
Winter Green-manure crop of young Lupins in the Citrus plantation.

Except in alluvial lands, periodically improved in fertility by flooding, the orchardist must consider the maintenance and improvement of the soil fertility if he wishes to harvest good crops. The application alone of artificial manures is of little value, when not supported by soil humus. Where animal manures are available, their incorporation with the soil is most desirable; but, in the absence of bulky, organic farmyard manure, the maintenance and improvement of soil fertility may be carried out by growing and turning under green manure crops. Apart from building up the physical condition of the soil, their growth during the rainy season reduces soil losses by erosion.

By the ploughing under of some succulent rapid-growing green-manure crop, the soil is enriched by the addition of certain essential plant foods. The carbon, oxygen, and hydrogen of plants come largely from the air, and the turning under of a crop, therefore, increases the store of such elements in the soil. The compounds that result from the crop decay increase the absorptive power of the soil and promote aeration, drainage and granulation—conditions of importance where successful plant growth is concerned. If the crop turned under is a legume, and the nodule organisms are active, the store of soil nitrogen is increased.

Plate 21.
New Zealand Lupin—Note root nodules.

Green-manure crops may also function as a cover crop, in so far as they take up the extremely soluble plant foods and prevent their loss in the drainage water. Green-manure crops, especially those with deep roots, absorb plant food from a great depth, and when the crop is turned under, this material is deposited in a more available form nearer the tree root zone.

When planning the growth of green-manure crops, care should be taken to avoid, as far as possible, their competition with the trees for soil moisture, particularly during the active period of tree growth and fruit development. Under no consideration should trees be permitted to suffer from lack of moisture.

In coastal orchards the general practice should be to utilise the summer rains. By planting about late November, a good germination may usually be obtained, since, under ordinary weather conditions, November is showery. The crop may then be permitted to grow until

about the end of February, which period will cover the rainy season, ensuring a good bulk for turning under, and incidentally checking soil erosion.

Plate 22.

Reconditioning Passion Vine soils. Green-manure crop of Mustard ready for turning under.

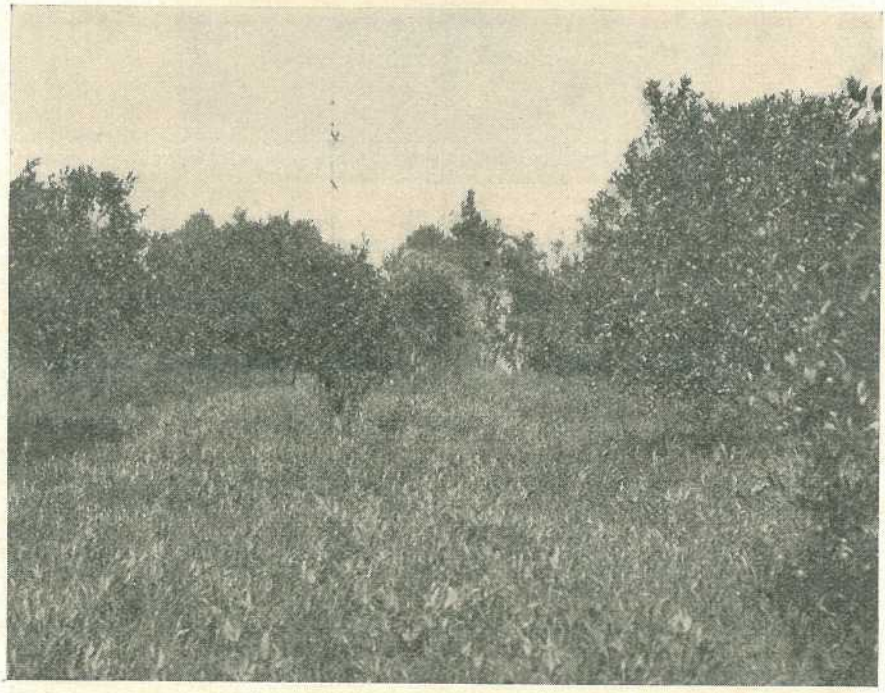


Plate 23.

Winter Green-manure crop of Field Peas and Skinless Barley in a Citrus plantation.

The districts in which irrigation facilities are available, or where autumn and late rains are seasonable, will be best served by planting late autumn and winter green-manure crops. Such crops, however, should not be permitted to grow over into the active spring period.

In newly planted orchards, trees up to four or five years of age seldom occupy more than a relatively small proportion of the total area upon which they have been planted. This factor may be early utilised to build up a reserve of vegetable matter in the soil by thickly interplanting cover crops up to four or five years. The tree roots do not extend far from the trunk and do not take up the amount of space occupied by those of older established trees. Thus cultivation may be confined to the immediate vicinity of the trees; and by far the greater amount of space down the centre of the tree rows may be occupied in growing both summer and winter green crops. A strip along each side of the tree is thus being cultivated frequently.

Plate 24.
Summer Green-manure crop of Crotalaria in a Custard Apple plantation.

The choice of the particular crop to grow will depend upon the season, the amount of water available, and the length of growing period available.

As the main essentials of a desirable green crop are rapid and succulent growth, it is of considerable benefit to apply a light dressing of fertiliser when sowing the crop. Both legumes and non-legumes will benefit considerably by the presence of phosphates in the early stages of growth, whilst in some soils nitrogen as well as phosphates may be required to produce good growth.

Though as yet the most desirable plant to use as a green-manure crop has not been found, there are at least two or three that have proved satisfactory for summer crops. Planted during November and December

as seasonal conditions permit, Crotalaria, Poona Pea, and Black Cowpea have done well, particularly where sown with superphosphate. The addition of one to two hundredweight of superphosphate per acre at seeding will be found to give excellent results. On poor and exhausted soils, the addition of a little sulphate of ammonia or nitrate of soda at the rate of ½ cwt. to the acre will be of material assistance to the cover crop.

Plate 25.

Reconditioning Pineapple soils. Green-manure crop of Maize ready for turning under.

Under normal conditions these plants will have made satisfactory growth and produced a good body of succulent tops for turning under during March and April.

For the winter green-manure crop, field peas and barley, tick beans, mustard, and in some districts lupins and vetches have proved satisfactory.

Planted in March, good bodies of material have been ready for turning under in June. Here again, except perhaps in practically virgin soils, it is very desirable that a suitable fertiliser be used at planting to ensure quick growing and succulent plants.

Some Tropical Fruits.

No. 15 THE MABOLO.

S. E. STEPHENS, Northern Instructor in Fruit Culture.

THE Mabolo is a member of the Order Ebenaceae, or Ebony family, and is closely related to the Sapotaceous fruits. The tree is slow growing and takes many years to reach its ultimate height of about 30 feet. Its chief value lies in its ornamental appearance rather than in its fruit production, for although the tree crops heavily the fruit is of mediocre quality.

The native habitat of the mabolo is the Philippine Islands and the East Indies. Outside these countries it is only infrequently met with, usually planted as a specimen in tropical fruit gardens or parks. Specimens in Queensland are very limited in number.

Plate 26.
A three-year-old Mabolo Seedling, illustrating the slow growth.

The tree is usually raised from seed which germinate readily enough in loamy sand. The growth of seedlings is very slow and it takes a considerable time for the plants to reach a suitable size for planting in the field.

The foliage of this plant is distinctive in that, while the upper surface of the leaves is dark-green and glossy, the under surface is of a greyish colour and heavily pubescent. The leaves are of fair size, being 8 to 10 inches long by 3 to 4 inches wide, and are borne laterally along the smaller growths. During September flower buds are produced in all the leaf axils of the season's lateral growths, the flowers being directed downwards beneath the leaves. The flower has a cumbersome appearance with its four strongly recurved fleshy, cream-coloured petals opening

out over a like number of large erect sepals. Only a comparatively small number of flowers produce fruit, but even so a heavy crop usually results. The fruit is undoubtedly of striking appearance. Shaped similarly to one of the flat type of persimmon, it retains the sepals throughout its growth as does its persimmon relative. The skin of the fruit is thickly covered with fine needle-like hairs, giving it a velvety appearance. The colour is rusty-brown tinged in the young fruit with green, but assuming a reddish hue when ripe. On cutting the ripe fruit across it will be seen that it consists of a white mealy flesh covered

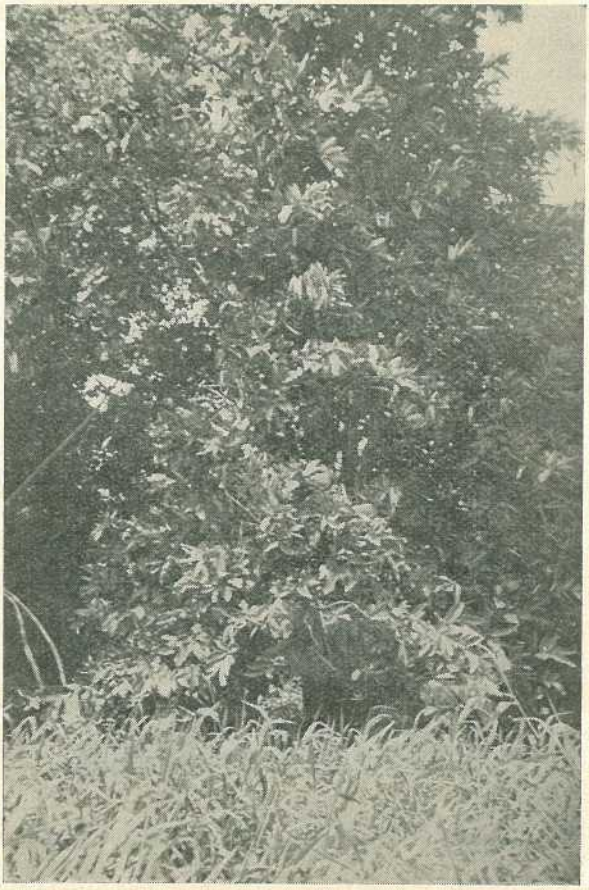


Plate 27.
A Mature Tree about Forty Years old.

by a thin skin. The star-shaped disposition of the seed cavities which is characteristic in sapotaceous fruits, is retained in this fruit also. The first taste of the fruit does not create a favourable impression and further acquaintance with it only modifies that impression in a small degree. The fruit cannot even be classed as of fair quality. A peculiarity the fruit shares with quite a number of tropical fruits is the remarkably strong scent of the ripe fruit. Although not unpleasant this scent becomes overpowering in a closed room. The ripening season

in North Queensland is January to March, but odd ripe fruits will sometimes be found at other seasons.

In regard to soil for the mabolo, trees are growing well in the North on rich alluvial loam and fairly well on loamy sand kept well moistened.

The fruit-sucking moth is very partial to this fruit which it sucks out, leaving only a spongy mass. Fruit fly also attacks it readily.

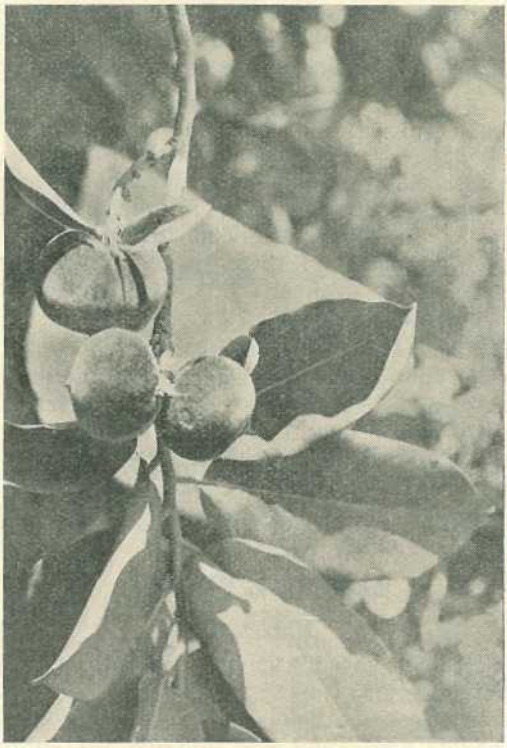


Plate 28.
The Mabolo Fruit.

Several common names are applied to this fruit. In its native habitat Mabolo is the common name. In other places it is called "Velvet apple" (from the velvety appearance of the fruit), and "Butter fruit" (probably in allusion to the buttery consistency of the mealy flesh). Botanically it is known as Diospyros discolor.

Efforts to propagate the tree vegetatively have been made in the Philippine Islands by P. J. Webster, who found that shield budding may be successfully practised. Unless better varieties exist in that country than we have in Queensland, however, such propagation of this fruit would be hardly worth while.

The Fruit Market.

JAS. H. GREGORY, Instructor in Fruit Packing.

THE advent of the cold weather has affected the values of many different fruits on the various markets, particularly bananas and citrus. With the shortage of supplies, however, this should be only of a temporary nature.

Growers who have shown a tendency to harvest fruit before it is actually ready, so that they could avail themselves of the high prices prevailing, will now cease their efforts in this direction, and consequently the quality of winter fruit should be enhanced from the consumer's point of view.

Complaints are still received about the marketing of green papaws. This fruit is only now becoming known to the Southern people, and at this juncture, whilst the market is being developed, it would be best to send only first quality fruit. Many hundreds of tourists travel from the Southern States to Cairns, where at this period of the year first quality fruit is obtainable, and these people, returning to the South with a taste developed for tropical fruits, are naturally disappointed if they are sold a poor quality fruit.

A similar situation exists in respect to custard apples, many growers in the past having spoiled the market by sending in immature fruit. The development of a taste and outlet for tropical fruits will be a slow process, but to this State should more than repay the work entailed. Queensland has a monopoly in the production of these fruits, so that any expansion of markets must benefit only the growers of this State.

The following is a summary of the market prices obtaining during the month:—

TROPICAL FRUITS.

Bananas.

Melbourne prices for cased fruit were as follows: Eights and Nines, 18s. to 19s., Sevens 16s. to 17s., Sixes 14s. to 15s. On the Sydney market the continued cold weather during June caused a considerable drop in prices, so that Eights and Nines sold at from 15s. to 18s., Sevens 13s. to 16s., and Sixes 10s. to 14s. In Brisbane Eights and Nines brought 13s. 3d. to 16s. 6d., Sevens 12s. 9d. to 15s. 9d., and Sixes 9s. 3d. to 14s. 3d., while Lady's Fingers sold at from 3d. to 6¼d. per dozen.

The returns for the bushel case consignments sent to the Melbourne market were very satisfactory, comparing favourably with those obtained for similar fruit in tropical cases. Unfortunately for the experimental consignments, many growers despatched fruit to the Sydney market. This was not desired at the time, and it was not surprising that returns were definitely unsatisfactory. At a conference held at Murwillumbah it was decided that marketing bananas in clusters and in the bushel case be optional, the regulations, as at present gazetted, being applicable.

Pineapples.

Complaints regarding the marketing of green fruit are still being received; in their own interests growers should remember that winter conditions are now prevailing, and send only mature fruit.

Smoothleaf pines in Melbourne brought from 9s. to 12s. per case, and in Sydney 8s. to 13s. per case. Brisbane prices were from 4s. 6d. to 8s. per case, or for loose fruit from 2s. to 6s. per dozen. Roughs realised from 3s. to 6s. per case in Brisbane, and from 1s. to 4s. per dozen loose.

Custard Apples.

Market prices ranged as follows: Melbourne 4s. to 6s., Sydney 2s. to 5s., and Brisbane 2s. to 3s. per half bushel.

Papaws.

Melbourne prices were from 14s. to 18s., and Sydney prices from 16s. to 20s. per tropical case. In Brisbane Yarwun fruit realised from 9s. to 11s. per tropical case; Gunalda fruit from 6s. 6d. to 7s. per bushel; and local fruit from 4s. to 6s. per bushel, with specials to 7s.

Avocados.

In Melbourne avocados sold at from 12s. to 14s. per case, and in Brisbane choice lines at from 8s. to 9s.

Granadillas.

Supplies were generally light, from 6s. to 10s. per dozen being obtained for prime large fruit.

Passion Fruit.

Sydney prices ranged from 8s. to 12s. per half-bushel case, and Brisbane prices from 4s. to 6s. for second grade fruit; from 7s. to 8s. for first grade, and specials higher.

CITRUS FRUITS.

Oranges have maintained values at a steady rate. Mandarins slumped for a few days at the end of May, but have again reached higher levels and should now maintain prices. Queensland grapefruit of first quality has sold at high rates in Melbourne and Sydney, but the taste for this fruit on the part of the Brisbane public appears to require more development, as the demand at present is not great.

Oranges.

In Brisbane commons realised from 6s. to 8s. per bushel, with specials to 9s., while Benyenda fruit sold at from 8s. to 10s. and Gayndah from 7s. to 9s. 6d.; Navels sold at from 8s. to 11s. per case. In Sydney from 6s. to 8s. per case was obtained for local Navels, and from 3s. to 7s. for commons.

Mandarins.

Brisbane prices were as follows: Local Glens 5s. to 10s., Gayndah Glens 8s. to 12s., Benyenda Glens 10s. to 12s., Fewtrells 4s. to 5s., Emperors 4s. to 9s., Scarlets 4s. to 7s. Sydney prices were from 6s. to 13s., and Melbourne from 9s. to 12s.

Grapefruit.

In Melbourne prices up to 16s. per bushel were obtained for Queensland Marsh Seedless, while in Brisbane from 6s. to 8s. per

bushel was obtained for local fruit, and from 9s. to 11s. for Gayndah fruit.

Lemons.

Sydney prices ranging from 2s. to 8s. per bushel were realised, and in Brisbane from 10s. to 15s. for Gayndah fruit and from 7s. to 10s. for others.

DECIDUOUS FRUITS.

Practically all supplies of apples and pears are now being obtained from cold storage. Owing to the heavy supplies of fruit held in storage, growers with fruit in store are advised to spread their marketing over a period instead of endeavouring to beat the market with haphazard consignments.

Apples.

Stanthorpe Granny Smiths sold at from 8s. 6d. to 10s. 6d. per bushel case, and imported apples as follows: Jonathan 7s. to 10s., Cleopatra 5s. to 7s. 6d., French Crab 5s. to 7s., Granny Smith 6s. to 10s.

Pears.

Prices were as follows: Winter Cole 6s. to 13s., Winter Nelis 7s. to 10s., Packhams 6s. to 8s., Josephine 7s. to 9s., other varieties 7s. to 8s. per bushel.

OTHER FRUITS AND VEGETABLES.

Strawberries.

Brisbane prices ranged from 6s. to 10s. a dozen boxes, with choice berries from 13s. to 16s., and a few specials higher. In Sydney trays realised from 7s. to 9s. each, and boxes from 11s. to 15s. per dozen.

Cape Gooseberries.

The Brisbane price was from 6d. to 7d. per lb.

Tomatoes.

In Brisbane ripe tomatoes sold at from 1s. to 3s. per half-bushel, green from 1s. 6d. to 3s., and coloured from 2s. to 5s. Small fruit is not popular. In Melbourne Queensland fruit realised from 3s. to 5s.

Cucumbers.

Prices realised in Sydney were from 2s. to 5s. per case, and in Brisbane from 4s. to 5s.

Other Vegetables.

