ANNUAL RATES OF SUBSCRIPTION.

Farmers, Graziers, Horticulturists, and Schools of Arts, **One Shilling.** members of Agricultural Societies, **Five Shillings,** including postage. General Public, **Ten shillings,** including postage.

VOL. XLIV. 1 DECEMBER, 1935. PART 6

Event and Comment.

The Queensland Butter Board—Marketing Efficiency the Aim.

AN alteration in the method of electing the Butter Board aroused considerable controversy in the course of the month, much of it expressed in print in the correspondence columns of the metropolitan Press. In making a general reply to this criticism, the Minister for Agriculture and Stock, Hon. Frank W. Bulcock, dealt effectively with the objections made to the amended method of election. He pointed out that the Butter Board is only indirectly the selling instrument for the producer, but is the direct agent for the factory. The merit of such an arrangement lies in the fact that under this system the Butter Board is under a definite control, and should circumstances so warrant it, definite action could be taken by the factories—whose representatives meet each year in conference—such as is not possible by the producers.

The producers trust their directors; the great co-operative movement has been built on such trust and faith, and now for various reasons, said Mr. Bulcock, certain people are saying the directors are not worthy of trust and should not be given the power to elect the board.

"Efficiency is the keynote of progress, and if I understand the producer aright he is anxious to get the maximum of efficiency. A board elected by those who have a knowledge of butter marketing with all its difficulties and problems is surely likely to function more satisfactorily than a board chosen by producers, many of whom are unable to devote time to a study of the problem of butter marketing"

The proposed system builds up organisation in logical sequence. Under it the board is responsible to the factories, and the factories are responsible to the producers. But the problems confronting the factories are essentially different from the matters which concern the Butter Board, and the new system fairly divides responsibility, but places it on the shoulders of those who should carry it.

The method adopted for the forthcoming Butter Board election is on all fours with the present Federal system for election to that much more important body—the Federal Export Board—and is the system followed by the Hamilton Cold Stores Federation. In addition, the Sugar Board and the Committee of Direction of Fruit Marketing are elected in a similar fashion.

"It is significant," Mr. Bulcock added, "that no protest was raised when the Federal system was introduced, nor was a voice raised when the system to which I am now reverting was in operation years ago.

It is further to be remarked that no protest has reached me from interested parties, for since the Order was gazetted I have received no hostile communication in relation to the proposals."

Much has been said about depriving the farmer of his vote. The following figures indicate just how much this argument is worth:—

1926 ELECTION.

Division.	No. of suppliers.	No. who voted.	Votes cast for elected rep.	P.C. votes recd. to suppliers. in div.	P.C. votes recd. of total suppliers.
1	2,442	1,137	590	24	3.2
2	3,588	1,869	838	23	4.5
3	3,582	1,786	1,174	32	6.4
4	4,476	2,413	1,540	34	8.4
5	4,134	1,647	916	22	5.0
	18,222				
1928 ELECTION.					
1	583	281	187	32	1.0
6	4,446	1,833	1,238	27	6.8
Total suppliers, approximately 18,000. (No election 2, 3, 4, and 5 districts.)					
1931 ELECTION.					
1	737	379	304	41	1.6
3	4,093	2,767	1,391	34	7.7
4	3,572	2,492	1,445	40	8.0
Total suppliers, approximately 18,000. (No election in 2, 5, and 6 divisions.)					

These figures alone, apart from any other consideration, fairly justify the contemplated change.

Are Farmers to Blame?

ALTHOUGH the world's oldest industry, agriculture is often regarded with indifference, many city dwellers are quite forgetful of the fact that without the farmer their comparatively easy economic position would not be possible. In fact, the less intelligent among them affect a sort of social superiority over the tiller of the soil, who in their small minds is more or less deficient in all those qualities of business acumen

and brain of which they—the complacent city people—believe themselves to possess a monopoly. To that type of town mind the farmer is just the "Dad," "Dave," and "Joe" of the weekly comic Press, or that gross caricature which is the perennial butt of shallow city journalism. This remarkable mentality manifested itself at a recent meeting of a public body in another State, at which one speaker referred rather contemptuously to some local farmers as just ill-informed "cockies." There were protests, of course, and farmers present expressed resentment against the offensive personal reference. But the question arises, are not farmers themselves often to blame for depreciatory remarks about themselves and their calling?

In fact, is it not quite common at country meetings for farmers to call themselves "cockies" and describe their own vocation as "cocky-ing?" Even in Press communications many a good letter is spoilt by the pen-name adopted in a spirit of flippancy by the writer—"Cow Cocky," "Cane Cocky," "Poddy Dodger," and similar self-depreciatory pseudonyms. The world too often takes us at our own valuation, and self-depreciation never gets us anywhere.

In his contact with the world in general, in his contribution to the wellbeing of humanity, in his share in commercial and industrial enterprise, in his place in the realms of literary, artistic, and scientific achievement, and as a citizen of the Commonwealth, there is no warrant for the Australian placing himself under the influence of or developing what is called, in the jargon of the day, an inferiority complex. Australians have demonstrated their character and capacity in every field of human endeavour, both in peace and in war; they have shown themselves in no way inferior to other peoples either in intelligence or attainment. On the contrary, possessing as they do all the positive characteristics of the composite British peoples, the elements of the Australian race, they have very many points decidedly in their favour —and that may be said without overweening conceit and only on the evidence of the facts. While all this may be fairly claimed of Australians in general, the same may be said of farmers, as a class, in particular. When leaders were wanted in the A.I.F., boys from the bush supplied the demand. In the field of invention and in every avenue of peaceful enterprise, urban or rural, the land has supplied more than a fair share of the brains and brawn that established great undertakings, backed them, and led or forced them through to complete success.

The thoughtless jibe which we have taken as our text would naturally rankle in the minds of those to whom the remark was applied, but again it is asked are not farmers in some measure themselves responsible? What real protest have they ever made against the continual caricaturing of themselves in cheap city prints by artists whose conception of the farmer—the national food provider and economic shock absorber—is of the "Dad and Dave" order? Why do they call themselves, or allow themselves to be called, "cockies"? In the last generation the stage "Irishman" was an inhabitant of every music hall—a standing insult to a great race of people. Through vigorous objection, that grotesque travesty was banished from places of amusement never to return. Why do farmers endure without effective protest, even though some of their number unconsciously or thoughtlessly encourage it, the continual, humiliating caricaturing of themselves and their calling—one of the greatest and noblest to which man may set his hand and brain.

Potato Tuber Moth and Its Control.*

By ROBERT VEITCH, B.Sc.Agr., B.Sc.For., F.R.E.S., Chief Entomologist.

THE tuber moth, which is the world's most serious pest of potatoes, occurs wherever they are grown in Queensland. It is also a notorious enemy of tobacco, being known to growers of that crop as the tobacco-leaf miner, but the present discussion will be confined to the insect's activities as an enemy of the potato.

Life History and Habits.

The minute, oval, white, iridescent eggs (Plate 249; fig. 1) are deposited on leaves, stalks, and tubers, and may even be found on the sacks containing infested potatoes. The eggs on the tubers are laid in batches at the eyes (Plate 249; fig. 2) or in surface scars, but on the leaves they occur singly, and usually on the under surface, a total of 200 eggs being laid over a period of about two weeks by a single moth. The incubation period varies greatly, larvæ emerging from eggs laid in midsummer in three to five days, while in midwinter in North America an incubation period of almost five weeks has been recorded. The larvæ on hatching commence tunnelling within the leaf if the eggs have been laid thereon, and destruction of the tissue between the upper and lower surfaces can soon be detected in the form of blotch mines. Larvæ hatching on the tubers (Plate 249; fig. 8) either tunnel under the skin thereof or work their way to the heart of the potato. The tunnels may be 2 or 3 inches in length, and obviously burrowing in the heart of the tuber (Plate 249; fig. 9) is the most serious form of attack, large consignments of potatoes being frequently ruined thereby. The larvæ (Plate 249; fig. 3) are full-grown at the end of two weeks in summer, and then measure ½ inch in length and are predominantly white in colour with a slightly pinkish or greenish tinge on the upper surface. They generally pupate in silken cocoons (Plate 249; fig. 4) on the outside of the tubers, in folds of sacking, among dead leaves or under lumps of soil. Occasionally, however, the dark-brown pupæ (Plate 249; figs. 5 and 6), which are one-third of an inch in length, occur at the entrances of the tunnels in the tubers. Although silk is used in weaving the cocoons, any parts thereof that would otherwise be exposed are covered by particles of earth or debris; hence the silken nature of the cocoons is obscured. Eventually the inconspicuous moths (Plate 249; fig. 7) emerge after a pupal period of about one week during the warmer weather, and are seen to be greyish-brown in colour with a wingspread of half to three-quarters of an inch. Quite a number of generations of this pest are produced in the course of the year.

Control.

The first step in the control of the potato tuber moth is the safeguarding of the tubers in the soil. The seed potatoes should therefore be planted as deeply as practicable, the plants should be well hilled up, and the surface soil thoroughly pulverised. The procedure just outlined materially assists in reducing infestation of the tubers during the growing period, as it minimises the chances of the pest gaining access to them. At harvesting, the potatoes should be bagged, and the bags sewn up and removed from the field as soon as possible. The potatoes should never be exposed overnight in the field, for if that is done thousands of eggs

* *Phthorimæa operculella* Zell.

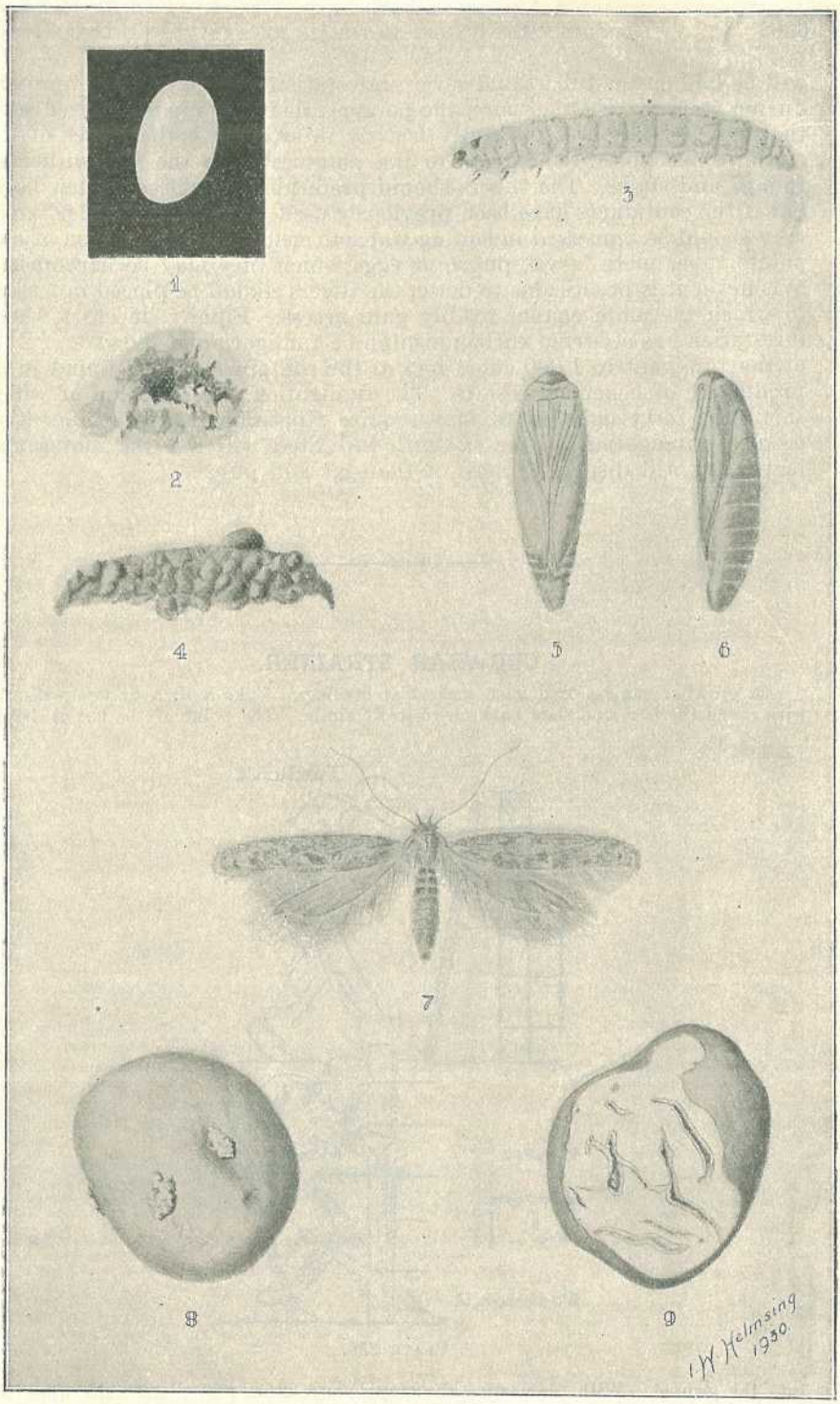


PLATE 249.

Potato tuber moth. Fig. 1: Egg × 35. Fig. 2: Eggs on tuber surface × 10. Fig. 3: Larva, lateral view × 4. Fig. 4: Silken cocoon covered by particles of earth × 2½. Fig. 5: Pupa, ventral view × 7. Fig. 6: Pupa, lateral view × 7. Fig. 7: Adult × 4. Fig. 8: Tuber showing external signs of infestation, half natural size. Fig. 9: Tuber showing tunnelling, half natural size.

will be laid on the tubers and severe infestation will inevitably eventuate during storage. Furthermore, the potatoes should never be covered with the tops, as these are frequently heavily infested with the larvae of the moth, which speedily migrate to the potatoes from the fast-withering foliage and stalks. The tubers should preferably be placed in new bags, but if the containers have been previously used for the storage of potatoes they should be immersed in boiling water to ensure the destruction of any potato tuber moth larvæ, pupæ, or eggs which they may be harbouring. Whenever it is practicable to do so, the tubers should be placed in a store to which the moth cannot readily gain access. Finally, in cases where infestation has occurred carbon bisulphide fumigation at the rate of 2 lb. of the fumigant to 1,000 cubic feet of the container will be found to be productive of beneficial results. The fumigation, the duration of which should be forty-eight hours, may require repetition should reinfestation occur. Fumigation at the strength indicated will kill the moths and larvæ and will dispose of most of the eggs and pupæ.

CROWBAR STRAINER.

A crowbar can be used as a makeshift strainer. Take a turn or two with the wire round the bar, and then back on to itself again. The point of the bar is driven

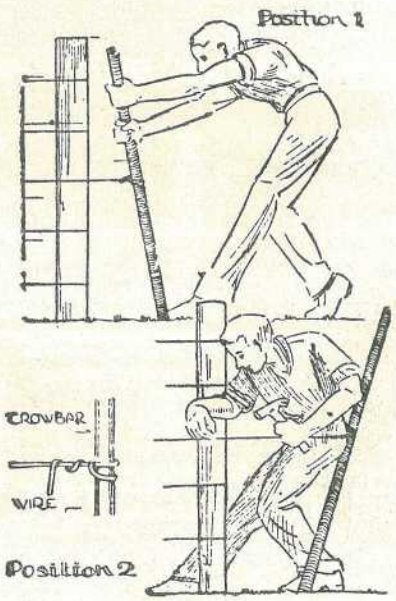


PLATE 250.

into the ground. With plain wire the staple may be in place, and then when the bar is levered back, it is an easy matter to sit on the bar and drive the staple home. With barbed wire, a sack used on the wire at the bar will save the fencer from being pricked.—"The Canegrowers' Weekly" (Mackay).

Coccidiosis of Poultry.

By C. R. MULHEARN, B.V.Sc., Veterinary Surgeon, Animal Health Station, Yeerongpilly.

COCCIDIOSIS is a disease caused by protozoan parasites known as coccidia. The parasites are very minute in size and can only be seen by aid of the microscope. There are many closely related types affecting both animals and birds, but each, with few exceptions, is specific for its own individual host—i.e., the parasites of one type of host are incapable of producing the disease in another.

Six different species of coccidia are known to infect the fowl. This, to a large extent, accounts for the diversity of symptoms and post-mortem appearances seen in this group of diseases. The two more common forms are located in the intestine and the caecum (blind gut), and both may be responsible for heavy mortalities in young chickens. Occasionally the disease is seen in turkeys, but ducks are rarely affected. The life cycles of all species are very similar, and consequently control measures are the same for each.

Heaviest mortality is experienced in young birds in which the acute form of the disease is encountered. The chronic disease is mostly seen in older birds, but it is of utmost importance, for not only does it cause much loss to the poultry farmer, but the infested adult birds act as a continual source of infection to the young stock.

The disease has come greatly into prominence with the artificial means of incubation and brooding. The unnatural methods of housing a large number of young birds in a confined area and under conditions which are essentially suitable for the propagation of the parasites greatly facilitates the spread of the disease through a flock.

Nature of the Disease.

The intestinal tract is the principal seat of the disease in all the domesticated birds. The kidneys may also be infected in the goose. The lesions are found in various portions of the intestines according to the species of coccidia concerned.

Life Cycle of the Parasites.

The coccidia are one host parasites—i.e., the infective material on passing from one fowl produces an attack of the disease when swallowed by another fowl. This is an important factor, and it has to be taken into consideration when control measures are adopted. The infective material which is in the form of minute cysts is passed out in the droppings of the diseased bird. These cysts require suitable conditions of moisture and humidity before they can ripen or effect the necessary changes within themselves, so that they can produce further cases of the disease. Under favourable conditions the ripening process may be completed within two days, but under other conditions fourteen days may be required. The cysts are covered with a tough leathery membrane and, being highly resistant, they remain infective for a considerable period of time. When they are picked up by their appropriate host, the membrane is dissolved by the digestive juices and a number of parasites is liberated in the intestinal tract. Each of these parasites invade a cell lining the wall of the intestine, and after growing it divides up into a number of new parasites which destroy the cell and become

liberated in the intestine. Each new parasite seeks a fresh intestinal cell, and this process is continually repeated. This is known as the asexual reproduction, and it is responsible for considerable damage and bleeding in the intestines. As a result the normal functions are interfered with, so that the birds are unable to gain full benefit from their food. Further, the breaking down of the tissues produces poisons which, when absorbed, seriously affect the general wellbeing of the fowl.

In order that the coccidia may not die out with the host bird, nature has evolved another method of reproduction whereby male and female parasites unite to form a spore-like body or cyst. This cyst is then covered with a tough envelope and is passed out in the droppings to the exterior. When a large number of cysts are passed out and the droppings are not regularly cleaned up, the houses and the feed and water become grossly contaminated. Healthy chickens introduced into such houses are exposed to heavy infestation and develop a serious form of the disease. It is obvious, then, that where the chickens are closely confined and when bad sanitation is practised, conditions are favourable for a rapid spread of coccidiosis from bird to bird. On the other hand, with good sanitation the losses will be minimised.

Incidence of the Disease.

The disease is widely distributed, and each year it is responsible for heavy losses amongst young birds in southern Queensland. Young chickens a week old may occasionally be infected, but most losses occur in birds aged from two to ten weeks. It is generally when chickens are moved from the brooders to infected runs that outbreaks are encountered. Adult fowls may also be infected, but they usually suffer from the chronic type of coccidiosis.

Symptoms.

Chickens usually suffer from the acute form of the disease, although some may also show symptoms of the chronic form. The severity of the symptoms is dependent to a large extent on the degree of infestation, and this is directly related to the methods of sanitation adopted.

In the very severe cases no symptoms may be noticed, for an individual chicken may appear normal one day and be found dead the next. In the more common cases the affected chickens lose their appetite and become listless and depressed. They show evidence of general mopiness and stand hunched up with ruffled feathers and drooping wings. There is usually a greyish-white or mustard-coloured diarrhœa, and in severe cases blood may be present in the droppings. The above symptoms, however, are not diagnostic of coccidiosis, for they may be seen in other diseases of chickens. The affected birds usually show some evidence of anæmia, and the comb and wattles become very pale. Leg weakness and even paralysis may develop in some cases, but it must not be assumed that all cases of leg weakness are due to coccidiosis.

In fatal cases, death usually takes places in from two to seven days after the onset of symptoms. Chickens which are strong and vigorous are not so severely affected as those chickens which are under-sized, badly fed, and housed or infested with other parasites. Any circumstances which lower the resistance of the birds to disease will render them more susceptible to coccidiosis.

In the chronic form of the disease, which is mostly seen in adult birds, there is a general unthriftiness associated with a gradual wasting and persistent diarrhœa. Anæmia is also usually pronounced.

Post Mortem Appearances.

Post-mortem changes are confined to the intestines and they vary with the severity of the disease and the species of coccidia concerned. Various portions of the intestine or the cæca may be affected. In the acute cases the walls become greatly thickened and numerous red blood spots may be seen along the affected areas. Bleeding occurs into the bowel, which may be full of a mixture of diarrhœic fæces and blood, or it may contain extensive blood clots. In other cases, particularly in the cæca, a greyish-yellow core of cheese-like consistency may be found. The lining membrane of the bowel is usually destroyed along the affected areas. In many fatal cases no pronounced naked eye changes can be seen, and the disease can only be diagnosed by means of the microscope.

Diagnosis.

It is impossible to make a positive diagnosis of coccidiosis from the symptoms, and post-mortem findings for similar changes may be seen in other diseases. However, when a serious mortality occurs in chickens over two weeks old this disease should be suspected. When losses are experienced in young birds—i.e., from hatching to two weeks—the cause is more likely to be due to the disease known as Bacillary White Diarrhœa.

Positive diagnosis of coccidiosis can only be made with the aid of the microscope, when coccidia in the intestinal wall and in the droppings are demonstrated. These parasites are quite characteristic, and they vary in number according to the severity and the stage of the disease. When coccidiosis is suspected, two live chickens showing definite symptoms should be submitted to the Animal Health Station, Yeerongpilly.

Treatment.

The medicinal treatment of coccidiosis has not been very satisfactory. It is much better to prevent the disease than to attempt to cure it.

The trouble will die out of its own accord if very strict measures to prevent reinfestation of the birds are carried out. The following treatments should be tried, and they will give some relief:—

(1) A high protein diet with up to 40 per cent. of a milk product. This should be kept up until the disease is definitely on the wane. Butter-milk, milk powder, skim milk, or sour milk may be used. Poultry farmers are advised to make use of the cheapest milk product available, but care should be taken to see that only wholesome products are fed. A mixture of the following ingredients has been found satisfactory:—

	lb.
Dried, skim milk or butter milk	40
Wheat bran	10
Ground grain	50

This mash should be fed immediately the disease is diagnosed, and a restricted amount of grain may be fed once or twice daily. This ration should be fed from one to two weeks, when a gradual change may be made back to the usual ration. Greens or cod-liver oil should also be available all the time.

(2) A high protein ration, together with iodised milk. Iodised milk is made as follows:—

1 gram .. .. Iodine
2 grams .. .. Potassium iodide

are dissolved in 2 oz. of water. This is added to 1 pint of milk, and the mixture is heated until it becomes white. This milk is then added to 1 gallon of water. The chickens are given as much as they will drink.

If sanitary measures are neglected, little benefit can be expected from the above treatments.

Following an outbreak of the disease, general treatment should be aimed at.

(1) Removal of all factors which may tend to lower the body resistance of the chickens.

(2) The prevention of further infestation with coccidia.

(3) The prevention of the spread of the disease to any further batches of chickens which have not become infested.

In order to do this it is essential that the chickens should not be overcrowded, and that there should be ample space at the feeding and watering places. The hoppers and water-troughs should be arranged so that there is no risk of contamination with the dropping from infected birds. All sick chickens should be isolated immediately, for at an early period of the sickness the droppings become heavily charged with the infective stage of the parasite.

Prevention and Control.

It is most important that rigid sanitation measures should be carried out if prevention and control is to be attempted. As all types of coccidiosis die out promptly if reinfection per medium of contaminated droppings is prevented, it is obvious that thorough and regular cleaning of poultry houses will be the most effective method of stamping out the disease. Immediately an outbreak is diagnosed the following measures should be adopted:—

(1) Collect and burn all litter and droppings and thoroughly wash the incubators and brooders with a hot disinfectant solution, such as a 5 per cent. cyllin. As the cysts are extremely susceptible to increases in temperature, the use of hot solutions is recommended. Success has also been claimed when disinfection by means of the flame of a blow-lamp has been carried out. Another method of disinfection is to spray the houses, litter, &c., with a solution made by mixing 1 part of a coal-tar disinfectant with 9 parts of a light mineral oil. None of these methods are 100 per cent. effective, but they all destroy the majority of the infective cysts.

(2) The floor of the houses should be swept clean; the droppings removed every forty-eight hours, or preferably every twenty-four hours; this should be done for at least a fortnight, and during this time the chickens should be confined to the houses. Standing chickens on wire-netting as in the battery method of rearing is most effective, as then the droppings can be collected from a tray beneath the netting and the chickens remain free of contamination.

Dark, damp fowlhouses should be avoided, as these situations are most favourable for the preservation of the cysts. As previously stated, the cysts are highly resistant, and they may remain infective in the soil for twelve months or more; so that if no attempt is made to destroy the infection the disease may appear in the chickens each year. Following an outbreak the soil of the houses and yards should be dug up and ground quick lime mixed through it at the rate of 1¼ lb. per square yard. Alternately the surface soil to a depth of 3 in. may be removed and replaced by soil from areas to which poultry have had no access. The latter is the better method and is quite practicable when only a small area is to be dealt with.

As a number of old birds remain chronic carriers and continually pass the cysts out in their droppings, it is advisable that the older birds should never have access to the chicken-houses. It is also essential that the droppings from older birds should not be carried in on the boots, &c., of attendants.

Recent work in other parts of the world has demonstrated that an immunity is produced following an attack of the disease. Experiments indicate that it is possible to produce a mild attack with a subsequent immunity by feeding a limited number of weakened cysts to susceptible chickens. The methods, however, have not been perfected, and this means of immunising has not yet been attempted in Australia.

USEFUL FARM HOE.

Take an old, worn shovel, and cut from A to B as shown on the illustration. Then bend to form a hoe, as shown. When the edge is sharpened, this tool is good

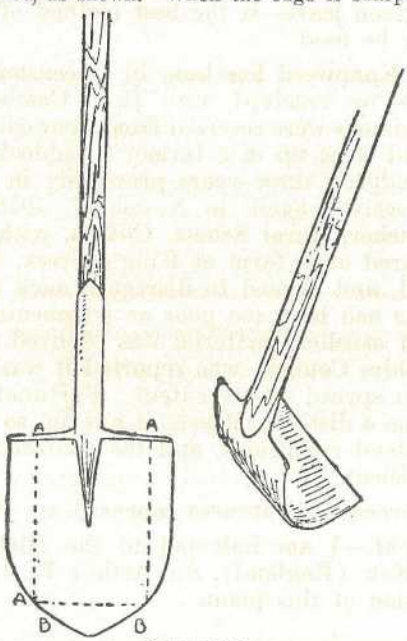


Plate 251.

for cutting weeds, hoeing potatoes and grubbing blackberries, as well as several other jobs on the farm.—"The Canegrowers' Weekly" (Mackay).

Weeds of Queensland.

By C. T. WHITE, Government Botanist.

CREEPING KNAPWEED (*Centaurea repens*).

Description.—A perennial thistle-like plant, with underground stems (rhizomes) sending up flowering branches every here and there about 2 ft. high. Stems rather woody, both leaves and stems covered with a close coating of hairs giving the whole plant a grey appearance. Leaves ½ to 1½ in. long, narrow and mostly under 1¼ in. broad, toothed on the edges. Flower heads small, narrow-ovoid in the lower part, spreading in the upper, outer involucral bracts broad with scarious ends, intermediate ones narrower, upper and innermost with plumose tips. Seeds (achenes) brown, about one line long.

Distribution.—I can find few references to this plant in the literature available to me; all give it as a native of the Orient, by which I suppose it to be a native of Asia Minor or countries at the eastern end of the Mediterranean and bordering the Red Sea.

Botanical Name.—Centaurea; the Centaur Chiron is supposed to have cured the wound in his foot made by the arrow of Hercules from the juice of a species of this genus or an allied plant; *repens,* Latin meaning creeping.

Properties.—This plant is not known to possess any poisonous or harmful properties.

Control.—Frequent cutting to prevent seed formation, and more especially to starve the underground stems by depriving them of the food-assimilating green leaves is the best method of eradication where it can conveniently be used.