Brisbane prices for beans were from 9s. to 12s. per bag, for peas 8s. to 11s. per bag, and for lettuce 6d. to 1s. 3d. per dozen.

PUBLICATIONS.

A booklet on strawberry packing will be available for distribution shortly.

COTTON.

The combination of killing frosts occurring in most districts around the 19th of May, and the bright windy weather prevailing through June, has hastened the opening of the crops. The completion of harvesting is therefore well under way in all districts, for, as a rule, only a very light top crop has been produced. The volume of cotton arriving at the two ginneries still continues at a substantial rate, however, and it would appear that a slightly higher total will be obtained than appeared likely at the end of May. The quality and grades of the average cotton being received still are remarkably good considering the season.

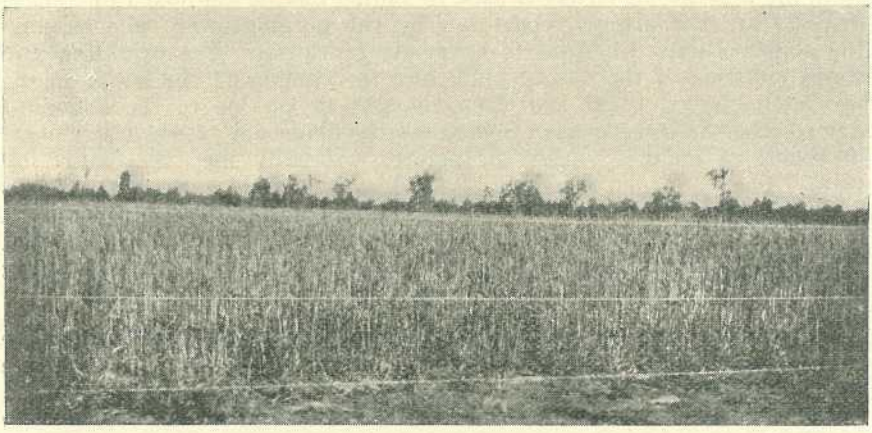


Plate 29.

A wheat crop at Charleville, South Western Queensland, grown under conditions of natural rainfall.

SUGAR.

Weather conditions for the first part of the month were uniformly dry, with relieving showers in central and northern areas. Cold droughty conditions have prevailed in the southern part of the State.

Practically all northern mills have now commenced crushing with reasonably good sugar content of cane. Dry weather and pest damage have considerably reduced crops in the central district, while the outlook for the current season in the southern part of the State is not good. Final estimates of crops have not yet been completed.

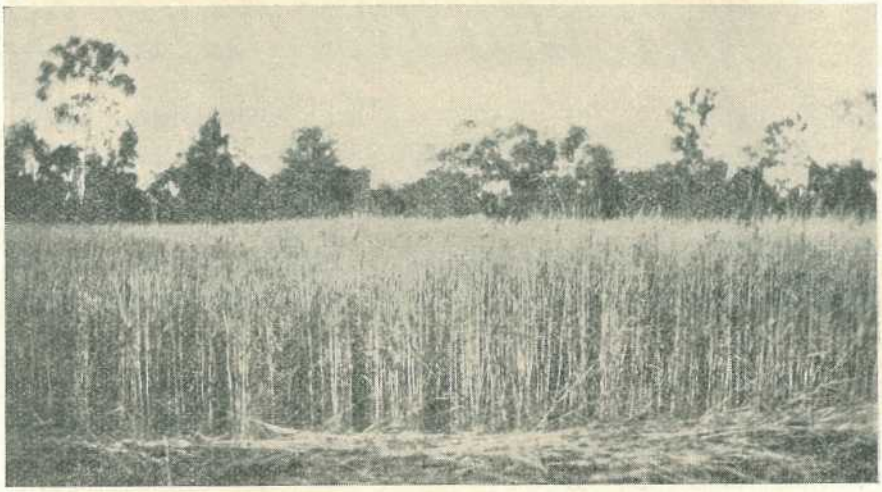


Plate 30.

A WESTERN WHEATFIELD.—A good crop grown under "dry farming" conditions near Charleville.

USE CERTIFIED POTATO SEED.

The spring crop of potatoes in Queensland suffers considerably from the presence of virus diseases, including mosaic and leaf roll. These diseases are not always recognised by the potatogrower, who ascribes the abnormalities produced to a variety of causes. The crinkling and slight mottling of the mosaic plant and the curling of the leaves in the leaf roll affected plant are often thought to be due to the action of dry weather or insect pests. Sometimes the abnormal plants are thought to belong to another variety of potato. Actually they are caused by virus diseases, which considerably reduce the yield. Sucking insects are responsible for the secondary spread of the diseases, but the principal loss is due to primary infection, which comes from the seed potatoes. The tubers from affected plants are numerous, but small, and as a result the yield is low in quantity and poor in quality.

The only practicable control measure for these diseases is the use of seed tubers free from virus. One cannot detect virus infection in the tubers, and the only means of ensuring that they are free is to examine personally the crop from which they are produced. Seed from potato crops, which have been regularly inspected and conform to certain required standards, is available at least in New South Wales. This seed, known as certified seed, commands a better price than the ordinary lines, but even a small improvement in crop value will more than repay any additional planting cost. A list of the available sources of certified seed may be obtained on application to the New South Wales Department of Agriculture.

R. B. Morwood.

ROOT CROPS FOR PIGS.

Successful pig raising depends largely on the production on the farm of suitable root crops. The crops should be fed to the pigs on the paddock system which permits the animals to do some of their own harvesting, and also suits their natural inclination to graze and search for roots.

Under normal seasonal conditions there are many root crops which possess a high food value and are more or less resistant to the immediate effects of dry weather.

Root crops recommended for pig feeding include sweet potatoes and English potatoes (after picking out the marketable potatoes, there always remain the small and broken tubers), Swede turnips, mangel wurzels, and several varieties of sugar beet. Arrowroot is worth consideration as a carry-over crop, while, in Central and North Queensland, varieties of cassava are worth cultivating in heavy types of soil which are less suitable for sweet potatoes. Of all these root crops, however, sweet potatoes are regarded by many pig farmers as the most useful.

In experiments conducted by the Department of Agriculture and Stock, Belgian field carrots gave results indicating that they are worth a trial. Onions are unsuitable for pig feeding. Jerusalem artichokes are not grown in Queensland to the extent that their importance as a pig food warrants. They are adapted to cultivation in a wide range of soils, although like sweet potatoes, they do best in a deep loamy or sandy soil rich in humus and with plenty of moisture.

E. J. Shelton.

Plate 31.
A maize crop grown for fodder at Charleville.

A CRUSH FOR CATTLE AND HORSES.

A crush for holding cattle or horses should be built on every farm. It costs little and occupies a small area; yet it saves much time and labour when adult stock are to be dehorned, branded, castrated, speyed, drenched, &c. For these operations the animal should be held in a position which allows of no movement.

The ordinary crush can be arranged to accommodate large or small animals. A series of auger holes (½ in. diameter) are bored about 6 inches apart along two rails of convenient height on each side of the crush. The holes should be deep enough to seat a bolt or iron pin firmly. The bolt or pin should stand 4 to 6 inches above the rail. These pins—one on each side—serve as chocks against which a cross rail may be placed. By working the animal right to the front of the crush, the pins and rails may be arranged to prevent any "backing." In a similar manner the width of the crush may be adjusted to prevent lateral movement.

To secure the head of the animal, the "A" shaped bail-type of structure may be made from a double cross rail between which slide vertical poles attached to the base of the crush posts by stout hinges. With such a crush many farm operations usually requiring four men can be done quickly and efficiently by a man and boy.

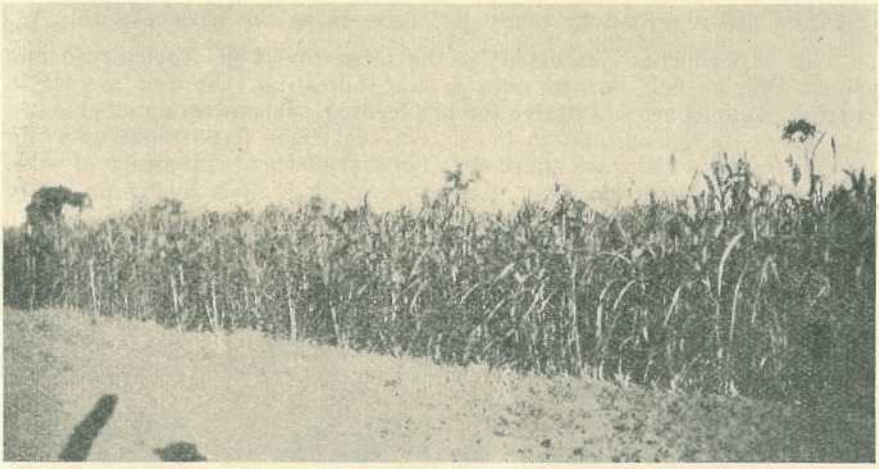


Plate 32.

"DRY FARMING" IN THE WEST.—A non-irrigated crop of Saccaline Sorghum, near Charleville.

FARM GATES.

Very little in the way of cultural operations is at present possible in many farming and dairying centres of the State, as a result of the adverse weather conditions. Nevertheless, on practically every holding there is quite a lot of work to be done, such as fencing repairs, the making and hanging of gates, the painting of buildings, and the overhauling of machinery, implements, and harness. Some of these jobs can be done during dry weather, and others are better reserved for rainy periods.

It is advisable to give attention to the outsibe jobs first and, of these, the erection and repair of gates is important. It is, indeed, surprising to find so many make-shift gates on the farm when strong light gates can be made or purchased at very reasonable prices.

Of the different types on the market, the wooden gates are the best, as those having a steel pipe frame, if once bent out of shape, are difficult to straighten, whereas a broken rail or two can readily be

replaced. The self-opening types are favoured by some farmers, but these are more expensive and more liable to get out of order than the simpler kind.

Gates should always be swung independent of the fence, on good heavy posts placed 4 feet in the ground, with a sill log in between. The hinges, which should be strong, are generally placed in a vertical line. Occasionally, it is desirable that the foot of a gate should lift when opened, and this can be arranged by placing the lower hinge half an inch off the plumb in the opening direction.

The following materials are required to make a double five-barred bolted gate for a 12-foot opening without any morticing:—

112 running feet of 3-inch by 1-inch or 4-inch by 1-inch timber;

3 lb. of 3½-inch by ⅜-inch bolts and washers;

2 pairs hook and eye hinges 2 feet by 2 inch by $\frac{5}{16}$ inch.

Butts and heads should be cut 4 feet long, and should be double—that is, placed on each side of the bars. The bottom of the first rail should be 3 inches from the bottom of the upright. The distance between the first and second rails should be 6 inches; between second and third, 6 inches; between third and fourth, 7 inches; and between fourth and fifth, 8 inches. There should be two double stays on either side of rails on each gate running from the bottom of the butt to the top of the head.

When hinges are being placed in position small pieces of 3-inch by 1-inch timber should be inserted against the rails for packing purposes. A sliding piece of 3-inch by 1-inch timber along the third rail between the stay and the head makes an excellent fastener.

Gates are not completed until they have been painted and if the first two coats are given before the gates are put together, a considerable amount of time will be saved.

R. E. Soutter.

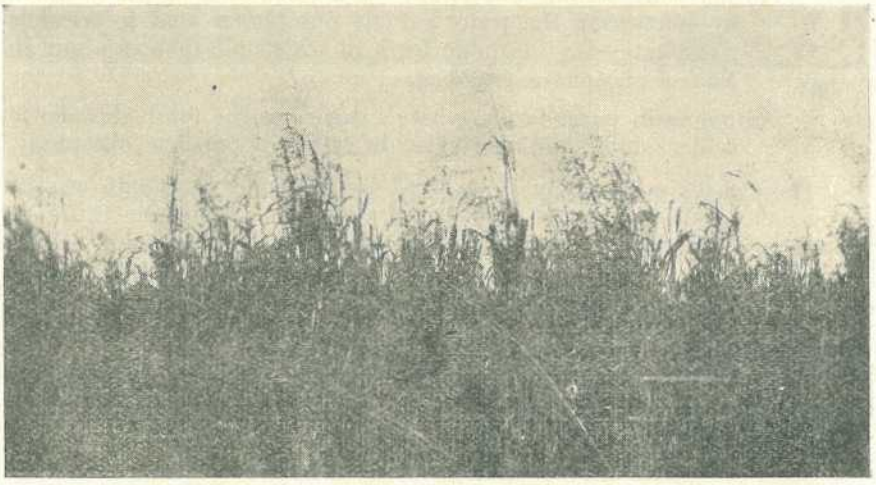


Plate 33.
Sudan grass grown for hay on a property near Charleville.

PHOSPHATIC MANURES.

Three types of inorganic phosphates are available on the Queensland market—superphosphate, Nauru phosphate, and basic phosphate.

Nauru, or rock phosphate, comes from the Nauru and Ocean Islands where it occurs in enormous beds, as tricalcium phosphate, together with various impurities. The rock phosphate is mined and then ground down to very fine dimensions. A good sample would include 87 per cent. tricalcium phosphate, containing 39 per cent. phosphoric acid; 7·5 per cent. other salts and water; 5·5 per cent. impurities.

Superphosphate is manufactured from Nauru phosphate, the latter being first ground and then mixed with approximately an equal amount of sulphuric acid. By this means the insoluble rock phosphate is converted to the water soluble form in superphosphate. Cheaper grades of superphosphate than those marketed in Queensland are available, the prices varying with the water soluble phosphoric acid content of the fertilizer. Australian superphosphate is as high a grade as is sold anywhere.

Superphosphate contains 36 per cent. water soluble phosphate of lime (containing 20·5 per cent. water soluble phosphoric acid); 4 per cent. other phosphates; 48 per cent. other salts; and 12 per cent. moisture and impurities. A little free phosphoric acid is also present.

Purchasers of superphosphate sometimes come across some confusing terms in the trade description. The following are the more important:—

"20·5 per cent. phosphoric acid" is the amount of water soluble phosphoric acid;

"22 per cent. super" indicates the total phosphoric acid in both water soluble and insoluble forms;

"45 per cent. soluble phosphate" is a calculated figure obtained by converting the water soluble phosphoric acid to tricalcic phosphate—the insoluble form in which phosphates occur in Nauru phosphate and bone;

"48 per cent. tricalcic phosphate" describes the total phosphoric acid (soluble and insoluble) in terms of tricalcic phosphate.

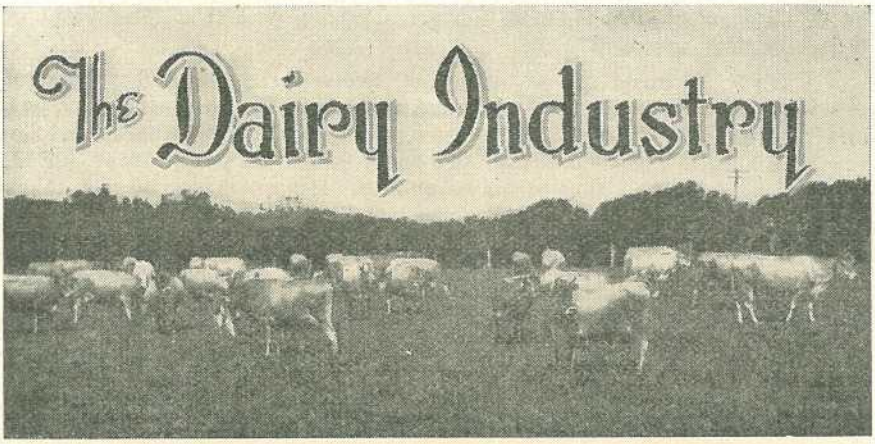
These descriptions may be applied to the superphosphate on the Queensland market, but the only useful figure for comparing different proprietary brands is "per cent. water soluble phosphoric acid." This is what the farmer intends to buy when purchasing superphosphates.

Queensland supplies are obtained from Port Kembla and Cockle Creek in New South Wales.

Basic phosphate is manufactured by mixing superphosphate with lime in varying proportions. The water soluble phosphoric acid is changed to the citrate soluble form.

Basic phosphate has a limited use in Queensland and is not included in mixed fertilizers.

F. B. Coleman.



Profitable Dairying.

MANY farmers consider that the more cows they milk, the more efficient and profitable their dairying activities become. There are, however, a number of other factors which must be considered in relation to dairy farm efficiency.

Matters under the farmers' control include pasture management, the quality of the milk or cream, and the incidence of disease in his herd. Good pasture management requires the introduction of the best grasses, rotational grazing, the conservation of fodder, pasture renovation, and the use of any necessary fertilizers. The quality of the milk or cream is largely controlled by the attention which is given to milking, separating, and storage of the milk on the farm, freedom of the pastures from tainting weeds, and the health of the herd. The incidence of disease in the herd depends to a very large extent on the care and attention given to the animals.

The milking capacity of the herd is dependent on that of the individual cows. Every herd contains animals which are less efficient producers than their companions, and these can only be detected by a regular system of herd testing. Once the unprofitable cows are detected, they should be immediately culled. Their offspring should also be regarded with suspicion, for in all probability they will have inherited undesirable characteristics of their dams. Only the more profitable cows in the herd, as determined by the herd tester, should be retained as breeders.

Farm management and the quality of the herd determine the efficiency of the dairy farm which can best be estimated on the yield of butter fat per acre. Good farm management and a poor herd are just as bad as a good herd and poor management. Good management and a good herd must result in a high yield per acre. Take, for example, the two following cases:—

Farmer A owns 200 acres of land and 50 cows which he bought cheaply at £3 per head from his neighbours. These he allowed to roam at will over his property. By this method he is able to maintain 1 cow on 4 acres of land. From this herd he obtains 7,500 lb of butter fat

(9,000 lb. of commercial butter) per year, equivalent to 150 lb. per cow. With butter fat at 1s. per lb. his gross income is £375. The yield of butter fat per acre is 37½ lb.

Farmer B owns an adjoining 60 acres. He adopted rotational grazing and other desirable practices and was able to maintain 1 cow on 3 acres. He bought 20 selected high-producing animals at £30 per head from which he obtains 6,000 lb. of butter fat per year, or 300 lb. per cow—just double that of his neighbour. His gross income is £300 or £75 less than his neighbour. The yield of butter fat per acre, however, is 100 lb., or nearly three times that of A.

Consideration of the factory returns misled A into believing that he is more efficient than B. An analysis of the finances, however, would show something like the following:—

	A	B
	£	£
Capital invested in land (£15 per acre) ..	3,000	900
Capital invested in buildings and residence ..	900	900
Capital invested in fencing (B subdividing his smaller property)	100	100
Capital invested in cows	150	600
Total capital invested	4,150	2,500
Factory returns total	375	300
Working expenses (A at 5s. acre, B at 10s. acre)	50	30
Net return	325	270
Net return per acre	£1 12 6	£4 10
Net percentage return on invested capital	7·8 p.c.	10·8 p.c.

L. A. Burgess.

PITTED BLUE GRASS.

A Pest in Coastal Pastures.