The Creeping Knapweed has been in Queensland for some years; the first specimens we received were from Cambooya in 1916. In January, 1919, specimens were received from Toowoomba, where a couple of little patches had come up in a farmer's paddock, and he suspected the weed was introduced three years previously in New Zealand oats. Specimens were received again in November, 1926, from Mr. A. B. Copeman, head teacher, Rural School, Clifton, with the report that it had recently appeared on a farm at King's Creek, was growing freely in heavy black soil, and seemed to disregard such things as droughts. All these specimens had been too poor or fragmentary for satisfactory determinations, but excellent material was received in March this year from the Clifton Shire Council, who reported it was a weed new to the district, but not yet spread to any extent. Fortunately, though having the power to become a distinct menace, it has not so far become aggressive under Queensland conditions, and the control methods mentioned above should be efficient.

Botanical Reference.—Centaurea repens L. sp. Pl. ed. II., 1233.

Acknowledgment.—I am indebted to the Director of the Royal Botanic Gardens, Kew (England), Sir Arthur W. Hill, for the correct specific determination of this plant.

MELILOT OR HEXHAM SCENT (*Melilotus indica*).

Description.—An upright annual giving off a peculiar and characteristic "coumarin" odour. Leaves trifoliate (composed of three leaflets);

PLATE 252.
CREEPING KNAPWEED (*Centaurea repens*).

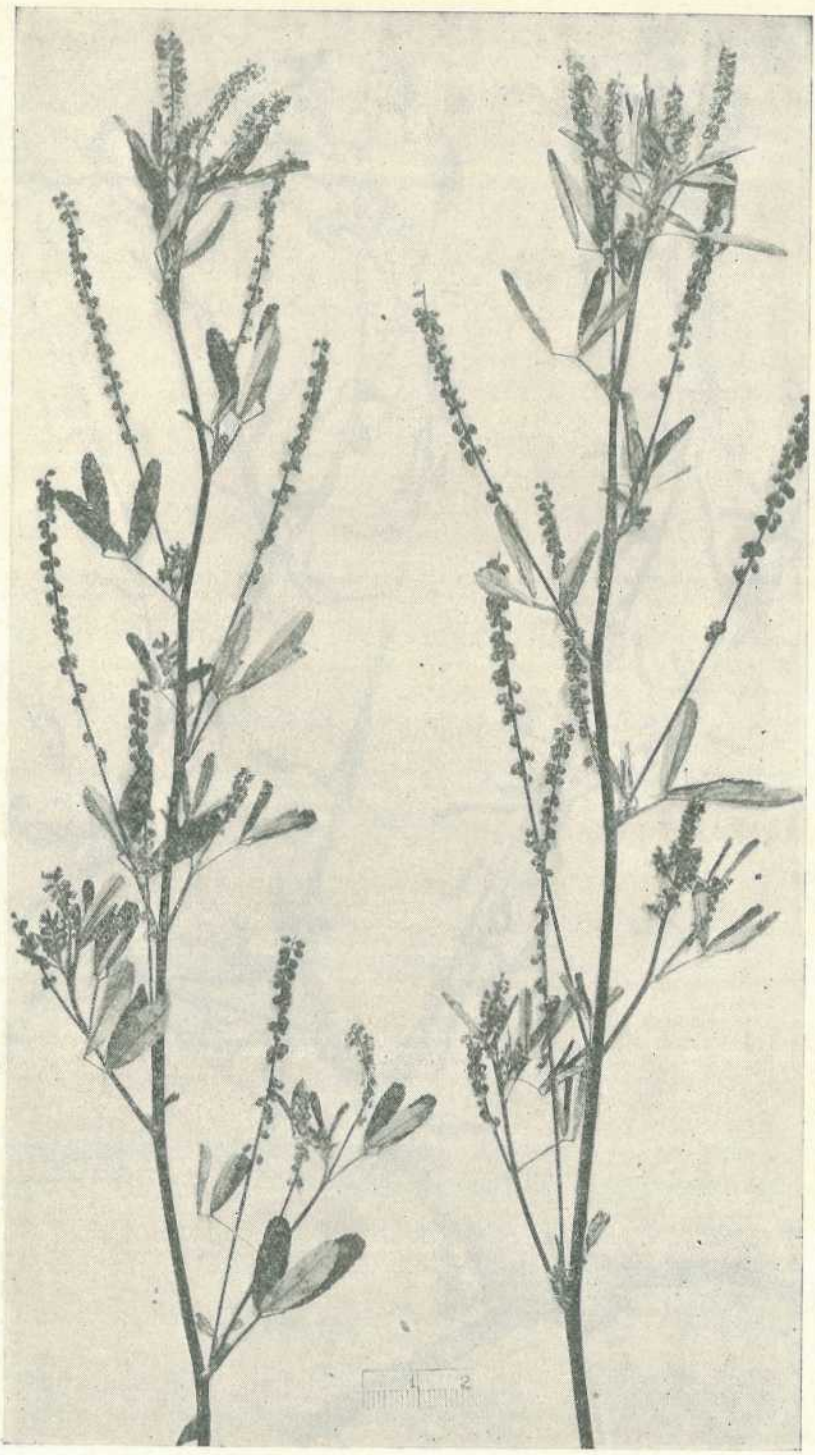


PLATE 253.
MELILOT OR HEXHAM SCENT (*Melilotus indica*).

leaflets toothed ¾ to 1 in. long, common leaf-stalk or petiole about ½ in. long. Flowers small yellow in slender spikes in the leaf axils, the spike with its stalk (peduncle) about 1 in. long, lengthening in seed to three or four times this length. Pod small, globose or ovoid, slightly wrinkled, and enclosing a single seed.

Distribution.—A native of Southern Europe, Northern Africa, and Western Asia, but now widely spread as a weed in many warm, temperate and sub-tropical countries.

Botanical Name.—*Melilotus* from the Latin mel—honey, and Lotus, an allied genus of plants. Some of the genus *Melilotus*, which includes the Sweet or Bokhard Clover, are valuable bee plants. In Queensland previously and in most Australian works it has generally been recorded as *Melilotus parviflora*, but the specific name *indica* has fifteen years priority, and is the one now generally accepted by botanists.

Common Names.—Small-flowered Melilot; Yellow-flowered Melilot; King Island Melilot; and Hexham Scent are all names that have been applied to it. In Western Australia it is sometimes said to be known as Naninup Weed.

Properties.—It was boomed as a fodder in Australia some years ago under the name of King Island Melilot, but our experience in Queensland has been that stock do not take very readily to it and have to become accustomed to the peculiar odour and flavour. It has the great disadvantage of tainting milk and cream rather badly. It is short-lived, being at its best during the spring months, dying off at the approach of hot weather towards the end of October or early November. As a fodder plant for Queensland for winter and spring months it is poor compared with some of the annual trefoils and clovers, such as the common burr trefoil and cluster clover.

It is a common weed of wheatfields, and if reaped with the wheat and stored for any period the peculiar penetrating odour is communicated to the flour and bread subsequently made.

Control.—Ploughed in, especially in the young stages, the plant will make a valuable green manure. Cut off near the ground level when it is in flower it will shoot again with numerous short branches, and the cutting will have to be done several times before the root is exhausted; the best time to cut is at the end of the flowering season, just before the seed ripens. In smaller areas, hand-pulling or chipping or digging can be resorted to.

Botanical References.—*Melilotus indica* (L.) Allioni. Fl. Ped. 308 (1785). *Melilotus parviflora* Desf. Fl. Atl. 2, p. 192 (1800). See note under "Botanical Name."

The Poisoning of Undergrowth with Arsenic Pentoxide.

By F. SKINNER (Field Cadet, Agricultural Branch).

IN these times, when production costs have to be carefully weighed, the farmer is seeking the cheapest and speediest method of clearing new areas of land which are carrying useless undergrowth.

The purpose of this article is to offer helpful suggestions which are based on a close study of the methods employed in tree-poisoning.

In recent years full recognition has been given to the advantages of arsenic pentoxide as a plant poison, as an alternative to sodium arsenite, which was formerly used. With sodium arsenite, the preparation of the solution involved the mixing of either washing soda or caustic soda with the white arsenious oxide to convert it into a readily active agent.

In the case of arsenic pentoxide, it is soluble in cold water, and no waste of time or labour is incurred in its preparation. This poison is now being extensively used, and its cheapness, combined with effective results, commends it for the eradication of practically all species of undergrowth and green timber.

The poison acts very rapidly on plant life, and, if correctly applied, results will become apparent after two days. In the case of larger trees, the foliage will commence to wither about four days after treatment. Its action on foliage is both rapid and severe, and, as arsenic pentoxide is a dehydrating agent, the leaves wither in a very short time. Their discolouration is due to the oxidisation of the chlorophyll, or green colouring pigment within the epidermal cells of the leaves.

In using this preparation the soil surrounding the poisoned plant is not affected, and, consequently, no damage is sustained by herbage or other plant life.

Mixing.

As arsenic pentoxide solution has a corrosive action on iron and tin containers, it is necessary to use either wooden or copper vessels.

Usually the substance is lumpy, so it is advisable to prepare the day's mixture overnight in order to allow ample time for it to dissolve. Before using, stir well—the liquid should now be practically colourless. If to be used as a spray, add half a pint of molasses as a sticker or spreader per gallon of poison.

Strength of Poison.

The most effective mixture is 2 lb. of arsenic pentoxide per gallon of water. For spraying tender foliage or suckers, ½ a lb. per gallon is sufficient.

Methods of Application.

As a general rule, for the treatment of all undergrowth the cuts must be made as near ground level as possible. This work is done with a brush-hook. Two operators are necessary—one using the brush hook and the other following closely with the swab or spray, according to the area to be treated.

Small areas up to several acres can be most economically treated by swabbing. The cut surfaces should be thoroughly poisoned. An ordinary kitchen mop for washing cups, &c., makes a first-class swab. Any grocer stocks them.

Large areas require a quicker method, so in order to save time a lead-coated knapsack spray is recommended. This costs about £3 15s., and holds about 3 gallons. The spray pump requires to be equipped with a nozzle designed to throw a fine cone of spray, and the inclusion of an auto-pop shut-off valve permits the operator to control the flow of spray by thumb pressure. This is not a standard fitting, but is well worth the cost (approximately 10s. 6d.).

As this spray operates under pressure, the work can be done thoroughly and speedily—the poison is forced into all cracks and crevices, thus making for a complete kill. Remember to always hold the nozzle as near to the cut surfaces as possible.

It may be mentioned that this spray pump has numerous uses on any farm, orchard, or garden, apart from tree-poisoning.

Another method is a little slower, but saves labour, as the brushing is done independently of the spraying. After the growth has been cut allow it to dry and then fire it. Within a very short time new growth appears, and before these shoots attain a length of 12 inches spray them with the weaker mixture—namely, ½ lb. per gallon. Being so tender, they are easily killed, and absorb and transmit sufficient poison to the roots to kill the stump.

Lantana is easily treated by this method.

Tall timber can be effectively poisoned by frilling—a process somewhat similar to ringbarking. The only difference is that the cuts are downwards deep into the wood, but the bark is not removed.

The mixture (2 lb. per gallon) is poured into the open cut. Oak, wattle, stringbark, bloodwood, blackbutt, ironbark, turpentine, and tallowwood are all, relatively, simple to kill. However, care must be taken with gums and ti-tree to prevent suckering. Box is the most difficult to kill, as it has a large underground crown. Particular attention must be given to it, and when treating the saplings it is advisable to also spray the bark at ground level. Clumps of suckers arising from an old stump should all be sprayed.

The so-called wild tobacco (*Solanum auriculatum*), which is such a pest in some localities, can be successfully eradicated with arsenic pentoxide.

Time of Application.

To obtain the best results and reduce suckering to a minimum, poisoning should be performed when the sap flow is less vigorous and the vegetation is passing into the dormant stage. This period varies in accordance with the climatic conditions obtaining in different districts, but usually it commences about March.

It is inadvisable to conduct poisoning operations any later than July.

The best results are usually obtained during a warm, dry period when transpiration losses are high and the soil moisture content is low.

Care and Handling.

Arsenic pentoxide must at all times be regarded as a very dangerous poison, and great care must be exercised when handling it. Finger-nails are taken off very easily if the solution gets around them. It is always wise to keep a supply of fresh water close at hand in case the operator gets splashed with the poison.

Prevent the access of stock to any treated area for three or four weeks after poisoning, especially if molasses has been mixed with the poison.

Keep lids on tins when not in use, as arsenic pentoxide is a hygroscopic substance and will draw moisture from the atmosphere, and this will result in incorrect weights being obtained.

The chief care of the spray pump consists of a thorough cleansing after use.

Arsenic pentoxide can be obtained from the Prickly-pear and Noxious Weeds Section, Lands Department, Brisbane, at the concession rate of 5s. per 20 lb. tin., f.o.r.

Acknowledgment.

Our thanks are due to Mr. S. Walker, Upper Coomera, for his assistance and co-operation in the work of conducting a recent series of timber-poisoning experiments.

MOSQUITO CONTROL.

The mosquito which occurs most commonly in dwellings is the grey-brown *Culex fatigans*, which, during the daytime, may be found sheltering in dark corners of rooms, behind wardrobes, clothes, &c. This mosquito is the transmitter of the organism which causes filariasis (the condition known as elephantiasis).

The common house mosquito breeds in water about habitations, and shows a preference for polluted water, tins of liquid manure, or even flower vases in which the water has not been changed for some time. The eggs are laid on the surface of the water and cemented together to form an egg-raft which may consist of many hundreds of eggs. The larva or "wriggler" possesses a syphon or breathing tube which has at its extremity a breathing hole or spiracle. This syphon projects from the upper surface of the tip of the abdomen. The pupa, which is capable of moving rapidly through the water, breathes through a pair of respiratory "trumpets" situated on its back.

The systematic drainage of surface waters is an important factor in the control of mosquitoes. Water tanks or other vessels, such as tins containing water or liquid manure, should be suitably screened to prevent the adults from depositing their eggs therein. The treatment of surface water in pools, drains, &c., with kerosene will kill the larvae and pupae as they come to the surface for air, and also many of the adults which alight upon the surface to deposit their eggs. One fluid ounce of kerosene covers about 15 square feet of water (1 gallon to approximately 2,400 square feet).

The introduction of various species of fish into ponds and lakes will reduce to a minimum the numbers of mosquito larvae and pupae present in those situations.

The screening of habitations to prevent the entry of adult mosquitoes and the use of mosquito nets will give protection from their bites. Kerosene pyrethrum spray, made as follows, will kill adult mosquitoes in the house:—Place 4 oz. of pyrethrum powder in 1 quart of kerosene; mix and shake well, then allow to stand for about eight hours. Strain through fine muslin and add ¾ fluid ounce of methyl salicylate (synthetic oil of wintergreen) after which the mixture is ready for use.

A mixture of citronella (6 parts), kerosene (3 parts), and cocoanut oil (1 part) applied to the hands and face is an effective repellent.

Management of Sown Pastures.

By C. W. WINDERS, B.Sc.Agr., Assistant (Agronomy) in the Agricultural Branch.

INTRODUCTION.

THE aims of pasture management—whether extensive or semi-intensive grazing conditions prevail—are twofold: First, to increase the carrying capacity of the pasture to the maximum and to maintain it at that level; and, secondly, to prevent the pasture from deteriorating, and, if possible, to improve it. These two aims should be pursued concurrently. Production of animal products, such as wool, mutton, beef, milk, or cream, should not be made at the expense of quality of the pasture. In order to strike a balance between the needs of the stock on the one hand and the requirements of the pasture on the other, it is essential to operate a system of pasture management which gives due recognition to the demands of both parties—namely, the stock and the pastures. Different pasture types call for different details of management, but the same basic principles underlie every efficient grazing scheme.

What is known as the "intensive system of pasture management" embodies all the refinements of good grazing practices, but some modifications of this system are necessary for Queensland conditions. The intensive system, which was evolved in Germany during the Great War, employs scientific methods of feeding pasture to stock. The object is to systematically feed off the pasture at the stage of maximum food value, and to accomplish this it is necessary to concentrate stock at many times the normal rate upon the pastures for periods correspondingly shortened for each paddock. This means the provision of a number of paddocks and their rotational grazing. On dairy farms in those countries where, because of regular and uniform rainfall, it is possible to adhere to an orderly plan of rotation, it is usual to either follow the milkers with dry cattle to clean up any rough herbage, or to level the rough grass by a mower. Other important aspects of the system are the utilisation of the surplus of grass produced in the flush of the year, harrowing after grazing to distribute dung, renovating to reinvigorate the pasture, and systematic top-dressing with phosphates and nitrogenous manures.

MANAGEMENT OF PASPALUM PASTURES.

Subdivision of Paddocks.

Paddocks of 20 or more acres are the usual thing on a great number of dairy farms, and it is to the size of the paddocks and lack of proper management that the typical pasture conditions existing on such farms can be attributed. Under the conditions of uncontrolled grazing, the pastures during the flush of their growth consist characteristically of a series of closely grazed patches interspersed with rank growth which is either not eaten at all or is left until the following autumn or winter, when it has much deteriorated in food value. As often more than half the pasture consists of untouched rank growth, it is easy to visualise the large amount of waste that occurs. The explanation of such uneven grazing lies in the fact of the cow's preference for the short, leafy grass, which has a much greater feeding value than the same grass when it has become rank and stemmy, for when a cow is turned into a paddock

which supplies a superabundance of feed she will graze the pasture in patches and will return again and again to these short patches, neglecting the overgrown clumps.

As the first step of a procedure designed to keep the pasture at the short, leafy stage, it is necessary to provide a series of small paddocks which may be grazed in rotation. The extent of subdivision depends on the size of the herd, for it has been found that for pastures similar to our coastal paspalum pastures a rapid feeding-off of a paddock is obtained by concentrating ten to twelve animals per acre upon it. Thus a farm milking on an average thirty cows should have a number of paddocks of 2½ to 3 acres, with sixty cows, 5 to 6 acres; and so on.

The number of paddocks should be six or more, as this will allow each paddock to be grazed for a few days when the paspalum is 5 to 6 inches high, and is of high feed value. Under favourable seasonal conditions, using six paddocks, paddock No. 1 should be ready for grazing again after the other five have been grazed in rotation; but where there is great risk of sudden rainfall deficiency or superabundance it would be wise to have nine or ten paddocks for rotational grazing purposes.

Great care must be given to the layout of the paddocks in order to provide for the most convenient movement of the stock and their easy access to water. Water should be provided in each paddock or in a laneway into which the paddocks open. Laneways used by the cattle should be at least 2 chains wide, in order to reduce puddling to a minimum in wet weather, and to prevent injury by horning due to overcrowding.

When subdividing paddocks, it is unnecessary to erect stout four-barbed fences, for experience has shown that a fence of two barbs with posts 20 to 25 feet apart, with two droppers between—iron or wooden—will hold the cows quite well, except if rogues are present. Good straining posts at each end are, however, essential. Along the laneways a three or four wire fence, with posts 18 feet apart and one dropper between, is satisfactory.

Rotational Grazing.

As the aim is the systematic provision of the short bite, the pasture must not be allowed to grow rank, innutritious, and unpalatable. The short, green growth, 4 to 6 inches high, should be eaten off quickly by the milkers, and before it becomes necessary for them to forage for a good bite the cows should be removed to the paddock next in the rotation. Dry stock take the place of the milking cows in the first paddock to clean up any irregularities, and where these are unable to cope with the work it will be necessary to mow any clumps that may be left. If patches of long grass are allowed to remain in the paddock the area of short young pasture at next feeding is correspondingly reduced. Feeding the pasture too hard reduces the capacity of the plants to respond quickly and produce new leaf growth.

Spreading Animal Droppings.

A paddock after being grazed has a scattering of droppings over its area, and great improvement of the pasturage is effected by harrowing the dung before it becomes too hard. The dung contains a fair proportion of the original food value of the grass, and if a dropping is allowed to lie undisturbed the plant foods contained within it will lead to a rank growth of the grass in the immediate vicinity of the

dropping. If, however, a special pasture harrow or an ordinary harrow about which several lengths of barbed wire are loosely coiled is run over the paddock the fertilizing ingredients are more uniformly spread over the field and the grass is evenly benefited.

Renovation of Paspalum Pastures.

On many old-established paspalum areas which have received little or no attention directed towards the welfare of the pasture, there has been formed a more or less pure turf so stunted and sodbound that little feed is produced from the paspalum itself, and conditions are too hard for any associate species, such as white clover, to thrive. When this sodbound stage is reached the cover formed by the turf over the soil precludes easy access of water and of free air, and to allow these natural recuperating influences to operate it is necessary to break up the matted grass.

On badly matted areas ploughing-up the paspalum is perhaps the only satisfactory way of reinvigorating the pasture. This operation should be carried out during the rainy season of late summer, the land being ploughed sufficiently deep to allow of the sod being turned on its side and then levelled off with the harrows. (Shallow ploughing, by turning the slice right over and exposing most of the roots to the air, tends to destroy the paspalum.) Such drastic treatment as ploughing of the pasture will throw the treated area out of production for some months, but if the farm is subdivided into small areas one paddock may be ploughed each year, thus providing for the turning over of each paspalum paddock once every five or six years. The temporary loss of feed occasioned by severe renovation will be more than compensated for by the improved condition of the pasturage during subsequent years. After the ploughing and working-down of the area a mixture of winter legumes could be broadcasted.

On areas not badly matted good results have followed treatment in early autumn by special paspalum renovators. This is very heavy work, and considerable horse-power is required to do satisfactory work with such implements. In those cases where points of different sizes may be fitted it is advisable to renovate in one direction with the fine points and then to cross-renovate, using the broader points. Before renovating, it is wise to mow any long, coarse grass on the area. Renovation by these means not only aerates the soil, but removes loose and dead grass, and provides good soil conditions for the broadcasting of legumes such as red clover, white clover, and lucerne.

Lime and Fertilizer Treatment.

Where it is believed that a particular area of pasture land is deficient in lime, steps should be taken to test the effect of top-dressing portion of the area with agricultural lime at the rate of 10 cwt. or 1 ton to the acre. Liming should be carried out well in advance of any fertilizer treatment. If the pasture shows benefit from lime treatment the dressing should be repeated every three years.

A certain amount of experimental work has been carried out in Queensland in connection with top-dressing of paspalum pastures, and good results have in some instances been obtained. It is advisable for farmers to experiment with different types and quantities of fertilizers

on their own farms, in order to learn what is the most economic dressing to apply. It may happen that a top-dressing with 1 or 2 cwt. of superphosphate in the autumn of each year will prove a satisfactory proposition, and it may also be economically sound to apply autumn and late winter dressings of sulphate of ammonia in order to force growth in the off-season. Mowing of any roughage and the renovation of the pasture should always precede top-dressing; otherwise there is a very considerable waste of fertilizer.

Conservation of Grass.

During the period of summer rains the dairy animals are unable to cope with the prolific growth of grass, and where an efficient system of pasture management is not followed it usually happens that most of the surplus grass is wasted. This summer surplus should be conserved as pasture hay or as grass silage. On those farms which are well subdivided, during the flush of the season when it is difficult to keep the grass fed off, one or two of the paddocks could be shut up and the grass allowed to go to the hay or silage stage and then mown. In the paspalum areas of Southern Queensland conditions during the flush of growth are generally too wet to allow of satisfactory curing of hay; consequently, the ensiling of the grass is recommended, since the value of grass for silage is not lowered by light falls of rain on the cut material.

Though, as mentioned previously, the young, leafy growth is richest in nutrients, it will be found that the most satisfactory stage of cutting for economical feeding is when the grass has made rapid and luxuriant growth, with the seed-heads just formed but not yet flowering. If the grass is very mature before being harvested, or is allowed to become too dry before being stacked, a charred product will result.

The grass may be conserved in tower, pit, trench, or stack silos. If the farm is already provided with a tower silo, this may be used to store the grass, which can be filled into the silo by an elevator or by a mast stacker and grab. The stack silo possesses the great advantage that it can be built out in the field which is being cut, but there is a fairly great wastage of material. The pit silo is suitable only where the location and soil are appropriate, but it is cheap to construct and to fill. A handy form of pit silo is the trench silo, which has batters at each end, allowing the team horses to aid in tramping the material.

The stack is particularly favoured for grass silage. If sufficient grass is available a round stack about 14 feet in diameter should be planned; this, when built up to about 14 feet, will contain about 30 tons of silage. The grass is cut with the mowing machine and conveyed to the stack on a tumble sweep. A mast and boom grab stacker is necessary to reduce the labour of elevating the material as the height of the stack increases. Each day no more should be cut than can be stacked on the same day. The outside must be kept well trampled, and the centre kept level until finishing off, when the top should be rounded and sealed with a depth of a foot or so of earth.

A trench silo should be at least 7 feet deep and long in proportion to its width. In filling, the horses can be driven lengthwise through the pit, and their trampling gives better consolidation and exclusion of air.

Grass silage requires a couple of months to mature, and then may be fed out. As deterioration on exposure to air is rapid, it is essential to uncover only a small section of the ensiled material at one time.

MANAGEMENT OF RHODES GRASS PASTURES.

Many of the points mentioned under the preceding section are just as applicable to Rhodes grass pastures as they are to paspalum pastures. The farm should be suitably subdivided to allow for rotational grazing, and the grazing should be efficiently controlled so that each paddock is eaten off when the growth is young and leafy and no clumps allowed to remain. Hard grazing must be avoided, particularly on light soils. The scattering of the manure lying on the pasture should be regularly carried out in order to effect a uniform improvement in the growth of the grass.

Mechanical treatment of Rhodes grass pastures is productive of good results, the use of a strong tyne cultivator breaking up consolidated soil and allowing free ingress of air and water and also removing dead trash.

Rhodes grass makes excellent hay, and the summer surplus grown in paddocks over which a mower can be operated should be conserved as hay for feeding during the winter and early spring months, when natural feed is poor in quality and in quantity.

MANAGEMENT OF NATIVE GRASS AREAS ON FARMS.

In most of the agricultural districts the area of native pasture utilised for grazing is small compared with the acreage of introduced grasses such as paspalum and Rhodes grass, and usually the native grass pastures are restricted to the poorer types of forest soils. On parts of the Darling Downs, however, where dairying is a sideline to crop production, native pastures are utilised for grazing in conjunction with fodder crops. Such native pastures have established themselves naturally, either after ringbarking or clearing of the forest, or on paddocks gone out of cultivation. The former class of pasture is difficult to improve. A very slow improvement may be effected by top-dressing with superphosphate to encourage the development of native legumes present in the pasture, or by running a cultivator over the pasture in early autumn and broadcasting seed of hardy legumes such as cluster clover and English trefoil. Marked improvement of these native pasture areas can only be effected by breaking up the land and cropping it for a season or two with annuals preparatory to sowing down suitable permanent pasture mixtures, either summer growers or winter growers. The native pasture, as such, is very valuable on the Downs, as it contains a large proportion of winter-growing species, such as wallaby grass, spear grass, plume grass, &c., but better winter pastures as well as permanent summer grass should be established on all farms, and the areas carrying native grass could gradually be converted into more productive paddocks. The old cultivation paddocks which have been allowed to revert to weeds and annual grasses such as barley grass, wallaby grass, &c., make fairly good pasture areas, and can be improved by the incorporation of useful grasses and legumes. As opportunity permits, these areas, after being restored to a fairly high level of fertility by the growing of legumes and green manuring, should be sown to permanent grass or to crops.

MANAGEMENT OF WINTER PASTURES.

Since the establishment of winter pastures entails a good deal of labour and expense, they must obviously receive very special treatment if the expenditure is to be recouped. Only relatively small areas of

winter pasturage will be available on most farms, and the temptation to stock these paddocks heavily during the months when the "broad acres" are unproductive must be resisted. Such pastures should as far as possible be reserved for cows in production, for breeding ewes, or for fattening stock. The pastures should not be stocked too early in the growing season, but must be allowed to make good growth before grazing. The animals should be allowed on to a paddock of winter pasture for about an hour a day, and they should be removed sooner if they begin to lie down. Camping on the area should be avoided, as the pasture becomes fouled and distasteful to the stock. Sufficient stock should be used to eat a paddock down in a week, and the pasture must not be too closely grazed. After the completion of a grazing the harrows should be run over the paddock to scatter the droppings. The pasture must be given ample time to recover and produce good feed before being grazed again. The aim should be to provide sufficient paddocks of winter grass to allow of rotational grazing and a continuous supply of green nutritious feed.

Certain of the annual winter pasture plants are self-regenerating —namely, Italian rye grass, Wimmera rye grass, and prairie grass— and towards the end of the growing season pastures of these grasses must be left unstocked in order to allow seed to be matured and disseminated. Areas which have been so treated should be lightly harrowed in early autumn to make a seed-bed for the establishment of seedlings produced by the self-sown seed.

HINTS ON GENERAL GRAZING FARM MANAGEMENT.

In subdividing the grazing area of a farm, care must be taken to include only one type of pasture in each paddock. If an area of poor pasture and an area of better pasture occur in the one paddock the stock will neglect the inferior grass and concentrate upon the good-class pasture, to the detriment of the paddock as a whole. A similar preference is shown for the top-dressed portions of a paddock which has not been uniformly treated.

Suitable shade should be provided for the stock in hot weather, and shelters for protection during cold weather. The location of these resting-places should be chosen with a thought to the conservation of the animal's excreta. If the paddock slopes to a creek or a river the animals should be encouraged to rest near the top of the slope, because if they camp along the watercourse heavy rains will wash the droppings away and remove a large amount of fertilizing material which, by careful attention to the layout of shade and shelter facilities, could be retained on the pasture area.

The several classes of live stock have different grazing habits, and a proper appreciation of these habits will enable a much better utilisation of the pasture resources on a property to be achieved. Sown pastures in Queensland are used primarily for dairy cattle, though of recent years fat sheep and beef cattle have been raised in increasing numbers partly on sown pasturage. Cattle are the most efficient grazers, inasmuch as they graze more uniformly than other classes of live stock. Sheep are more selective in their grazing, paying greatest attention to the finer constituents of the pasture and neglecting the coarser elements. Horse paddocks, it is usually noticed, deteriorate much more rapidly than other pastures, the horses allowing the coarser grasses to increase

by neglecting them in favour of the fine grasses, the latter eventually being eaten out altogether. Sheep, and goats also, eat some weeds more readily, and are thus useful on dairy farms for cleaning up the pastures. For most types of pasture it is found that most efficient grazing is attained by carrying two or three classes of live stock, but this is not always practicable. The pastures in lightly timbered country on the Darling Downs and in the Maranoa, many of which are used for sheep-raising, require after an exceptionally favourable period of rainfall to be eaten off by cattle before the sheep can make good use of them. In some mixed pastures there are plants especially palatable to cattle and others particularly liked by sheep, and these preferences should be noted and appropriate use made of the knowledge during the grazing period.

The burning of paspalum, Rhodes grass, and other pastures is quite common in Queensland, the object being to get rid of accumulated trash and coarse, dry material, and to encourage the production of an early bite in the spring. No information is available to indicate what precisely is the effect of burning on such pastures, but there is no doubt that firing results in the loss of a large amount of organic matter, and probably has other harmful effects if regularly carried out. There is much to be said in favour of the view that the few benefits obtained from burning could no doubt be obtained by the adoption of a system of pasture management involving periodic heavy grazing, the use of the mower, and the harrowing of the pasture.

HORSES REQUIRE CLEAN WATER.

Horses require anything from 5 to 15 gallons of water a day, the quantity depending on the temperature and the amount of work performed. The water should be as pure as possible, clear in appearance, and free from taste, colour, or smell. Pure water is just as essential to a horse as it is to a man, and it is a mistake to suppose that a horse can drink badly contaminated water with impunity. Water obtained from pools or shallow wells contaminated with surface drainage, or containing decomposing organic matter, frequently causes diarrhoea, and generally predisposes to colic. Water that contains a large amount of sediment should not be given, as the sediment causes a mechanical irritation of the mucous membrane of the stomach and intestines—i.e., sand colic.

When the horse is at rest in the stable water should be given three times a day, and should invariably be given previous to feeding. This latter point is of considerable practical importance. A horse's stomach is small in proportion to the animal's size, and water does not remain in it, but passes through the stomach and small bowel to the cæcum, or water-gut. If water is given after feeding, besides weakening the digestive juices, a considerable portion of the food in the stomach and small intestines will be washed out in an undigested state, and indigestion and colic may result. Water in small quantities can be given within an hour or so from the completion of feeding, if desired.

After a long journey it is a good plan to water a mile or so before the journey's end, and take the horse slowly in afterwards. This prevents chills and colic due to the ingestion of a large quantity of water when in an exhausted state. An animal after prolonged exertion or fast work has its system depleted of fluid. It will not eat sufficiently until its thirst has been satisfied; therefore, the water should come first, and while the animal is still warm is the best time to give it. After standing, the body temperature falls, and to give cold water freely then is only to intensify the effect of the cold water on the system.

Refrigerating Brines.

By L. A. BURGESS, A.A.C.I., Dairy Research Laboratory.

REFRIGERATION has a very important influence on the dairying industry. It is utilised for the freezing of ice-cream mixes, the manufacture of ice used in transportation of dairy produce, the cooling of water for butter-washing, the rapid cooling of pasteurised milk and cream, and for controlling the temperature of cold-storage rooms. It plays a most important part in the manufacture of butter, because the careful control of temperature from the time the cream is received at the factory until the butter reaches the consumer has an important bearing on the quality of this product. Since the financial return to a factory is largely governed by the quality of its product, the efficiency of the refrigeration unit is a matter of sufficient importance to warrant more attention than it apparently receives at present.

In the butter industry both the direct expansion system and the brine circulating system are used, and each may be claimed to be efficient in its particular sphere. The brine system differs from the direct expansion system in so far that refrigerating power is stored in the brine, and it only requires a circulating pump to fully utilise this power after the refrigerating plant is stopped. With the direct expansion system refrigeration ceases with the stopping of the refrigerating plant.

Kinds of Brine.

Of the many commercial products offered for brine making, two have been widely employed—namely, sodium chloride or salt, and calcium chloride. Of the two, calcium chloride appears to have become the more widely used. The advantages claimed for calcium chloride brine are that it is less corrosive than salt, and lower temperatures are attainable. It has a bitter taste, however, and brine-leaks therefore should be immediately attended to, especially where there is a danger of contamination of milk or cream. Where a brine-leak occurs in contact with air, corrosion almost invariably ensues, particularly with salt brines, and this is a further reason why brine-leaks should never be neglected.

Strength of Brine.

The strength of the brine varies according to the purpose for which it is to be used. A brine with a specific gravity of 1·17 to 1·18 has been found to be most suitable for butter-factory work, while for icemaking a specific gravity of 1·13 to 1·15 gives good results. A strong brine is less corrosive than a weak brine, but an excessively strong brine increases the tendency to crystallise and greatly increases the load on the pumps.

Tables I. and II. show the properties of sodium chloride and calcium chloride brines respectively. In these tables no reference is made to such arbitrary scales as Baumé, Twaddell, and Salometer scales, which are at times used in various industries for controlling the strength of

brines, lyes, &c. Their use is not recommended for a number of reasons, among which may be mentioned—

(1) The information obtained from their use is practically valueless unless the specific gravity is also shown.

(2) For liquids heavier than water there are Baumé hydrometers graduated in—

(*a*) The original Baumé degrees;

(*b*) The "rational" Baumé degrees;

(*c*) The American Baumé degrees.

(3) For liquids lighter than water there are the same three Baumé scales.

(4) The "heavier than water" and "lighter than water" Baumé scales overlap, and hence some liquids would give readings on both scales which can only lead to confusion unless the particular Baumé scale in use is known.

TABLE I.

SODIUM CHLORIDE BRINES.

Specific Gravity at 60°F.	Percentage of Sodium Chloride by Weight.	Lb. of Sodium Chloride per 100 Imperial Gallons of Brine.	Lb. of Sodium Chloride per 100 Cubic Feet of Brine.	Lb. of Sodium Chloride per 100 Imperial Gallons of Water.	Lb. of Sodium Chloride per 100 Cubic Feet of Water.	Freezing Point °F.
1·007	1	10·1	63	10·1	63	31·8
1·015	2	20·3	126	20·4	127	29·3
1·022	3	30·7	191	30·9	192	27·8
1·029	4	41·2	257	41·7	260	26·6
1·036	5	51·8	323	52·6	328	25·2
1·044	6	62·6	390	63·8	397	23·9
1·051	7	73·6	458	75·3	469	22·5
1·059	8	84·7	528	87·0	542	21·2
1·066	9	95·9	597	98·9	616	19·9
1·073	10	107·5	668	111·0	692	18·7
1·081	11	119·0	741	123·5	770	17·4
1·089	12	130·5	814	136·5	849	16·0
1·096	13	142·5	888	149·5	930	14·8
1·104	14	154·5	962	163·0	1,013	13·5
1·111	15	166·5	1,038	176·5	1,099	12·2
1·119	16	179·0	1,115	190·5	1,186	11·0
1·127	17	191·5	1,193	205·0	1,275	9·7
1·135	18	204·0	1,272	219·5	1,366	8·5
1·143	19	217·0	1,352	234·5	1,460	7·3
1·151	20	230·0	1,434	250·0	1,557	6·1
1·159	21	243·5	1,517	266·0	1,655	4·9
1·167	22	257·0	1,598	282·0	1,756	3·6
1·176	23	270·5	1,684	299·0	1,860	2·4
1·184	24	284·0	1,770	317·0	1,972	1·2
1·192	25	298·0	1,856	333·5	2,077	0·5
1·201	26	312·0	1,939	351·5	2,190	−1·1

TABLE II.

CALCIUM CHLORIDE BRINES.

Specific Gravity at 60°F.	Percentage of Calcium Chloride (Anhydrous) by Weight.	POUNDS OF ANHYDROUS CALCIUM CHLORIDE.				POUNDS OF COMMERCIAL (80 PER CENT.) CALCIUM CHLORIDE.				Freezing Point °F.
		contained in—		to be added to—		contained in—		to be added to—		
		100 Imperial Gallons of Brine.	100 Cubic Feet of Brine.	100 Imperial Gallons of Water.	100 Cubic Feet of Water	100 Imperial Gallons of Brine.	100 Cubic Feet of Brine.	100 Imperial Gallons of Water	100 Cubic Feet of Water	
1·007	1	10·1	63	10·1	63	12·6	78·5	12·6	78	31·1
1·015	2	20·3	126	20·4	127	25·4	158	25·6	160	30·4
1·024	3	30·7	191	30·9	192	38·4	239	38·9	242	29·5
1·032	4	41·2	257	41·7	260	51·5	321	52·6	328	28·6
1·041	5	52·0	324	52·6	328	65·0	405	66·6	415	27·7
1·049	6	63·0	392	63·8	397	78·8	491	81·0	504	26·6
1·058	7	74·0	461	75·3	469	92·5	576	95·9	598	25·5
1·067	8	85·4	532	87·0	542	106·8	666	111·1	692	24·3
1·076	9	96·8	603	98·9	616	121·0	754	126·7	789	22·8
1·085	10	108·5	676	111·0	692	135·5	844	142·5	888	21·.
1·094	11	120·5	750	123·5	770	150·5	938	159·5	994	19·7
1·103	12	132·5	825	136·5	849	165·5	1,032	176·5	1,100	18·1
1·112	13	144·5	900	149·5	930	180·5	1,125	194·0	1,208	16·3
1·121	14	157·0	978	163·0	1,013	196·5	1,225	211·5	1,318	14·3
1·131	15	169·5	1,056	176·5	1,099	212·0	1,321	230·5	1,436	12·2
1·140	16	182·5	1,137	190·5	1,186	228·0	1,420	250·0	1,558	10·0
1·150	17	195·5	1,218	205·0	1,275	244·0	1,520	270·0	1,683	7·5
1·159	18	208·5	1,299	219·5	1,366	260·5	1,623	290·0	1,806	4·6
1·169	19	222·0	1,383	234·5	1,460	277·5	1,730	311·5	1,941	1·7
1·179	20	236·0	1,470	250·0	1,557	295·0	1,838	333·0	2,075	− 1·4
1·189	21	250·0	1,558	266·0	1,655	312·5	1,947	356·0	2,219	− 4·9
1·199	22	264·0	1,645	282·0	1,756	330·0	2,056	379·0	2,361	− 8·6
1·209	23	278·0	1,732	299·0	1,860	348·0	2,169	404·0	2,518	− 11·6
1·219	24	293·0	1,825	317·0	1,972	366·0	2,280	430·0	2,678	− 17·1
1·229	25	307·5	1,915	333·5	2,077	384·5	2,395	454·5	2,830	− 21·8
1·283	30	385·0	2,400	428·5	2,670	481·0	2,998	600·0	3,740	− 54·4
1·338	35	468·0	2,915	538·0	3,350	585·0	3,645	776·0	4,835	+ 2·8

Brine Temperature.

It should be noted (Table II.) that the minimum temperature attainable with calcium chloride brines is that obtained by using a brine with a specific gravity of 1·283. A stronger brine than this only results in a waste of calcium chloride and refrigerating inefficiency.

Purity of Commercial Calcium Chloride.

That portion of Table II. referring to commercial calcium chloride has been calculated for a product containing 80 per cent. of calcium chloride. As the commercial product usually contains from 75 to 80 per cent., these figures must be taken as only approximate. An illustration will show how a 75 per cent. calcium chloride affects the specific gravity of the resultant brine.

A brine of specific gravity 1·179 requires 333 lb. of 80 per cent. calcium chloride per 100 gallons of water. This weight of a 75 per cent. product will give a brine with a specific gravity of only 1·167.

Displacement by Coils.

In preparing a brine the capacity of the brine tank should be known and an allowance made for the capacity of the submerged ammonia coils. This may be calculated from Table III.

TABLE III.

External Diameter of Submerged Piping.	Imperial Gallons Displaced per 100 ft. of Piping.	External Diameter of Submerged Piping.	Imperial Gallons Displaced per 100 ft. of Piping.
In.		In.	
1¼	5·3	2	13·6
1½	7·6	2½	21·2
1⅝	8·9	3	30·5
1¾	10·3	4	54·4
1⅞	12·0	5	84·9

Adjusting the Strength of the Brine.

If the brine in use is found to have a specific gravity of less than 1·17, it may be brought to the correct strength by adding the requisite quantity of sodium chloride or calcium chloride as shown in Table IV.

If the brine has a specific gravity higher than 1·17, it may be weakened or diluted to that specific gravity by adding the required volume of water found from Table V.

TABLE IV.

BRINE STRENGTHENING TABLE.

(To raise the specific gravity of brines to 1·17).

SODIUM CHLORIDE (SALT) BRINES.		CALCIUM CHLORIDE BRINES.	
Specific Gravity of Brine at 60°F.	Pounds of Sodium Chloride to be added to each 100 Imperial Gallons of Brine.	Specific Gravity of Brine at 60°F.	Pounds of Commercial (80 per cent.) Calcium Chloride to be added to each 100 Imperial Gallons of Brine.
1·17	Nil	1·17	Nil
1·16	19	1·16	19
1·15	37	1·15	39
1·14	55	1·14	58
1·13	73	1·13	77
1·12	91	1·12	95
1·11	108	1·11	114
1·10	126	1·10	134
1·09	143	1·09	153
1·08	160	1·08	172
1·07	177	1·07	190
1·06	195	1·06	208
1·05	209	1·05	225

TABLE V.

BRINE DILUTION TABLE.

(To lower the specific gravity of brine to 1·17).

SODIUM CHLORIDE (SALT) BRINES).		CALCIUM CHLORIDE BRINES.	
Specific Gravity of Brine at 60°F.	Imperial Gallons of Water to add to each 100 Imperial Gallons of Brine.	Specific Gravity of Brine at 60°F.	Imperial Gallons of Water to add to each 100 Imperial Gallons of Brine.
1·17	Nil	1·17	Nil
1·18	5	1·18	5
1·19	10	1·19	10·5
1·20	15·5	1·20	15·5
1·21	21	1·21	21
		1·22	26
		1·23	31·5
		1·24	36·5
		1·25	42

Corrosion by Brine.

General Precautions.—Iron and galvanised iron are employed almost universally in refrigerating systems. Remarks are therefore confined chiefly to the prevention of corrosion of these substances. The following well-known precautions must be observed if corrosion is to be reduced to a minimum:—

(1) Keep up the strength of the brine, as strong brines are less corrosive than weak brines. Brines may be weakened in a number of ways, such as by condensation of moisture from the atmosphere, leakage of water into the brine system, and by chemical action causing a precipitation.

(2) Keep the brine system as airtight as possible. The access of air allows the absorption of oxygen and carbon dioxide by the brine. Dissolved oxygen causes rusting of iron pipes, while carbon dioxide causes the brine to become acid, and in calcium chloride brines may cause precipitation of calcium carbonate, thus weakening the brine.

(3) Keep the return pipe under the surface of the brine, as this reduces the possibility of oxygen and carbon dioxide being dissolved. A return pipe which ends above the surface causes aeration by carrying bubbles of air into the brine.

(4) Ammonia leakage into the brine causes the formation of ammonium chloride, which even in small quantities accelerates the corrosion of iron and zinc. Ammonia leaks may be best prevented by regular inspections and by so controlling the brine that corrosion of the ammonia coils is reduced to the minimum.

Chemical Corrosion Preventives.

There have been a number of methods suggested for minimising brine corrosion which involve chemical treatment or control. The principal methods are—

1. Addition of silicates.
2. Addition of chromates.
3. Keeping the brine at a definite alkalinity.
4. Controlling the pH between certain definite limits.

Each of these methods is worthy of a brief discussion.

1. *Addition of Silicates.*—It has been found that the addition of sodium silicate or waterglass to soda cleansing agents has been very effective in preventing corrosion to a large number of metals, particularly aluminium and its alloys. Their use in brines has not been so successful, and Hunziker, Cordes, and Nissen[1] state that their use of calcium chloride brines is undesirable. In salt brines the addition of silicates reduced corrosion on a number of metals and alloys, but with galvanised iron and zinc the silicate addition was quite ineffective. The consensus of opinion is that although silicates largely prevent corrosion of iron and steel in fresh water, they have been found ineffective in brines[2].

2. *Addition of Chromates.*—Sodium chromate and dichromate having been found effective in reducing corrosion of tin-plated copper and iron by alkali cleansers, have also been applied to brines with considerable success. Quite a number of investigators(2), (3), (4), (7) have

recommended its use, and in Europe there are a number of proprietary salts containing chromate for use in refrigeration systems(5), (6). Hunziker, Cordes, and Nissen[1] found that, while the corrosion of most metals was reduced to quite small amounts by this method, it did not appreciably reduce the corrosion of iron and galvanised iron. The Corrosion Committee of the American Society of Refrigerating Engineers recommend that 100 lb. of sodium dichromate and 35 lb. of caustic soda should be used for each 1,000 cubic feet of calcium chloride brine, and double those quantities should be used for sodium chloride brines. They further recommend that from one-quarter to one-half of the above quantities should be added yearly (2), (3), (4). The quantities of caustic soda mentioned above are sufficient to convert the dichromate into the more effective chromate. La Motte, Kenny, and Reed[8] state that the amount of dichromate used should be carefully regulated, since the protective action decreases when the concentration of chromate rises beyond a certain point. All the investigators are unanimous that the brine should be made very slightly alkaline after the dichromate has been added.

3. *Keeping the Brine Alkaline.*—This method appears to be the most widely practiced, but, unfortunately, the term "alkaline" has a very wide meaning. Hunziker[9] states that the alkalinity should be 0·05 per cent. apparently calculated as caustic soda. Poste and Donauer[10] and Bryant[7] state that the alkalinity should be greater than 0·1 per cent. Whitman, Chappell, and Roberts[3] show, however, that a high alkalinity causes pitting to occur, and the investigations of Hunziker, Cordes, and Nissen[1] indicate that high alkalinity is not desirable. The latter investigators indeed obtained a greater degree of corrosion in alkaline brines (0·05 per cent.) than in neutral brines, particularly with zinc and galvanised iron. The general opinion now appears to be that brines should be maintained only slightly alkaline, and modern practice points more and more to the advantages of controlling the pH of the brine, rather than the adoption of an arbitrary percentage of alkalinity.

4. *Controlling the pH Between Certain Definite Limits.*—Whitman, Chappell, and Roberts[3], in their report to the Corrosion Committee of the American Society of Refrigerating Engineers, recommend: "Brines should be maintained very slightly alkaline (pH 9·5). This is the most desirable alkalinity for both iron and zinc in calcium and sodium brines. More acid brines cause increased corrosion, while more alkaline ones cause severe pitting." Britton[11] also states: "With galvanised vessels and pipes corrosive action is at a minimum at pH 9·5 to 10."

With galvanised equipment a protective coating of a zinc compound is formed in weakly alkaline solutions, but this protective coating is dissolved in strongly alkaline and in acid brines.

Summary.

The chemical methods for the prevention of corrosion may be summarised as follows:—

(*a*) Calcium chloride brines should contain 0·16 per cent and sodium chloride brines 0·32 per cent. of sodium chromate, and the pH of the chromate-treated brines should be between 7·5 and 8·5.

(*b*) Both calcium chloride and sodium chloride brines (without chromate) should be maintained at pH 9·5 to 10.

REFERENCES.

1. HUNZIKER, CORDES, and NISSEN. Journal Dairy Science (1929), 12, 252.
2. RUSSELL, ROBERTS, and CHAPPELL. Refrigerating Engineering (1927), 13, 209.
3. WHITMAN, CHAPPELL, and ROBERTS. Refrigerating Engineering (1925), 12, 158.
4. ROBERTS, FORREST, and RUSSELL. Refrigerating Engineering (1927), 14, 173.
5. MOHR and KRAMER. Proceedings of Tenth World's Dairy Congress (1934), Section 2, page 239.
6. BURR and MIETHKE. Proceedings of Tenth World's Dairy Congress (1934), Section 2, page 281.
7. BRYANT. Report of the Conference of the Queensland Butter and Cheese Factory Managers' Association (1930), pages 35-36.
8. LA MOTTE, KENNY, and REED. "pH and its Practical Application" (1932), page 80.
9. HUNZIKER. "The Butter Industry" (1927). Second edition, page 40.
10. POSTE and DONAUER. "The Milk Dealer" (February, 1923).
11. BRITTON. "Hydrogen Ions" (1932), page 522.

Cane Trash and Soil Organic Matter.

A VALUABLE contribution on this important topic was presented at the recent International Conference of Sugar Cane Technologists by Mr. C. R. von Stieglitz, of the Bureau staff. This paper embodied the results of a laboratory study designed to demonstrate the influence of heavy additions of trash to the soil, as it affects both the physical condition and the fertility of the land.

The trash was added to the soil in a finely-crushed state, and soil moisture conditions were so regulated as to ensure a rapid rotting of the material. The amount added during the course of six months was equal to the trash and tops which would be derived from 200 tons of cane per acre. By introducing this exaggerated effect, it was possible to gain some idea of what would happen over the course of several years under normal field conditions.

It was found that a very pronounced increase in soil fertility was effected by the treatment, showing that the plantfoods bound up in the trash were readily liberated as the material decomposed. An interesting aspect was the marked increase in soil nitrogen; the gain to the soil was greater than would be expected from the analysis of the trash, showing that by feeding certain groups of soil bacteria with carbohydrate food they were stimulated to absorb atmospheric nitrogen and combine it into a form available to the cane crop.

Contrary to popular supposition, the rotting of the trash rendered the soil less acid than before, and not more so. Farmers often express the opinion that organic matter will make the soil sour, necessitating an application of lime to correct this defect.

The physical condition of the land was very definitely improved by the trash addition. This was reflected in the improvement in the available moisture capacity of the soil, which in the case of the red volcanic loam, was increased by 17 per cent. Other tests showed that the structure of the soil had been appreciably "opened up" by the trash treatment, thus rendering it more readily absorptive of moisture and increasing the ease with which a condition of good tilth might be created and maintained.

—H.W.K., in the "Cane Growers' Quarterly Bulletin," Bureau of Sugar Experiment Stations.

Laboratory Testing of Soils.

By H. W. KERR.*

THE most direct and best method of determining the fertilizer requirements of the soil is that of the field trial. Most canegrowers are acquainted with the farm fertility trials which have been conducted throughout the sugar areas during the past six years, and the results derived therefrom have been of great benefit to the farmers participating in the work. But this method is laborious, and the number of such trials that can be carried out effectively each year is decidedly limited; in addition to his other duties, from 15 to 20 trials will ensure a busy year for one field officer.

Attempts have been made to devise laboratory soil tests whereby it may be possible to gauge correctly the plantfood deficiencies of the soil by a rapid chemical method. To establish the value of any test requires years of careful comparison between the laboratory results and actual field experience. This project has been pursued by the Bureau since the inauguration of the farm trials, and it is pleasing to report that we feel confident that we are able to give growers a reliable recommendation regarding the phosphate needs of the land, simply on the basis of our chemical test. With regard to potash, the results are not so convincing, and further investigation is required.

We are very interested at the present time in a pot test method which has been under trial in Hawaii for several years. The method consists, briefly, of filling a number of small earthenware pots with the soil under review, and adding varying amounts of plantfood, according to a pre-determined plan, to certain of the pots, after which they are sown with Sudan or Panicum grass. The yields from the respective pots at maturity are then used to calculate the requirements of the soil with respect to potash and phosphate. It is, really, a miniature "farm" trial, in which pots take the place of plots, and cane is replaced by a selected grass.

It is claimed that the results are proving of very great value in enabling reliable plantfood recommendations to be made. It is interesting to note, also, that the method gives most reliable results with respect to potash, and if Queensland experience should confirm this, we would have at our command satisfactory methods for the determination of both phosphate and potash deficiencies.

Now that a glasshouse is available at Meringa, the possibilities of the method will shortly be tested. In the near future, similar facilities will be provided at the Mackay and Bundaberg Stations, and the work will be extended to those centres if early results suggest that the method is trustworthy.

It is rather significant that in no cane country has a satisfactory test for nitrogen deficiency been formulated, excepting, of course, the direct field trial. It is generally recognised in Queensland that practically all cane soils are in need of this plantfood—particularly for ratoon crops—and farm trial results to date enable us to recommend, with a high degree of confidence, a suitable application of this plantfood under varying conditions.

---

* Reprinted from the "Cane Growers' Quarterly Bulletin," through the courtesy of Dr. Kerr, Director of the Bureau of Sugar Experiment Stations.

A Fertilizer Gun.

By N. J. KING.*

THE device illustrated in the attached sketch could be used with advantage by most cane growers. The problem of top dressing a field with sulphate of ammonia cheaply and expeditiously often arises, and in the past several methods have been adopted. Most brands of sulphate of ammonia are lumpy, and unsuitable for the vibrator; but even with the English "sugar crystal" type of sulphate (which runs easily through the machine) there are times when the vibrator cannot be used. The cane may be too far advanced for a horse to be used—as in the case of a standover crop—or the ground may be too wet after rains for horse work; and it is at such a time that the grower desires to do his top dressing. Frequently, boxes or tins are utilised for hand top-dressing, and old sacks slung over the shoulder by means of a strap and with a hole in the corner are widely employed, the sulphate of ammonia being allowed to run from the hole as the worker walks along the row. These devices all serve their purpose but are, at the most, make-shifts.

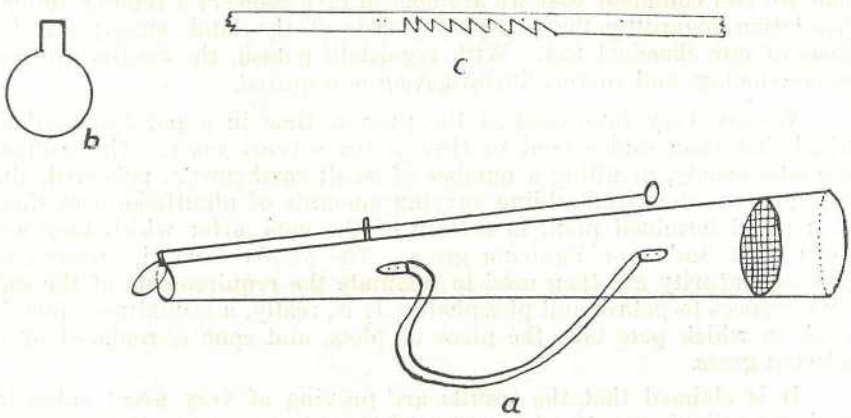


PLATE 254.
Illustrating the Method of Constructing a Simple and Effective Fertilizer Gun.

In the sketch shown (Plate 254 *a*) the fertilizer gun is a conical-shaped container made of 24 gauge galvanised iron. At the smaller end is a "flap-valve" made of the same material and attached to the container by means of a hinge at the top. Plate 254 *b* shows the flap valve and it is seen that the flap is extended somewhat above the hinge. To this extension is attached a rod about ¼-inch diameter and some 18-inches to 2 feet in length running through a guide which is riveted to the gun and terminating in a handle which can be made by bending the rod to the required shape. The rod is provided with slots over portion of its length as shown in Plate 254 *c*, to allow the flap to be set in any particular position. By pulling on the handle the flap will open any required distance and, by means of the cut-away sections, will stay in that position until altered by the operator.

* Reprinted from the current "Cane Growers' Quarterly Bulletin," through the courtesy of the Bureau of Sugar Experiment Stations.

Inside the top of the gun is set a screen made of half-inch mesh wire. The sulphate of ammonia is poured in through this screen and any lumps remaining on the wire can be rubbed through. No lid is necessary on the gun. A strap is riveted on as shown so that the device can be slung over the shoulder.

The writer is given to understand that a similar fertilizer gun (Plate 255) is used widely in Hawaii and that it can be constructed to any size depending on the desire of the operator. Generally a boy carries a gun containing 40 lbs. sulphate of ammonia, and a man some 60-70 lbs.