Pitted blue grass is very common, with a wide distribution in Australia. It is particularly abundant in overstocked pastures in coastal districts, owing to the more palatable species having been eaten out. Stock will eat it, of course, when forced to do so in the absence of other fodders. Pitted blue grass is very abundant in New South Wales and parts of Victoria where, possibly owing to the colder climate, it assumes a reddish tint, and is in consequence known as red leg, or red grass. In Queensland it is frequently known as coastal blue grass.

The improvement of old pastures overrun with this grass is a difficult proposition. In the Southern States, experience has shown that top-dressing with 1 cwt. of superphosphate per acre, preferably using a drill or spreader for the purpose, and the sowing of a small mixture of various clovers is the most satisfactory way of dealing with the pest. Under Queensland conditions, the most satisfactory clovers are white clover, cluster clover, and burr trefoil. About 1 lb. of each should be used per acre, and if desired, about 5 lb. of prairie grass can be added.

C. T. White.

CARE OF MILK UTENSILS ON THE FARM.

Milk as it comes from the average healthy cow contains comparatively few micro-organisms, and these are for the most part inactive in milk. There are many sources from which the bacteria responsible for souring, bad flavours, and other forms of deterioration may gain entrance to milk. Premature souring is very often caused by the use of milk vessels—pails, strainers, coolers, or cans—which, for some reason, are in a state of disrepair. A single utensil which has become worn or bent with continued use, and has developed cracks or crevices, may harbour undesirable bacteria capable of spoiling milk which has been otherwise very carefully produced.

With the cooler weather, summer troubles are apt to be forgotten; but if the cause is not removed, they will crop up again with the first hot spell. A thorough inspection of all milk vessels and equipment is, therefore, desirable, repairs or renewals being made where necessary. The seams of cans and pails should be resoldered if they have opened at all, and dents should be straightened out. Where the defect is more serious, there should be no hesitation in discarding the vessel, as it is only false economy to keep it in use.

No ordinary method of cleaning can dislodge bacteria established in very small crevices for they are well protected, and subsist on the small amount of milk solids left behind whenever the vessel is used. Even steam treatment will not destroy them completely.

Off-flavours, such as tallowy and cardboard taint in both milk and cream, are due to the presence of small amounts of copper and iron, which often come from coolers with defective tinning, or from rusty utensils. These flavours develop rapidly under favourable conditions, such as the exposure of the milk or cream to direct sunlight. They cannot be removed and it is, therefore, necessary to have any worn surfaces retinned as a preventative. Provided no abrasive is used in the preliminary cleaning—a stiff brush will usually remove milk solids—and no strong chemicals are applied, the tinning should have a reasonably long life.

Miss M. J. Griffiths,
Dairy Science Laboratory.

ANTISEPTICS.

Antiseptics are useful in the treatment of a wound and can be applied in two ways:—

1. As a weak solution to wash out the interior of the wound.
2. As dressings impregnated with the antiseptic to absorb any discharge, and prevent the further growth of germs. They also prevent contamination from outside sources.

Stockowners frequently use antiseptics at too great a strength, and do more harm than good. Some tissues are very susceptible to injury and solutions should not, therefore, be used at more than the recommended strength.

Antiseptics are particularly valuable for cleansing the hands before touching a wound, and in concentrated form some can be used to sterilise instruments when boiling water is not available.

After shaving off the hair surrounding a wound, the skin requires treatment with an antiseptic solution before any surgical operation is performed.

In emergencies, a wound should first be cleaned, then treated with an antiseptic, and protected from contamination.

Some common antiseptics are:—

Tincture of iodine—invaluable for immediate application to cuts and scratches.

Methylated spirits—used in undiluted form causes smarting, but has no ill effect on the tissues.

Permanganate of potash (commonly, though not correctly, known as Condy's fluid)—can be added to boiled rain water to make a deep pink antiseptic fluid which is mild in its action.

Boric acid—a saturated solution is made by adding two teaspoonsful to each pint of boiled rain water, and allowing the undissolved material to settle. A useful eye lotion can be prepared by mixing equal parts of the saturated solution and water.

Peroxide of hydrogen—an antiseptic and a deodorant. It is usually used at a 3 per cent. strength, and may be purchased as such. The stronger 30 per cent. solution must first be broken down to a milder form by adding nine parts of water to one of the solution.

—W. Dixon.

RATSTAIL OR PARRAMATTA GRASS.

The attention of coastal dairy farmers is drawn to the spread in paspalum and other useful pastures of the weedy ratstail or Parramatta grass. This is a tufted, perennial grass which reaches a height of up to 3 feet. The leaves are narrow, rolled, and wiry, and the seed-stalks are slender and carry a seed-head somewhat resembling a rat's tail.

Ratstail grass is commonly associated with inferior pasture types on second-class grazing country, and its spread into better class pastures is considered to be due to impoverishment of the originally fertile soil underlying those pastures. Since ratstail grass is useful for pasturage only in its very young stages of growth, its replacement of paspalum represents a serious decline in the carrying capacity of the invaded pasture.

Digging or pulling the grass out when it occurs as isolated plants is temporarily effective, but the most efficient means of controlling the spread of the weed is periodical renovation of the pasture with the object of building up the soil fertility and so enabling the paspalum to compete successfully with weed growths.

—C. W. Winders.

Dudley Eglinton's Useful Life.

ASTRONOMY AND TECHNICAL EDUCATION.

TO the present generation of Queenslanders, it was by his fame as an astronomer that the late Dudley Eglinton, whose death at his home at Virginia, near Brisbane, took place on the 10th June, was best known. Even before he entered seriously on the study of the stars, however, Mr. Eglinton had laid the people of the State under a debt of gratitude to him by his achievements in the realm of technical education. He also had rendered valuable service to the community as secretary and librarian of the Brisbane School of Arts for 22 years, during which he had been largely responsible for placing the affairs of that institution on a sound foundation.

Plate 34.—The Late Dudley Eglinton.

Readers of the Queensland Agricultural Journal will remember him chiefly, with appreciation and gratitude, as the contributor of the monthly astronomical data for Queensland which have been such a valuable feature for a number of years past.

Born at Newcastle-on-Tyne, England, on 12 October, 1850, Dudley Eglinton was a son of Mr. William Eglinton, who had been on the staff of the South-Eastern Railway Company for several years before he decided to bring his family to Australia. After he had been in Queensland for a short period, he was ordained as a Minister of the Church of England. He was the first clergyman to take charge of the Cleveland parish, and subsequently was transferred to Goondiwindi.

After having gained his primary education in private schools, Dudley Eglinton (then aged 16) entered Durham University; but his studies there were terminated 12 months later on his father deciding to come to Australia.

Began as School Teacher.

His first occupation in Queensland was as assistant teacher in the National school at Warwick, under the late Mr. J. A. Canny, who afterwards gained a high reputation as an inspector of schools. Eighteen months later, young Eglinton became a member of the teaching staff at the Church of England School at Toowoomba. He subsequently was a teacher at the Valley primary school, but had only been there for a few months when he applied for, and secured, the secretaryship of the Brisbane School of Arts. That was in 1874. At that time the institution was at the corner of Queen and Creek Streets, where the Queensland National Bank now stands; but in 1878 possession was taken of the site in Ann Street, where the library has since been carried on.

How Technical Education Started.

It was through conversations he had with people who used the library and reading room that Mr. Eglinton realised the need for further educational facilities such as those which night classes and lectures

might afford. It was from this germ of thought that the idea of an elaborate scheme of technical education sprang. It was almost entirely as the outcome of Mr. Eglinton's activities that art classes were started under the tuition of Mr. J. A. Clarke, an artist, and subsequently classes for instruction in book-keeping, shorthand, mathematics, French, German, carpentry, cookery and other subjects, under specially qualified teachers, were arranged for. The scheme was so successful and grew to such dimensions, that Mr. D. R. McConnell, M.A., was appointed director in 1889 and, later again, the Technical College was taken over by the Department of Public Instruction.

Interest in Astronomy.

When, at times, Mr. Eglinton was asked how he first came to be interested in astronomy, he would tell of his good fortune when, as a young teacher in Toowoomba, he had made the acquaintance of Dr. and Mrs. Carr-Boyd, and had been led by the latter to appreciate the beauties of the southern sky. In later years, he availed himself with enthusiasm of opportunities for stellar observations, and for an intensive study of the science of astronomy. Finding this subject increasingly fascinating, Mr. Eglinton devoted much of his spare time to the writing of articles on astronomy for the press, and in the preparation of lectures for delivery before various societies. One of his first articles, in which he discussed the discovery of a new planet, Ceres, and of a group of other minor planets, is dated February, 1897. Long and short articles were published in the press from time to time. Many special articles were written on his favourite subject "The Southern Cross," the first dating back to 1904, while the last was published in this journal, in December, 1936. A comprehensive paper on the Southern Cross and the early history of astronomical activity in Australia was read at the inauguration of the Queensland Astronomical Society, on 1st October, 1927.

In 1912, on the motion of Colonel E. F. Plant, of Brisbane, seconded by Sir Benjamin Stone, who acted on a letter of recommendation from Sir William MacGregor, the then Governor of Queensland, Mr. Eglinton was appointed a Fellow of the Royal Astronomical Society of England, an honour he always greatly prized. Sir Benjamin Stone was a specialist in astronomical photography.

The late Mr. Eglinton was twice married, his second wife being the widow of the late John H. Nicholson (author of "Halek" and other literary works). He leaves three sons one of whom is the Rev. Eric Eglinton (rector of Pialba) and two daughters, Mrs. Essex Evans is a sister of the deceased gentleman.

About 1924 the late Mr. Eglinton had the misfortune to lose his sight, as a result of his continuous use of a telescope in stellar observations. He, however, was enabled to continue his work with the devoted help of his wife; and he was so happy in himself, that those in his company, whilst engaged in animated conversation, were almost prone to forget that he was totally blind.

Law Relating to Bush Fires.

LIABILITY FOR DAMAGE DONE.

A CASE of considerable interest to the man on the land came before the Magistrate's Court in Maryborough on 7th June, when one farmer claimed £200 from another farmer, alleging that the defendant negligently made a fire on his land, and that owing to his negligence, the fire swept on to the plaintiff's property adjoining, doing material damage. The plaintiff claimed that 2 acres of plant cane valued at £92, 2 acres of ratoon cane, valued at £52, 1 acre of pineapples, valued at £60, and 309 standing pine trees, valued at £100, were destroyed—a total value of £304.

In the course of his judgment, Mr. J. A. Murray P.M., gave an interesting exposition of the law respecting the liability of an occupier of land for damage done by a fire which had spread from his property to an adjoining property or properties. Centuries ago, he said, an occupier of land was absolutely liable for damage caused by escape of fire from his land unless he could prove that the escape was due to the act of a stranger or act of God. Then in Queen Anne's reign, a statute was passed which operated to remove from the rule of absolute liability, cases where the origin of a fire could not be shown, that is to say, cases where a fire was accidental within the meaning of that statute. There still remained, however, the question of liability for damage done by fire lighted intentionally but without negligence.

The magistrate quoted an English case, Rylands v. Fletcher, heard in 1868, in which a rule had been laid down that if a person brings a dangerous thing on to his own land he is liable for damage caused if it escaped. Very soon after this decision, it was generally accepted that fire is a dangerous thing within the meaning of the rule, and that if an occupier of land allowed it to escape, he is, unless it were "accidental," liable for any damage it may cause. In recent times, the rule as to absolute liability has been whittled down. The rule that Ryland v. Fletcher does not apply to a "natural user of land" was gradually extended and held to cover "in certain cases" the use of fire.

Among other cases cited by the magistrate was a New South Wales case, Webber and Hazelwood (in 1934), in which the defendant had lit a fire on his land, and burnt off some 100 acres of stubble and during the process a stump was ignited and, a few days later, a high wind caused the fire from the stump to spread to, and do damage on, the plaintiff's land.

Evidence was given that the burning off was an ordinary farming operation conducted in a way in which the majority of farmers in the district burnt off their stubble. The jury gave a verdict that the defendant was not guilty of negligence. On appeal, the High Court held that the defendant was liable, independent of negligence, as it was not an ordinary or natural or reasonable use or employment of land, even if all the farmers in the district took the risk.

The facts found by the magistrate at Maryborough were as follows:—"That on the 28th October 1936, after sundown, defendant who is a farmer . . . , occupying over 100 acres of forest, scrub and cultivated land, lit a fire on his land for the purpose of burning off grass and rubbish. After a time, he left the fire untended

and went home. At 9 p.m. he discovered that the fire had caught a dead mahogany tree which smoulders and burns slowly. Meantime, 20 to 30 acres of his grass had been burnt. He stood by the burning tree for some time, but finally went home again. About mid-day next day, while he was working nearby, a high wind arose causing sparks to fly from the branches and tree which was about 40 feet high. Despite his efforts to control them the sparks were blown across a dry creek nearby and set fire to dry grass on the opposite side. The grass fire got away from him and spread from his land into plaintiff's land causing damages to growing crops and standing timber. At the time the fire was lit the weather had been dry and the grass was in consequence, dry and inflammable.

Mr. Murray held that, in view of the decision of the High Court, in the case of Webber and Hazelwood, it was made clear that "in considering whether any particular user of land is or is not a natural user, the extent of the risk that such user may cause of damage to neighbouring occupiers must be taken into consideration. It remains a question of fact, in each particular case whether or not any particular user is to be regarded as a natural user."

"In this case," continued the magistrate, "the act of defendant in lighting dry grass in open country at a very dry time of the year and leaving it untended and uncontrolled led to the mahogany tree catching alight, and he had difficulty in controlling this tree fire, for, next day when a high wind arose sparks were blown therefrom on to dry grass about a chain or so away and the grass caught fire and got away from the defendant despite his and his wife's valiant efforts.

"I am therefore of the opinion that the defendant's act was not a natural use of the land and that consequently he is absolutely liable for the damage caused quite apart from negligence. Even assuming it was a natural use of land I find the defendant was negligent in allowing the grass fire to set the mahogany tree on fire during his absence. Further, on the following day when he discovered the sparks from the mahogany tree were becoming dangerous he should have obtained assistance to make effective firebreaks on the opposite side of the creek. I am satisfied though that to cut down the tree at that time would have been dangerous to the person and to the spread of the fire to the grass nearby."

Judgment was given for the plaintiff as follows: Plant cane £92; ratoon cane £48; pineapplies £60; standing pine £75; a total of £275 less the £104 abandoned by the plaintiff to bring the case within the jurisdiction of the magistrate's court. The judgment therefore amounted to £171.

LIMING RATOON CROPS.

Farmers frequently learn that their land is in need of liming, just after they have planted their cane, and they are desirous of making an application of this material after the plant cane has been harvested.

In these circumstances, the lime—either burnt or crushed—may be broadcast over the trash, after harvesting. When the trash is burned the ash and lime are cultivated into the surface soil, and given reasonably moist conditions the benefit will readily be apparent on the first ratoon crop.

If this procedure be followed, the application of a fertilizer mixture containing sulphate of ammonia, or of sulphate of ammonia itself, can be made within a month without danger of loss of ammonia from the fertilizer.

H.W.K. in *The Cane Grower's Quarterly Bulletin* (Bur. Sugar Expt. Stns.)

Sugar Levies.

(Abbreviated Notice.)

1937 SEASON.

Regulations under "*The Primary Producers' Organisation and Marketing Acts*, 1926 *to* 1935," have been approved, providing for levies on suppliers of cane to sugar-mills at the following rates for the season 1937 (the figures for 1935 and 1936 are given for comparison purposes:—

Name of Mill.	General Levy by Queensland Canegrowers' Council.	Administrative Levy by District Executive.	Administrative Levy by Mill Suppliers' Committee.	Special Levy by Mill Suppliers' Committee.	Total Levies for 1937.	Total Levies for 1936, given for comparison.	Total Levies for 1935, given for comparison.
	d.	*d.*	*d.*	*d.*	*d.*	*d.*	*d.*
Mossman Central	¾	1¼	..	..	2	2¾	2¾
Hambledon	¾	¼	¼	..	1¼	1⅜	1⅜
Babinda Central	¾	¼	3/10	..	1 3/10	1¼	1⅛
Mulgrave Central	¾	¼	..	..	1	1⅛	1⅛
South Johnstone Central	¾	1½	..	..	2¼	2⅜	2¼
Goondi	¾	1½	¼	..	2⅓	2⅜	2¼
Mourilyan	¾	1½	..	..	2¼	2¼	2¼
Tully River Central	¾	1¾	..	..	2½	2½	2½
Macknade	¾	½	½	..	1¾	1¾	1⅝
Victoria	¾	½	½	..	1¾	1¾	1⅝
Kalamia	¾	..	¾	¾	2¼	2¼	1¼
Pioneer	¾	..	1	5/8	2⅜	1¾	1¾
Inkerman	¾	..	⅜	..	1⅛	1	1
Invicta	¾	..	1½	..	2¼	1¾	1¾
Proserpine Central	¾	1	..	..	1¾	1¾	1¾
Cattle Creek Central	¾	½	¼	..	1⅓	1½	1½
Plane Creek Central	¾	½	½	..	1¾	1¾	1¾
Marian Central	¾	½	½	½	2¼	2	2¼
North Eton Central	¾	½	..	..	1¼	1¾	1¾
Pleystowe	¾	½	½	½	2¼	2¼	2
Racecourse Central	¾	½	½	..	1¾	1¾	2¼
Farleigh	¾	½	½	..	1¾	1¾	1¾
Qunaba	¾	¾	¼	..	1¾	1⅛	1¼
Bingera	¾	¾	¼	..	1¼	1½	1½
Fairymead	¾	¾	½	..	2	1¾	1½
Gin Gin Central	¾	¾	¾	..	2¼	1½	1¾
Millaquin	¾	¾	..	..	1½	1¼	1¾
Isis Central	¾	½	..	..	1¼	1	1¼
Maryborough	¾	¾	..	..	1½	1¼	1⅓
Mount Bauple Central	¾	¾	..	..	1½	1½	1½
Moreton Central	¾	..	1	½	2¼	2¼	2⅛
Rocky Point	¾	..	¾	..	1½	1½	1⅜
Eagleby	¾	..	..	..	¾	¾	1

No poll will be taken in respect of the General Levy of ¾d. per ton (first column) for the Queensland Cane Growers' Council, or for the administrative levies by District Executives or Mill Suppliers' Committees (second and third columns).

In the fourth column, the levies on cane supplied to the Kalamia, Pioneer, Marian Central, Pleystowe, and Moreton Central Mills will be used in defraying the costs of employing farmers' representatives at those mills for the current season. In the case of these levies, growers may petition for a poll, and the petition must be signed by at least 100 or 50 per cent. (whichever shall be the less) of the cane suppliers to the five mills concerned.