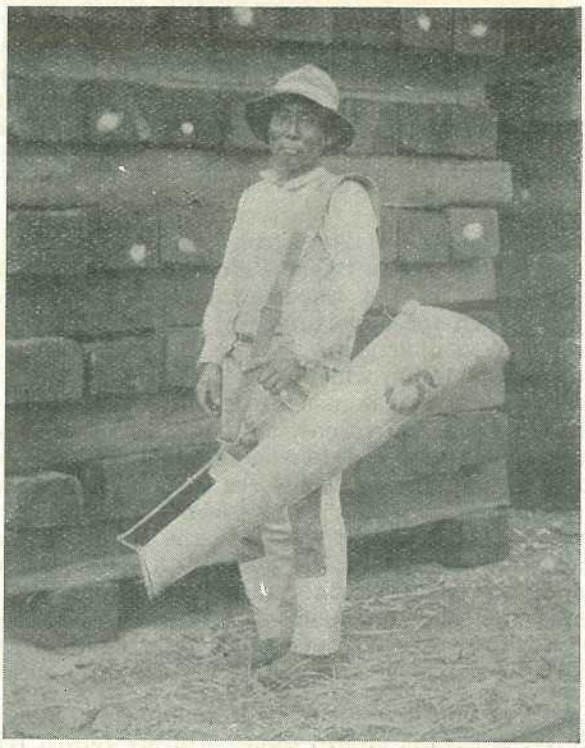


Plate 255.
The Fertilizer Gun Employed in Hawaii.

It can be seen that with very little practice a farmer would find at what setting the flap-valve would deliver 100, 150, or 200 lb. per acre, and could fill the gun accordingly to do so many rounds, depending on the length of the row. The device is simple and cheap to construct and could be made by any plumber.

LOADING HEAVY WEIGHTS—A POINT FOR YOUNG FARMERS.

When it is necessary on the farm to load any very heavy article in a dray, first back up to the article, then tip your dray, leaving the tail door on. Up-end or roll the load over the tail door. If it is too big, fasten it with rope to the front bar of the dray. Then take a 4-inch by 2-inch rail or a long stout pole and place through between the wheel spokes of both wheels. Standing by the tip, tell your horse to get-up. The rail through the spokes will lift the load and you can fasten the top lock. One man can load almost any weight by this method.

Entomology in Hawaii.*

By R. W. MUNGOMERY.

BEFORE leaving Sydney on 3rd April, I took the opportunity of interviewing the Chief Quarantine Officer for Sydney, and arranged for the entry of the Giant American Toad, which project was to form one of my chief objectives in Hawaii. Proceeding to Fiji, where a day's stay was made, I was able to make a hurried trip to the Nausori mill, where I learned that Badila was still being severely damaged by the beetle borer, whilst the harder Malabar variety was standing up to its attack fairly well. Later, in Honolulu, I had the opportunity of meeting Mr. G. Windred, Entomologist to the C.S.R. Company, who confirmed this report, and mentioned that the control exercised by the Tachinid fly was extremely low and disappointing. Fiji disease was also seen in the fields, but by systematic roguing and the use of slightly more resistant varieties the disease was being brought under better control again.

Arriving in Honolulu on 12th April, I was met by Mr. Pemberton, Entomologist of the Hawaiian Sugar Planters' Association Experiment Station, who took me to the Experiment Station headquarters, and thereafter I was given the opportunity of studying any pest or other problem in which I was particularly interested. Most of my time was spent on the Island of Oahu, which afforded the threefold advantage of having the largest number of pests and parasites, it was furnished with a wide variety of climatic conditions, and in addition it was the headquarters of a large scientific staff, to whom I could refer for any information which I required. After two weeks in Honolulu, I travelled by Inter-island Airways, via Maui, to the island of Hawaii, landing at Upolu, and thence proceeding by car down the Hamakua coast to Hilo. Passing through this country, I was able to see cane growing under a variety of conditions, from the windy drier areas to those of heavy rainfall, whilst cane was being transported to the mills by flumes, by aerial cables carrying slings of cane, by locomotives hauling trucks as in Queensland, and by strings of waggons being hauled by Diesel tractors.

After a week at Hilo I returned to Honolulu, remaining there until my departure for Australia on 3rd June. On my return trip to Fiji I met Mr. Simmonds, Government Entomologist at Suva, who kindly took me to some native gardens where I was able to get a fresh supply of the pink sugar cane mealy bug, the host of a parasite which I was bringing back with me to Queensland.

The advantages of such a trip to a foreign country extend far beyond the mere study of an insect or animal in its natural habitat, for its proposed introduction into a new country. This, in itself, is of importance as one immediately gains a clear conception of the requirements of the problem, and this goes far towards making the introduction a success. Unless the special requirements connected with the breeding of the introduced insect or animal are fully understood, valuable shipments are liable to be lost before the necessary experience is gained.

* This report outlines the observations of Mr. Mungomery during a recent brief visit to Hawaii. His comments—which are reprinted from the current "Cane Growers' Quarterly Bulletin" through the courtesy of the Bureau of Sugar Experiment Stations—should prove of considerable interest to farmers generally.

More can be learned by a few days' observation, and by the asking of a few judicious questions, than by weeks of searching for the same information from books.

Further, the investigator is able to see varied sets of economic conditions and appreciate why a form of control which may be successful in one country may not be applicable in another. In addition, he is able to study the methods by which problems are handled elsewhere, the technique and special equipment employed in this work, and also, he is usually benefited by being able to adapt some of these devices in the pursuit of his own immediate line of investigations. Finally, the contacts made with eminent scientific workers who have already "won their spurs" in the entomological world is something that cannot be estimated in pounds, shillings, and pence. One discusses his problems with them, obtains their ideas on lines of investigations or control, and is benefited by their vast experience gained through wide travels and varied associations. In this way confidence is strengthened.

The following notes on the status of the major pests, parasites, and predators associated with cane production in Hawaii are of interest, as they are of special importance to our own Queensland industry:—

Bufo marinus.

This Giant Toad was introduced into Hawaii three years ago with the idea of its becoming a general insect feeder, rather than for the specific purpose of subjugating any one pest. Already it has bred up to enormous numbers, but several years must yet elapse before it will have reached saturation point.

Most insect parasites are active during the day time, and as these toads are mainly nocturnal feeders, it was thought that the general parasite population will suffer very little as a result of this importation, while several beetles, centipedes, caterpillars, and other species which are active at night will fall victims to the toad. This is actually proving to be the case. In places where toads are numerous, very favourable reports are constantly being received concerning the good work which they are accomplishing. (A more detailed description of the toad, its feeding habits, and its possibilities in Queensland, has already been published in the Quarterly Bulletin, July, 1935.)

Anomala Grub.

Anomala grub damage formerly occurred over a small area in the vicinity of Waipio on the Island of Oahu. Ewa and Waipahu plantations suffered the greatest losses, but during the period of my visit no grub damage was seen. Moreover, grubs were particularly scarce in land that was being planted or ploughed out, and diggings made in likely looking "grub patch" areas similarly yielded few or no grubs. This scarcity was due to a combination of causes. In the first place *Scolia maniliae,* which was introduced from the Philippines many years ago, still maintains a very high degree of parasitism, and kills off large numbers of grubs. These wasps were very plentiful, and were found flying over all *Anomala*-infested fields. During last year, *Tiphia* sp., which was introduced to Hawaii 17 years ago, was first recovered in the fields, and its numbers then were fairly plentiful. More recently, *Elis* (near *pulchrina*), which was introduced from Guatemala last year, was recovered in the field, so that with the possibility of these three wasp

parasites operating against *Anomala,* wide variations in the degree of infestation should not be so marked in future. The predator, *Monocrepidius exsul,* can also be found in the red soils of this area, and lately a Guatemalan Elaterid, *Pyrophorus* sp., has also been liberated in the area to add to the array of *Anomala* enemies. Thus it will be apparent that an important parasite complex has been gradually built up around the *Anomala* grub, and what is most important, the bugbear of hyperparasites does not exist in these cases in Hawaii, so that the control that can be expected from their combined efforts should be high.

Another important controlling factor appears to be that of the arsenic treatment of infested soils. Although this practice has been in operation for only a few years, the treatment appears to have cleaned up some of the smaller patches of grub infestations, and a 300 lb. application of white arsenic per acre seems to give commercial control. It may be of interest to observe here, that is areas where up to one ton of arsenic per acre was applied to the soil, the up-take of arsenic by the cane stalks was no greater than in a block of the same crop growing on adjoining land, where no arsenic had been applied to the soil.

To prevent the possibility of *Anomala* being shipped to other islands, all new cane varieties from the Waipio substation (i.e., in the midst of the infested territory) are cut into sets, subjected to hot water treatment, and boxed in a screened *Anomala*-proof room, before being sent away by steamer.

Beetle Borer.

The beetle borer pest is much less prevalent in the Hawaiian Islands than in the parts of Queensland where it is now firmly established, and although borer is still one of the worst pests of sugar cane in Hawaii, the magnitude of its damage is very slight in comparison with that seen in some North Queensland canefields. In Hawaii, the Tachinid fly parasite exercises a very high degree of control, and is largely responsible for this reduction in borer damage. The system of cropping is an important factor in maintaining the Tachinid fly population in large numbers, crops being usually cut when from 20-24 months old. By this arrangement it will be apparent that approximately one-half of the cane is harvested each year, and at the end of the crushing season the remaining immature crops are about 12 months old (some older, and some younger, varying of course with the time of planting or harvesting). These young crops have sufficient cane developed to support a borer population as well as a corresponding fly population. In fact, the percentage of parasitism in cane of this age is usually greater than in cane 24 months old. By this means, a large supply of fly parasites is always at hand to migrate to nearby fields as soon as the borer attack commences. In this way a nice balance is maintained, and the borer pest does not gain the ascendency so easily. In North Queensland, on the other hand, practically all of the cane is harvested annually, and the only centres in which the fly is able to maintain itself are the few small sanctuaries left voluntarily by the growers, in unpermitted standover cane, in cane that is too small to harvest, or which has been left as a source of plants for the following year. The adult borer beetle lives for a long period, whilst the fly's life is a comparatively short one. Consequently, the borer is able to survive until such a time as young cane becomes available in which it can lay its eggs and commence breeding again. The fly, on the other hand, soon dies out if it cannot find

sufficient borer grubs on which to maintain itself during these unfavourable conditions; and for its increase again it is dependent on a few small colonies maintained in favourable sanctuaries or as outlined above. The lag between borer and parasite is thus often very considerable, and the borer is able to inflict severe damage before the parasite overtakes it. This is probably one of the chief reasons why borer control in Queensland is not all that could be desired. In Hawaii, the time lag between borer and parasite does not exist, and control is ever so much more satisfactory.

Another important factor is that, on the whole, cane is better grown in Hawaii than in Queensland, and therefore is not so attractive to borers; with normal growth (that is, an abundance of plant foods, water, and an absence of pests and diseases) there is very little crowding out of large stalks to cause souring, no top rot, no grub damage, and very little rat damage, all of which are important factors in encouraging borers to commence operations. Moreover, with the normal shedding of the leaf sheaths, parasites are able to operate, whereas where considerable binding of the leaf sheaths takes place, the borers protected by this matted trash are almost invariably not parasitised.* Further, Hawaii is not subject to cyclonic disturbances such as operate almost annually in North Queensland. These cyclones, with their attendant powerful winds and heavy rains, cause some cane to lodge rather badly, or to be otherwise damaged by floods. Trash then covers over the fallen cane, rendering it extremely satisfactory for borer attack, but very unsuitable for the operations of the fly parasite.

In the higher rainfall districts of Hawaii, which are reputedly the worst borer-infested localities, the two chief measures undertaken to minimise borer attack are a system of short cropping and the substitution of varieties possessing a harder rind, which are therefore more resistant to the borer. It has been found that borer control by the Tachinid fly parasite reaches a maximum when the crop is about 14 months old, after which there is a gradual decline in the percentage of parasitism, when the trash blanket becomes too thick and prevents the parasite from gaining access to the borers in the lower portion of the stalks. The plan is then to institute a system of short cropping; that is, the cane is cut at the age of 14-18 months, and by this means the borers are never able to breed up in sufficient numbers to cause really serious damage. By planting canes such as P.O.J. 36 and others which have a harder rind than, say, P.O.J. 2878, it has been possible to reduce borer damage to even smaller proportions. P.O.J. 36 has proved almost immune to borer attack. However, these canes can be grown only in restricted localities, and in recent practice some of the plantation agriculturists find it more profitable to grow the more susceptible variety P.O.J. 2878 than to continue growing P.O.J. 36. Whether borers will become cumulative, and damage still further increase in future years, will be an interesting point to watch.

Rat Damage.

Rat damage is prevalent in areas where much waste land, rock piles, and other rubbish occur, and also where cane has been abandoned

* It is thought that with the introduction of the sugar-cane mealy bug parasite, trash binding may in some instances be lessened, for the honey dew secreted by the mealy bugs often helps to make the trash cling to the cane stalk.

on account of quota restrictions. The introduced mongoose can frequently be seen running across the roads, and it is not able to keep the rat down to numbers sufficiently small to prevent serious damage occurring. Its unwelcome activities against many ground-nesting birds are thought to far outweigh any good it might do in killing a few rats. It, therefore, is not considered in a very favourable light in Hawaii.

No further intensive research on rats has been undertaken since the work of Pemberton, and the control measures advocated are much the same as those which he formulated, with the exception that thallium-coated wheat baits have almost completely replaced barium biscuit and strychnine-wheat baits. Squill has been tried, but its killing power does not always appear to be satisfactory, and further research with this compound is contemplated. In addition, it is thought that greater improvement in control could be made by determining more effective baits than wheat, and in this respect oatmeal and the germinal portion of maize seeds offer better possibilities.

Mealy Bugs.

The pink sugar-cane mealy bug is much less common than in Australia. Especially is this so in the drier parts of the Hawaiian Islands, and these are precisely the localities in Queensland where mealy bugs are often thickly clustered around the nodes of the cane. This scarcity of the mealy bug is due to the operations of a small parasitic wasp, several of which are able to mature in the one mealy bug. A consignment of these wasps has been brought back for colonisation in Queensland canefields.

Army Worms.

Two species of "army worm" are occasionally responsible for considerable damage to young cane, and both of these species are responsible for similar injury in Queensland canefields. *Spodoptera mauritia* appears to give most trouble, and I witnessed damaged portions of fields on the Island of Oahu, where young plant cane was completely stripped of its leaves. Similar damage was seen on Hawaii, and reports from Maui indicated that the same severe damage was occurring there. This damage occurs despite a vast array of parasites at work against these insects, but such outbreaks occur usually when some climatic condition has upset the happy balance existing between host and parasites, enabling the pest to increase suddenly.

Eggs are usually laid on the young cane leaves, and the young caterpillars on hatching out drop by thin threads to the nut-grass below, where they feed for some time, and later migrate to the young cane as they grow bigger. Several plantations follow the practice of having labourers clip these egg masses from the cane leaves and destroy them, but such a procedure is of doubtful value, as it greatly limits the activities of a tiny wasp parasite of the egg, and it only requires that a few egg masses be overlooked to furnish an ample supply of caterpillars which will infest the cane to such an extent as to cause this damage. These caterpillars do not, as a rule,, hide during the day under trash and other debris, like those of the Queensland species, *Cirphis unipuncta*, but feed openly on the cane leaves and in the spindle. Therefore, when artificial control measures are resorted to, a mixture of one part of arsenic to six parts of finely powdered raw rock phosphate is dusted over the entire area, the application being made at the rate of 100-150 lb. per acre. *Cirphis unipuncta* sometimes causes damage in some of the wetter

districts, and by virtue of the fact that the usual army worm bait disintegrates rather rapidly under heavy rainfall conditions, the following bait has been evolved, and has proven much more suitable in these wet districts:—

10 lb. bagasse 20 lb. molasses 1 lb. white arsenic ½ lb. casein (Kayso) 2 qt. water.	The arsenic is stirred into the molasses thoroughly before mixing in other ingredients.

Biological Control.

Biological control in Hawaii has given outstanding results. Especially can this be claimed in respect of sugar-cane entomology, and the high degree of control obtained by means of introduced parasites has become a classical example which is frequently quoted to demonstrate the benefits to be derived from this form of control. The chief reasons for these successes are that Hawaii, in the first place, has a very limited insect fauna, and, in the second place most of the serious pests have been introduced from other countries, and are not native to the Hawaiian Islands. When, therefore, a new pest has gained entry into Hawaii and threatens serious damage, entomologists have gone to the country of origin of the pest, and there sought out and introduced the most effective parasites. These searches have frequently taken them to fever-stricken and inaccessible areas, and much ingenuity was required in transporting the parasites back to Hawaii successfully. These difficulties have been overcome one by one, with the result that most of the formerly important pests (at least so far as sugar-cane is concerned) have been reduced to the status of comparatively unimportant ones. Such a state of affairs has been rendered possible by the fact that these introduced parasites have had a clear field in which to operate, and have not been hindered by the action of hyperparasites. This partly serves to explain why we, in Australia, cannot hope for the same high degree of success as is experienced in Hawaii. In the first place, we are dealing mostly with native pests which formerly fed on the leaves, stalks, and roots of native grasses, but which have now adopted cane as an equally, if not more suitable, host plant. In the second place, the parasite complex of our pests is very large and much involved. If further parasites were introduced, they would in most instances be necessarily so closely related to those already occurring in Australia as to render them liable to severe attack from hyperparasites. They would thus become ineffective as controlling factors of any great magnitude.

The control of the sugar-cane leaf hopper by parasites introduced from Australia, Fiji, and China, the control of the *Anomala* grub by a digger wasp, introduced from the Philippines, and the control of the beetle borer by the New Guinea Tachinid fly are some of the outstanding successes which the entomologists of the H.S.P.A. Experiment Station had to their credit many years ago. But they are not resting on their laurels; rather are they putting forth every effort to make parasite control even more effective. Within recent years the *Scelionid* parasite of grasshopper eggs has been successfully established, also the pink sugar cane mealy bug parasite, whilst during last year several new parasites and predators were imported from Guatemala to assist further in the control of the *Anomala* grub. One of these has already become established, whilst others have been liberated in *Anomala*-infested fields.

These many successes are apt to create the impression that introductions of parasites into Hawaii have been an easy matter. Actually, many parasites have been introduced, bred up to large numbers under laboratory conditions, liberated in the fields, and have afterwards failed to become established. In other cases, such as with the beetle borer, intensive search in many of the East Indian Islands has failed to bring to light a parasite likely to prove more successful than, or add to the degree of control already being exercised by, the New Guinea Tachinid fly. In some places other parasites were located, but they were either comparatively rare in occurrence, or they were suited more for the wet tropical jungles, where allied borers occur.

Disease Transmission Work.

Work was in progress in Hawaii to test the possibility of insect transmission of leaf-scald disease. Cane leaf hopper, cane aphis, and the grasshopper *Oxya chinensis* were being tested, but, although these tests had been in progress for more than a year, no case of transmission had been recorded.

An interesting sight which came under my notice was that of lightning injury to Yellow Caledonia. Where the lightning had struck the ground there was a circular area of about 10 yards in diameter where the cane had been damaged. Some of the cane stalks were dead, and showed considerable charring, whilst others had a prolific development of side shoots. Other stalks which came in contact with a strand of stout fencing wire used to prevent lodging had suffered similar injury for a distance of the entire length of the wire, some 1,200 feet. Certain of these canes displayed symptoms similar to leaf-scald, and later definite leaf-scald symptoms were found in a few stalks. This occurrence has raised the question of the probable masking of symptoms or the latency of the disease in this variety under the normal conditions of growth near Hilo, and the possibility of lightning injury or other serious growth check serving to bring out the typical leaf-scald symptoms.

Chlorotic streak was also seen to occur in some of the wetter localities, such as at Olaa plantation, on Hawaii, and at Kailua, on Oahu. In this latter area, many new seedling canes are being raised and tested annually, and the percentage of infection in these new varieties is very high, indicating a very rapid rate of spread.

No work is being done on this disease so far as attempting to determine possible insect vectors is concerned. The canes undergo a hot water treatment at 52°C. for 20 minutes prior to being sent to other parts of the islands.

Acknowledgment.

I wish to tender my sincere thanks to those in Queensland who made my trip to Hawaii possible, and to those in Hawaii who made my sojourn there so interesting and delightful. To the entomologists of the Hawaiian Sugar Planters' Association Experiment Station I owe a deep debt of gratitude, and particularly so to Mr. C. E. Pemberton, who not only made himself responsible for showing me the detailed activities connected with pest control in Hawaii, but also saw to my personal welfare whilst I was incapacitated for a time through sudden illness.

Frost Damage in Cane.

By N. J. KING.*

IN the Bundaberg district and those areas further south the incidence and severity of frosts become factors of importance in cane production. The winter of 1932 and of the present year provide a drastic example of what damage is likely to ensue from heavy frosts. It is an established fact that on frosty nights the lowest temperatures exist at the ground level, or in close proximity thereto. Cold air settles to the ground and therefore the lowest temperatures are recorded immediately above the soil—what is generally termed the "grass reading." As night approaches and the surface of the earth begins to cool, heat is radiated from the soil into the atmosphere. The soil moisture removed by this radiated heat condenses on contact with the cooler air and is deposited as dew. On an open field—under bare fallow—the radiated heat is quickly lost in the atmosphere and any drop in temperature of the air causes a settling of the colder atmospherical strata to the soil level.

In a field of tall cane, however, the cane tops act as a blanket, preventing to a large extent the radiation and consequent loss of heat from the soil. The atmosphere within the cane block keeps warmer and moister than the bare fallow block and is therefore subject to a smaller drop in temperature. Added to this is the fact that transpiration processes in the plant itself produce a certain amount of heat and this heat assists in lessening the effects of any serious drop in temperature in the surrounding atmosphere.

With a view to determining the effect of growing cane on atmospheric temperatures it was decided during 1933 to record temperatures each night on the Bundaberg Sugar Experiment Station, at heights varying from ground level to 7 feet 6 inches. Six thermometers of the maximum-minimum type were attached to a pole, the first at ground level and then at 18-inch intervals so that the highest was at 7 feet 6 inches. Temperatures were recorded each morning. The thermometers were first placed on a bare fallow block and the following are some of the figures obtained:—

Date.	Height.					
	0 in.	18 in.	36 in.	54 in.	72 in.	90 in.
1933						
28th April	55	57	65	66	65	64
3rd May	55	57	57	56	56	57
15th May	55	55	55	54	54	54
17th May	48	49	50	50	50	50
20th May	46	47	49	49	49	50
24th May	54	57	58	55	54	54
27th May	47	49	51	51	52	53
1st June	36	36	38	38	39	40

Two outstanding points in the above table are (1) the influence of still nights, and (2) the effect of a shower of rain. On April 28 was recorded a very still night with no breeze; the difference of 11 degrees F.

* In the "Cane Growers' Quarterly Bulletin" for October, published by the Bureau of Sugar Experiment Stations.

between the ground level and the 4 feet 6 inch level is really remarkable, illustrating in no uncertain manner the concentration of the cold air at the lower levels. On 15th May some 13 points of rain were registered and it is seen that on that night the lower level thermometer gave a higher minimum reading than the instruments higher up the pole. This latter observation supports the contention that crops on moist soils are less likely to be frosted than those on dry soils. Wet soils conduct heat better than do dry ones and consequently the radiation loss is more rapidly compensated for by conduction of heat from the subsoil; also under moist conditions the lower atmosphere is highly charged with moisture and the greater condensation produces a ground mist or fog which acts as a protective covering against radiation loss.

To obtain definite figures to illustrate and confirm this contention the thermometers were removed to Bingera Plantation and set up on a pole in an irrigated block so that the lowest thermometer was 12 inches from the ground and the highest 10 feet. A member of the staff of Messrs. Gibson and Howes co-operated in taking daily readings of the thermometers. The following are some of the figures recorded:—

Date.	Height.					
	12 in.	24 in.	48 in.	72 in.	96 in.	120 in.
1933.						
8th June	53	53	54	51	53	52
10th June	52	51	54	48	49	49
17th June	53	53	52	50	50	51
21st June	42	41	39	37	39	39
26th June	35	35	33	32	32	33
27th June	36	36	33	32	32	33

It is noticeable that the temperatures below six feet (inside the cane) are notably higher than above the cane, and that a definite drop occurs at about the six-foot level. This illustrates the fact that the cold air settles on the cane tops as it did on the ground in the bare fallow experiment. Radiated heat from the soil, and heat of transpiration from the cane keep the temperature there above normal atmospheric figures.

The thermometers were removed once more and divided into two lots of three each. One set was placed as before within a cane block, and the other outside the block where normal conditions prevailed.

Date.	In Cane Block.			Outside Cane Block.		
	Height.			Height.		
	2 ft.	6 ft.	10 ft.	2 ft.	6 ft.	10 ft.
1933.						
26th July	51	52	49	48	53	54
27th July	45	44	41	43	44	46
28th July	45	43	42	40	43	44
1st August	43	41	39	42	42	43
5th August	39	37	35	37	38	39

These figures merely confirm what has gone before.

The difference between frost and no frost may be a matter of one or two degrees of temperature and if moist soil and a tall cane crop can make this difference of two degrees, light frosts may thus be avoided. It is evident therefore that on lands of similar topography and growing the same variety, the irrigated crop is in less danger of frost damage than the non-irrigated one.

As the result of a few initial experiments it is thought—though by no means proved—that a trash cover on the ground surface may have a somewhat similar effect. During the winter of 1935 a soil recording thermometer was utilised to obtain some soil temperature readings. The instrument carried two thermometers and a complete record of variation in temperature was obtained on the chart. One thermometer was buried under 4 inches of soil and the other under 4 inches of soil plus the trash from the previous crop, which had been conserved in alternate interspaces. The accompanying diagram (Fig. 28) is copied from the recorder chart and shows the temperature of each thermometer at hourly intervals. Starting at 9 a.m., it is seen that the trash covered soil is warmer by two degrees than the bare soil. It remains warmer till 12.30 p.m. when the sun's rays heat up the bare soil, reaching a maximum at 5 p.m. at which time it is warmer by four degrees than the trash covered soil. At about 1 a.m., however, the bare soil becomes cooler than the trash covered, becoming some three degrees cooler by 9 a.m., and then begins to warm up again.

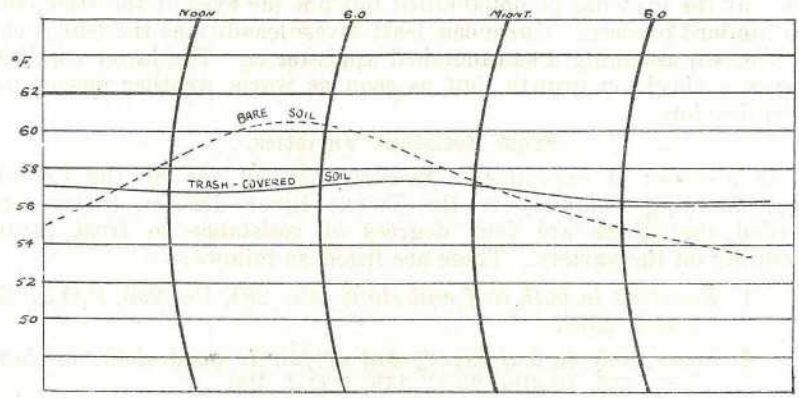


Plate 256.
Illustrating the Daily Variation in Soil Temperature with Bare and Trash-covered Land.

The trash here is obviously acting as an insulating blanket preventing rapid radiation of heat during the night, and it may be supposed that this effect is similar to that of a wet soil. In fact, the soil under the trash was moister than the bare soil, and the effect may be due to moisture alone. No conclusions can be drawn at this stage, but as the opportunity arises further work will be carried out.

The lighting of smoke fires or "smudges" has often been mooted in South Queensland as a frost-preventive measure, and has been used extensively in other parts of the world (notably California) for frost prevention with fruit crops. Some years ago a very complete investigation into the value of smudges showed conclusively, in

California, that the smoke had no appreciable effect in preventing frost, and that their only value was the warmth given off by the fires themselves. An orchard entirely surrounded by smoke fires enveloping all the trees in a blanket of smoke did not have its atmosphereic temperature raised by 1 degree above that of the surrounding orchards. Experiments at the Mackay Experiment Station on a very small block of cane were favourable, but experiments on the Northern Rivers of New South Wales, on a 10-acre block, were a failure.

It may be pointed out that the degree of cold during a frost is not a true criterion of the damage one may expect. A thermometer reading of 27° (5° of frost) may only mean that the temperature reached that figure for an instant; and the total time that the thermometer registered less than 32° may have been only half an hour. Much more damage would be done by a frost when the thermometer fell only to 30° (2° of frost) but remained there for eight or ten hours.

Severity of Frost Damage.

Under the most severe frost conditions in Queensland, such as were experienced at Wallaville this year, the leaves, growing point, and buds are all killed. The first indication of frost damage is revealed by slicing a stick of cane vertically, when it will be found that a sodden area occurs just above the growing point. This area turns brown after some forty-eight hours, when the "heart" can be pulled out of the stick. If the growing point be killed but not the eyes of the stick, side-shooting will proceed. Under the least severe conditions the leaves only are affected, assuming a sun-scorched appearance. The latter condition imposes a check on growth, but as soon as warm weather ensues new leaves develop.

Frost Resistant Varieties.

In a series of experiments recently carried out by the Colonial Sugar Refining Company in the Tweed River district, it has been recorded that there are four degrees of resistance to frost injury, depending on the variety. These are listed as follows:—

1. *Resistant in both leaf and stalk*—Co. 281, Co. 290, P.O.J. 979, P.O.J. 2379.
2. *Susceptible to leaf injury but of fair to good stalk resistance*—Q. 813, Badila, 26 C. 148, P.O.J. 100.
3. *Susceptible to stalk injury but of good leaf resistance*—P.O.J. 2364, P.O.J. 2727, P.O.J. 2878, P.O.J. 2883.
4. *Susceptible to injury in both leaf and stalk*—P.O.J. 2725, Korpi, Oramboo, Nanemo, S.C. 12/4, B.H. 10/12.

UTILIZING MAIZE COBS.

Cob charcoal is greatly relished by pigs, and where maize cobs are available they may easily be converted into valuable feed in the following way:—Dig a hole about 5 ft. deep, 5 ft. in diameter, and with slightly sloping sides. Start a fire with a few cobs, and keep adding cobs as fast as they ignite. When the whole mass is glowing red, have a couple of barrels of water handy, in which 40 lb. salt has been dissolved, and pour this water over the whole mass. Then cover the top of the pit with a large piece of sheet iron, placing some earth around the edges to exclude all air. The following morning there will be a valuable lot of charcoal, which the pigs will turn to excellent account.—"The Australasian."

THE November rainfall was generally under average throughout the State, only light storms being experienced early in the month. The subsequent hot dry westerly winds have dried out the pastures, and had an adverse effect on lucerne and all young growing crops. As an instance of the prevailing conditions, grass fires were experienced on portions of the Darling Downs, but owing to the strenuous efforts of the fire fighters, the conflagration did not extend to the wheat lands where crops were fast ripening.

Wheat.

Crops have ripened off rapidly, and the harvest has proceeded under favourable conditions without the delays often experienced as a result of early storms. Some high yields are being garnered, one of the most noteworthy reported being that from a small area at Moola in the Dalby district, where Messrs. James Hope and Son harvested 168 bags of Flora wheat from 7 acres, or 72 bushels per acre. From a total of 70 acres, of which the 7 acres formed a part, 970 bags were received, a yield of more than 41 bushels per acre. Like many Downs farmers, Mr. Hope, senr., is a dairyman, and wheat is chiefly grown on his property for fodder purposes.

The Queensland Government has passed the necessary legislation to give effect to the Commonwealth Wheat Stabilisation Scheme, but owing to the opposition being met with in other States, it is very doubtful whether the scheme can be applied to the present season's harvest, in the event of which the flour tax may be reimposed for an indefinite period. The scheme provides for the payment of a home consumption price of 4s. 9d. per bushel, and the equalisation of all home and export sales throughout Australia, in a similar manner to the plan now successfully operating in the dairying industry. Although Queensland as a non-exporting State does not stand to make any substantial gain from such a scheme, in view of the fact that approximately 75 per cent. of Australian wheat is exported, the principles of organised marketing must be impartially applied.

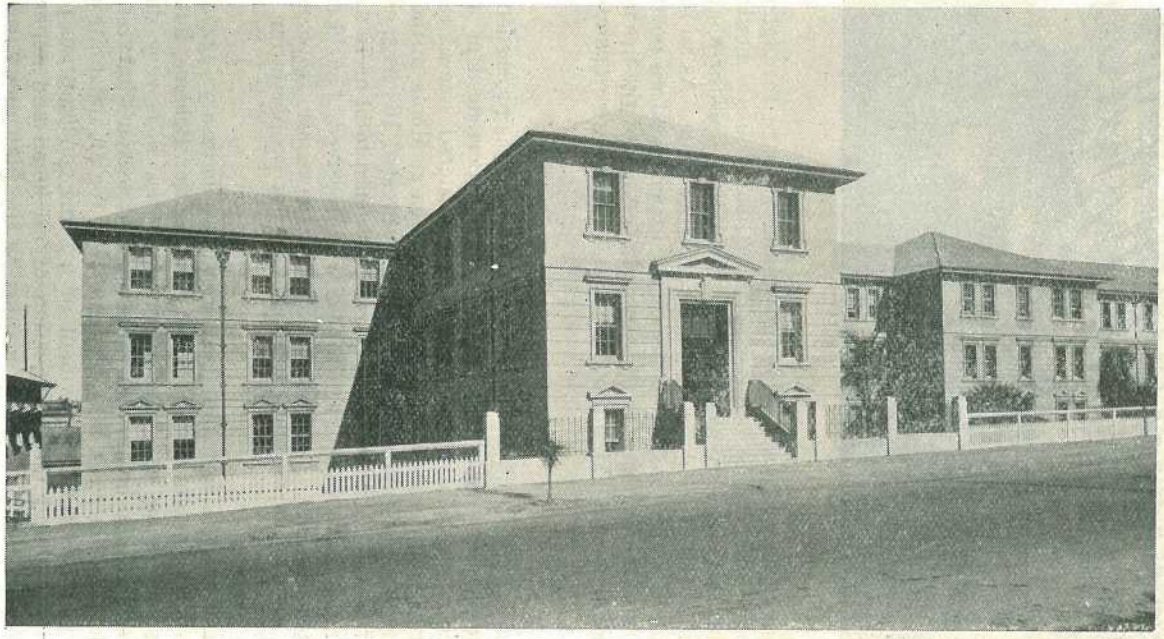


PLATE 257.
NEW WING, AGRICULTURE AND STOCK BUILDING, WILLIAM STREET, BRISBANE.

The wheatgrowers can rest assured that the Queensland Wheat Board will watch their interests closely, and that the best possible arrangement will be made.

Tobacco.

A comprehensive series of experiments is again being undertaken during the present season, in the Mareeba, Dimbulah, Townsville, Mackay, Bowen, Rockhampton, and south-western districts, embracing seed selection and propagation, fertilizer, variety, and green manurial trials. Plots have also been initiated in the Gayndah district, where soil conditions appear suitable, and where growers have access to water for irrigation purposes. Tobacco-growing is a new venture for farmers in this district, and the progress of the plots will be watched with interest. At the time of writing, weather conditions remain dry in the northern areas, so that generally planting out is delayed. Many growers in the Dimbulah area have installed pumping plants, and are planting out and watering by hand. Good progress is being made by the irrigated crops in the Mareeba district, especially where thorough cultivation is being practiced as against repeated applications of water with little or no cultvation. In the Texas, Yelarbon, and Inglewood areas, early seasonal conditions were more satisfactory, and plantings were practically finished by the end of November. Growers are maintaining their interest in tobacco cultivation, and although too early for an estimate of the total acreage, it is expected that the area under crop will exceed that of the previous season.

An officer of the Department of Agriculture and Stock is now in Sydney studying tobacco grading and general handling with one of the largest Australian tobacco manufacturing companies. Valuable information will be obtained, which will be passed on to the growers in due course.

Sugar.

The Bureau of Sugar Experiment Stations reports (25-11-35) :— During the month several of the northern mills completed their crushing and most mills will have finished for the year by early December. A re-estimate of the crop prepared in late October suggests that the sugar crop will be rather in excess of the earlier figures.

Growing conditions for the month have been quite satisfactory in the far northern area, and the condition of the young cane is excellent. In the areas from the Burdekin south, rain is badly needed to ensure a continuation of growth. Should the dry conditions persist for another fortnight the growth check will be most serious.

General.

The *Cactoblastis cactorum* continues its work among the secondary growths of prickly-pear on western lands, it being claimed that no extensive belts of dense regrowth remain. This remarkable insect has, therefore, overcome the primary pear and practically all secondary growth within a period of nine years. Other insects are to be tried out against the tiger pear, which has so far shown greater resistance to the Cactoblastis. In view of the increased interest being shown in grasses and pasture improvement by farmers and graziers throughout the State, the articles appearing in this and previous issues of the "Queensland Agricultural Journal" are particularly opportune. In this connection

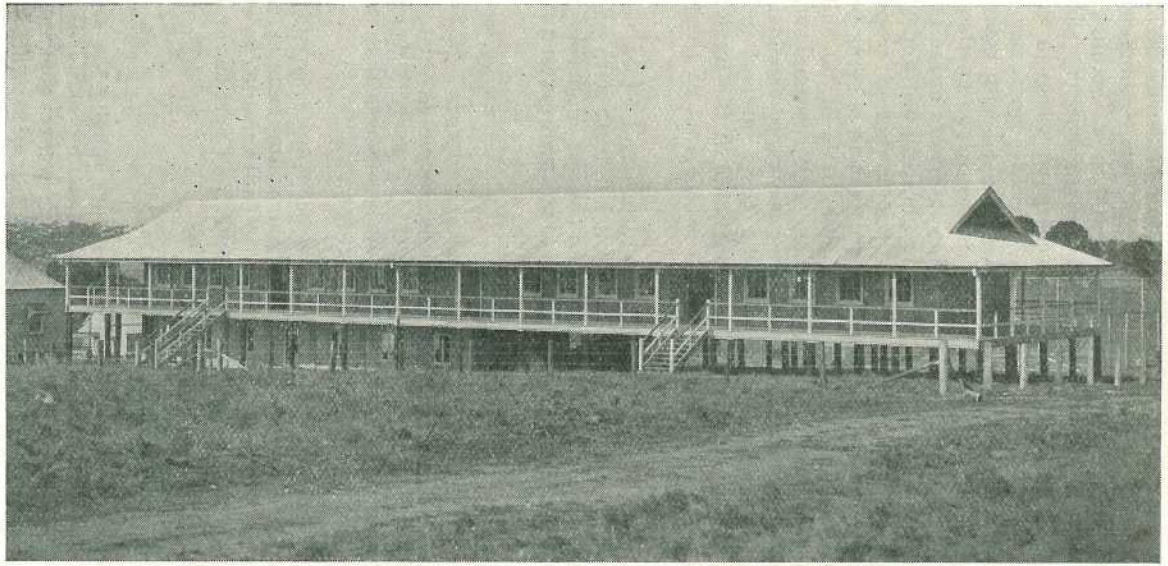


PLATE 258.

NEW DORMITORY, ST. LUCIA FARM SCHOOL.

At the Farm School, the rudiments of agriculture and animal husbandry are taught thoroughly. At the end of a six months' course, for which no charge is made, St. Lucia trainees are guaranteed a job with a good farmer. The demand for trained youths continues greater than the number available for farm employment.

New Zealand has set a high standard in pasture management, and although climatic conditions differ greatly from those obtaining in Queensland, the principles underlying their work can be applied with advantage.

Heavy supplies of potatoes have been reaching the local markets, reports indicating that many consignments are immature, unsatisfactorily graded, and infested with moth, resulting in depressed values. Prime-quality tubers continue to realise good prices, but owing to keen southern competition, local growers cannot expect good prices unless grading is thoroughly carried out.

Maize has increased in price, up to 4s. 8d. per bushel being paid. The rates for fodder have also improved, probably owing to the hot dry weather recently experienced causing the wilting of crops in the main supplying districts.

New Form of Rat Bait

ONE of the most interesting papers presented to agriculturalists at the recent International Technologists' Conference in Brisbane, dealt with the rat pest in cane areas, and was prepared by Mr. K. Gard, of Macknade. It sets out the results of extensive researches on the habits of the various species of rat which damage cane in Queensland, and concludes with a discussion of control measures which have been tried out in the Ingham district.

Of particular interest to canegrowers is the description of a new form of bait preparation which was devised by Mr. M. S. Barnett, of the Colonial Sugar Refining Company. This bait seems to combine all the desirable features of a highly satisfactory rat poison, and would appear to possess advantages over all other preparations which have been employed to date. The essential features are a paper container, rolled in the form of a cigarette, which is saturated with raw linseed oil, plugged at both ends with hard paraffin wax, and containing sufficient poisoned wheat to kill a fully grown rat.

It has been shown that linseed oil is an excellent attractant for the rat, while the poison cylinders (or "poisils") as prepared are rendered perfectly waterproof by the oil and wax treatment. The poisils are marketed in the form of a compact "wheel" which contains 600 or more baits; the wheel is held together by the paraffin coating top and bottom, but can readily be broken up by hand and the individual baits removed as required.

The paper concludes by stating that "this form of bait, prepared preferably with thallium sulphate, recommends itself as the most suitable one devised up to the present, being safe, handy, cheap, durable and effective." It was the opinion of the overseas entomologists attending the Conference that this method of bait preparation appeared destined to change the entire aspect of rat control, and marked one of the most important advances in this field in recent times.

--H.W.K., in the "Cane Growers' Quarterly Bulletin," Bureau of Sugar Experiment Stations.

APPLE PACKING FOR EXPORT AND HOME MARKETS.

By JAS. H. GREGORY, Instructor in Fruit Packing.

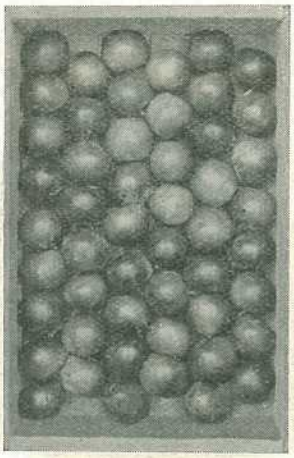
Part III.

(*Continued from August*, 1935.)

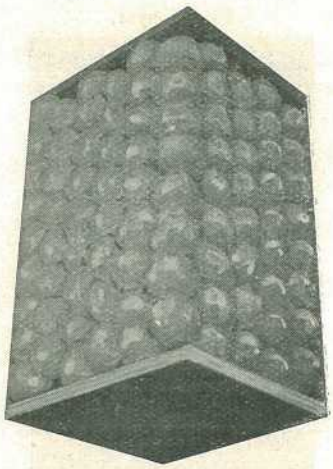
OWING to repeated requests, the angled type of packing the standard case is herewith illustrated in full. It is suggested that readers compare these illustrations with those of the standard packs previously published. The difference between the packs is the number of layers in the pack. Straight 3-3 packs are packed with open pockets, and contain six layers. The angled packs illustrated have closed pockets, and contain five layers. Straight 3-2 packs contain five layers, angled 3-2 packs four layers. The angled packs are of assistance when packing hardwood cases which do not permit a bulge to be placed upon the top and bottom of the case when packed. These packs are also advantageous when packing unwrapped apples. There is a risk, when using angled packs, of some of the fruit becoming stalk-marked, but care whilst packing will overcome this. The stalks should be placed so that they touch the cheeks of adjoining apples on the side nearest the packer. If this is done, the puncturing of the skin by the application of pressure to the layer whilst finishing it off is prevented. It is only with long-stalked varieties that there is any risk. Observations have shown that most stalk-marking takes place in the picking bags and on the sizing machines before packing.

3-3 Packs. Five Layers.

First Layer.

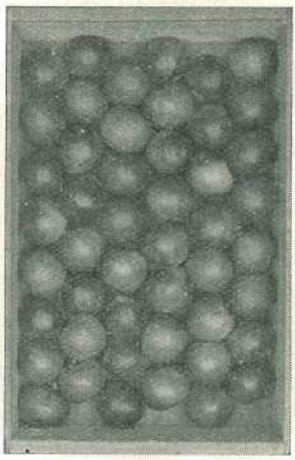


Finished Case.
Top. Side.

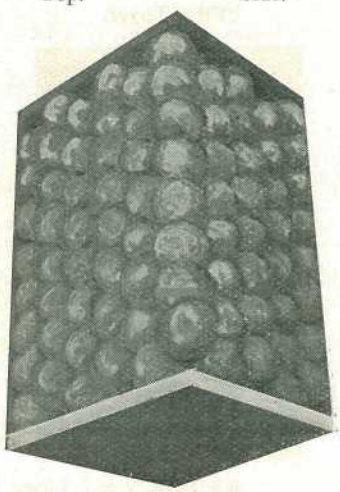


3-3 Pack, 9 x 8 Layer Count. Five Layers, 255 Count.

First Layer.



Finished Case.
Top. Side.

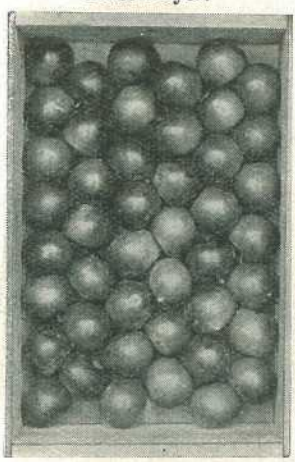


3-3 Pack, 8 x 8 Layer Count. Five Layers, 240 Count.

Plate 259.

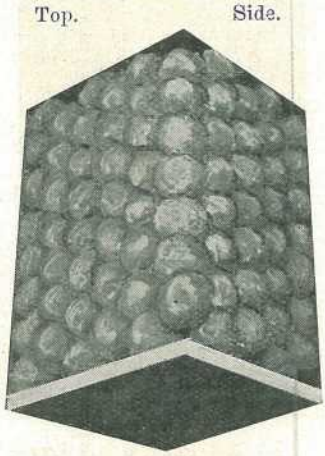
3-3 Packs. Five Layers.

First Layer.



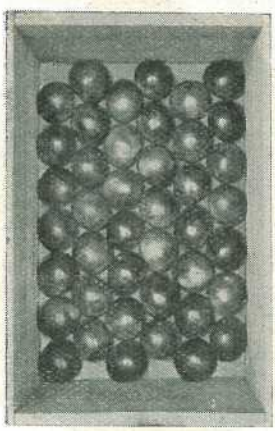
Finished Case.

Top. Side.



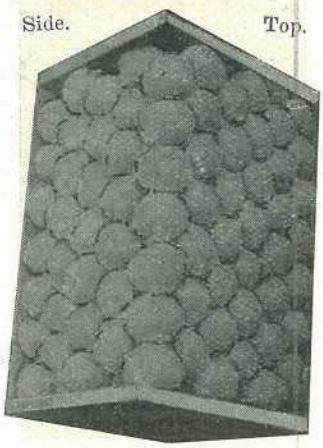
3-3 Pack, 8 x 7 Layer Count. Five Layers, 225 Count.

First Layer.



Finished Case.

Side. Top.

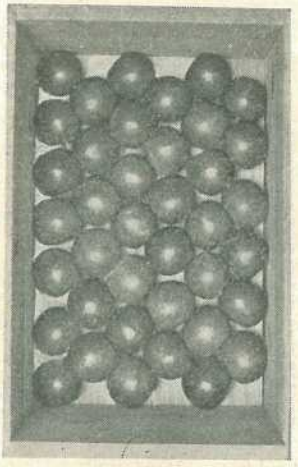


3-3 Pack, 7 x 7 Layer Count. Five Layers, 210 Count.

PLATE 260.

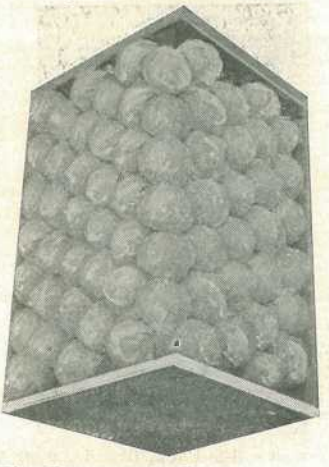
3-3 Packs. Five Layers.

First Layer.



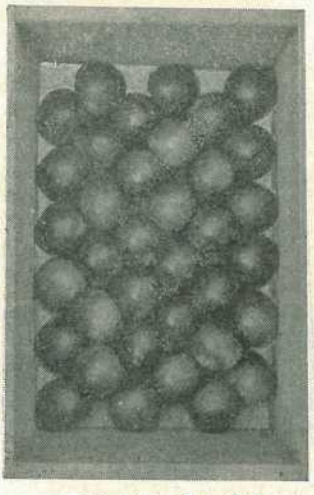
Finished Case.

Top. Side.



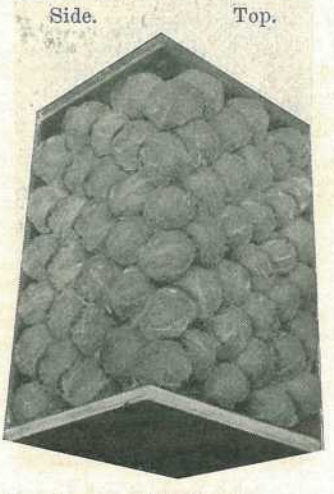
3-3 Pack, 7 x 6 Layer Count. Five Layers, 195 Count.

First Layer.



Finished Case.

Side. Top.

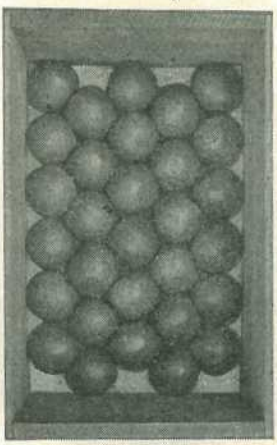


3-3 Pack, 6 x 6 Layer Count. Five Layers, 180 Count.

Plate 261.

3-2 Packs. Four Layers.

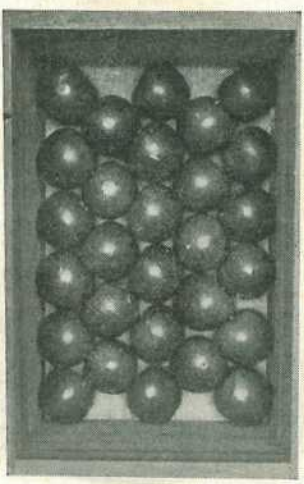
First Layer.



Finished Case.
Top. Side.

3-2 Pack, 6 x 6 Layer Count. Four Layers, 120 Count.

First Layer.



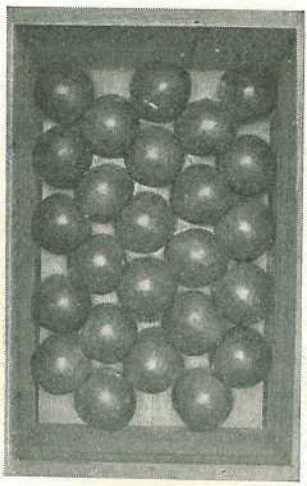
Finished Case.
Top. Side.

3-2 Pack, 6 x 5 Layer Count. Four Layers, 110 Count.

PLATE 262.

3-2 Packs. Four Layers.

First Layer.

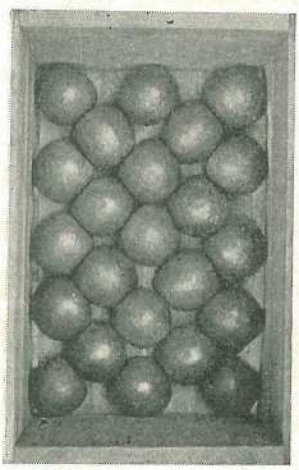


Finished Case.

Top. Side.

3-2 Pack, 5 x 5 Layer Count. Four Layers, 100 Count.

First Layer.



Finished Case.

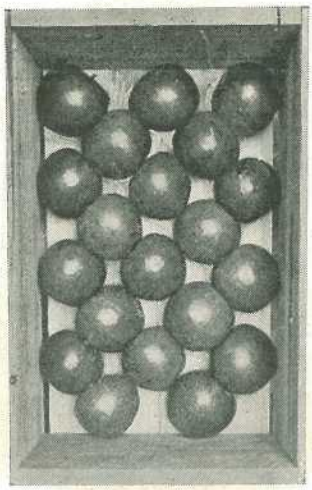
Side. Top.

3-2 Pack, 5 x 4 Layer Count. Four Layers, 90 Count.

Plate 263.

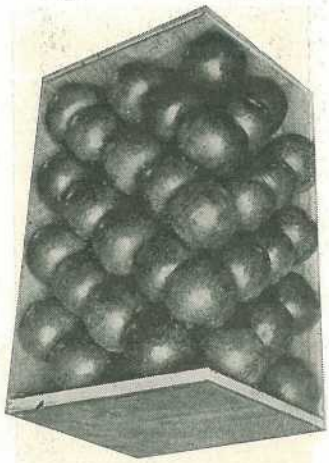
3-2 Packs. Four Layers.

First Layer.



Finished Case.

Top. Side.



3-2 Pack, 4 x 4 Layer Count. Four Layers, 80 Count.

PLATE 264.

WATER-CORE IN APPLES.

J. H. GREGORY, Instructor in Fruit Packing.

AS there have been many conflicting opinions expressed with regard to the effects of cold storage on water-core, a test was carried out by storing specimens of the following varieties of apples:—Granny Smith, Delicious, and Dunns.

Storage.

Specimens of these varieties of apples for the test were obtained in the Stanthorpe district. Some were placed in common storage in a cool place beneath a house at Stanthorpe on the 28th March, 1935, while the remainder was placed in cold storage at Messrs. Birt's Cold Stores, Brisbane, on the 29th March, 1935. In each case samples of unaffected good-quality fruit were enclosed as checks.

Temperatures.

The fruit held in common storage beneath the house was kept for a period of twenty-one days at temperatures varying up to a maximum of 76 degrees Fahr. The cold-stored fruit remained in storage at a temperature of from 34 to 35 degrees Fahr. until the 31st August, 1935—a period of twenty-two weeks and a day.

Condition of Fruit at Commencement of Test.

Specimens of fruit examined before storage showed the water-core sections, on being cut, to be transparent and practically colourless. With the exception of the traces of water-core, which were discernible

beneath the skin, the skin colour in each case was natural to the variety. There was no trace of greasiness on the skins of the Granny Smiths and Delicious, but the Dunns showed signs of this, possibly owing to the lateness of the season.

Condition of Fruit at Expiration of Test.

The following observations were made after storage under both conditions:—

Fruit Held in Common Storage for 21 Days.

Variety.	Results.
Dunns	Sound specimens.—The skin of the fruit became yellow in colour and greasy, but the flesh remained white and juicy, with a fair flavour for the variety.
	Water-core specimens.—Skin colour changed to yellow, and the fruit became dull in appearance. When cut, the water-core sections appeared spongy, and were brown in appearance and dry in texture, also insipid in flavour, with a slight taste of mustiness. The fruit gave the impression that it was on the verge of complete breakdown.
Delicious	Sound specimens.—Skins were slightly greasy, and the ground colour was a deeper yellow than at the start of the storage period. Flesh was clear, with fair flavour, but slightly "mealy" in texture.
	Water-core specimens.—Skins slightly greasy, but dull and darkened in appearance; flesh dry and "mealy," with a brownish appearance, tasteless and unattractive.
Granny Smith ..	Sound specimens.—Were in excellent condition. Skins showed signs of becoming greasy. Colour was practically unchanged; the fruit was juicy and the flesh full-flavoured.
	Slightly-affected specimens.—Signs of water-core were practically gone, and the condition of the fruit was comparable with that of the sound specimens.
	Badly-affected specimens.—Showed no change in the incidence of the trouble; the skin was dull, with no apparent change in the colour, and showed slight traces of greasiness.

Fruit Held in Cold Storage (35° F.) for 155 *Days.*

Variety.	Results.
Dunns	Sound specimens.—Yellow in colour, firm, juicy; skin greasy; flesh when cut of attractive appearance.
	Water-core specimens.—Skin dull yellow to brownish yellow in colour and greasy; flesh "mealy," dull, brownish in colour, soft, and unattractive in flavour.
Delicious	Sound specimens.—In good condition, bright and juicy, but giving the impression that they had been stored for a sufficiently long period. Flesh was white and of good flavour, and in large specimens "mealy" in texture.
	Water-core specimens.—Skin dull in appearance and unattractive; flesh soft, brown, and flavourless; fruit dead in character.
Granny Smith ..	Sound specimens.—Were in excellent condition, with good flavour, bright appearance, and juicy.
	Water-core specimens.—Apparently no improvement in the skin of even the slightly-affected specimens, although the actual water-core affection had decreased greatly, and where originally only slightly affected, had completely disappeared. Badly-affected apples were showing a brownish development in the flesh, with a dry texture and poor flavour compared with the sound fruit.

From these observations it will be seen that either cold storage or common storage has not any great control towards eliminating water-core after the fruit has been harvested. The best course would appear to be to leave the fruit hang on the trees and so give it a chance to grow out of the trouble. Field observations have shown that fruit not unduly affected will grow out of the trouble in from two to three weeks under normal growing conditions. It is hoped to conduct further tests with various varieties during the next Stanthorpe season.

PACKING BANANAS FOR MARKET.