In addition to the foregoing levies, the undermentioned Mill Suppliers' Committees are empowered to make particular levies on growers within each of the following districts, at the following rates :—

Name of Mill Suppliers' Committee and Mill to which Cane is Supplied.	Description of District upon the Growers wherein Levies will be made and description of Cane upon the Growers whereof Levies will be made.	Amount of Levy per ton of Cane Supplied.	Purposes of Levy.
		d.	
Isis Central ..	Pialba district within the boundaries of the parishes of Urangan, Vernon, and Bingham, county March	1¼	To be used for administrative purposes by Pialba Branch of Isis Central Mill Suppliers' Committee.
Isis Central ..	All cane consigned on the railway by Government trucks from Booyal, Junien, and Marule Sidings on the Dallarnil Railway	¼	To be used for administrative purposes by Booyal Branch of Isis Central Mill Suppliers' Committee.
Mount Bauple Central	Mount Bauple district within the boundaries of the parishes of Gundiah, Tiaro, Gootchie, Curra, and St. Mary	¼	To be used for administrative purposes by Mount Bauple Branch of Mount Bauple Mill Suppliers' Committee.
Mount Bauple Central	Yerra district within the boundaries of the parishes of Gungaloon, Denison, Doongul, Woocoo, and Young	¼	To be used for administrative purposes by Yerra-Mungar district Branch of Mount Bauple Mill Suppliers' Committee.
Maryborough ..	Pialba district within the boundaries of the parishes of Vernon, Urangan, and Bingham, county March	¾	To be used for administrative purposes by Pialba District Branch of Maryborough Mill Suppliers' Committee.
Maryborough ..	Maryborough district within the boundaries of the parishes of Tinana, Maryborough, Bidwell, Elliott, Young, and Walliebum, county March	¼	To be used for administrative purposes by Maryborough District Branch of Maryborough Mill Suppliers' Committee.
Millaquin ..	All cane delivered at Yandaran Siding	½	To be used for administrative purposes by Yandaran Branch of Millaquin Mill Suppliers' Committee.
Racecourse Central	All cane hauled over Silent Grove tramline	2	To defray the costs of employing a farmers' representative of the section of growers concerned at the Racecourse Mill for the current season.
Marian Central ..	All cane loaded at Dow's Creek and Langdon Siding	¾	To be used for insurance and weighbridge maintenance by the Dow's Creek and Langdon Branch of the Marian Central Mill Suppliers Committee.

Growers are given the opportunity of petitioning for a poll to decide whether or not the above levies shall be made. The petition must be signed by at least 100 or 50 per cent. (whichever shall be the less) of the cane suppliers within any of the areas concerned.

All petitions must reach the Secretary for Agriculture and Stock, Department of Agriculture and Stock, Brisbane, on or before the 10th July, 1937.

Full particulars of these Regulations appear in the *Government Gazette* of the 20th May, 1937, or may be obtained on application to the managers of the various sugar-mills in Queensland or to the undersigned—

E. GRAHAM, Under Secretary,
Department of Agriculture and Stock,
Brisbane.

CARE OF STORED HONEY.

If honey is stored in a damp place and not thoroughly sealed up, it will absorb moisture, and if excessive moisture is so taken up the honey is liable to ferment and deteriorate in value. Do not leave the lid off the containers, or leave honey exposed for any length of time during the late autumn and winter months. If kept in a dry place in a sound container honey will keep good for years. It may granulate, but that is not a sign of deterioration, and in such cases it may easily be liquefied by immersion of the container in hot water.

PRODUCTION RECORDING.

List of cows and heifers officially tested by Officers of the Department of Agriculture and Stock which have qualified for entry into the advanced register of the herd books of the Australian Illawarra Shorthorn Society, the Jersey Cattle Society, and the Ayrshire Cattle Society, production charts for which were compiled during the month of May, 1937 (273 days unless otherwise stated).

Name of Cow.	Owner.	Milk Production.	Butter Fat.	Sire.
		Lb.	Lb.	
AUSTRALIAN ILLAWARRA SHORTHORNS.				
MATURE COW (OVER 5 YEARS), STANDARD 350 LB.				
Wanulla Bantam III.	E. O. Jeynes, Raceview	12,065·5	509·37	Gay Prince of Bri Bri
SENIOR 3 (OVER 3½ YEARS), STANDARD 290 Lb.				
Sunnyview Gentle 4th	A. E. Vohland, Aubigny	7,898·2	374·675	Jellicoe of Headlands
SENIOR 2 (OVER 2½ YEARS), STANDARD 250 LB.				
College Wendie	Q.A.H.S. and College, Lawes	7,636·6	332·959	College Robin
JUNIOR 2 (UNDER 2½ YEARS), STANDARD 230 LB.				
Trevor Hill Polly	Geo. Gwynne, Umbiram	7,955·23	312·138	North Glen, Emblem
Trevor Hill Dove	Geo. Gwynne, Umbiram	6,953·19	282·152	North Glen Emblem
Trevor Hill Mermaid	Geo. Gwynne, Umbiram	6,834·66	277·224	Viscount of Corunna
JERSEY.				
JUNIOR 4 (UNDER 4½ YEARS), STANDARD 310 LB.				
Maurfield Golden Lily	F. Maurer, Darra	7,374·7	360·011	Prospect Monty
SENIOR 2 (OVER 2½ YEARS), STANDARD 250 LB.				
Glenview Hopeful	F. P. Fowler and Sons, Coalstoun Lakes	6,505·1	337·078	Trinity Governor's Hope
JUNIOR 2 (UNDER 2½ YEARS), STANDARD 230 LB.				
Glenview Tinkelbell	F. P. Fowler and Sons, Coalstoun Lakes	5,806·7	284·167	Trinity Governor's Hope
Oxford Remus Dainty (272 days)	Oxenford Bros., Oxenford	4,444·87	260·608	Overlook Nancy's Remus
AYRSHIRE.				
SENIOR 3 (OVER 3½ YEARS), STANDARD 290 LB.				
Myola Jollity	R. M. Anderson, Southbrook	10,994·84	477·464	Longland's Bonny Willie 2nd

The Tropics and Man

Electrical and Other Effects

No. 6.

DOUGLAS H. K. LEE, M.Sc., M.B., B.S., D.T.M., Professor of Physiology, University of Queensland.

IN this initial series of articles I have deliberately dealt with the somewhat technical subjects of temperature, humidity, air-movement, and radiation because these are the important causes of the effects of hot climates upon man. There remain certain minor climatic factors which must be looked at briefly, if we are to leave this branch of tropical study with a properly balanced picture of these causes. With them I shall deal to-day, so that in a future series we can confine our attention more to the man and the results in him of climatic stress and talk less about these technical though important causes.

Electrical Conditions.

We all know the feeling of tension which is experienced before a thunderstorm and the marked relief which is felt afterwards. Those who have experienced the violent dust-storms of the inland plains have noticed the same feelings there. It is quite a popular, and in the absence of any special evidence, a logical belief that it is the accumulation of electrical tension before and its discharge during a thunderstorm which is responsible for the sequence of general feelings. This belief is lent colour by certain individuals who seem to be peculiarly susceptible to these experiences and often predict a storm an appreciable time before the usual weather signs begin to accumulate. Further strength is given to the belief by the demonstration of similar or even greater electrical disturbances in the course of a dust-storm. A party of physicists, investigating the occurrence of thunderstorms in a part of South Africa, where they were very frequent, were very much troubled to find that their recording instrument showed on one occasion a much greater electrical discharge than usually accompanied thunderstorms, in spite of the fact that no storm had been over. Very careful testing showed no fault in the apparatus, and they were left with the conclusion that a dust-storm which had passed over was responsible for the discharge. Unfortunately, Nature did not repeat the experiment for them, and I do not know that anyone else has taken it up. Personally, I find it difficult to believe that such dense dust-clouds travel such distances as they do unless the dust particles are electrically charged.

Doubtful Effect of Ionization.

As I say, there is a popular belief that the electrical state of the atmosphere has a definite effect upon one's feelings of comfort, and certain evidence would fit in satisfactorily with this view. We must remember, however, that electrical disturbances are not the only things going on at the times of these storms. Before a thunderstorm, the air is often still, the temperature is high, and more importantly still the humidity is high. These are all conditions which interfere with loss of heat from the body and produce discomfort. The accumulation of angry

clouds and the hushed voice of nature which precede the storm both have a profound psychological effect, particularly in those people who dislike violent thunderstorms. Such considerations would do no more than sound a warning against pinning one's faith absolutely to the belief in electrical effects, were it not for certain experiments which have been conducted. A number of subjects were allowed to breath air which, without their knowing, was charged with electrical particles of one or other kind. In the majority of normal people the breathing of such air had no definite effect upon sensation or upon a number of other bodily functions. I myself sat as a subject upon one occasion, and the only time I experienced any change in sensation was when the plant, unknown to me, was not working and I was breathing ordinary every-day air.

While normal people were not affected in these experiments, people of the "rheumatic" type and people with disturbance of blood pressure often did experience some alteration of sensation and showed other evidence of being affected by the electrical charges. This matter is still being investigated, and the results should be of interest. As the matter stands at present, the importance of electrical changes to perfectly normal people appears to be small, but to certain susceptible people they may be of some importance.

Barometric Pressure.

It is quite definite, of course, that when the barometric pressure is markedly lowered, as in climbing high mountains, people suffer from lack of oxygen. It is equally true that a marked increase in pressure (over two atmospheres) also affects the body, not while it is on, but if it is suddenly released. These effects are seen in divers and in compressed air workers. It is highly doubtful, however, whether the normal fluctuations which occur at moderate heights in different parts of the world and at different times have any effect upon human welfare. An authority in tropical medicine once solemnly stated that the lowered barometric pressure in the tropics (itself a doubtful statement) meant that tropical dwellers must suffer from lack of oxygen. This statement was repeated by an even greater authority in tropical medicine. Any second-year medical student could tell you why this statement cannot possibly be true—which only shows how authorities can make bad slips when off their beaten track.

Chemical Effects.

In the days before more exact knowledge was possible, it was the fashion to ascribe puzzling medical conditions to vague atmospheric influences and "miasmata." There was a feeling that in certain areas there were chemical or even more mysterious vapours abroad in the air which left death and ill-health in their wake. These conditions have largely been tracked down to much more prosaic causes such as mosquitoes, germs, and the like, but from time to time the chemical theory is resurrected to explain, or rather dispose of some difficulty in understanding the occurrences of disease. As a matter of fact, the chemical composition of the air all over the world is remarkably constant, apart from certain very localised and well-known instances, such as the accumulation of carbon-dioxide gas in lime-stone caves. There is certainly no evidence to associate chemical changes in the air with tropical conditions.

Mechanical Effects.

The purely mechanical effects of wind and rain are well seen in the rugged countenance of the all-weathers man. These are more beneficial than otherwise, although sometimes in blondes they may assist radiation in producing skin cancers. Of more importance is the abrasive effect of sand and dust. This probably accounts for the frequent occurrence of small fibrous growths on the eye-ball in dusty climates. These "pterygia" or "pingueculae" start from the corner of the eye and grow very slowly across. Occasionally they grow large enough to require removal—a fairly simple procedure. They are frequently confused by well-meaning advisers with cataract, but this is an unnecessary and lamentable blunder which has caused considerable distress to many people. Another effect of dust is to irritate the lining of the nose, and, with the swelling produced by heat radiations, to produce blockage of the nasal passages. This seems to be more noticeable in newcomers than in residents.

WORMS IN POULTRY.

During the rearing of birds about to commence their first season of production, diseases such as coccidiosis, bacillary, white diarrhœa and roup will have taken their toll. These diseases are spectacular in their onset and the symptoms manifested and the mortalities experienced have compelled the poultry farmer to undertake control measures in order to mimimise his losses as much as possible.

In many instances, however, worm infestation has been overlooked. The effects of worm infestation are usually insidious in nature, and being accumulative do not attract attention until the birds are seriously affected. Such effects include failure to make normal growth and even loss of weight, loss of appetite and activity, dull, ruffled plumage, and a paleness of the comb and shanks. The mortality, especially among young birds, may be serious. More important still young pullets, while maintaining a ravenous appetite and being apparently in fair health, are not producing their normal quota of eggs.

Of the various worms which infest poultry one of the most important is the large roundworm, which grows up to 4 or 5 inches in length, and is found in the intestine. Where the farmer pays careful attention to sanitation and cleanliness this and other worms rarely become dangerous for, by the regular removal of droppings and the adoption of other measures which promote cleanliness, the source of infestation is removed. Prevention of infestation is most important in the control of parasitic worms. There are, however, certain drugs which may be employed to remove the worms from the birds, and if treatment is employed regularly the infestation should be of no great importance. Treatment of poultry for worms may be undertaken either by mixing certain drugs with the mash (flock treatment), or else by giving the drug to each individual bird (individual treatment).

Flock Treatment.—Flock treatment can be applied with success only when the birds are kept under intensive or semi-intensive conditions. The procedure is to mix nicotine sulphate with the mash at the rate of .5 cubic centimetre of nicotine sulphate for every 1 lb. of dry mash. The amount of nicotine sulphate required is incorporated with just sufficient water so that when mixed the mash is flakey. About 1 part of nicotine sulphate to 400 parts of water is usually adequate. The mixing should be thorough so that no lumps remain. This treated mash is mixed fresh daily and fed continuously for four days.

Individual Treatment.—The best drug to use for individual treatment is carbon tetrachloride. This may be given in capsules or by means of a syringe and rubber tubing. The birds are starved overnight and treated next morning. They may be fed immediately after treatment. The doses range from .5 cubic centimetre to 2 cubic centimetres, depending on the size of the bird. If the syringe is used great care must be taken to avoid delivering the drug into the windpipe, which would cause instant death. Before undertaking this treatment farmers should apply to the Animal Health Station, Yeerongpilly, for further details.

Answers to Correspondents

BOTANY.

Replies selected from the outgoing mail of the Government Botanist, Mr. C. T. White, F.L.S.

Madagascar Plum. Worm Seed.

K.R.E.B. (Marian)—

Your specimen is the Governor plum or Madagascar plum, *Flacourtia Ramontchi*, a native of Madagascar, but cultivated widely in tropical and sub-tropical countries. It is an excellent, edible plum; the male and female trees are distinct, the females, of course, only bearing fruit. The Burdekin plum is a totally different plant, a native tree, common in the scrubs from the Burnett District northwards.

The weed is *Chenopodium ambrosioides*, the worm seed. The seed of this plant and an allied species is the source of oil of chenopodium, largely used as a worm expellent. It is not known to be poisonous or harmful in any way, but we do not remember ever having seen stock eat it. Its extraordinarily strong odour would probably prevent them from touching it.

Bull-head Burr. Khaki Weed. "Fat Hen."

R.A. (Nanango)—

(1) *Tribulus terrestris*, bull-head burr. This plant is very widely spread over the warmer temperate regions of the world, and is a moderately common weed in Queensland. It is particularly abundant on some of the Downs country of the Central West. It occurs in South Africa where it is accused of causing a disease in sheep, known as big-head, or yellow-head. No trouble, so far as we can ascertain, has been caused by the plant in Australia.

(2) *Alternanthera repens*, khaki weed, a native of tropical America, and now widely spread as a weed in most warm temperate countries. It is supposed to have been introduced into Australia from South Africa about the time of the Boer War.

(3) *Chenopodium album*, fat hen or goose foot, a very common farm weed in Queensland, and not known to possess any poisonous or harmful properties.

One of the Sorghums.

T.P. (Maleny)—

Your specimen is not Johnson grass, but a very closely allied sorghum, *Sorghum verticilliflorum*, a native of Africa, now very common in Queensland, and we think as common, if not commoner, than the true Johnson grass. It is frequently seen in cultivation lands and similar places where the ground has been disturbed. It grows very vigorous, and is easier to eradicate than Johnson grass, as it does not form the white, underground stems that Johnson grass does. Ordinary digging out will soon get rid of it. Like other sorghums, it contains a prussic-acid-yielding glucoside; in fact, it is one of the worst offenders in this respect, and caution must, therefore, be exercised in feeding stock with it.

"Scrub Panicum."

"Inquirer" (Ridgelands)—

The specimen represents *Setaria australiensis*, commonly called in Queensland, the scrub panicum, a native grass, frequently seen around scrub clearings, and along scrub tracks. It is generally regarded for such places as quite good fodder, but we think it is hardly worth cultivating, for where it should grow, better fodders, such as giant setaria or Manchurian millet, which are very closely allied to it, would grow equally as well. Seed of the scrub panicum is not stocked by nurserymen, but the giant setaria is obtainable through commercial channels at a fairly cheap rate.

Plants from the Murgon District Identified.

C.G. (Moffatdale Project Club, Murgon)—

1. *Arundinella nepalensis*—a common grass on forested hillsides in many parts of coastal Queensland. It is also very common in the Burnett district. We have not heard a local name given to it. It is not usually regarded as of much value as a fodder.
2. *Cyperus fulvus*, a sedge, not a true grass. The sedges, on the whole, are not regarded as having the same value as true grasses.
3. *Setaria glauca*, pigeon grass—a useful grass, particularly for wet, low-lying paddocks. It is also commonly seen as a weed of cultivation.
4. *Bothriochloa intermedia*, forest blue grass—the commonest native grass in many parts of the Burnett district and Callide Valley.
5. *Sporobolus elongatus*, rat's tail grass—not generally regarded as of much value as a fodder.
6. *Bothriochloa decipiens*—bitter blue grass, or pitted blue grass. The latter name comes from a small pit that can be seen in the spikelet. This grass has over-run many paddocks to the exclusion of other species, owing to better sorts having been eaten out. Stock will eat it, but do not care for it when other feed is available.
7. *Chloris ventricosa*—a native chloris or windmill grass, generally regarded as a good fodder. It sometimes comes up very thickly in cleared brigalow country, or cleared vinescrub country.
8. *Paspalum dilatatum*, common paspalum.
9. *Eleusine indica*, crowfoot grass—a very common grass, widely spread over the warmer regions of the world. In Queensland, it occurs mostly either as a weed of cultivation or where the ground has been disturbed. It is moderately palatable to stock, but, like sorghum and some other grasses, contains a prussic-acid-yielding glucocide; very little trouble has been experienced with it in Queensland.
10. *Eragrostis leptostachya*—paddock love grass. The love grasses are of only secondary value as fodders, but are rather useful grasses in mixed native pasture.
11. *Digitaria marginata*, summer grass—occurs mostly as a weed of cultivation or where the ground has been disturbed. It is quite palatable to stock.
12. *Digitaria divaricatissima*—a roly-poly grass.
13. *Pennisetum alopecuroides*—swamp foxtail.
14. *Eriochloa* sp.—early spring grass. We have several species of Eriochloa in Queensland, and they all go under the name of early spring grass. They are very palatable. The vernacular name is not particularly appropriate, as they are no earlier than many other grasses that come up after early spring rains.
15. Specimen damaged, but looks like *Cynodon dactylon*, the common couch grass.
16. *Eragrostis cilianensis*—stink grass. This grass is a native of Southern Europe, and in Queensland occurs mostly as a weed of cultivation. It is not particularly palatable to stock. The name stink grass arises from the number of glands along the leaf edge which give off a peculiar, and not altogether unpleasant, odour.
17. *Aristida glumaris*—a species of wire grass or three-pronged spear grass. The wire grasses or spear grasses, on the whole, are of very poor quality as fodder.
18. *Chloris virgata*, feather top or woolly top Rhodes grass—a very luscious-looking grass, very common as a weed of cultivation and in places where the ground has been disturbed. In spite of its appearance, stock do not seem to take readily to it, although they will eat it, we have been told, in the form of hay.