By JAS. H. GREGORY, Instructor in Fruit Packing.

(*Continued from page* 621, *Vol. XLI., Part* 5—*November*, 1935.)

NOTWITHSTANDING the many packs described and the apparent disadvantages the "full-hand" pack shows, there is no doubt that when studying all the phases of marketing this and part "hand" or "cluster" packs are the best. The incidence of disease is lessened and the display value to the shopkeeper greatly increased. Inquiry at retailers confirms this. Most people agree that a nicely ripened hand of bananas has more appeal in a shop window than a heap of singles. Part hands or clusters have also the same advantage over single packs. Where growers pack in singles, one wonders why the vertical two pack has not been used more, as it is a most attractive-looking pack and is quite easy to do.

Summarised, the salient points of banana-packing are as follows:—

Care in harvesting from the stool and carting to the packing house to avoid damage to the fruit.

Care whilst removing the hands from the bunch.

Care whilst breaking the hands into part hands or singles, so that the shanks are not wrenched.

In summer cool the fruit and keep cool; in winter do not permit the bunches to become chilled.

Oversize your fruit when packing in preference to undersizing.

Pack to a natural bulge low at the ends of the case and high in the centre.

Do not pack diseased or malformed fruit.

Clean up the packing shed and implements after despatching each consignment.

PACKING-HOUSE HYGIENE.

This is most important if the risk of disease is to be reduced. Most transit troubles are caused through fungal infections. If fruit is allowed to lie about the packing shed and decay, the risk of infecting

Finished Cases of Bananas.

"Sixes."

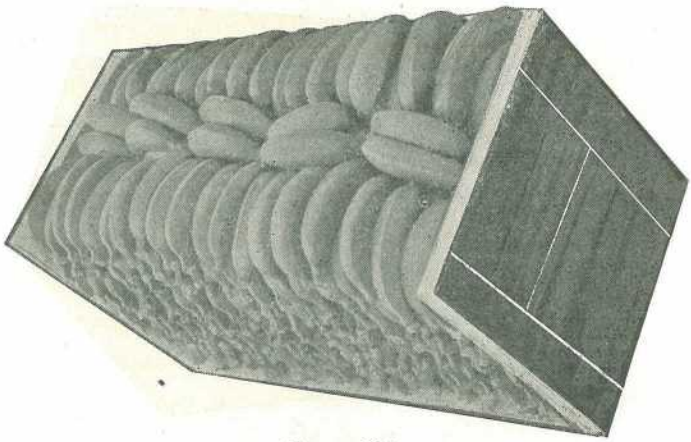


Plate 265.
"SIXES" SINGLE PACK.

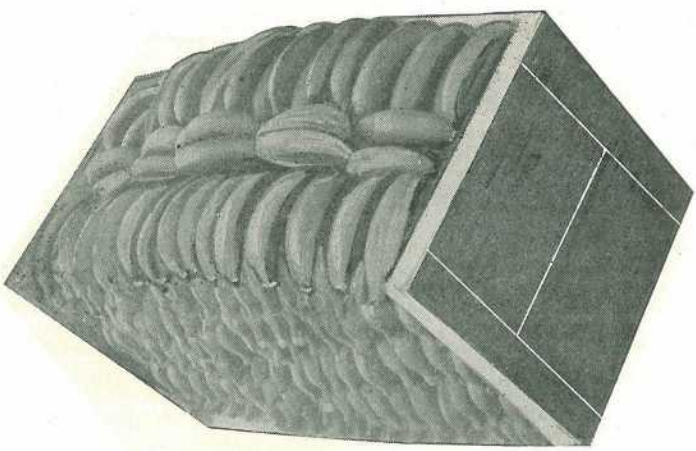


Plate 266.
"SIXES" VERTICAL TWO PACK.

Cases with lid and side removed.

Finished Cases of Bananas.

"Sevens."

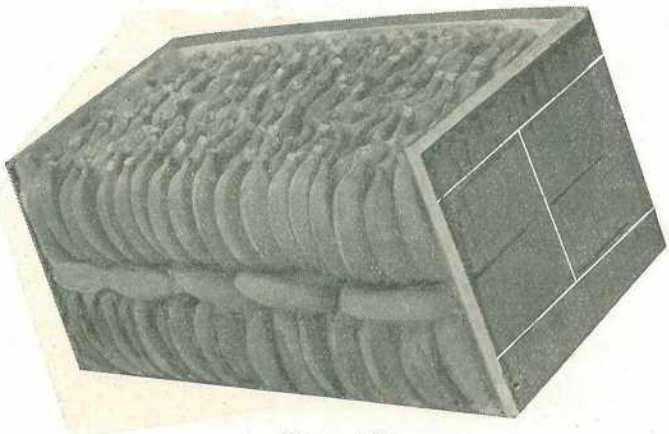


PLATE 267.
"SEVENS" SINGLE PACK.

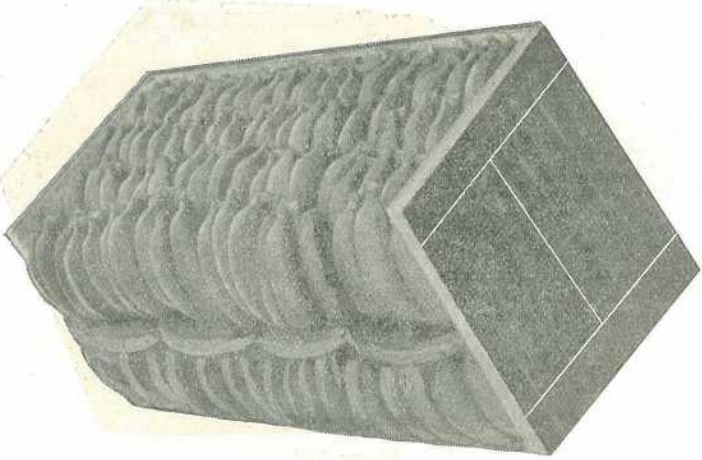


PLATE 268.
"SEVENS" VERTICAL TWO PACK.

Cases with lid and side removed.

Finished Cases of Bananas.

"Eights."

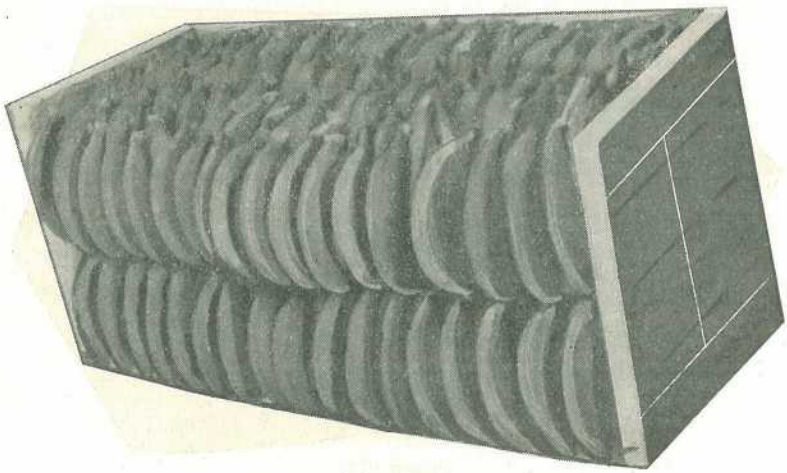


Plate 269.
"EIGHTS" SINGLE PACK.

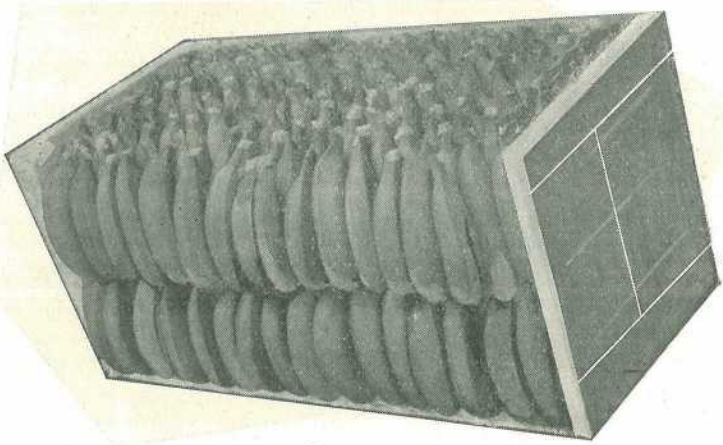


Plate 270.
"EIGHTS" VERTICAL TWO PACK.

Cases with lid and side removed.

Finished Cases of Bananas.

"Nines."

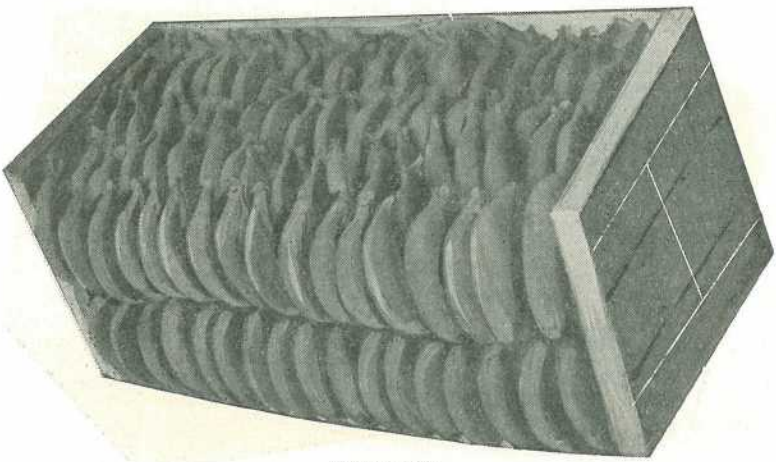


PLATE 271.
"NINES" SINGLE PACK.

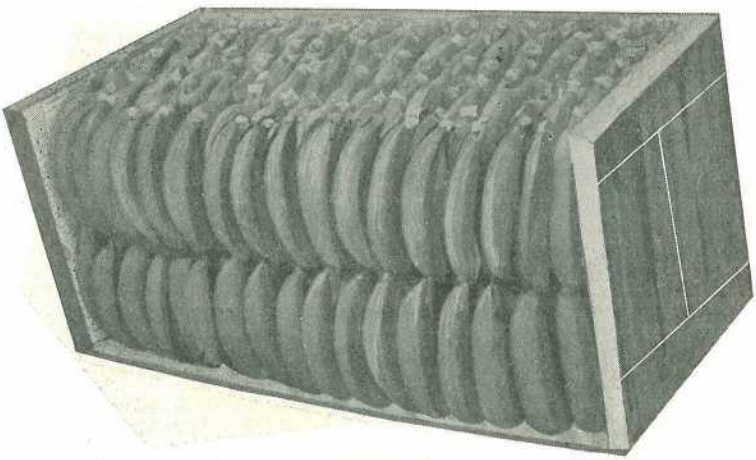


PLATE 272.
"NINES" VERTICAL TWO PACK.

Cases with lid and side removed.

good fruit is greatly increased. The difficulty lies in the fact that infection is not noticed at the time of packing, but the development takes place during transit and ripening, to the detriment of satisfactory prices. All packing sheds should be thoroughly cleaned up after using and occasionally sprayed out with a solution of formalin and water—one part formalin to twenty parts of water. All implements should be carefully cleaned and put away until again needed.

NAILING DOWN.

After packing, care should be exercised when nailing down. A good lidding press is a useful part of the packing-house equipment. A careful selection of timber for the lids—first-class boards free from knots—will be found to assist in saving time in nailing down. Boards which split and break during nailing down, particularly if the railing time is near, cause great inconvenience. If a press is not part of the shed equipment, a piece of 3 x 2 should be placed under the end of the box whilst nailing. The lids should be nailed in position by driving the nails in on the angle.

BRANDING.

A little care in this operation can save much future handling. Cases should be branded so that as little confusion as possible is caused to loaders and checkers during transit. It is necessary under the marketing Acts of the various States to place certain particulars on the ends of the cases. The grower's full name and address, the name and the grade of the fruit, must be branded on the case. In addition, the agent's stensil is also placed on one end. An example of good branding would be:—

One End—Shipping and Agent's Number.

C O D
99
M E L B

Other End—Grower's name and address, name and grade of fruit.

J. Jones,
Palmwoods, Queensland.

Cavendish Bananas,
Sixes.

The branding should be neat and not show stencil ink smudges from running the brush over the edges of the stencil plate. Stencils should be made with a good margin around the lettering. Fancy labels would be an advantage with good fruit, but are not generally used in the banana industry as with other fruits.

WIRING.

Wiring cases is an insurance against ullage and bad handling. Two wires are recommended for use. One is placed around each end of the case, running parallel with the edge of the end of the case. The wire should be placed around the box just off the inside edge of the end

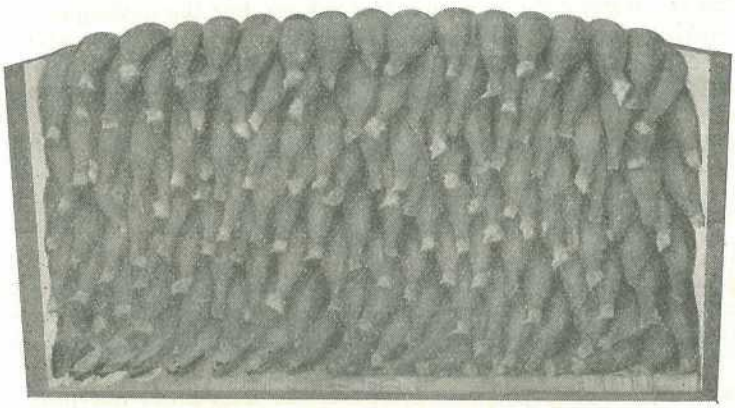


PLATE 273.

CASE OF SINGLES WITH SIDE REMOVED.—Note the placing of the fruit in the spaces of the layer beneath.

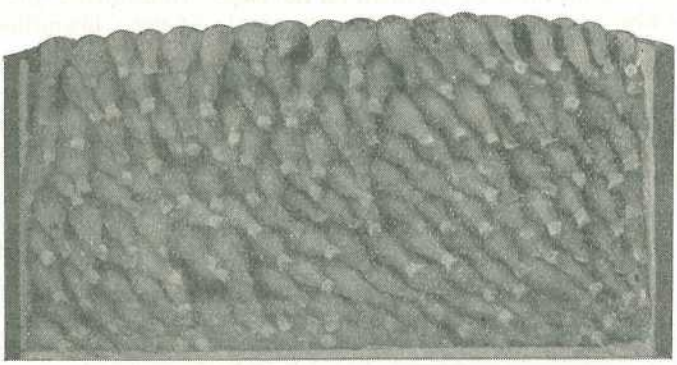


PLATE 274.

CASE OF SINGLES WITH SIDE REMOVED.—Compare with Plate 273. In this pack the packer did not take sufficient care in placing the shanks of the fruit well down the side of the box. This to some extent spoils the look and firmness of the finished pack.

Finished Cases, Alternate Layer Pack.

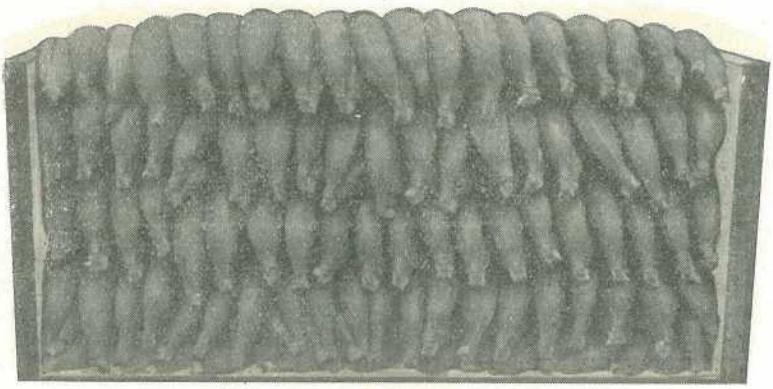


PLATE 275.

CASE OF VERTICAL PACK WITH SIDE REMOVED.—Compare the appearance of the layers in this pack with those of the single pack illustrated in Plate 273.

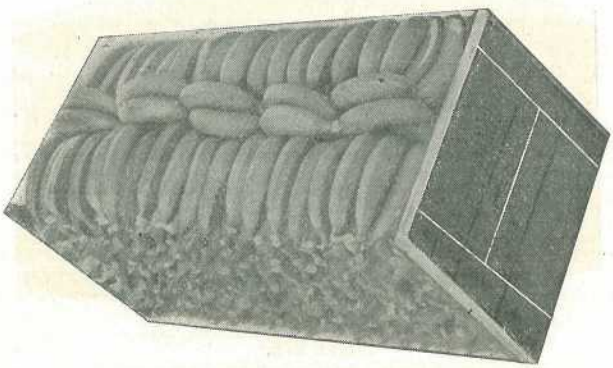


PLATE 276.

CASE WITH LID AND SIDE REMOVED.—Note the placing of the top layer.

Finished Cases, Alternate Layer Pack.

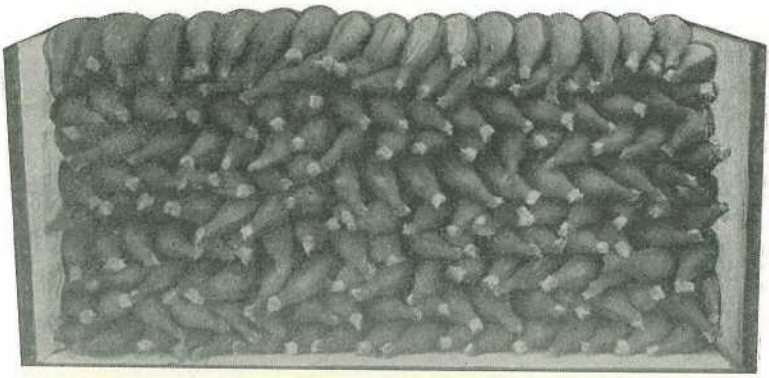
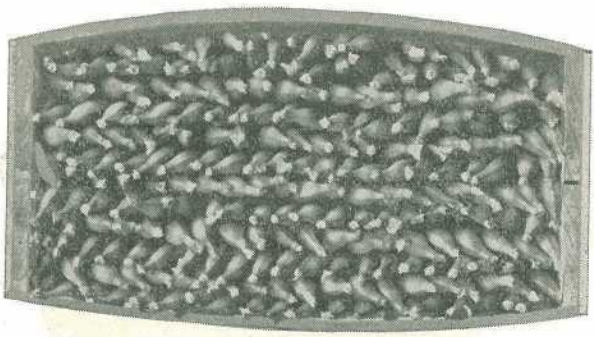


PLATE 277.

CASE WITH SIDE REMOVED.—Note the placing of the top layer, which is placed with the concave side down as in finishing the ordinary single pack.

TOP.



BOTTOM.

PLATE 278.

PACKED CASE NAILED DOWN WITH SIDE REMOVED TO SHOW THE BULGE ON THE TOP AND BOTTOM BOARDS.—This illustrates the necessity of having the bottom boards raised off the floor when nailing the case down.

of the case. When wiring, the machine should never be placed on the lid or bottom, but on the side as illustrated.

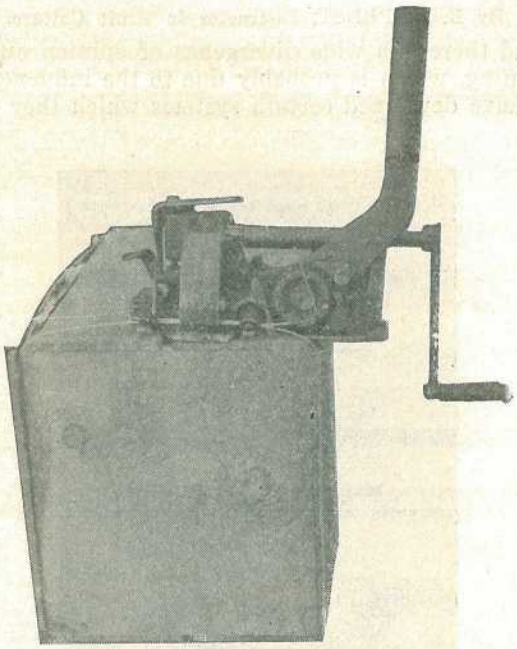


Plate 279.

Showing the position of the wiring machine when applying the wire strapping.

As the whole basis of successful marketing is care, growers should follow this principle right to the finish of their share of handling. Remember, good packing, fancy labels, stencilling, or wiring will not continue to sell bad fruit! It is only by careful attention to detail in handling at all stages that one is able to place on the market bananas that will meet competition and bring to growers a return that will compensate for all the hard work put in on the plantation. It must be remembered that the customer is always right, and it is up to us all to see that satisfaction is obtained by all consumers of Queensland bananas.

ACKNOWLEDGMENTS.

Thanks are due to Mr. R. Rathbone, of Upper Mudgeeraba, for providing the fruit used in the packing illustrated, and Mr. J. McGregor Wills, agent, Banana Industry Protection Board, for assisting to obtain the photographs.

PRUNING OF CITRUS TREES IN QUEENSLAND.

By R. L. PREST, Instructor in Fruit Culture.

IN Queensland there is a wide divergence of opinion on the subject of citrus pruning, which is probably due to the influence of individual pruners who have developed certain systems which they believed suited their trees.

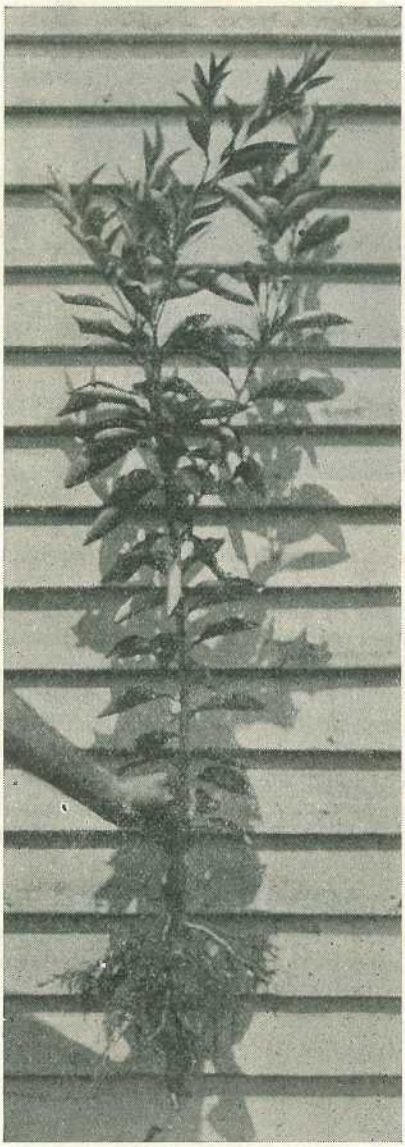


PLATE 280.
A desirable type of nursery tree.

Pruning has, as a consequence, generally developed into a mechanical procedure rather than one based on an understanding of principles involved.

In general terms the method of pruning depends on—

(*a*) The age of the tree.

(*b*) The variety of the tree.

(*c*) The type of tree (whether vegetative or fruiting).

(*d*) Soil and cultural conditions.

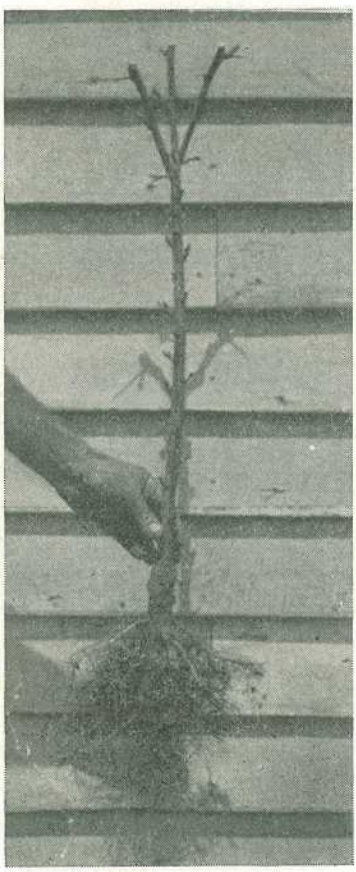


PLATE 281.

The nursery tree shown in Plate 280 prepared for planting.

The main objects in pruning may be classified as follows:—The training of young trees; the removal of undesirable limbs; the modification of form to meet economical and cultural requirements and to counteract unfavourable climatic conditions; the removal of injured and worn out parts; the renewal of old and decadent trees.

Preparation of Nursery Trees for Planting.

The present day tendency of nurserymen is towards the practice of sending out trees carrying large heads, and in some instances shaping them prior to despatch. The former method is best, as the planter is better able to shape the trees as he desires them. The latter is of little benefit owing to damage which may be sustained to some of the branches during transit.

The rooting system should be well washed prior to planting in order to remove any of the mud puddle which may be adhering thereto. Bruised and broken roots require to be shortened, and the head of the tree should be shortened and shaped to develop evenly.

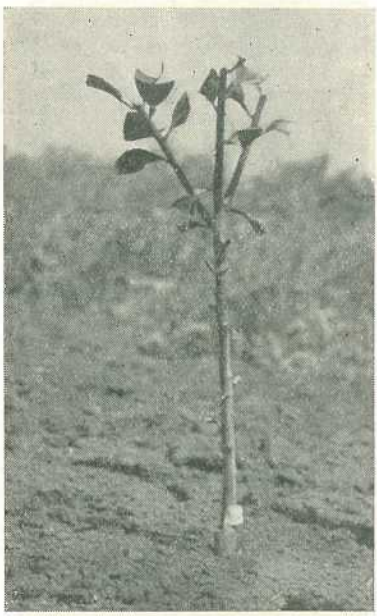


PLATE 282.

A newly-planted tree. Note that the union of the stock and scion is well above ground level.

Training Young Trees.

The pruning of young trees in the orchard should be confined to the removal of adventitious shoots from the stem, and the checking of excessively vigorous growths from the main arms.

It will be noted from Plates 281 and 282 that three main arms have been left on which to build the future tree. Two secondary arms only should be permitted to grow from the ends of each of these main arms in order to develop a strong and well-shaped top. Other secondary arms will grow but should be removed. Undesirable shoots which grow all along the main arms, and which obviously are out of place, would by their continued growth weaken the framework of the tree and should be cut away. In instances where awkwardly-shaped trees are received from the nursery it is often possible to train a shoot which ordinarily

would be out of place to develop and fill up a gap. Such training involves shortening back the required shoot at some dormant period of growth to a bud pointing in the direction it is desired the shoot should grow. Remember that a shoot can be trained in any direction by cutting back to a bud pointing in that direction. Long weak limbs that do not show a tendency to branch should be headed back generally to the limit of the other growths, so that the tree will grow strong, compact, and symmetrical. The top should not be allowed to become too dense; on the other hand it should not be kept so open as to permit the sun scalding the main limbs and branches.

PLATE 283.
Four-year-old Valencia Late.

It is worthy of note that where special bud-selected trees have been planted, they have consistently grown into shapely desirable trees and require very little attention from the pruner.

Plate 283 illustrates a young Valencia Late tree showing growth typical of this variety. This tree requires little pruning beyond the removal of any misplaced or excessively vigorous limbs such as those

at the top marked A and B, which can be cut right back to their source. Any dead twigs and crowded foliage would naturally require to be removed.

Plate 285 illustrates a four-year-old Washington Navel and shows typical sucker growths, the treatment of which is sometimes apt to puzzle the pruner.

PLATE 284.
The tree in Plate 4 after pruning. Note that the excessively vigorous limbs marked "A" and "B" in Plate 283 have been removed.

As a rule such sucker growths may be considered parasitic, but they do not necessarily remain so, for in many instances they later produce bloom and fruit of normal fulness. Generally in practice it is a good plan to remove such growths, remembering that the fact that they can be curbed and induced to fruit makes it possible at times to utilise them for replacing broken and damaged limbs.

Provided that a well-developed framework has been maintained, young well-grown citrus trees should come into profitable bearing at an age of between four and six years. During the first years of bearing pruning should be directed towards the removal of suckers and decadent first-fruiting shoots. Where pruning operations have been diligently carried out on young trees, they require very little pruning during several following years, though they should be gone through annually and suckers and dead wood removed.

There is no doubt that the low production in the case of many old but well cared for orchards is due to the lack of vigorous healthy fruiting wood. This condition points to the necessity for a periodical renewal of fruiting wood, which can be best accomplished by thinning out and at the same time shortening back terminal growths and twigs. The cuts should be made right back to strong new growths, removing weak shoots and those that have borne fruits. The thinning leaves space for the necessary subdivision, whilst the shortening back tends to force into growth dormant buds from behind, stops the excessive growth of any branches, and at the same time renews supplies of

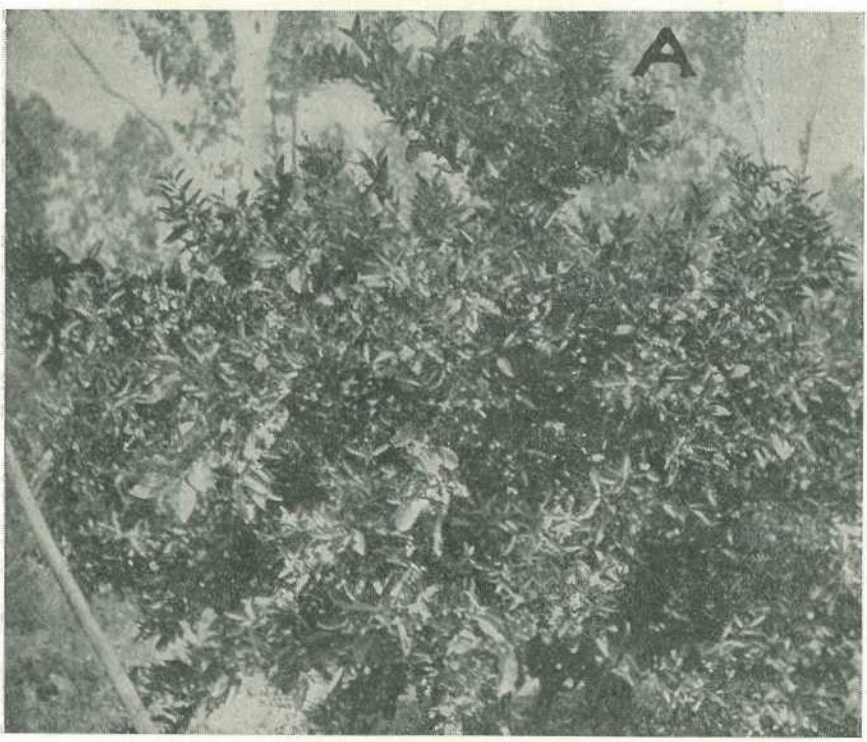


Plate 285.
Four-year-old Washington Navel, showing typical sucker growths.

fruiting wood. Where crowding is evident, the removal of entire branches is at times desirable. The entry of plenty of light and air assists the growth of healthy and vigorous shoots from behind the outside ring of foliage. These shoots make new fruiting wood. Any excessive growth of suckers or water sprouts arising from well inside the tree following heavy pruning require to be cut away or they will absorb a lot of the vigour of the tree and crowd the centre.

In older trees where vitality has been impaired, provision will require to be made for the renewal of old crowded and decadent limbs. In such instances pruning is of a much heavier nature, requiring the removal of entire branches. Such branches should be cut right back to

their source of origin, so that the sap is readily diverted to the remaining limbs, encouraging new fruiting wood. Under no circumstances whatsoever should stubbing be resorted to. In instances where it is necessary to replace the larger limbs the work requires to be done gradually over two or more years to avoid excessive suckering.

PLATE 286.

Sucker, marked A at the top of tree shown in Plate 285, after removal.

Lower branches of the trees should not be allowed to touch the ground, as fruit borne on such branches is generally blemished and of poor quality. On the other hand trees should not be pruned too high from the ground. The height to which they should be lifted varies according to circumstances; in most instances knee-high will prove to be satisfactory.

In Queensland the regular thinning and pruning of bearing trees is definitely necessary. Frequent and regular treatment tends to preserve as nearly as possible the balance between the root system and aerial portions of the tree, assists in the control of economical and cultural requirements and counteracting unfavourable climatic conditions.

Mandarins.

The majority of mandarins when not systematically trained and pruned are often merely shrubs, not trees. They naturally grow very densely, and unless regularly thinned out and shortened back after the fruit has been harvested the massed twigs become so dense that many perish and the remainder are so weakened that only small inferior fruits are produced.

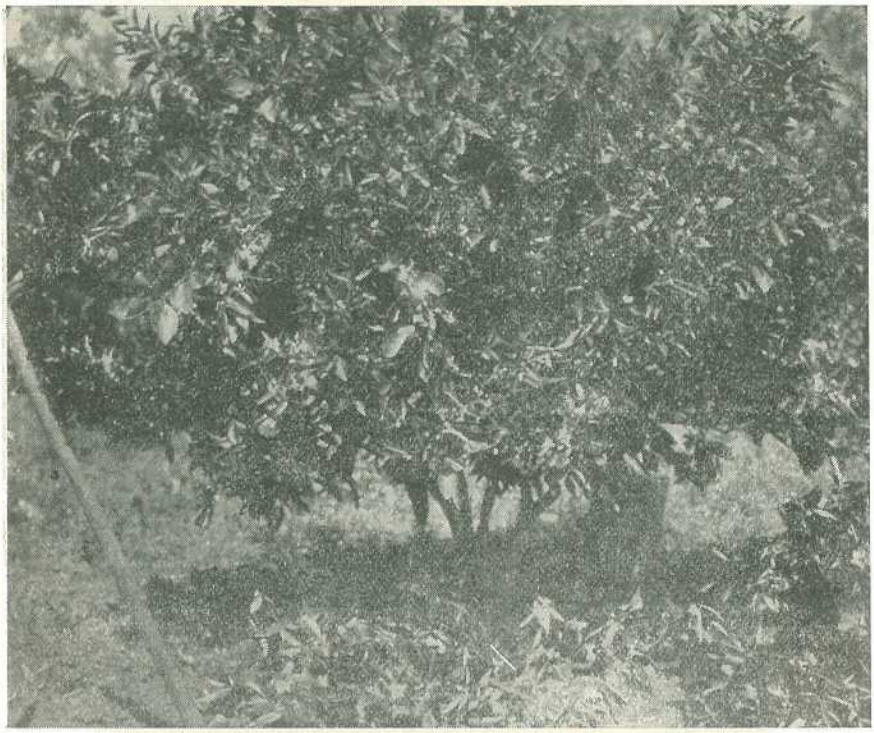


Plate 287.
The tree in Plate 285 after pruning.

The treatment at planting is identical with that of the orange. After the first season from planting numerous vigorous upright shoots arise from the head of the tree. While small these should be thinned, leaving only those which will assist in building a desirable framework. These should be carefully watched, and where the growth becomes too lengthy, shortened in to a lateral growth, and where laterals are not present headed back to the limits of the other growths. Heading back and thinning may be done when the growths have hardened, not when they are soft and growing rapidly. It is possible to check excessive growths by pinching out an inch or so of the tips.

The densely-growing habit of the mandarin, leading to a profusion of weak shoots, is responsible for overbearing and resultant small and inferior fruits at an early age. Providing that a well-developed framework has been maintained, young well-grown mandarin trees may be permitted to bear at four years of age. The annual pruning of bearing

mandarin trees requires the same regular and close attention as in training and forming young trees. The dense growths and crowded branches require to be well thinned out and shortened back to vigorous laterals of current season growth, removing weak twigs and where

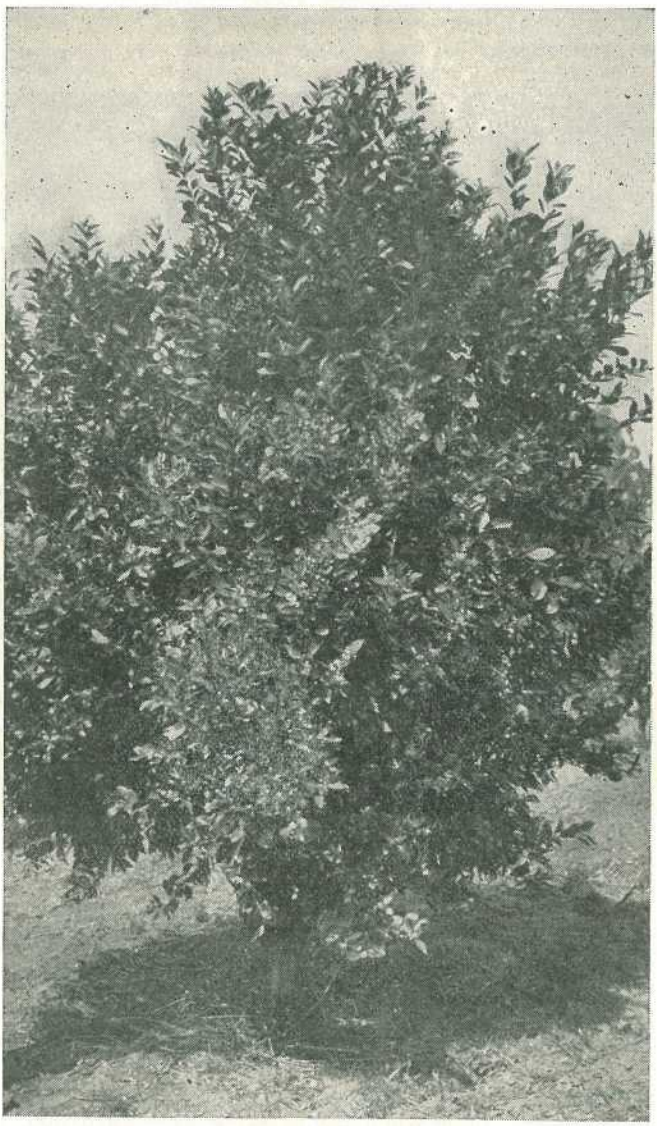


PLATE 288.
Four-year-old Glen Retreat Mandarin.

possible shoots that have borne fruits. Such annual treatment permitting ample light and the ready circulation of air throughout—(1) greatly increases the vigour of the tree; (2) suppresses surplus growths and twigs; (3) improves the size and quality of the fruit, and (4) provides for the renewal of ample young and vigorous fruiting wood.

Lemons.

With lemons the general practice with growers has been to prune severely while the trees are young in an effort to control the growth and so produce a strong framework. In some instances such treatment has retarded growth, and certainly it has retarded the early fruiting of the

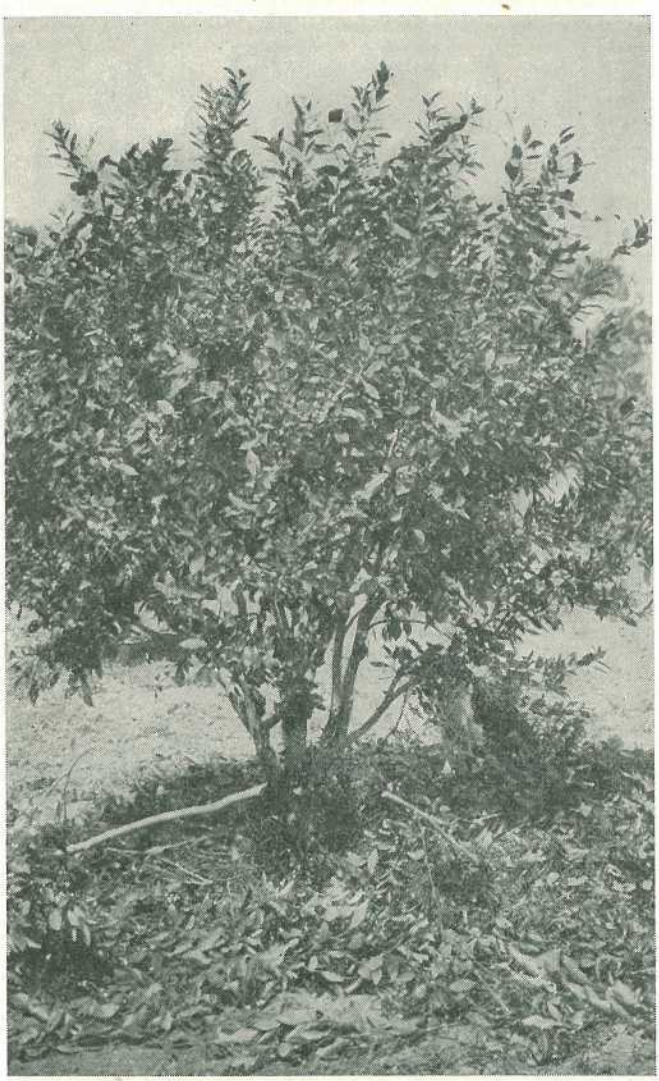


Plate 289.

Tree in Plate 288 after pruning.

trees. Apart from the necessary trimming at planting, which, similarly to oranges, consists of shortening back and removing broken and bruised roots, and a corresponding shortening back of the head of the tree in such a manner as to produce a strong straight stem with three or four

well-placed arms radiating therefrom, little pruning should be done during the first two or three years. All that is necessary is a light thinning to remove any undesirable shoots that are out of place and would later upset the balance of the tree, and perhaps a shortening of

PLATE 290.
Twelve-year-old Glen Retreat Mandarin before pruning.

excessively vigorous shoots. Main upright-growing limbs, evenly spaced, should be selected as main leaders. As the trees get older these become weighted down at the ends by subdivision and the weight of fruit and strong side shoots will arise from them. These side shoots should be

thinned out, but not all removed. Those left should be shortened back to form spurs which will produce the best fruit. Suitable growths close to the centre of the tree may be left to grow upright and take the place of the first leaders which have been weighed down.

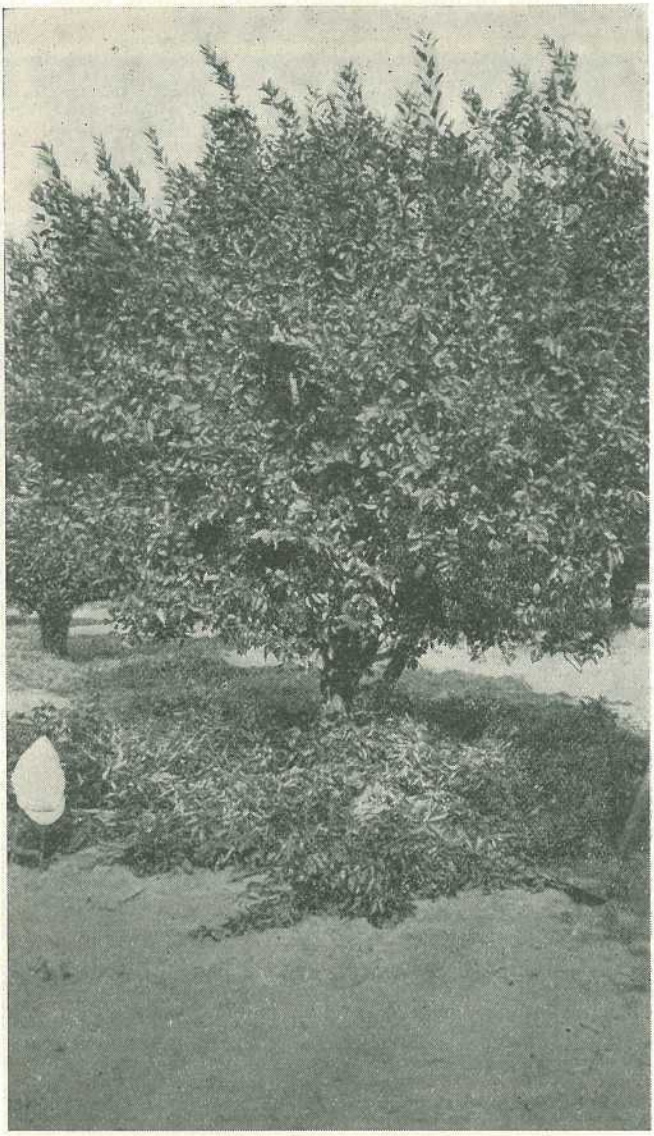


PLATE 291.
Twelve-year-old Glen Retreat after pruning.

In time it will be found the tree is built up of series of tiered branches radiating from the main framework. The object of building up the tree in this manner and spurring it is to encourage a fruit-bearing habit. This is explained as follows:—As the fruit weighs the

vertical branches down to a more horizontal position, the vigour of the branches is reduced, and side shoots arising from such branches are, when spurred as outlined above, conducive to fruit production.

When shortening side shoots, the cuts should be made well back into ripe wood, thus throwing the sap into dormant buds. Light wood

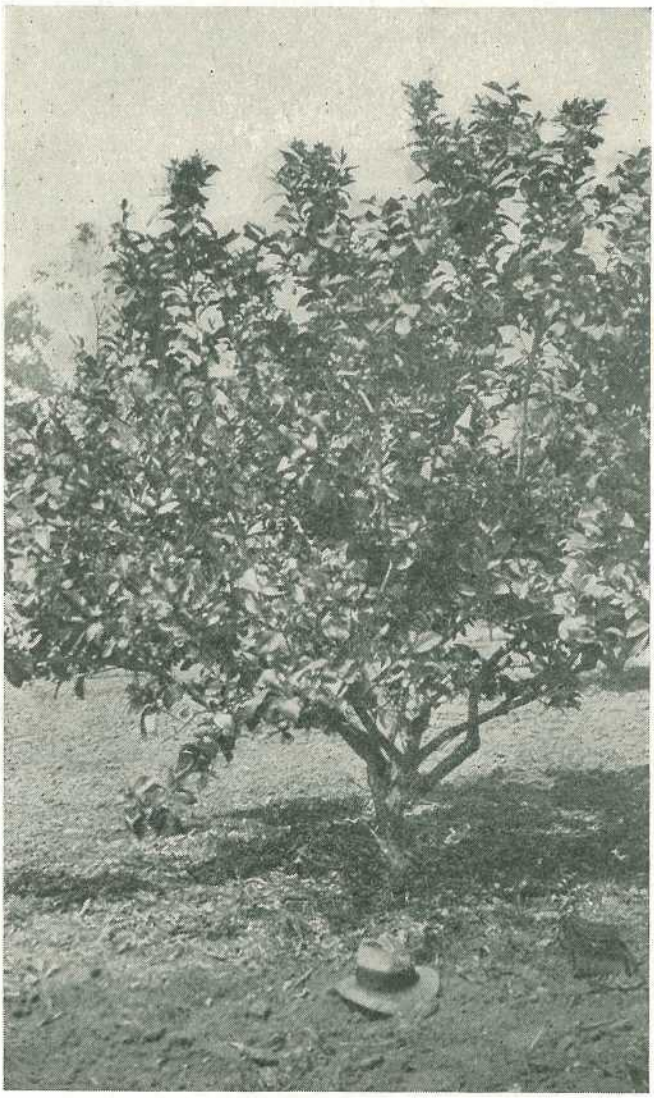


PLATE 292.
Typical young lemon tree.

issuing from inside the more erect permanent arms may be retained, shortening for spurring, and from time to time renewed. No rank growth should be tolerated unless it is required to continue the work of

Plate 293.
Lemon leader weighted down. Note strong side shoots.

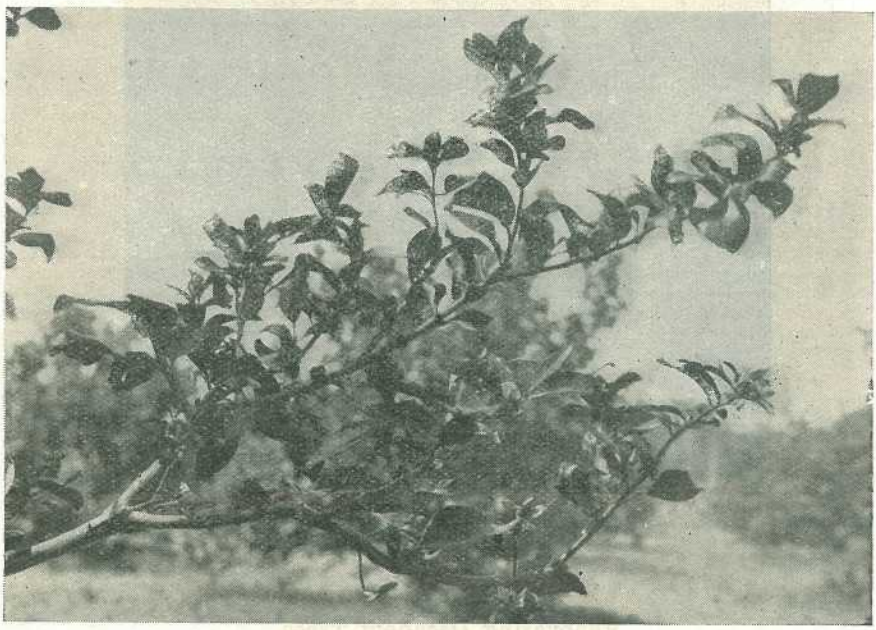


Plate 294.
The fallen leader shown in Plate 293 after thinning and shortening back the side shoots.

some displaced leader. As the limbs drag down it will be necessary from time to time to lift the tree by removing some of the lower limbs.

PLATE 295.
Badly framed young lemon.

Renovating Decadent Trees.

The renovating of many of our old citrus orchards which are rapidly failing in productivity and health constitutes a serious problem. The cause of the decline of citrus trees in Queensland is chiefly due to

starvation together with a combination of climatic and soil conditions. The characteristics of decadent trees may be enumerated as follows:—

(1) Increased percentage of small-sized fruits.
(2) Decreased yield.
(3) Dwarfed foliage in the tree tops.
(4) Weak leafless fruiting wood.
(5) Heavy production of weak blossom.

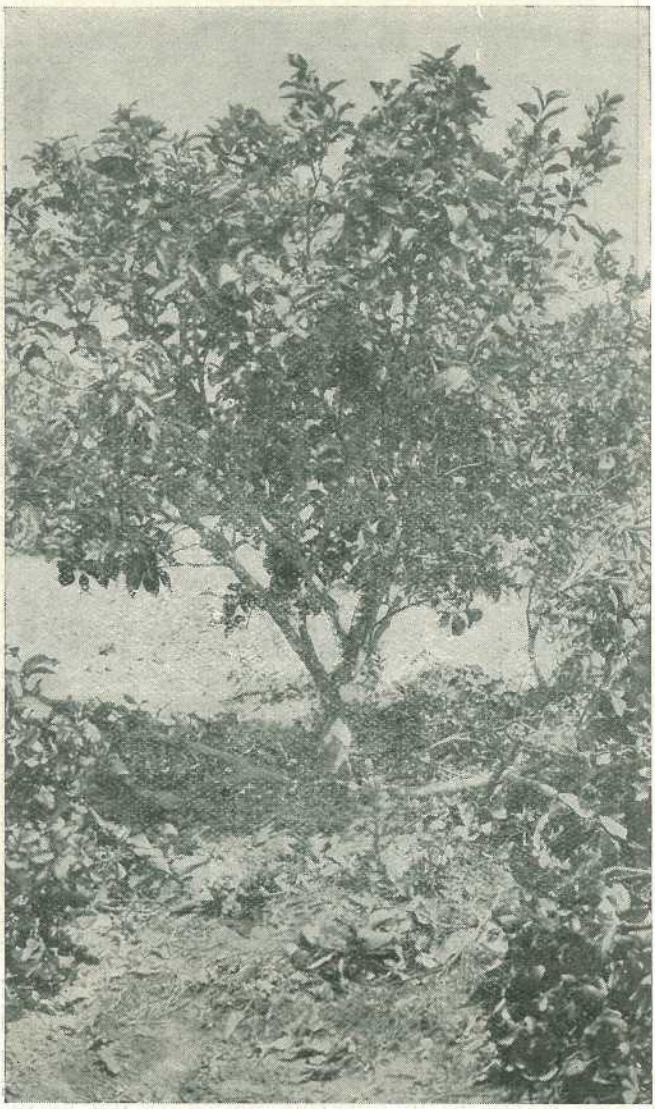


PLATE 296.
The same Tree illustrated (Plate 295) after pruning.

There are numerous instances where many of our old and decadent trees may be profitably renovated. Several methods have been used in rejuvenating citrus trees—deheading (by which is meant the cutting back of the tree to three or four main arms to within 18 inches to 2 feet of the main stem); a modification of this in which the secondary

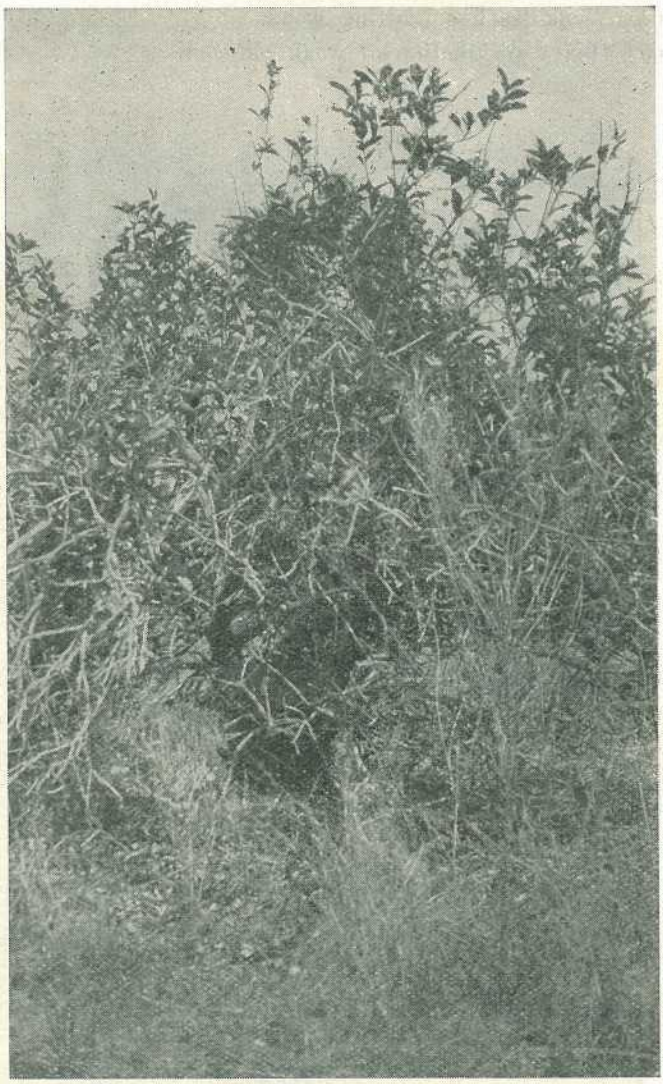


PLATE 297.

A Decadent Lemon Tree.

branches are stubbed back to a foot or so in length. Both these methods are somewhat severe, as in removing the entire top of the tree, the balance is upset and the rooting system weakened. Skeletonising—a much less severe method—has now found favour and is giving satisfactory results.

The entire framework of the tree is generally left, except where crowded and diseased limbs require to be removed. Cross limbs and unnecessary leaders are cut out or shortened back. An entirely new fruiting system is built up from the remaining skeleton. The degree of severity of cutting back depends upon the condition of the tree. When declining trees are cut back in this manner, it should be remembered

Plate 298.
The same Tree shown (Plate 297) after pruning.

that the bark is very susceptible to sun scald and all the exposed limbs must be thickly coated with a suitable whitewash for protection. A simple whitewash formula can be made as follows:—

Quick Lime	7 lb.
Sulphur (powdered)	2 lb.
Salt, flour, or size	1 lb.

As the lime is slacked down, the sulphur and sale should be well stirred in, and sufficient water should be added to bring the mixture to the consistency of a good paint.

SOME TROPICAL FRUITS.

4. THE BREAD FRUIT.

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

THE Bread fruit is a tropical member of the order Urticaceæ, a family which also includes fruit so widely differing as the mulberry, the fig, and the jack-fruit.

The native habitat is generally regarded to be the Malayan archipelago, where it has also been cultivated since very remote times. From there it spread many centuries ago throughout the tropical Pacific Islands. In Polynesia it has been a staple article of diet amongst the natives for many hundreds of years. About 150 years ago the fruit was considered of such value that the British Government sent out a special expedition to introduce it into the West Indies. The expedition proved abortive on account of the mutiny of the crew, their seizure of the ship, the "Bounty," and their subsequent establishment of a colony on Pitcairn Island. A later expedition successfully transported a large number of plants to the West Indies. They did not prove so popular an article of diet with the negroes, however, as they were with the Polynesians.

Introduction into Queensland was effected some thirty to forty years ago. The fruit did not become a popular one here, however, and the occurrence of trees is now very restricted. In fact it is doubtful whether more than a dozen trees could now be found in Queensland. This is indeed to be regretted, as, apart from the value of the fruit, the Bread fruit tree is a very ornamental shade tree and would be a distinct acquisition to tropical parks and gardens.

When grown under favourable conditions the tree will reach a height of 40 to 60 feet. The leaves are large—up to 2 feet long—ovate and leathery, entire at the base and three to nine lobed at the upper end. They are light-green in colour and are clustered towards the ends of the branchlets. The small branches grow at a thickness of nearly an inch in diameter and are very pliable. The fruit is carried on short thick stalks on the ends of the branches and grows to a size varying from 4 to 8 inches in diameter. The skin has a rough surface, is green when young and changes to greenish yellow when ripe. The flesh is mealy and white in young fruit and assumes a yellow tint as it ripens. In the Cairns district the tree blooms during November and ripens its fruit during April and May. In other parts of the North, however, it is reported to have a much more extended season.

The fruit is used as a vegetable and for this purpose is picked before ripening, whilst the flesh is still white and mealy. Boiling or baking is the common mode of preparation amongst the islanders, but most Europeans regard slicing and frying like potato chips as the most palatable method of preparation.