Purple Datura.

Q.S.Q. (Mitchell)—

The specimen represents *Datura cornucopia*, the "horn of plenty," or purple datura, a plant, we believe, of garden origin. It is very closely allied to the common stramonium or thorn apple, naturalised along watercourses on the Darling Downs and in the Maranoa district. This common species is frequently known as castor oil, although the true castor oil, naturalised in coastal Queensland, is a different plant.

Practically all species of *datura* are poisonous in all parts, the seeds being the most virosent. The one you sent is frequently cultivated as a garden subject, and we have never known it to escape, and become a bad weed-pest. It contains, however, possibilities in that respect.

Elephant Grass.

A.W.T. (Chermside)—

Elephant grass is still cultivated to some extent in coastal Queensland, but has gone out of favour somewhat, as it is not so palatable as other fodders. It also is inclined, if left standing, to grow to rather a hard cane. On this account, the grass should be kept cut back, to not more than six feet high. If preferred, it can be grazed, and stock under these conditions, usually eat it well down. It is very easily propagated, either by division, or cuttings, If propagated by cuttings, two or three nodes of the hard cane part should be used, and two nodes or joints placed in the ground. If preferred, they can be planted horizontally, like sugar-cane. Grown from division, the plants should be cut well back, almost to the ground, and the stool divided into individual cuttings.

The grass is fairly nutritious, and we think worth growing, if kept treated in the way recommended. If the stock are turned on to it, when it is very high, they will eat it back to the cane portion, and this will then send out tufts along the edge, which are quite palatable.

Common Weeds in North Queensland.

Inquirer (Townsville)—

The specimens collected at the railway trucking yard at Bambaroo have been determined as follows:—

1. *Flemingia parviflora*—a native legume, very common in the pastures of North Queensland.
2. *Urena lobata*—one of several weeds known in the North as Chinese burr.
3. *Sida acuta*—popularly called *Sida retusa* in the North.
4. *Capsicum fastigiatum* Chili. This species is the main source of cayenne pepper.
5. *Sida cordifolia*—flannel weed.
6. *Gomphrena decumbens*—a plant of the Amaranth family, a very common weed in North Queensland, but for which we have not heard a local name.
7. *Hyptis suaveolens*—one of the several plants of the family *Labiateae*, known in North Queensland as "mint."
8. *Erechthites quadridentata*—a common weed of the family *Compositeae*, for which we have not heard a common name.
9. Grass—seed-heads would be required to identify.
10. *Xanthium pungens*—noogoora burr. The noogoora burr is poisonous only in the cotyledon stage. In the stage of the present specimen, as far as we know, it is quite harmless.
11. *Stylosanthes sundaica*—Townsville lucerne.
12. *Bothryochloa intermedia*—a species of blue grass.
13. *Acanthospermum hispidum*—star burr.
14. *Physalis minima*—wild Cape gooseberry.

All are very common weeds throughout the whole of North Queensland, particularly in the coastal country. None of them is known to cause any trouble to stock, as far as we know.

Specimens from Tamborine Mountain Identified.

G.A. (Tamborine)—

(1) *Marsdenia rostrata.* Milk vine: this plant is poisonous to stock.

(2) *Solanum campanulatum.* A prickly species of Solanum very common as a secondary growth on Tamborine Mountain and other places in South-eastern Queensland. We have never heard of stock eating it to any extent, although parts of most solanums are harmful.

(3) *Stephania hernandiaefolia.* Tape vine, a plant poisonous to stock.

(4) *Solanum stelligerum.* A species of Solanum or Potato Bush very common as a secondary growth on Tamborine Mountain and coastal Queensland.

(5) *Vitis clematidea,* a wild grape vine not known to to be poisonous or harmful in any way to stock.

If you are losing stock from poisonous plants we are inclined to regard number (1) as the most likely cause of the trouble.

Rice Grass.

C.F.R. (Caloundra)—

It is rather difficult to determine grasses correctly in the absence of seed-heads, but we think the one you sent is *Leersia hexandra*, a rice grass, generally regarded as an excellent fodder for wet, swampy situations.

Some Bush Flowers.

E.J.S. (Kalbar)—

(1) *Cynoglossum suaveolens.*

(2) This looks like the same as No. 1, but in very young flower. This plant is frequently known as Native Forget-me-not.

(3) *Pimelea pauciflora*, sometimes called scrub kurrajong, probably on account of the fibrous nature of the bark. It has been proved by feeding tests to be poisonous to stock, but stock rarely eat it in sufficient quantities to cause trouble.

(4) *Cynoglossum latifolium.*

(5A) and (5B) *Pimelea pauciflora.*

(6) *Synoum glandulosum*, a tree of rather irregular growth, commonly called scentless rose bush.

(7) *Drimys dipetala*, sometimes called pepper bush.

(8) *Bothrychium ternatum*, parsley fern.

(9) *Helipterum anthemoides.*

(10) *Peperomia reflexa.*

(11) *Cadellia monostylis.* This plant was called *Guilfoylia monostylis* by Mueller, and now most botanists keep his genus distinct from Cadellia. In this, we think they are right.

(12) *Liparis reflexa.*

(13) *Psychotria loniceroides.*

(14) Are you sure the leaves are correctly matched with your description of the flower? Your description of the flower fits almost exactly *Tarretia*, either *argyrodendron* or *T. actinophylla*. The former is commonly known as hickory, crow's foot elm, or booyong, the latter sometimes by similar names, or as black jack. Both occur in the Cunningham's Gap scrub. The leaves, however, do not seem to belong here, and we cannot place them satisfactorily. It is often very hard to match leaves on the ground with those on the tops of the trees.

Plants from the Mid-West Identified.

C.H.D. (Roma)—

(1) *Glycine tabacina.* Glycine peas are very common legumes in the average native mixed pasture, both in coastal Queensland and further inland. The actual species are not very well defined, but we should say they should have much the same food value, and are quite useful herbs.

(2) *Desmodium campylocaulon* or tick trefoil, peculiar to the inland parts of Queensland.

(3) *Crotalaria dissitiflora*, a species of rattle pod.

(4) *Glycine tomentosa.*

(5) *Dichanthium sericeum*, blue grass.

(6) *Dichanthium sp.* This may be a form of No. 5, but the genus is at present under review, and in many cases, we cannot give specific names until our material has been revised by Mr. C. E. Hubbard, of the Royal Botanic Gardens, Kew, England, who is monographing the group.

(7) A form of *Bothriochloa intermedia.* This differs from the ordinary intermedia in having a very much more branched inflorescence, but otherwise seems the same. It is quite common in Queensland, but as yet, has not received a distinctive varietal or specific name.

Button Grass.

F.McC. (Mundubbera)—

Your specimen represents the button grass, *Dactyloctenium radulans*, a very common grass in Western Queensland, but not so often seen nearer the coast. It is a grass that comes up very rapidly with summer rains and soon dries off. Like Flinders grass, however, when it dries off, it is generally regarded as a valuable fodder, and a good standing hay. It is one of the recognised important sheep grasses of the Western Downs.

Grasses, Millets and Sedges.

A.MacK. (Brookfield)—

(1) *Setaria geniculata* var. breviseta.

(2) *Setaria glauca.* Both 1 and 2 are sometimes called pigeon grass, also native setaria or wild millet, though this last name is applied to a number of grasses in Queensland. They are quite good grasses, though, usually speaking, they prefer old cultivation lands or rather damp situations. They are not so frequently seen in the ordinary pasture.

(3) A form of *Bothriochloa intermedia,* forest blue grass.

(4) *Kyllinga cylindrica,* Mullumbimby couch, a sedge, not a true grass. The sedges are separated from the true grasses on several botanical characters. They are not generally regarded as having the same fodder value as grasses.

(5) *Bothriochloa intermedia.*

(6) *Sporobolus Berteroanus,* Parramatta grass.

(7) *Cyperus gracilis,* a sedge. (See remarks on No. 4.)

(8) *Eleusine indica,* crow's foot grass. This grass is very widely spread over the warm temperate regions of the world. In Queensland, it mostly occurs as a weed of cultivation. Like young sorghum and some other plants, it contains a prussic-acid-yielding glucoside but fatalities from it in Queensland are exceedingly rare.

(9) *Brachiaria foliosa,* leafy panic grass, generally regarded as an excellent fodder.

(10) *Sida rhombifolia,* most commonly known as sida retusa, one of the commonest farm weeds in Queensland.

(11) *Alstonia constricta,* native cinchona, native quinine, or bitter bark. The bark of this tree is official in the British pharmacopœia, but the demand for it is very small, and the price low. It is used as a tonic.

(12) *Wickstroemia indica,* tie bush. The local name comes from the fact that the bark is very flexible, and was used as a source of fibre by the aborigines. On many occasions, this plant has been reported to us as poisonous to stock. Feeding experiments carried out on the leaves at Yeerongpilly some years ago gave negative results. The animals fed on the plant were very emaciated at the end of a fortnight's feeding, with the faeces stained with blood, but recovered when put on to ordinary food. A couple of years ago, some berries of this were received which, it was said, had caused the death of a child at Nambour. Fed to guinea-pigs at Yeerongpilly, they produced death in a very short time. It was seen, therefore, that the plant is most dangerous when in berry.

(13) *Mallotus cloaxyloides,* a small tree, very common as a scrub regrowth in South-eastern Queensland. We have not heard a local name given to it.

(14) *Elaeocarpus obovatus,* pigeon berry, or blue berry ash, a very common tree along creek-sides in Southern Queensland. It bears white flowers in very great abundance during the late spring months, and these are assiduously worked by bees.

Stramonium or Thorn Apple.

The Shire Clerk (Rosewood)—

The specimen forwarded is the Stramonium or thorn apple, *Datura stramonium,* a very common weed in cultivation and along creek banks in Queensland. It is a very poisonous plant, but stock usually avoid it in the growing state. The only trouble that we have experienced with it has been when it has been cut with a crop, chaffed, and the subsequent chaff fed to working horses or chaff-fed cows. The leaves are used for making cigarettes for smoking to give relief in asthma.

White Cedar Berries.

A.H. (Laidley)—

The specimens forwarded represent *Melia dubia* (white cedar). The fleshy part of the berries of white cedar is undoubtedly poisonous to all classes of stock, pigs being particularly susceptible. Experimental work has proved that the bark and flowers are also poisonous. So far as we know, however, the leaves have not been found to produce death in animals that feed on them. Your enquiry has been passed on to Dr. W. R. Seddon, Veterinary Adviser, who has carried out some investigations on this tree.

Grasses Identified.

N.R.A. (Kabra, via Rockhampton)—

(1) *Bothriochloa decipiens,* sometimes called bitter blue grass, or coastal blue grass. It is very widely spread in Queensland, and on the whole, is of only secondary value as a fodder. It is exceedingly common now in some places, the more palatable native grasses having been eaten out.

(2) *Heteropogon contortus,* bunched spear grass.

(3) *Eragrostis leptostachya,* paddock love grass.

(4) *Enneapogon avenaceus,* white heads.

(5) *Eleusine indica,* crowfoot grass. This grass is very widely spread over the warmer regions of the world. In Queensland, it mostly occurs as a weed of cultivation, or in places where the ground has been disturbed. It has a very firm hold of the soil, and is, on this account, sometimes called "Hold-fast." It is moderately palatable, but contains a prussic-acid-yielding glucoside. Nevertheless, there are very few records of its having been harmful to stock in Queensland.

(6) *Bothriochloa decipiens.*

(7) *Cyperus bifax,* a sedge. The sedges are very closely allied to the true grasses, but on the whole, have not the same fodder value. "The Principles of Botany for Queensland Farmers" which has been running as a series of articles in the Queensland Agricultural Journal, will soon be published in book form.

(8) *Eragrostis cilianensis,* stink grass. This is very widely distributed over the warmer regions of the world. In Queensland, it mostly occurs as a weed of cultivation. The name "stink grass" arises from the peculiar, but not altogether unpleasant odour, given off by the leaves when crushed. So far as our experience goes, stock do not take very readily to the grass, though we have been told that horses, when being worked in cultivation, will eat it at every opportunity. This, however, is hardly a normal test. They may eat it perhaps, in the form of hay, as it often occurs with grasses of this type.

(9) *Sida cordifolia,* flannel weed.

(10) *Dactyloctenium aegyptium,* button grass.

(11) *Chloris barbata,* purple top Rhodes grass.

(12) *Indigofera hirsuta,* hairy indigo.

(13) *Acanthospermum hispidum,* star burr.

Aggressive Weed Pests.

P.McM. (Ballandean)—

(1) *Ajuga australis,* Australian bugle, a native plant, fairly common in some parts in the forest pasture, and occasionally seen as a weed of cultivation. So far as we know, it has not established itself anywhere as a very aggressive weed-pest in cultivated land.

(2) *Verbena bonariensis,* purple top, a native of South America, now naturalized as a weed in many warm countries. It is a very objectionable weed in Queensland and New South Wales, aggressive, though on the whole, not particularly difficult to eradicate in small areas.

These are the names corresponding to the numbers on your specimens, though from your description, No. 1 is a vigorous upright grower, and No. 2, a low stunted plant. This seems to indicate that your specimen numbers and notes do not correspond.

Oat and Barley Grass.

J.T. (Charleville)—

(1) *Panicum decompositum,* barley grass, also commonly called native millet, though this latter local name is given to a number of grasses in Queensland. This grass is very common in many parts of Western Queensland, and provides a fair bulk of forage. Seeds were used by the aborigines in the early days as a source of grain.

(2) *Astrebla lappacea,* curly Mitchell grass, probably the best of the Mitchells.

(3) *Astrebla elymoides,* hoop Mitchell.

(4) *Themeda avenaceus,* tall oat grass; makes a good bulk of leafy bottom.

(5) *Themeda australis,* kangaroo grass.

Identification of Grasses.

J.S. (Eidsvold)—

(1) *Dichanthium sp.* one of the blue grasses. Most of the blue grasses are quite good fodders and play an important part in the mixed native pasture. They are not particularly drought-resistant, and do not stand up to heavy stocking.

(2) *Chloris divaricata,* one of the native chloris, or windmill grasses, but makes a fair bottom for sheep.

(3) *Bothriochloa intermedia,* forest blue grass.

(4) *Aristida sp.,* a wire grass or 3-pronged spear grass. We do not know of any way of getting rid of this plant. Species of wire grass or 3-pronged spear grass are very much inclined to over-run much of the sandy land in many parts of Queensland. In other places, they are very common on hillsides, and spread rapidly down, eating out all the better class of fodders. They are drought-resistant, and unpalatable.

(5) *Chloris gayana,* Rhodes grass.

(6) *Digitaria Brownei,* a fairly common grass in much of the sandy lands of Queensland. It is not known to have any particular virtues, but is probably quite useful in the mixed native pasture on such country.

(7) *Themeda avenaceus,* tall oat grass.

(8) *Tragus racemosus,* small burr grass.

(9) *Heteropogon contortus,* Bunch-spear grass, very palatable for stock in its younger stage, but soon becomes very harsh, and inclined to overrun much hillside country.

(10) *Eragrostis elongata,* a love grass.

(11) *Calotis lappulacea,* burr daisy. This and other species of calotis are commonly called bindy-eyes but this local name is now applied very commonly in Queensland to a number of burr plants.

(12) *Siegesbeckia orientalis,* commonly called farmer's lice, a very common weed of cultivation, sometimes seen on hillside pastures. It is of no particular consequence, and would not be very aggressive, we should think, under your conditions.

(13) *Arundinella nepalensis,* a reedy grass, very common on hillsides in Queensland. It is too coarse to be of much value as a fodder, but is not an aggressive species in the same way as the aristidas or wire grasses.

(14) *Malvastrum spicatum,* a very common weed of the mallow family.

(15) *Grewia latifolia,* a moderately common plant in Queensland, particularly on hillside country. In North Queensland an allied species is used as a cure for diarrhœa and dysentery, it is said, with very good results. Probably the leaves of the present species would have much the same effect. It is not known to possess any poisonous or harmful properties, but we have never seen cattle eat it, at least to any extent.

Bottle Tree Caustic.

Inquirer (Mitchell)—

Your specimen is the bottle tree caustic, *Euphorbia eremophila,* a very common weed in many parts of Australia, and stretching in Queensland from the coast right on the sea-beach to the far west. It is generally regarded as poisonous to stock, particularly sheep, though ordinary paddock stock do not seem to eat the plant to any extent, and most of the trouble from it has been with travelling stock, or freshly untrucked sheep. The symptoms described are similar to those of the ordinary scrub caustic (*Euphorbia Drummondii*). The head and neck of affected sheep swell very considerably, and if the swelling is pierced an amber-coloured fluid exudes, and the life of the sheep may be saved.

Feather Top Grass.

J.H.F. (Columboola)—

Your specimen is *Chloris virgata,* commonly known as feather top, or woolly top Rhodes grass. This grass is very widely spread over the tropical and sub-tropical regions of the world, and is quite common in many parts of Queensland, particularly as a weed of cultivation. It is very common in the lucerne-growing areas of the Lockyer Valley, and is said to have seriously decreased the earning capacity of some of the lucerne fields. It is a luscious-looking grass, but stock do not take very readily to it, though they are said to eat it freely in the form of hay. It is barely worth cultivating, as, on the whole, where it grows Rhodes grass can be grown equally well, and is a better fodder.

Annatto and Clitorus: Ornamental Shrubs.

T.H. (Maclean, N.S.W.)—

Your specimen represents *Bixa Orellana*, the Annatto, a native of tropical America, but now widely cultivated as an ornamental shrub in many tropical and sub-tropical countries. The seeds are contained in a prickly pod, and the red covering that surrounds them is exported from some countries for the purpose of colouring butters and cheeses. Annatto is particularly used for this purpose in Continental Europe, where a demand for a highly-coloured butter or cheese exists.

We do not know where you could obtain seeds of *Clitorus*. They do not seem to be regularly stocked by seedsmen here. The plant is quite naturalized about Townsville, and is seen everywhere on the hills about the town. Perhaps the Curator, Botanic Gardens, Townsville, might be able to supply you with some. We occasionally have a few on hand, and will remember your request.

Grasses from the Mid-west Named.

A.M.H. (Chinchilla)—

1. *Chloris virgata*—feather top or woolly top Rhodes grass. This grass is very widely spread through Queensland, and mostly occurs as a weed of cultivation or where the ground has been disturbed. Although rather luscious-looking, our experience has been, on the whole, that stock do not take to it very readily, although we are told they eat it freely enough in the form of hay.

2. *Echinochloa colona*—barnyard millet or wild millet. This grass is very common in parts of Queensland, and occurs mostly either as a weed of cultivation or in damp places. It is an excellent pasture, and is very closely allied to such well-known cultivated plants as white panicum and Japanese millet.

3. *Eleusine indica*—crowfoot grass, a very common grass in Queensland, mostly occurring as a weed of cultivation.

4. *Rynchelytrum repens*—red Natal grass. This grass is now very widely distributed in Queensland, and occurs mostly either in cultivation lands or where the ground has been disturbed; in some places it has extended into the ordinary pasture. Reports on its fodder value vary, but, on the whole, it is of only secondary value. It is a very common weed on the fruit farms of coastal Queensland, and by itself, and with other fodders, has been found to make excellent chop-chop for working horses.

A CONVENIENT AND SIMPLE FIRE-STICK.

The following idea for a cheap and effective fire-stick comes from a northern canegrower:—

A 3 to 4-foot length of ½-inch or ¾-inch galvanized piping is plugged at one end with a piece of suitable cloth, to serve as a wick. This may be attached to a length of wire, like a rifle "pull-through," and is so packed that kerosene poured into the pipe just leaks slowly through. The wick is lighted, and the operator walks along the border of the field dropping flame on the trash.

One bottle of kerosene will suffice to burn several acres of trash. It may be used also on weeds and rubbish generally, and its lightness makes it a handy weapon for the reburning of cane tops which have been raked into rows, and which would probably serve to reinfect neighbouring crops with borers were they not destroyed by fire.

E.H.F. in *The Cane Growers' Quarterly Bulletin* (Bur. Sugar Expt. Stations).

General Notes

Staff Changes and Appointments.

Messrs. F. C. J. Jorss, H. Lambert, and R. J. Rollston have been appointed assistant inspecting cane testers for the forthcoming sugar season, with headquarters at Cairns, Mackay, and Bundaberg, respectively.

List of police officers appointed to act also as inspectors of slaughterhouses as from the 8th May, 1937: Sergeant T. G. Long (Redcliffe), Sergeant J. R. Meade (Cooktown), Sergeant J. Rinaldi (Mossman), Constable A. Cox (Yelarbon), and Constable R. V. Walker (Rosedale).

Mr. D. A. Bacon has been appointed an inspector of dairies, stock, and slaughterhouses as from the 17th May.

Additions to the list of honorary rangers under the Animals and Birds Acts:—Messrs. S. R. Prout (Finch Hatton), C. W. Davidson (Carmila), C. A. Atherton (Koumala), F. A. Atherton (Koumala), S. A. Lilliendal (Koumala), J. C. Rasmussen (Mount Convenient, Sarina), E. S. Daly (Ilbilbie) J. Lawrie (West Plane Creek, Sarina), and E. J. Walsh (Shinfield, Sarina).

Mr. L. H. Roles has been appointed chairman of the Isis Local Sugar Cane Prices Board, vice Mr. V. J. Anderson, transferred.

Mr. N. J. King, A.A.C.I., soils survey officer, Bureau of Sugar Experiment Stations, Bundaberg, has been appointed chemist-in-charge, Sugar Experiment Station, Bundaberg.

Messrs. A. J. Hooper (Tourist Officer, Cairns) and M. P. Staunton (Assistant Tourist Officer, Cairns) have been appointed honorary rangers under the Animals and Birds Acts and the Native Plants Protection Act as from the 1st May, 1937.

The following persons have been appointed cane testers for the forthcoming sugar season at the mills indicated—G. E. Becker (Mulgrave), Miss D. Bowder (Marian), T. Breen (Proserpine), T. P. Brown (Mossman), J. Casey (Tully), L. Chadwick (Inkerman), Miss E. Christsen (Mourilyan), L. G. F. Holbach (South Johnstone), C. H. Humphreys (Cattle Creek), C. H. Jorgensen (Kalamia), Miss J. Orr (North Eton), Miss I Palmer (Invicta), W. Richardson (Babinda), Miss M. T. Smith (Plane Creek), G. Tait (Pioneer), F. W. Trulson (Pleystowe), R. D. Woolcock (Racecourse), and V. F. Worthington (Farleigh).

The following persons have been appointed assistant cane testers for the forthcoming sugar season at the mills indicated—Miss A. Anderson (Plane Creek), P. C. Boettcher (Pleystowe), C. Boone (Tully), L. C. J. Clifton (Proserpine), D. M. Corbett (Kalamia), E. J. Delaney (Pioneer), Miss F. Foubister (Proserpine), H. J. Heidke (Pleystowe), H. L. Holthouse (Plane Creek), Miss N. Hooper (South Johnstone), Miss M. A. Lyle (Farleigh), R. A. Mahoney (Marian), V. B. Martin (Racecourse), S. McRostie (Kalamia), Miss M. Morris (Tully), J. H. Murtagh (Racecourse), Mrs. M. E. Nally (Inkerman), Miss E. M. Rowe (Invicta), C. E. Savage (Farleigh), Miss P. Southwick (Babinda), J. Y. Taylor (Marian), D. Walton (Invicta), P. A. Van Lith (North Eton), Miss M. E. L. Wassell (Pioneer), and Miss S. Wilkinson (Cattle Creek).

The following persons have been appointed honorary rangers under the Animals and Birds Acts, as from the 29th May:—Messrs. F. W. Finlay (Riverview), B. G. White (Yimbun), A. Williams (Toogoolawah), T. Helander (Rita Island, Ayr), and J. F. J. O'Connor (Ayr).

Police Constable R. Holben, of Eumundi, has been appointed also an inspector of slaughterhouses, as from 29th May.

Mr. E. R. Gibson, Clerk of Petty Sessions, Mossman, has been appointed also chairman of the Mossman Local Sugar Cane Prices Board and an agent of the Central Board for the purpose of making enquiries with regard to sales and leases of assigned lands, vice J. P. Lee, transferred.

Mr. H. St. J. Pratt, Instructor in Fruit Culture, Department of Agriculture, Stanthorpe, has been appointed Senior Instructor in Fruit Culture.

Constable W. E. Lynam, Tinana, and the non-commissioned officers in charge of the police at Longreach, Aramac, Barcaldine, Isisford, Jundah, Muttaburra, and Tambo, have been appointed also inspectors under the Brands Acts.

The following have been appointed also inspectors under the Slaughtering Act:—Constables W. H. Anger, J. T. King, and J. H. Sprenger (Longreach); W. C. C. Sprenger (Aramac); W. C. Cutler (Alpha); J. F. O'Connor (Barcaldine); R. J. Cowan (Blackall); W. Mollenhauer (Isisford); V. C. Mahoney (Jericho); C. R. G. Thomson (Tambo); R. P. Hagarty (Windorah); and I. E. B. Wardrop (Winton).

Mr. G. H. Jenkins, M.Sc.App., B.Sc., A.A.C.I. Fairymead Sugar Co., Bundaberg, has been appointed assistant mill technologist, Bureau of Sugar Experiment Stations, Department of Agriculture and Stock. Another appointment to the Bureau of Sugar Experiment Stations is that of Mr. H. G. Knust, of Tully, who will fill the position of instructor (sugar cane culture).

Mr. H. M. Groszmann, Assistant to Horticultural Research Officer, Department of Agriculture and Stock, has been transferred to Nambour.

The following transfers of Inspectors in the Department of Agriculture and Stock have been approved:—Mr. S. C. Smith, Inspector of Slaughterhouses and Dairies, from Cairns to Mackay; Mr. J. R. Canty, Inspector of Slaughterhouses and Stock, from Innisfail to Cairns; and Mr. J. T. Littleton, Inspector under the Stock, Slaughtering, and Dairy Produce Acts, from Brisbane to Innisfail.

Appointments of honorary rangers have been made as follows:—Mr. E. M. Bauer, Molle Islands, Proserpine, honorary ranger under the Animals and Birds Acts; Mr. S. Zlotkowski, Ashra Downs, Muttaburra, honorary ranger under the Native Plants Protection Act; and Mr. O. J. S. Craig, "Bunya Tavern," Bunya Mountains, via Dalby, honorary ranger under the Animals and Birds Acts and the Native Plants Protection Act.

Mr. W. Booth, of Bebo, via Yelarbon, has been appointed an honorary inspector of Stock, and Constable A. Still, of East Bundaberg, an inspector under the Slaughtering Act and the Brands Acts.

Sugar Cane Assessments.

An Order in Council has been issued under the Regulation of Sugar Cane Prices Acts fixing the general assessment for the Sugar Cane Prices Fund on all sugar-cane produced in Queensland during the coming season at 1½d. per ton. In addition, special assessments are levied on cane supplied to the Mossman, Pioneer, and Inkerman Mills for the purpose of checking by survey the assigned sugar-cane lands in those districts in accordance with "*The Regulations of Sugar Cane Prices Acts Amendment Act of* 1931." These special assessments are at the rate of 1d. per ton in the case of Mossman, and ½d. in the case of Pioneer and Inkerman Mills.

Local Butter Marketing Scheme and Equalisation System.

An Order in Council has been passed amending the constitution of the Queensland Butter Board with regard to the Local Marketing Scheme and Equalisation System. Previously, if moneys held by the Board and urgently required by the factories were to be distributed, the distribution had to be effected on the basis of sales over a period of twelve months preceding the distribution, that is, on the basis of sales not made within the period during which the new marketing arrangements have operated. The present amendment now enables the Board to distribute moneys which belong to the factories as they become available, and on the basis of sales within periods during which such moneys have been accumulated. Also, the Board has been empowered to take action in the case of refusal or omission to furnish returns of sales to the Board.

Wild Life Preservation—New Sanctuary Near Rockhampton.

An area of about 3,600 acres of land on Hedlow Creek (parish of Barmoya, county of Livingstone), owned by Mr. M. C. Beak, Sandringham, Green Lake road, via Rockhampton, has been declared a sanctuary under the Animals and Birds Acts, in which it shall be unlawful for any person to take or kill any animal or bird.

Northern Pig Board Levy.

The Governor in Council has approved of the issue of Regulations Nos. 508 and 509 under the Primary Producers' Organisation and Marketing Acts, empowering the Northern Pig Board to make a levy on growers at the rate of sixpence (6d.) for each pig delivered to the board during the period from the 1st March, 1937, to the 31st December, 1940, to provide for the administrative expenses of the board. The amount of the levy will be deducted by the Northern Pig Board from payments due by the board to growers concerned.

Hereditary Unsoundness of Stallions.

Regulation 3 under the Stallions Registration Acts has been amended to include "Cryptorchidism" in hereditary unsoundness list for stallions.

Banana Levy Regulation Amendment.

A Regulation issued under the Fruit Marketing Organisation Acts in August, 1936, empowering the Committee of Direction of Fruit Marketing to make a levy on bananas marketed in Queensland, has been amended to provide that the Commissioner for Railways may collect the levy on account of the Committee of Direction on any Consignments of bananas to Brisbane.

Wild Life Preservation.

An Order in Council has been issued under the Animals and Birds Acts, declaring "Braeside," Dalveen, the property of Mr. G. C. Cory, to be a sanctuary for the protection of native birds and animals.

Bundaberg Cane Growers Levy.

Regulations have been issued under the Primary Producers' Organisation and Marketing Acts, empowering the Bundaberg District Cane Growers' Executive to make a levy at the rate of one penny per ton for administrative purposes on growers of sugar-cane in its district.

Peanut Board.

Regulation 158 under the Primary Producers' Organisation and Marketing Acts has been amended to provide for a reduction in the rate of the levy by the Peanut Board from one farthing (¼d.) to one eighth of a penny (⅛d.) per lb.

An Order in Council has been issued under the Primary Producers' Organisation and Marketing Acts giving notice of intention to extend the operations of the Peanut Board for the period from the 28th August, 1940, to the 27th August, 1947. Growers are given the opportunity of forwarding a petition for a poll on the question of whether or not the board shall be thus extended, such to be lodged on or before the 26th July next.

An Order in Council has been issued under the Primary Producers' Organisation and Marketing Acts, amending the constitution of the Peanut Board in regard to the tenure of officers of members of the board and the definition of a grower.

The amendments provide for triennial elections and a three years' term of office for all members of the board.

Persons who are deemed to be growers of peanuts and eligible to vote at any election or referendum shall be those who during the preceding twelve months have cultivated peanuts for sale in any part of the State on not less than half an acre of land of which they are owners or tenants under a written lease or agreement, or which they are farming under a written share-farming agreement, and who delivered to the board for sale all the peanuts produced for sale from such land.

District Executives and Sugar Mill Suppliers' Committee.

Regulations under the Primary Producers' Organisation and Marketing Acts embodying fees and allowances payable to members of district cane growers' executives and mill suppliers' committees have been amended to provide for alterations in the scale of fees payable to members of the Maryborough District Cane Growers' Executive and the Mount Bauple Central and Maryborough Mill Suppliers' Committees.

Registration of Veterinary Surgeons.

The Act providing for the registration of all persons engaged in the practice of veterinary surgery is now in operation. All persons who are eligible for registration should apply to the Registrar of the Board, Department of Agriculture and Stock, Brisbane, for the application forms provided by the Regulations, and other particulars.

Rural Topics

Improvements on Small Sheep Holdings.

When money is available a small pastoral holding frequently carries improvements fit for a much larger property. On the other hand, when finance is not available, the small holding often lacks even the bare improvements which are essential to the well-being of the sheep and the handling of the clip.

A holding has a certain capital value, and unnecessary improvements merely over-capitalise the property. Interest has either to be paid or allowed for this excess expenditure.

Certain improvements are, however, essential in all cases.

A substantial boundary fence and, should the district suffer from the depredations of dogs, netting and top netting are obviously necessary.

Next in importance is the water supply. Should there be adequate natural water the selector is fortunate. Failing natural water, wells, sub-artesian bores, surface tanks, or bore drains to conduct supplies from neighbouring bores must be provided. The type of watering facilities to be used is essentially a matter of economics. What pays best, particularly in drought emergencies, should be a guiding principle in the grazier's choice.

A horse paddock and yards for the handy working of house cows require early construction. This paddock should, of course, be handily situated to the homestead and should contain water.

Subdivisions of the property for the convenient working of sheep is seldom given sufficient thought. It involves not only the running of fence lines, but their construction in such a manner that water is easily and continuously available to the stock. The fences themselves should be substantially erected to obviate continuous drafting and boxing. Too much money may be spent in wrongly thought out subdivisions, but generally speaking, the smaller the paddocks the better. The posts used for fencing should consist of timbers proved in the district for their durability.

The shearing shed and drafting yards may, on a small holding, be lumped together. The shed should be well constructed and properly designed, but not larger than is desirable for the competent handling of the numbers ordinarily run on the property. The yards also should be constructed substantially, and their correct design for the drafting of sheep is of first importance. Where shed and yards are together the latter should be so placed that the shed can be conveniently filled with woolly sheep.

Finally, the situation of the house should permit the easy working of the property, and its cost should be no greater than the improved value of the holding warrants.

The Importance of Washing the Udder.

An essential feature in clean milk or cream production is the thorough cleaning of the cow's udder before each milking. Clean water and cloths should always be available for this purpose in the milking shed, and a few crystals of Condy's crystals should be added to the water used.

If this precaution is taken the milk will not be contaminated with cow's hair, scaly material, dirt, soil, &c. Materials of this type carry innumerable germs which rapidly increase and produce early deterioration in the milk or cream.

During cream separation the dirty grey or brown slimy residue in the bowl indicates the extent to which the cream is affected.

When clean milking is practised and the milk is strained through cotton filter discs into clean utensils, the slime in the separator bowl will be almost white and the cream is relatively free from dirt carrying undesirable bacteria.

Scores of tests carried out by the methylene blue test which is the best known factory method for differentiating between clean and unclean milk, clearly show a very marked improvement in the quality of milk where the udder has been washed.

Dirty milk may contain from 4,000,000 to 20,000,000 bacteria per cubic centimetre, whereas this number can be reduced to less than 500,000 per cubic centimetre by taking care that the udder, hands, utensils, &c., are thoroughly clean.

A great proportion of inferior cream is caused by bacterial contamination due to the omission of three most important processes—thorough washing of the udder of the cow and the milker's hands, thorough scalding of all utensils after each milking, thorough cooling and mixing of cream.

Nutritional Requirements of Poultry.

Poultry raisers as a whole have a very fair idea of the principles and practice of feeding, and take into consideration factors that make for efficient and economic production.

The present day values of cereals may induce some to depart from old and accepted practices in order to reduce costs. There are three points, however, that must not be lost sight of if the best results are to be obtained and the general health of the stock maintained, viz., the vitamin content of the ration, the protein content, and the quantity supplied.

Vitamins.—Vitamin A is of outstanding importance at the present juncture, for a shortage in the ration may cause outbreaks of nutritional roup as well as lowered egg production. The feeding of yellow maize and green feed ensure a sufficient supply of this vitamin. The price of maize will, however, preclude its inclusion in the ration to the same extent as in past years. Wheat will be used to replace this cereal, and so one source of vitamin A is lost.

On most poultry farms during the winter months, green feed is not plentiful, consequently under normal circumstances the loss due to a shortage of maize cannot be overcome. It is, therefore, of paramount importance that the poultry raiser should make a special effort to supply the birds with good succulent green feed. Green feed is the cheapest form in which the birds' requirement of this vitamin can be supplied. In cases where home-grown green feed cannot be obtained, poultry raisers should use at least 10 per cent. of good green lucerne chaff or meal in the mash fed to their birds.

Protein.—To obtain the maximum economic production, laying birds should have in their ration (i.e., grain and mash) a total of approximately 15 per cent. of crude protein. Maize has about 10 per cent. and wheat about 13 per cent. of protein. Where maize has been used extensively and is replaced with wheat it may be desirable to reduce slightly the protein content of the ration. This is most easily brought about by a slight reduction in the meat meal fed.

Generally speaking, however, the protein-rich meat meal is not overfed, and its greater use is advisable in certain circumstances. This is particularly so in the case of the poultry raiser who feeds extensive quantities of skim milk to his birds. With the approach of winter the milk supply will probably diminish. In such cases, the loss of protein of animal origin in the form of milk should be supplemented with meat meal.

Quantity.—Providing the right kind of food is being used, economic production is only possible by feeding the birds all they will consume. Do not be afraid of making your birds unduly fat. The good producer will convert the food supplied in excess of body requirements into eggs. Birds which cannot do this should be culled and sold for table purposes.

Beef Cattle Management.

Extensive canning operations are in progress throughout the major meatworks in Queensland, and they furnish an excellent opportunity for the cattle-man to practise rigorous culling. All aged animals of either sex, speyed cows, and beasts of an unfit type, including calves, should be marketed.

The remaining stock should be regarded as "chiller" grade animals. Rigorous culling will lessen the demands on the available feed, and young steers will, therefore, have a better opportunity to develop normally. Similarly, the breeders will have a better chance of producing healthy calves.

The practice of handfeeding any but valuable stock would soon prove ruinous on a large holding, and even on a small property, where mixed farming is carried on, the beef animals must come last on the list of stock eligible for supplementary concentrate rations.

On most runs there is one objectionable feature which should receive attention, and that is unclean water. Clean water must be protected by fences, or by drawing off into troughs. Even the approaches should be stoned or corduroyed. Foul or extremely dirty supplies should be fenced off, or at least partly purified, by the liberal use of burnt lime or fresh ashes.

A stock lick is a great help to cattle on most Queensland properties. No elaborate preparation is required. Equal parts of salt and bone-meal make a suitable mixture. Where heavy consumption makes the expense unduly high, the bone may be partly replaced by old wood ashes. A regular inspection is advisable so that steps may be taken to remedy any fouling of the mixture.

Our Untold Timber Wealth.

What Ivor Brown says in the following extract from an article in "Wood," a forestry magazine published in England, should have an especial appeal for Queenslanders:—

"The case for knowledge, whether it is knowledge of roots or rocks or bees or butterflies, is not that your head is thereby stuffed with a paper army of Latin names; for that kind of ornithology or botany I have no use whatever. Collecting eggs, skins, fossils, and dead flowers, and labelling them with the utmost correctitude is a dreary and very often a sadly destructive pastime. True knowledge of natural history has nothing to do with pedantic collection and possession; it is the information which leads to understanding and opens your eyes as you take a country or suburban walk or even a stroll in the city park, the information which enables you to comprehend why such and such a flower or tree is found in this or that place, its particular function in the natural scheme, its beauties, and its utilities.

"The case for intelligent instruction of children in the nature and quality of our native timber is overwhelming. I say "intelligent" instruction because this kind of teaching can be desperately dull; it should be kept as far as possible from the examination syllabus, the prize for quick responses, and the honour that goes to the ready rattle of a list of names. It should be based not only on the picture-book and the text, but on the actual growth of the roadside, the playing-field, and the adjoining country. If such teaching is given by lively minds, it must add enormously to our comprehension of England, not only of our legacy of English beauty but to our understanding of social developments.

"Timber, the first material of manipulative man, the especial foundation of our island-story, the oaken face that launched a thousand ships, the buried forests of the coal-measures, the chair we sit on and the desk we write on, the visual glory of our plans and parklands and the pit-prop yielding conifers and cover of our foothills—what was I ever taught about all that? Yes, there was one thing. The English yew and the English bowman. How curious that education should select one aspect of England's timber story which has left the least mark! The record, for example, of the English oak and its manifold usages in ship and house building as well as for furnaces and for furnishing would sum up a considerable fraction of the English heritage. But it was always the yew.

"Education has marched, since I was learning all about Virgil's woods and unable to recognise my own. It does, I believe, place far less reliance on the twigs of the birch and on the slender form of imported timber which bears the name of rattan. I trust that its notions of natural history have equally progressed since I, as Bughunter, loafed among the woods I could not name and did not appreciate or understand. If there ever was a subject which could be made to fascinate an intelligent boy or girl and lead him or her on to the enjoyment of the rural scene and to lively social speculation, it is the nature of our British woodlands and their relation to our earth, our climate, the beauty of our land, and the history of its people.

ANNUAL SCHOOL OF INSTRUCTION FOR DAIRY AND PIG FARMERS.

Preparations for the school of instruction for dairy and pig farmers, which is held annually at the Queensland Agricultural High School and College, Lawes, are in progress. This year the school will open on Monday, 23rd August, and conclude on Saturday, 4th September. The fee is £3 10s. for the full course, and will cover board, lodging, and instruction (and excursion). Concession fares will apply to rail travel. Early application to the Principal, Queensland Agricultural High School and College, Lawes, Queensland, is advised.

Students travelling by rail should book to Lawes, noting also that express mail trains do not set down or pick up passengers at that siding. Further information may be obtained direct from College or from the Department of Agriculture and Stock, Brisbane.

Orchard Notes

AUGUST.

THE COASTAL DISTRICTS.

IN many centres the bulk of the citrus fruits, with the exception of the late-ripening varieties, will have been harvested, and cultural operations should be receiving attention.

Trees which show indications of impaired vigour will require a somewhat heavy pruning, both in respect to thinning and shortening the branches. Where the trees are vigorous and healthy a light pruning only will be necessary, except in the case of the Glen Retreat mandarin. The densely-growing habit of this variety leads to a profusion of weak shoots, which, if allowed to develop, will be responsible for overbearing and resultant small and inferior fruit at an early age.

Where trees show signs of failing, investigations should be made at or near ground level for the presence of collar rot. The roots should be examined for disease, and in the North Coast districts for the presence of the citrus root bark channeller. A light application of paradichlorobenzene buried a few inches deep in circular drills around the tree and with the surface stamped firmly has been recommended for controlling this pest. The distance between the circular drills should be not more than 18 inches, and care should be taken to prevent the crystals of paradichlorobenzene from coming into contact with the roots. It may be necessary to repeat the application after an interval of three or four weeks.

Where it is necessary to control black spot, melanose and scab, the fungicide should be applied at the correct time. The control measures recommended are—

For Black Spot.

Bordeaux of 3-2-40 strength or Bordeaux of 3-2-40 strength + 1 per cent. of oil emulsion—

(1) As soon as the fruit has set;
(2) About a month to six weeks later;
(3) If black spot has been serious previously, another application just prior to the February rains.

For Melanose.

The use of a similar fungicide—

(1) Immediately the fruit has set;
(2) A month to six weeks later, or more often if the weather conditions are exceptionally wet.

For Scab.

(1) Bordeaux mixture 6-4-40 or Bordeaux 6-4-40 + 1 per cent. oil emulsion immediately before the new growth commences; this will help to clean up fungus on the old scabs;

(2) Bordeaux 3-2-40 or Bordeaux 3-2-40 + 1 per cent. oil emulsion at about the middle of the flowering period; this and subsequent applications are for the protection of young foliage and fruit;

(3) Bordeaux as soon as the fruit has set;

(4) If the season is exceptionally wet, it is advisable to give one or two further applications in order to keep the young fruit and foliage well covered.

Where for any reason healthy trees of vigorous constitution are unprofitable, they may be headed back—in fact, have the whole of the top removed—leaving a few selected arms. All other branches should be cut away at their source of origin. The three or four remaining arms, whose lengths will vary from 2 to 4 feet, will form the future framework of the tree. Care must be taken to cover the whole of the exposed bark with a suitable coating of whitewash to prevent sunburn. The numerous shoots which will grow from main arms are suitably reduced, leaving from two to four on each arm. Under favourable conditions these will be in a fit condition to receive selected buds from desirable trees by the following autumn.

It is desirable that, when shoots intended for budding have attained a length of from 6 to 9 inches, their terminals should be nipped off in order to stiffen their growth and guard against the possibility of damage by strong winds.

Fertilizing should be completed as early as possible, the mixture for the spring application being high in readily available nitrogen. Ploughing should then be completed, the depth of this being regulated by local conditions and the nature of the original preparation of the land. Following upon the ploughing the land should be worked down to a fine state of tilth. On hillside orchards attention should be given to the care of possible storm waters. Cultivation should be so arranged as to form shallow drains or banks along the tree rows and across the heaviest slope, leading into suitable side drains which may be grassed to prevent erosion.

The planting of trees may be continued and, with the exception of custard apples, expedited. The attention of citrus growers should be confined to varieties suited to their local conditions.

The pruning of grape vines should be completed, and where cuttings for planting are required these should be selected, trimmed, and heeled-in in slightly dry soil. Canes intended for cuttings should not be allowed to lie about and dry out, but should be treated the day they are severed from the plant. Cuttings are frequently made of excessive length; however, from 10 to 12 inches is a suitable length which allows for insertion in the soil so as to permit of the top bud, with a short section of the internode, protruding above the surface.

THE GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

ALL pruning other than that applied to peaches and varieties which are late in coming into growth should be completed this month, and the planting of young trees, if not already done, should no longer be delayed. Early planting is preferred, the sooner after the fall of leaves the better. When there are indications of the swelling of the buds, the time is opportune for wroking over unprofitable trees, where the stock is reasonably vigorous. Strap grafting, as advised by the local field officers, is the most satisfactory method of top-working deciduous trees.

The pruning of vines should be postponed as long as circumstances permit, and these can only be gauged on actual observation as they are subject to much variation.

The usual winter working of the land is essential for the retention of moisture and aeration of the soil, but in shallow soils in which many orchards are planted deep working is most detrimental. The matter of seedling stocks for apples and the inferior plants frequently received from Southern nurseries prompts a query as to how many seeds have been stratified for spring planting, and whether any effort is being made towards raising a local supply of nursery stock.

CHEEPLY MADE RUG FOR DAIRY COWS.

As a means of assisting the dairy cow to conserve heat (and thus preventing food wastage), the rugging of the animals during at least a portion of the winter is well worth while, especially in colder districts and situations. Many farmers would like to rug their cows, yet cannot afford to purchase the market article. The farmer can, however, make his own cow rugs for little more than the cost of the bags, a ball of twine, and a sewing needle, plus his own ingenuity.

Two bags (cornsacks or any heavy bags will do), or three for larger cows, will make a nice rug. Split them down the seams and join together and place on the cow. Next cut off a strip from 10 to 18 inches wide so that the rug will not hang too low. This need not be wasted; it is folded, and when sewn to the rug provides the strap for the thighs, this being the only strap used. The front is now fitted by turning up the front corners and sewing them to the sides of the rug. This strengthens the rug and obviates the necessity for cutting off the spare portion which the cow would tread on. The two turned-back portions are then measured and sewn to fit fairly tightly to the cow's neck. The back strap is fitted 12 to 15 inches below the rump level, and the rug is complete.

This home-made rug will keep the cow warm, and after a few days' wear, when the oil, etc., from the cow's body has worked into the rug, it will also be waterproof. The rug can quite easily be slipped off and on over the cow's head, and it is advisable to remove it daily except on rainy or very bleak days. The cow's name painted on the rug over the rump with tar prevents confusion in replacing the rugs.

Farm Notes

AUGUST.

THE most important work during August will be the preparation of the land for all spring-sown crops. The better the cultivation the better the results that can be expected. Potato planting will be in full swing this month, and in connection with this crop the prevention of diseases calls for special attention. Where possible, seed potatoes should be selected from localities which are free from disease; they should be well sprouted, and, if possible, should not exceed 2 oz. in weight. Seed potatoes of this size are more economical to use than those large enough to necessitate cutting. However, if only large-sized seed are procurable, the tubers should be cut so that at least two well-developed eyes are left. The cut surfaces require to be well dusted with slaked lime or wood ashes as soon as possible after cutting. If considered necessary to prevent possible infection by scab, potatoes should be treated with hot formalin or acid corrosive sublimate. Details of the method employed may be obtained from the Department. When treatment has not been carried out prior to sprouting it should be delayed until a day or so before planting. Where cut tubers are to be sown, they should be dipped before cutting.

In localities where all danger from frosts is over, sweet potato cuttings may be planted out. This crop deserves more attention owing to its value for both culinary and stock food purposes.

Arrowroot may also be planted this month in suitable localities.

With the advent of warmer weather weed growth will increase, and cultivators will be kept busy in growing crops, and land being prepared for sorghums, millets, maize, cotton, and summer growing crops generally.

THREE DAY SICKNESS.

Three day sickness is a disease of unknown origin, but, like influenza and small pox it is probably caused by a very minute parasite. It first appeared in the Gulf Country about a year ago and may have been introduced to the continent through the accidental carriage of infected insects from countries to the north of Australia.

As the disease spread with great rapidity through the State, and then along the coastal districts of New South Wales in a few weeks, it is possible that some factors other than insects may also play a part in spreading the disease.

The disease is characterised by a high fever which lasts for a day or two. There is a discharge from the eyes and nose, and, in many cases, lameness in one or other of the limbs is marked. The animal shows a disinclination to move. It prefers to lie down in the shade and remain so during the day or so that represents the acute phase of the disease.

Treatment is not necessary and the animals should be left wholly undisturbed, if possible. This, of course, cannot be always carried out, particularly with milking cows which have to be milked twice daily.

Cows in full milk show a marked decline in the milk produced, but the yield usually returns to normal when the animals show signs of recovery or shortly afterwards.

In severe cases, animals may develop a marked weakness in the hind quarters and show difficulty in rising. This symptom is temporary only though it sometimes persists for several days. The animal should then be fed off the ground and turned over from one side to the other two or three times a day.

Redwater has occurred in some of the herds on tick infested country during the three days sickness outbreak and has caused some losses. This is due to the fact that animals on ticky country are normally "carriers" of the redwater organisms. So long as the animal is quite healthy, these organisms are harmless, but immediately there is a weakening of the constitution of the animal, as may occur during three day sickness, they increase in numbers and produce redwater. If this happens, the animal has to receive appropriate treatment.—Dr. JOHN LEGG.

OUR BABIES.

Under this heading a series of short articles by the Medical and Nursing Staffs of the Queensland Baby Clinics, dealing with the care and general welfare of babies, has been planned in the hope of maintaining their health, increasing their happiness, and decreasing the number of avoidable deaths.

A BREAKFAST TABLE CONVERSATION.

IT was an hotel in a small country town in the west of Queensland. I sat with a young man on my right. I had never seen him before, and shall probably never see him again. Breakfast is more cheerful with a little conversation than eaten in glum silence. So I made a beginning with the weather.

Pasteur and Lister.

Then changing the subject—"What keeps people in this town out of bed till midnight?"

"The pictures."

"Ah! Was it a good picture?"

"Yes, it was Pasteur."

"That is a good picture. I saw it in Brisbane some time back. I suppose not one Australian in a thousand had ever heard of Pasteur. Listen, I will tell you something. Some years ago a Paris newspaper offered a prize, for which the competitors were to name the ten greatest Frenchmen. Who do you think headed the list; Napoleon, Victor Hugo, General Foch? Not one of these. Louis Pasteur came first. Can you imagine Australians or Englishmen placing a man of science in the first place in such a competition?"

"There lived recently an Englishman who was a firm friend of Pasteur and as great as he. He was Joseph Lister, the discoverer of

antiseptic surgery. How many Australians know anything about Lister, except perhaps his name? Pasteur showed us that many diseases are caused by germs; Lister showed us how to keep disease germs out of wounds. If you were thrown off your horse, and broke your leg, and the bone stuck out through the skin, who would save your life after you were taken to hospital? Why, of course, Joseph Lister!"

Children and Milk.

I changed the subject. "I suppose an experienced stockman can tell at a glance whether a mob of cattle is poorly nourished?"

"Yes, certainly."

"Yesterday, I met a mob of small children coming out of school. I looked at them carefully. They were a poor lot; one of the worst I have seen in Queensland. Most of them were too thin, and many of them had legs like broomsticks. This is not the fault of the district, nor do I think it is due to want of money. You can find in this district poor parents who have well nourished children, because they drink plenty of milk, mostly goats' milk. There are plenty of goats here. In a season like this you can get plenty of goats' milk for nothing at all—nothing but a little trouble."

The Small Boy.

On my left sat a boy of four years, very neatly clothed, very well behaved, very quiet. I thought I would give him a turn.

"Yesterday I saw a number of small boys riding bicycles." He responded instantly with a smile.

"I ride a bicycle at home. It has three wheels."

"You will learn to ride on two wheels some day."

The boy's mother was not there. He was in charge of a friend. Just then he asked him what he would have to drink.

"Water," he said.

Better than tea, I thought. But I handed him the milk jug.

"Won't you drink this beautiful milk?"

"No, I like water better."

His guardian said, "You should drink milk. It is so good for you."

Realising the futility of this I kept silent. Then, after an interval—

"Do you play cricket?"

"No."

"What do you play?"

"I like playing tennis."

"You will play better tennis, if you drink milk every day. There is something to think about."

A seed planted by the wayside. I fear it will never sprout.

Balancing the Diet.

(Contributed by the Queensland Nutrition Council.)

A GREAT authority on nutrition after investigating the diets of all types of people, rich and poor, was convinced that the majority of mankind lives on a diet which is defective in some respect. That does not necessarily mean that the majority of people are starving. Many people may and do eat more than enough food of a "kind", yet their diet may be defective in some one type of food constituent, *i.e.* their diet is not well-balanced. For example, in Australia, the people as a whole eat too much sugar and white flour and not enough fruit and vegetables, milk, eggs, and cheese. How then are we to balance our diets? Before we can do this intelligently, we must know something of the different types of food constituents.

Foodstuffs, as commonly used, may contain all or some of the six essentials in any diet, viz.—water, carbohydrates, fats, proteins, minerals, and vitamins.

(1) *Water* is contained in most foods, even in solids, such as vegetables and fruit, bread and meat, while good milk contains about 87 per cent. of water. Water is very essential to a well-balanced diet, and may be taken as "Adam's Ale", when at least six glasses daily would be needed, or in the form of milk, tea, coffee, cocoa or soups.

(2) The next essential is *carbohydrates.* These, together with the fats, provide the body with energy and heat when digested. The carbohydrates should form about two-thirds of our daily food supply and include such substances as potatoes, fruit, vegetables, cereals, rice, sago, flour and sugar. *Bread,* consisting largely of flour, is one of the most commonly used carbohydrate foods; indeed, according to modern knowledge, it is often too commonly used. Wholemeal or cerevite bread should always be used in preference to white—for they are both much richer in the sixth essential—vitamins.

(3) *The Fats.*—The third essential of a balanced diet mentioned above includes such substance as butter, fat of meats, cream, oils and nuts, and here in Queensland should form about one-sixth of the total quantity of the daily food supply. In cold countries, such as Northern Canada, the Esquimaux live almost on seal and the blubber of whale, which consist largely of fat. In tropical and temperate climates, during summer, less fat is perhaps needed than during the winter.

(4) *Proteins* are the fourth essential of a well-balanced diet. These are usually known as body builders or strength producing foods. Meat, fish, eggs, cheese, peas and beans are foods rich in protein and these should form about one-sixth of the daily food supply. They are especially necessary for growing children. Men doing hard manual labour also require a good deal of protein, but the habits of people in Queensland generally ensure a more than ample supply for working men.

(5) The *mineral substances* come next among the essentials. Four important members of these are often deficient in the diet. These are—iron, lime, phosphates, and iodine. Iron is very necessary to keep the blood in a healthy state. Some of the foods which should be taken for their iron content are egg yolk, liver, whole-grain cereals, green vegetables, and dried fruits. Lime and phosphates are very necessary for the proper development of the bones and teeth, and also help in the formation of muscles and nerves. A lack of lime and phosphates in foods leads to many very serious conditions, especially in children. Milk,

cheese, oatmeal, carrots and potatoes are all rich in lime and should be included in the daily dietary. Of these, milk and cheese are especially valuable. For phosphates, foods such as milk, liver, brains, cheese, eggs, fish-roes should have a place in a well-balanced diet. *Iodine*, too, is essential in order to keep the body healthy. In districts where the food contains insufficient iodine, e.g., in certain parts of the Alps and in certain districts of New Zealand, a large percentage of the population develops goitre, a form of swelling in the neck. Oysters, cod-liver oil, eggs, potatoes (with skins on) and leafy vegetables, all contain sufficient iodine for the bodily needs.

(6) Now, the sixth and last essential of a well-balanced diet are *Vitamins,* of which there are many. The most important of these are known as A, B, C, D.

From what has been said, it will be very obvious that milk, meat, eggs, and cheese, fruit and green vegetables, along with wholemeal or cerevite bread, make a well-balanced diet. Attached will be found a table which will be a guide in the choice of foods and, if followed, will provide both variety and balance in the diet. The table:—

BREAKFAST.

BALANCE YOUR MEAL BY HAVING ONE FOOD FROM EACH OF THE FOUR GROUPS.

(1) Fruit.	(2) Milk.	(3) Cereals and Breads.	(4) Proteins.
Orange Pineapple Apple Pawpaw Bananas Grapefruit Tomato Apricot Peaches Cherries Pears Grapes (Fresh fruit is best, but stewed can be used for a change)	Certified milk Pasteurised milk (Lower grade milks should be boiled before being given to children)	Wheat Germ breakfast meal (*e.g.*, Cerevite) Stoneground wheaten porridge meal Firstbreak wheaten meal Cerevite bread Wholemeal bread Oatmeal (occasionally) ("Prepared" breakfast foods are not economical)	Egg— poached scrambled omelette fried boiled Lamb's fry Kidneys Fish Chops Steak Bacon Ham

LUNCHEON OR LIGHT EVENING MEAL.

BALANCE YOUR MEAL BY HAVING ONE FOOD FROM EACH OF THE FOUR GROUPS.

(1) Protein Foods.	(2) Salad Vegetables and Fruit.	(3) Starchy Foods.	(4) Milk.
Mutton Lamb Beef Cheese Fish Ham Tongue Pork Veal Poultry Rabbit Pea soup Nuts	Lettuce Tomato Celery Apple and cheese Beetroot Pineapple and cheese Onion Shredded raw carrot Radishes Fresh fruit (as for breakfast)	Potato (boiled in jacket) Cauliflower Cerevite bread Wholemeal bread Macaroni	As for breakfast, Milk soup

DINNER.

BALANCE YOUR MEAL BY HAVING ONE FOOD FROM EACH OF THE FOUR GROUPS.

(1) Protein Foods.	(2) Starchy Foods.	(3) Vegetables.	(4) Dessert.
As for lunch	Potatoes— boiled in jackets baked mashed Other starchy foods, as for lunch	Cabbage Lettuce Spinach Silverbeet Onions Carrot Cauliflower Tomatoes Parsnips Turnips Pumpkin	Fruit salad Pineapple Stewed fruits Custard made with milk and eggs

Australia, in fact the whole civilized world, is becoming nutrition-minded. Let us here in Queensland keep abreast in the forward march and introduce into our own homes a well-balanced diet. In this way, we may help materially in the building up of a strong and stalwart race, surpassing even our present high standard.

IN THE FARM KITCHEN.

PUDDINGS AND SAUCES.

When the cold weather has whetted the appetite, hot steamed puddings become popular items on the menu.

The puddings described here are suitable for this time of the year, and not the least attractive feature of many is the unusual sauce which accompanies them.

Plain Foundation Pudding.

Take 6 oz. flour, 1 teaspoonful baking powder, ½ gill milk, 2 eggs, 3 oz. sugar, 2 oz. butter, pinch salt, vanilla.

Beat the butter and sugar to a cream. Add eggs and beat well. Add milk and vanilla gradually. Lastly add the sifted flour and baking powder, and stir very lightly. Place in a greased mould covered with greased paper and steam for one and a half hours.

To make this into a Marguerite pudding, put a little jam in the bottom of the mould before filling in the mixture.

For a lemon pudding, add the grated rind of a lemon.

Sultanas, dates, currants, may be added. These give the pudding its distinctive name.

Marmalade Pudding.

Take 2 oz. butter, 2 oz. sugar, 4 oz. flour, ¾ teaspoonful carbonate of soda, 1 egg, 2 tablespoonfuls milk, 2 tablespoonfuls marmalade.

Cream the butter and sugar. Add the marmalade, beaten eggs and milk, then stir in the sifted flour and carbonate of soda. Pour into a well-buttered mould, cover with greased paper, and steam for about one and a half hours. Serve with marmalade sauce.

Delaware Pudding.

Take 10 oz. suet crust, 2 oz. chopped peel, 2 tablespoonfuls breadcrumbs, 1 large apple, 1 tablespoonful dates, or currants, 2 tablespoonfuls syrup.

Grease a pudding basin. Roll crust out thinly, and cut into varying rounds to fit and fill a pudding basin. Chop the apple. Mix all the ingredients together with enough syrup to make the mixture spreadable. Grease the basin and fill it with alternate layers of pastry and mixture. Have the last layer of pastry. Cover with a floured cloth. Steam for two hours. When turned out, coat with syrup flavoured with lemon juice to taste.

Ginger Pudding.

Take 3 oz. breadcrumbs, 3 oz. margarine, 2 eggs, 3 oz. brown sugar, 3 oz. flour, 1 tablespoonful preserved ginger, 1 teaspoonful baking powder, 2 tablespoonfuls ginger syrup, milk.

Rub the margarine into the flour. Stir in all the other dry ingredients, the chopped ginger and ginger syrup. Moisten to a thin batter with eggs and milk, if required. Grease a pudding mould, turn the mixture into it. Cover with greased paper. Steam for one and a half hours. Serve with ginger sauce or custard sauce.

Sweet Carrot Pudding.

Take 1 lb. carrots, ½ lb. breadcrumbs, 1 egg, 2 oz. butter, 1 oz. brown sugar, salt, lemon sauce.

Scrape the carrots, put them into boiling water, and cook until soft. Rub through a sieve. Add the breadcrumbs, sugar, butter, pinch of salt, sufficient beaten egg to bind well together. Butter a pudding basin, put in the mixture, and steam for about one hour. Turn out the pudding and serve hot with lemon sauce.

Heredotus Pudding.

Take ¼ lb. breadcrumbs, ½ lb. suet, ½ lb. raisins, 2 figs, ¼ oz. allspice, 1 egg, 1 oz. sugar, ½ lemon, 2 tablespoonfuls sherry.

Chop the suet finely and the figs. Cut the stoned raisins in half, and mix all the dry ingredients together, with the rind of a lemon grated. Beat the egg well and add it, and if necessary sufficient milk to make into a dough. Put into a buttered basin, cover with a scalded and floured cloth. Steam for four hours, and serve with sherry sauce, made by mixing half a pint of water with half an ounce of cornflour into a smooth paste, and then boiling it with an ounce of castor sugar for five minutes, stirring it all the time. A glassful of sherry can be added after it has boiled.

Steamed Victoria Pudding.

Take 8 oz. self-raising flour, 4 oz. suet, pinch salt, 1 bare teacupful water, 1 cooking apple, 2 tablespoonfuls apricot jam, sugar if liked.

Mix the flour and finely chopped suet together with a pinch of salt. Grate the apple, cut up the cherries, and add to the mixture with the jam. Mix with the water into a paste. Put into a greased basin and steam for two hours.

Lemon Sauce.

Take ½ pint boiling water, 1 lemon, 1 oz. loaf sugar, 1 dessertspoonful cornflour.

Rub the sugar on the lemon until the actual rind is removed. Dissolve this in the boiling water and simmer gently. Mix the cornflour into a smooth paste with a little cold water. Add some of the warm mixture to this, then pour all back into the saucepan, stirring it continually until it boils. Add the lemon juice and serve.

Cabinet Pudding.

Take 2 cupfuls breadcrumbs, 1 egg, ¼ pint milk, 1 tablespoonful sugar, ½ cupful raisins and currants, a few crystallised cherries.

Stone and cut up the raisins; make a custard with the egg and the quarter pint of milk and the sugar. Butter a mould, put a few glace cherries at the bottom,

then put a layer of breadcrumbs, and after that a layer of the dried fruit, and go on doing this until there are no more ingredients left. Then pour in the custard and steam gently for half an hour. Serve with a lemon sauce, made by boiling half a pint of water and a cupful of sugar to a syrup, with the juice and rind of one lemon. Thicken it with three tablespoonfuls of cornflour and stir in a tablespoonful of butter before serving.

Verney Pudding.

Take 4 oz. flour, 2 oz. sugar, 3 oz. butter, 2 eggs, 1 tablespoonful jam, ½ teaspoonful corbonate of soda.

Beat butter and sugar to a cream, add eggs, and beat thoroughly, add jam, stir in the flour and carbonate of soda, put into a greased mould, cover with a greased paper, and steam one and a half hours. Turn out and serve with jam sauce.

Sago Plum Pudding.

Take 3 tablespoonfuls sago, 1½ gills hot milk, ½ cupful breadcrumbs, ¾ cupful stoned raisins or sultanas, ½ cupful sugar, 2 oz. butter, 1 egg, ½ teaspoonful carbonate of soda, toffee sauce.

Wash the sago and strain it. Pour the hot milk on the sago and let it stand for three hours. Add the raisins to the sago with breadcrumbs, sugar, and butter. Put the mixture into a saucepan and heat it till the butter is melted. Beat the egg with the soda and stir it in. Pour it into a mould which has been well greased, and twist a greased paper over the top. Steam for two hours. Leave the pudding for three minutes before turning out. Pour toffee sauce round and serve.

Toffee Sauce.

Take 2 oz. butter, ¼ lb. golden syrup, ¼ lb. brown sugar.

Melt the butter and add the sugar and syrup, stir till it boils. Boil it for fifteen minutes. Stir till it begins to thicken, and pour it quickly over the pudding.

Sweet Sauce.

Take 1½ teaspoonfuls cornflour, 1½ teaspoonfuls castor sugar, ½ pint milk, flavouring to taste.

Mix the cornflour to a smooth paste with some of the milk. Heat the remainder and stir it on to it. Return it to the saucepan, bring it to the boil, and simmer for a few minutes, keeping it well stirred all the time. Add the sugar and flavouring and pour the sauce round the pudding.

Apricot Jam Sauce.

Put 1½ tablespoonfuls of apricot jam into a saucepan with ¼ of a pint of water. Boil it for a minute or two and use. A squeeze of lemon juice or a spoonful of sherry may be added.

Orange Sauce.

One large juicy orange, 2 oz. sugar, 6 drops cochineal.

Squeeze the orange juice on to the sugar. Dissolve the sugar slowly and boil it for eight minutes. Add the cochineal.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF MAY, IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALL DURING 1937 AND 1936, FOR COMPARISON.

Divisions and stations.	Average Rainfall.		Total Rainfall		Divisions and stations.	Average Rainfall.		Total Rainfall.	
	May.	No. of years' records.	May, 1937.	May, 1936.		May.	No. of years' records.	May, 1937.	May, 1936.
North Coast.	In.		In.	In.	*Central Highlands.*	In.		In.	In.
Atherton	2·28	36	1·42	3·47	Clermont ..	1·26	66	Nil	1·03
Cairns	4·56	55	2·61	4·81	Gindie	0·88	38	..	1·04
Cardwell	3·64	65	2·64	3·51	Springsure ..	1·23	68	0·30	1·08
Cooktown ..	2·85	61	0·62	3·28					
Herberton ..	1·75	51	1·27	1·60					
Ingham	3·66	45	2·27	2·69					
Innisfail	12·58	56	3·59	14·49					
Mossman Mill ..	3·95	24	1·53	4·09	*Darling Downs.*				
Townsville ..	1·29	66	0·13	0·54					
Central Coast.					Dalby	1·29	67	0·08	0·49
					Emu Vale ..	1·13	41	0·29	0·56
					Hermitage ..	1·13	31	..	0·32
Ayr	1·12	50	0·24	0·10	Jimbour ..	1·20	49	0·20	0·31
Bowen	1·30	66	0·17	0·38	Miles	1·45	52	Nil	0·15
Charters Towers ..	0·79	55	0·03	0·38	Stanthorpe ..	1·81	64	0·34	0·82
Mackay	3·82	66	0·92	4·09	Toowoomba ..	2·13	65	0·66	0·43
Prosperine ..	4·36	34	1·27	2·61	Warwick ..	1·50	72	0·29	0·71
St. Lawrence ..	1·77	66	0·06	2·65					
South Coast.									
					Maranoa.				
Biggenden ..	1·70	38	0·28	1·59					
Bundaberg ..	2·59	54	0·52	2·91					
Brisbane	2·74	85	0·25	1·14	Roma	1·36	63	Nil	0·26
Caboolture ..	2·80	50	1·24	3·82					
Childers	2·11	42	0·61	2·28					
Crohamhurst ..	4·80	44	0·54	4·42					
Esk	1·90	50	1·73	0·71					
Gayndah	1·57	66	0·06	1·91					
Gympie	2·79	67	0·51	1·71	*State Farms, &c.*				
Kilkivan	1·82	58	0·02	2·80					
Maryborough ..	2·99	66	0·26	2·95	Bungeworgorai ..	0·85	22	..	0·06
Nambour	4·68	41	0·94	5·24	Gatton College ..	1·58	38	0·32	0·62
Nanango	1·51	55	0·31	0·96	Kairi	2·06	21	..	..
Rockhampton ..	1·61	66	0·09	1·06	Mackay Sugar Experiment Station	3·37	40	0·59	3·32
Woodford	2·84	50	0·47	2·48					

A. S. RICHARDS, Divisional Meteorologist.

CLIMATOLOGICAL TABLE—MAY, 1937.

COMPILED FROM TELEGRAPHIC REPORTS.

Districts and Stations.	Mean Atmospheric Pressure, at 9 a.m.	Shade Temperature.						Rainfall.	
		Means.		Extremes.				Total.	Wet Days.
		Max.	Min.	Max.	Date.	Min.	Date.		
Coastal.	In.	Deg.	Deg.	Deg.		Deg.		Points.	
Cooktown	29·96	81	72	83	9, 11, 18	61	27	62	3
Herberton	..	75	54	82	14, 16	45	27	127	8
Rockhampton	30·07	82	59	90	16	47	19	9	2
Brisbane	30.10	76	55	84	1	49	19	25	5
Darling Downs.									
Dalby	30·09	74	45	81	6	34	18	8	2
Stanthorpe	..	68	35	75	2, 6	26	18	34	4
Toowoomba	..	70	46	76	2, 7	35	18	66	4
Mid-Interior.					25				
Georgetown	30·00	87	56	91	10, 11, 14	49	14	Nil	..
Longreach	30·07	83	50	90	15	40	28	Nil	..
Mitchell	30·12	76	40	83	6, 7	29	19	Nil	..
Western									
Burketown	29·99	87	61	93	11, 25	53	19	Nil	..
Bulla	..	83	53	95	15	45	18, 30	Nil	..
Thargomindah	30·08	75	48	88	6, 7	39	19	Nil	..

ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY A. C. EGLINTON.

TIMES OF SUNRISE, SUNSET, AND MOONRISE.

AT WARWICK.

	July. 1937.		August. 1937.		July. 1937.	Aug. 1937.
	Rises.	Sets.	Rises.	Sets.	Rises.	Rises.
					a.m.	a.m.
1	6.45	5·7	6.35	5·21	12·1	1·4
2	6·45	5·7	6·34	5·22	—	2·8
3	6·45	5·7	6·33	5·23	1.3	3·11
4	6·45	5·8	6·33	5·24	2·7	4·9
5	6·45	5·8	6·32	5·25	3·13	5·2
6	6·45	5·8	6·31	5·25	4·21	5·51
7	6·45	5·9	6·31	5·26	5·25	6·33
8	6·45	5·9	6·30	5·26	6·23	7·11
9	6·44	5·9	6·29	5·27	7·13	7·47
10	6·44	5·10	6·28	5·27	7·58	8·22
11	6·44	5·10	6·28	5·28	8·38	8·56
12	6·44	5·11	6·27	5·28	9·15	9·32
13	6·43	5·11	6·26	5·29	9.47	10.9
14	6·43	5·12	6·25	5·29	10·25	10·50
15	6·43	5·12	6·24	5·30	10·58	11·31
						p.m.
16	6·43	5·13	6·23	5·30	11·32	12·17
					p.m.	
17	6·42	5.13	6·22	5·31	12·12	1.7
18	6·42	5·14	6 21	5·31	12·52	2·0
19	6·42	5·14	6·20	5·32	1·36	2·56
20	6·41	5·15	6·19	5·32	2·24	3·52
21	6·41	5·15	6·18	5·33	3·15	4·49
22	9·41	5·16	6·18	5·33	4·7	5·49
23	6·40	5·16	6·17	5·33	5·7	6·48
24	6·40	5·17	6·16	5·34	6 3	7·48
25	6·39	5·17	6·15	5·34	7·0	8·48
26	6·39	5·18	6·14	5·35	7·58	9·52
27	6·38	5·18	6·13	5·35	8·56	10.56
28	6.38	5·19	6·12	5·36	9·55	..
						p.m.
29	6·37	5·19	6·11	5·36	10·56	12·2
30	6·36	5·20	6·10	5·37	11·58	1·4
31	6·35	5·21	6·9	5·37		2·3

Phases of the Moon, Occultations, &c.

1st July	☽	Last Quarter	11 3	p.m.
8th ,,	●	New Moon	2 13	p.m.
15th ,,	☾	First Quarter	7 36	p.m.
23rd ,,	○	Full Moon	10 46	p.m.

Perigee, 6th July, at 7 p.m.
Apogee, 18th July, at 8 p.m.

Mercury will on the 8th arrive at that part of its orbit where it will be beyond the Sun from the Earth. More than 137 million miles separating us at this time from the "Inferior Planet" revolving, like Venus, inside of the Earth's orbit.

On the 18th Saturn, in Pisces, will be stationary—apparently—since dire results would follow were motion to cease but for a moment among the host of heavenly bodies. It is explained that when the Earth, as seen from a "Superior Planet," has reached its furthest distance east or west of the Sun the planet, as seen from the Earth, will seem at rest, because for a short period we will move either directly towards or away from it, after which the planet will resume its normal eastern or, apparently, western course.

Mercury, on its swift journey around the Sun in a quarter of a year will from the beginning of the month travel through the constellations Gemini and Cancer then, crossing the borderline into Leo will there, on the last day of the month, be in close vicinity to Regulus, less than half a degree from this first magnitude star on the ecliptic. They may be seen near the western horizon soon after sunset.

Mercury rises at 6.7 a.m., 38 minutes before the Sun and sets at 4.27 p.m., 40 minutes before it on the 1st; on the 15th it rises at 7.18 a.m., 35 minutes after the Sun, and sets at 5.45 p.m., 33 minutes after it.

Venus rises at 3.17 a.m., 3 hours 28 minutes before the Sun and sets at 2.11 p.m., 2 hours 56 minutes before it on the 1st; on the 15th it rises at 3.26 a.m., 3 hours 17 minutes before the Sun and sets at 2.7 p.m., 3 hours 5 minutes before it.

Mars rises at 1.37 p.m. and sets at 3.9 a.m. on the 1st; on the 15th it rises at 12.48 p.m. and sets at 2.25 a.m.

Jupiter rises at 6.9 p.m. and sets at 7.50 a.m. on the 1st; on the 15th it rises at 5.9 p.m. and sets at 6.50 a.m.

Saturn rises at 11.37 p.m. and sets at 11.43 a.m. on the 1st; on the 15th it rises at 10.43 p.m. and sets at 10.48 a.m.

The Southern Cross will be upright about 6 p.m. and on its side at midnight on the 1st but two hours earlier at the end of the month.

6 Aug.	●	New Moon	10 37	a.m.
14 ,,	☾	First Quarter	12 28	a.m.
22 ,,	○	Full Moon	10 47	a.m.
29 ,,	☽	Last Quarter	9 55	a.m.

Perigee, 3rd August, at 2 p.m.
Apogee, 15th August, at 1 p.m.
Perigee, 29th August, at 1 p.m.

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

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhat 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.