There are two distinct varieties of this tree, the one seedless and the other seeded. The fruit of the seeded one is regarded as very poor and the flesh is seldom eaten. However, it contains a large number of seeds which, when roasted, form a palatable nut said to resemble a chestnut in flavour. This variety is frequently referred to as the Bread nut to avoid confusion with the seedless, or edible fruited variety. The seedless variety is generally regarded as being a horticultural one originally propagated

from the seeded variety, but both have been known since very early times so the origin is somewhat obscure. Both varieties bear the botanical name of *Artocarpus communis,* Fost. or *Artocarpus incisa,* L.

The Bread fruit is a distinctly tropical tree and will not withstand cold. A number of attempts have been made to grow it in the United States of America, but W. Popenoe reports that no trees have been known to survive to fruiting age, even in Southern Florida. Even in its native regions it will not thrive in the cooler altitudes about 2,000 feet. It appears to be purely a fruit of the tropical low land country.

To obtain the most favourable results the trees should be given ample room in an open situation, on good rich, deep, and well-drained soil, with ample soil moisture. Lack of any of these essentials will result in an unthrifty tree which most probably will not fruit.

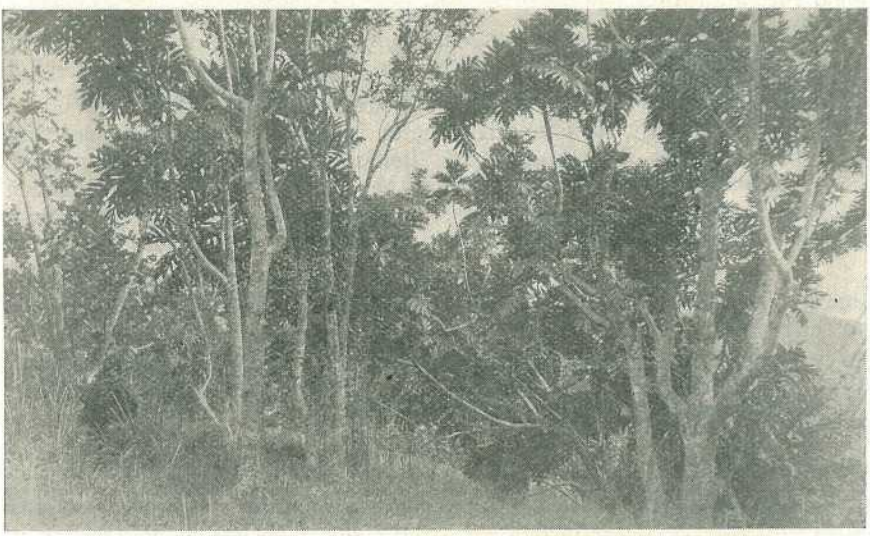


Plate 299.

Bread Fruit Grove.

Note the manner in which the tree spreads by means of root suckers.

Under suitable conditions the natural habit of root growth is shallow and widely spreading. A regular network of roots is formed just beneath the surface of the soil, and frequently short sections protrude. Wherever this occurs and the root bark becomes scarred a sucker arises. The sucker soon develops an independent root system and forms another tree. In this manner one tree will soon develop into a grove if the suckers are not kept down. This habit of suckering is made use of in the propagation of new trees of the seedless variety. When a sucker arises a section of root carrying the young shoot is carefully severed from the parent tree and transplanted. When it is desired to raise a number of young plants a tree is frequently induced to sucker by cutting a number of the smaller roots and raising the cut end above the soil. By maintaining plentiful soil moisture the severed root is forced into aerial growth and is then transplanted.

In the Philippines a method of propagation has been evolved which is less wasteful of root than this. Roots of ½ inch up to 2 inches in thickness are dug up and cut into sections of about 10 to 12 inches in length. These are then planted in coarse sand or sandy loam in a slanting position with about 2 inches of the thick end above the soil, and treated as hardwood cuttings. Care is necessary in the preparation of the roots that they are not allowed to dry or to become damaged. The propagation should be carried out during the wet season.

CITRUS NOTES.

By R. L. PREST, Instructor in Fruit Culture.

DURING the months of September and October, citrus centres along the North Coast, South Coast, and Gayndah district have received good falls of rain.

The favourable conditions experienced are now reflected in the greatly improved appearance of the trees in those orchards receiving good cultural attention. The blossoming has been very satisfactory.

Mr. H. Collard, Assistant Instructor in Fruit Culture, reports that the budwood plot is looking well. Lemons (which appeared to have been slightly affected by cold during the winter) have now assumed a good leaf growth of normal colour. The W. Siletta, Joppa, and Marsh Seedless trees planted in September are making satisfactory headway.

In the Torbanlea-Burrum district brown spot of the mandarin is again noticeable. The disease is observed to a greater or lesser extent in the majority of orchards, but appears, however, to be more pronounced where spraying has been neglected or has been delayed until the disease has become manifest, in which cases the fruit in addition to the foliage is affected, causing a fairly heavy shedding.

It also appears that trees which were sprayed before the disease definitely became noticeable prior to recent rains, although not entirely free from spot, have suffered least from the disease. Spraying (chiefly with Burgundy) has afforded an appreciable measure of control up to the present date.

In all centres, departmental field officers have been busily engaged in carrying out instructional duties in general cultural problems, pruning demonstrations, and field days, particularly with regard to tree renovation.

MARKETING NOTES.

By JAS H. GREGORY, Instructor in Fruit Packing.

NOVEMBER has gone, and if the hot weather experienced during the month is an indication of the coming summer weather, we may expect a warm time. Warm weather conditions stimulate the sale of fruit; so growers can go philosophically to work during the hot spells. At the same time we read of record low temperatures for the month at Stanthorpe. This again should assist the fruit industry, the cold snaps, as a rule, assisting greatly to control many of our entomological troubles. At the present time shops are displaying their greatest variety of fruits for the year. New season's cherries, mangoes, plums,

and peaches are displayed alongside the old season's oranges, grape fruit, apples, and pears, and the ever-present pineapples, papaws, bananas, lemons, and passion fruit.

Apples.

The advice given in our last issue still holds good. Apples in cold storage should now be placed on the market. Yates and small-sized Democrats are holding the best. Some lines of Sturmers and Granny Smiths are giving trouble with " sleepiness " and rots. Prices are the highest for many seasons. Firm lines are selling in Brisbane up to 16s., whilst good lines of Granny Smiths are realising up to 18s. New season's apples will shortly be on the market. Growers will be well advised to keep small green apples off the market. Where green fruit is marketed as cookers, it should be at least 2½ inches in diameter. Fruit under this size is not popular as a cooker, and, not being fit for anything else, will soon help in creating a glut.

Cherries.

Early cherries have arrived in excellent condition this season, 4s. to 9s. per tray being the price received. The packing has been excellent. Some lines of Stanthorpe realised 12s.

Plums.

The first consignment of plums sold at 8s. to 9s. per case. The quality generally was only of a fair standard, which should improve as the season advances.

Peaches.

" China Flats " have been in good supply and of mixed quality, 1s. to 3s. per tray being realised. Early Stanthorpe have been in good demand. Small sizes are unpopular.

Apricots.

At 8s. to 13s. per case, early consignments have sold well. Small sizes are in poor demand.

Citrus.

Good oranges have sold up to 10s., the market being firm. A few poorly coloured fruit from the second crop have been hard to move. Growers would do better to remove this fruit from the trees before it has time to grow, as the price usually obtained does not warrant the strength taken from the tree. Prices up to 13s. have been obtained for first-class cured lines of lemons. The extra trouble employed in curing, as a rule, is amply repaid by better keeping quality and prices.

Mandarins are now getting scarce, the quality being poor.

Passion Fruit.

Passions are selling well up to 17s. per case. Keep the smooth-skinned fruit apart from that with wrinkled skins. Crinkled fruit should be marketed in separate cases. Up to 40s. per case has been realised in Melbourne and Sydney; half-bushels to 20s.

Papaws.

Southern consignments which show less colour than those despatched during the last few months can now be packed. The writer of these notes has just returned from visiting northern districts. The excessive use of padding materials has been the cause of reduced prices on northern markets. This and the harvesting of too green fruit are important problems. The dry weather has had an adverse effect on the quality of the fruit. Brisbane prices are firm for good fruit, up to 9s. per 1½ bushel case being obtained. Prices as low as 2s. per case have been taken for poor lines. Careful marketing by all growers would not allow of this great difference in prices. The southern markets still remain firm for good well-coloured lines—Sydney, 8s. to 12s.; Melbourne, 7s. to 10s. per 1½ bushel case.

Mangoes.

Melbourne and Sydney consignments should consist only of the high-class fibreless fruit. The common method of harvesting by knocking the fruit to the ground should be abolished. Many consignments arriving in Brisbane show signs of bad handlng. Common varieties at present on the market in Brisbane have been greatly handicapped by the large percentage of green, immature fruit packed. Consignments from the Townsville district have had this fault to a marked degree. Prices from 5s. to 8s. have prevailed. The use of half-bushel cases is recommended. Consignments for the South should be wrapped and layered in woodwool for the best results.

Bananas.

Carelessness in packing is still manifest in some consignments. More care should be taken whilst breaking up the hands into singles. We apparently are content to suffer the single pack, with its greater risk of black end, &c. The best bananas on display at present are full and part hands. One wonders why the vertical two pack is not used more by "finger" packers. Greater care must be taken in selecting fruit for the South. Fruit should also be thoroughly cooled before packing. Cases have realised up to 10s. in Brisbane; Melbourne, eights and nines 11s. to 12s., sevens 9s. to 10s., sixes 7s. to 8s.; Sydney, nines 14s. to 15s., eights 11s. to 13s., sevens 9s. to 11s., sixes 6s. to 9s.

Pineapples.

Brisbane prices show an excellent return—up to 10s. a dozen. A few sales over 11s. per case for good lines were reported. Northern growers sending in cases should not omit packing material; woodwool is advised for preference. If this not available, grass should be used. It is necessary that the grass be thoroughly dry. Cool the fruit before packing, and keep it cool after the cases are lidded. Every care must be taken in handling pines. Remember that smooths are the popular fruit in the southern capitals. Melbourne and Sydney prices were 10s. to 14s. per case.

Tomatoes.

The season, owing to the hail in the Redlands district, has been one of mixed qualities. Prices have maintained themselves well for good lines in Brisbane and Sydney, although Melbourne market collapsed early in the month under the influx of tomatoes from all States. Prices in

Brisbane were: Green 3s. to 4s., ripe 3s. 6d. to 5s. 6d.; in Sydney, 3s. to 6s., a few Coff's Harbour to 10s. Late in the month Brisbane prices climbed to 8s. for good fruit.

General.

A survey of marketing operations shows more than ever that regular consignments to the market pay the best. Trying to beat the market with small and large consignments sent at irregular intervals does not pay, and has an upsetting effect on the market. Regular consignments give the agent a chance to establish and maintain a connection.

Publications.

It is expected that booklets on marketing bananas and apples, with a packing chart for lemons, will be available in the next few weeks. Copies may be obtained free on application to the Under Secretary, Department of Agriculture and Stock, Brisbane.

HOLDING A HORSE—A POINT FOR THE YOUNG STOCKMAN.

People working among stock frequently have to walk long distances to catch their mounts after having done the job on hand. The illustration shows an effective way of stopping this little gallop, and still allowing the horse to feed. The reins

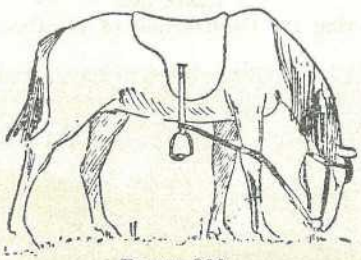


PLATE 300.

are taken round the inside of the leg above the knee, brought back underneath themselves and fastened to the stirrup-iron in the ordinary way. This prevents the horse from lifting its head, and will be found most satisfactory in practice.

CONTRIVANCE FOR HARROWING.

Here is a simple contrivance which will do away with all the walking when harrowing. Get two small wheels and an axle, the old front carriage off a set of discs is excellent, as the axle is short, and the wheels of a handy size. Take a six foot length of 6 x 2, and bolt one end on to the axle, and nail on a small skid at the other end. Then fix a box for a seat on to the 6 x 2 above the axle and a piece of wood across the 6 x 2 at a convenient distance for a foot-rest. Fix a chain from the skid to the drawbar of the harrows, and you can harrow at ease with practically no extra draught on the horses.—"The Canegrowers' Weekly" (Mackay).

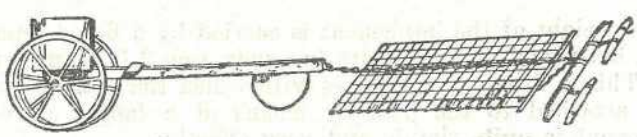


PLATE 301.

"Cotton King" Attachment.

Canegrowers are generally agreed that the "Cotton King" disc cultivator is very severe on the horses employed to operate it; and those farmers who study the comfort of their animals will be interested in the accompanying photographs of a device which is employed in the Cairns district.

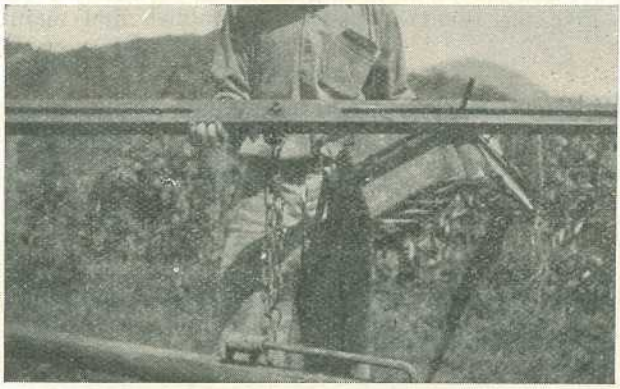


PLATE 302.
Showing the Construction of the Cross-bar.

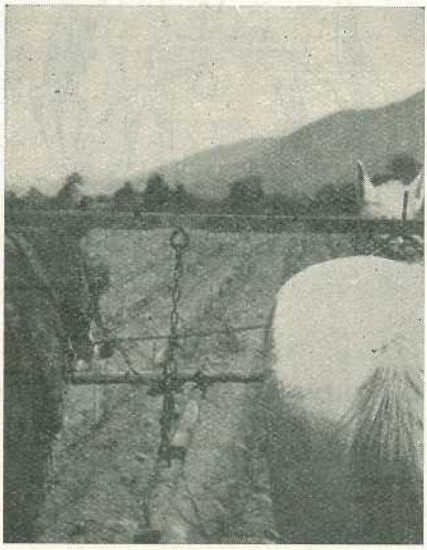


PLATE 303.
Illustrating the Method of Attachment to the Pole.

The weight of the implement is carried by a 6-feet length of 3 in. x 1½ in. hardwood provided with two slots each 2 ft. 2 in. long and ¾ in. wide. This is fitted to two spikes with which the saddles are provided, and is attached to the pole by means of a length of chain. The arrangement is quite simple and very effective.

—G.B., in the "Cane Growers' Quarterly Bulletin," Bureau of Sugar Experiment Stations.

LIST OF REGISTERED STALLIONS.

Subjoined is a list of stallions in respect of which Certificates of Registration were issued under "*The Stallions Registration Acts*, 1923 *to* 1934," during the year 1935-36:—

BLOOD STALLIONS CERTIFICATED FOR LIFE DURING YEAR 1935-36.

Name.	No.	Age.	Description.	Owner.
Ago-Lily	1130	Aged	Bay	J. V. Coughlan, Willah, *via* Yeulba
Almond	1566	5	Bay	L. Onions, Mondure
Ambermond	1567	5	Bay	C. R. S. Smith, Mount Joseph, Brooweena
Arboreal	1519	5	Bay	M. Ryan, Ascot Chambers, Brisbane
Armlic	1568	6	Bay or brown	R. Bawden, Gillen's Siding
Avonia	1197	Aged	Brown	L. S. Richards, Mount Hillalong, Nebo
Bachelor's Heir	1520	5	Chestnut	K. Brennan, Boonah
Bachelor's Lodge	1131	5	Bay	W. Redman, Braemar
Bilbo	1171	5	Brown	J. B. Shannon, Tooloombah, Rockhampton
Brown Lock	1569	Aged	Bay or brown	J. P. Walsh, Mount Perry
Brown Lock	1564	6	Bay	M. J. Rynne, Maryvale
Burn Lad	1132	5	Chestnut	J. Cantwell, Chinchilla
Byramjee	1521	5	Brown	Mrs. F. Black, care of C. Connell, Manson road, Hendra
Chako	1191	Aged	Black	A. B. Turner, Tiverton, Nebo
Chantepa	1570	Aged	Bay	Jones' Bros., Eureka, Eidsvold
Dalmain	1571	5	Bay	A. P. Gibson, Boolboonda
Deltrim	1172	Aged	Bay	J. W. Holland, Bushley
Egera	1192	Aged	Bay or brown	P. Ussher, Lake Elphinstone, Nebo
Fiery Bachelor	1133	5	Bay	D. Reen, Alice street, Toowoomba
Flying Painter	1134	5	Bay	W. Gillies, East Cooyar
Forceona	1522	5	Grey	I. J. Spence, care of W. A. Tucker, Hendra
Fox Earth	1547	6	Brown	J. G. McDougall, Lyndhurst, Warwick
Grand Revel	1572	Aged	Bay	W. E. Sauer, Gayndah
Grenade	1136	5	Grey	O. Ridge, Windsor, New South Wales
Gunborough	1523	5	Black	T. Kidd, Windorah
Guy Fawkes	1573	5	Chestnut	J. P. Walsh, Mount Perry
Happy Returns	1136	5	Bay	E. W. Walker, Oakey
High Exchange	1524	6	Bay	Reynolds and Bell, Winchester street, Hamilton
Jay Orr	1180	Aged	Roan chestnut	A. G. Lawrie, Westwood
Jean Jacques	1525	5	Chestnut	W. Bullock, Booval
Jehad	1574	5	Chestnut	W. G. Hein, James street, Howard
Jemmatic	1575	5	Bay	L. Wedemeyer, Eidsvold
Jigga Jigga	1193	Aged	Bay	A. D. Shannon, Oxford Downs, Nebo
Kenwinning	1137	6	Chestnut	A. G. R. Liddle, Woodlawn, Bell
Kerbonte	1138	5	Brown	F. King, Bell
King Baralong	1526	5	Bay brown	J. Douglas, Sandgate
Kinglock	1179	5	Bay	A. G. Lawrie, Westwood
Lalaguli	1548	Aged	Bay	J. A. Parker, Lalaguli
Leolita	1527	5	Bay	T. Jennings, Greenmount
Lord Lever	1563	5	Bay	H. Brown, Warwick
Love's Gift	1194	Aged	Chestnut	I. A. Perry, Peel street, Mackay
Lucky Boy	1576	Aged	Dark bay	J. G. Gogan, Kilkivan
Marco Day	1139	5	Brown	W. H. Richards, Chinchilla
Matador	1173	Aged	Bay	Joyce and Joyce, Eidsvold
Memorial	1577	5	Bay	Pownall and Pownall, Mount Perry
Merry Malster	1578	5	Bay	Seiler Bros., Durong
Mistletoe	1195	6	Bay	E. Doyle, Marian
Mountain Oak	1174	6	Chestnut	R. W. H. Smith, Princhester
Mulga Willa	1196	5	Brown	E. Gillham, Glendon, Nebo
Night Piper	1528	6	Brown	Mrs. D. Lay, Kent street, Ascot
One Name Pioneer	1579	6	Bay	T. M. Leane, Bancroft, *via* Monto
Pavonian	1198	Aged	Chestnut	A. Williams and Co., Homevale, Nebo
Pially	1199	Aged	Bay	A. J. Carden-Collins, Tondara, Gumlu
Pickle Branch	1140	Aged	Chestnut	J. L. Watts, Tara
Prince Fox	1549	Aged	Bay	W. H. Donovan, Belah, Stanthorpe
Proud General	1200	Aged	Bay	W. H. Gillham, Suttor Creek, Nebo
Ras Kas II.	1175	Aged	Bay	A. and J. Rea, Eden Garry, Kunwarara
Robin	1201	Aged	Bay	G. K. Gordon, Mount Pleasant, Binbee
Rosamber	1529	5	Bay	T. Jennings, Greenmount
Rossini	11550	Aged	Bay	Pearsby Past'l Co., Stanthorpe
Saint Grafton	1530	5	Brown	J. D. Kirwan, Lisson Grove, Wooloowin
Seaforth	1176	Aged	Chestnut	L. A. Mackenzie, Telson, Dingo
Serewick	1580	5	Brown	T. J. Campbell, Kolonga, Gin Gin
Siemon's Fort	1141	Aged	Brown	W. W. J. Lloyd, Harrow
Sir Bluewin	1551	5	Bay	M. Brosnan, Dragon street, Warwick
Soft Step	1531	5	Brown	W. J. Tucker, Hendra
Southern Don	1581	5	Chestnut	D. A. Proctor, Kalliwa, Mount Perry
Stanfred	1581	5	Dark chestnut	F. S. Lord, Brooklands, Nanango
Syce Lad II.	1583	6	Bay	H. E. Stewart, Paloma, Comingla
The Irishman	1532	5	Bay	Mrs. M. Kelly, Gympie road, Kedron
The Orphan	1202	Aged	Cream	H. Rowe, The Hollows, Mirani
Two Up	1203	5	Bay	Dr. Dalrymple, Mackay
Wallanbah	1204	Aged	Black	A. Williams and Co., Homedale, Nebo
Warwickeye	1533	5	Black	L. Dixon, Hendra
Wittabius	1534	5	Chestnut	C. Bergann, Witta
Wool Top	1178	Aged	Bay	J. McEvoy, Mount Lucas, Boongarry
Young Ayrbridge	1503	5	Brown	J. W. McKenzie, Dayboro

PONY STALLIONS CERTIFICATED FOR LIFE DURING YEAR 1935-36.

Name.	No.	Age.	Description.	Owner.
Aden's Chief ..	1165	5	Grey ..	J. V. Willis, Meringandan
Bonnie Lad	1516	Aged	Cream ..	J. M. Newman, Caboolture
Carbine	1181	5	Black ..	G. P. Clanfield, River street, Mount Morgan
Ding Dong	1166	6	Bay	J. C. Mann, Yarranlea
Hailstone	1167	5	Grey ..	H. V. Farquharson, Newtown, Toowoomba
Kalbar	1517	5	Brown ..	J. Yarrow, Silverdale, Kalbar
Laddie	1536	5	Dark taffy ..	E. A. Furniss, Eumundi
Larrikin	1205	5	Taffy	R. Whittington, Oakenden
Little Don ..	1605	5	Bay	H. W. Wieland, Greenview, Wondai
Little Mischief ..	1606	5	Chestnut ..	R. Humphreys, Boompa
Little Prince ..	1607	Aged	Taffy	H. Richards, P 146, Bailey. *via* Monto
Mog Wamp ..	1608	Aged	Roan	T. E. B. Dingle, Mount Perry
Rappie	1535	Aged	Brown ..	E. P. McMillan, Eagle Farm
Robin	1168	Aged	Brown ..	P. Barr, Boree Creek, *via* Millmerran
Sandpiper	1609	Aged	Grey ..	E. J. Boldery, Gayndah
Skylark	1610	Aged	Piebald ..	J. E. Grout, Musket Flat, Maryborough
Spark	1611	5	Brown ..	A. A. Stockill, Goomeri
The Black Joke ..	1182	6	Black ..	A. J. Salisbury, Duaringa
Valley Boy ..	1612	6	Chestnut ..	L. A. Matton, Wooloogа
Welsh Boy	1518	5	Taffy	D. J. Crowley, Crowley Vale, *via* Gatton
Young Guinea ..	1169	5	Brown ..	H. H. Ehrlich, Douglas ,*via* Goombungee

TROTTER STALLIONS CERTIFICATED FOR LIFE DURING YEAR 1935-36.

Cedarwood	1170	5	Black ..	G. Ellsden, Pampas
Last Bill	1613	5	Bay	Mrs. A. Gick, 173 Ann street, Maryborough

DRAUGHT STALLIONS CERTIFICATED FOR LIFE DURING YEAR 1935-36.

Banker	1142	5	Brown ..	A. R. and R. C. Curd, Jandowae
Barney II.	1552	6	Bay	M. Mow, Kurrumbul
Baron Favour ..	1537	5	Bay	J. M. Newman, Caboolture
Baroona Musketeer	1538	5	Chestnut ..	E. Mussig, Yurol, Cooroy
Ben	1584	5	Bay	V. K. Trott, Reid's Creek, Gayndah
Ben Hur	1585	5	Black ..	M. MacDonnell, South Side, Gympie
Black Prince ..	1553	5	Black ..	D. W. Bell, Beebo
Blaze Dale	1206	5	Brown ..	A. W. Law, Kuttabul
Blue Boy	1207	5	Grey ..	A. N. Sunderland, Sunnyside, Mackay
Bluff Wyllie ..	1504	5	Bay	L. Schneider, Kent's Pocket, Boonah
Bold Hero	1506	5	Bay	G. Lee, Calvert
Bonny Clyde ..	1143	6	Bay	A. Grant, Undulla Creek, Tara
Boondandilla ..	1614	6	Brown ..	C. M. Wright and Sons, Ltd., Goondiwindi
Boxer	1586	6	Bay	W. V. Lines, Electra, Pine Creek, Goondoon
Bright Star ..	1587	6	Bay	J. Kennedy, Kumbia
British Pride ..	1554	5	Bay	T. J. Ryan, Freestone
Brown Prince ..	1539	Aged	Brown ..	J. Collins and Sons, care of Moreheads, Ltd., Brisbane
Brown Star ..	1144	5	Brown ..	R. W. Thomson, Hurstvale, *via* Greenmount
Captain	1184	Aged	Bay	C. M. Peacock, Dululu
Captain	1501	6	Brown ..	C. Maas, Waterford
Captain Duke ..	1507	5	Black ..	F. Horne, Springbrook
Carlyle Prairie ..	1145	5	Bay	A. A. Treasure, Brigalow
Charlie Chaplin ..	1146	Aged	Bay	H. J. Barrett, Bruan Park, Tara
Crystal Ball ..	1185	5	Bay	G. Dahlter, Nagoorin
Crystal Hope ..	1508	5	Bay	Handley Bros., Murphy's Creek
Dale	1209	7	Brown ..	E. G. Lascelles, Goorganga, Proserpine
Don	1588	5	Bay	J. Toft, P.O., Bundaberg
Donald George ..	1147	Aged	Bay	F. Hoffmann, Hillside, Farm, Guluguba
Don Bradman ..	1589	5	Bay	C. Jeynes, Glastonbury
Dornford Baron ..	1237	6	Grey ..	J. Andrews, Dornford, Bowen
Duke	1186	Aged	Black ..	McCartney Bros., Yaamba
Duke	1187	5	Bay	W. Scantlebury, Theodore
Duke	1148	6	Bay	E. H. Crook, Viola Downs, Wandoan
Duke Dale	1149	5	Black ..	H. J. Knight, Koondai-i Creek, Bell
Edgecombe Prince ..	1150	5	Bay	J. W. Ritter, Edgecombe, Mount Tyson
Farmer	1210	5	Light bay ..	A. Hinschen, Acacia Vale, Proserpine
Farmer II.	1211	Aged	Bay	F. J. Muller, Don River, Bowen
Farmer's Glory ..	1509	5	Bay	F. W. Abrahams, Lark Hill, *via* Walloon
Foot Step	1212	5	Bay	W. Schulz, Flaggy Rock
General Chief ..	1510	5	Bay	W. F. Litzow, Tarampa
General Wheeler ..	1213	Aged	Bay	A. McClure, Mirani
Glenlad	1374	5	Bay	D. Dunn, Bruff Hill, Beaudesert
Golden Charmer ..	1511	6	Chestnut ..	A. R. Hanson, Amberley
Great Heir	1512	5	Brown ..	T. H. Green, Milford
Hector	1214	5	Bay	P. Brook, Koumala
Hendon Bill ..	1555	5	Bay	G. H. Clarke, Allora
Highland Grey ..	1215	5	Grey ..	A. Petersen, Homebush road, Mackay
Home Dale ..	1216	Aged	Black ..	Wright and Davidson, Nebo
Isaac	1217	5	Bay	P. S. Brook, Koumala
Jack	1151	5	Brown ..	W. F. McNamara, Tara

DRAUGHT STALLIONS CERTIFICATED FOR LIFE DURING YEAR 1935-36.—*continued.*

Name.	No.	Age.	Description.	Owner.
John Bright	1218	Aged	Bay	E. G. Lascelles, Proserpine
Jondaryan Carlisle	1556	6	Bay	M. Lysacht, Clinton Vale
Jondaryan McIntyre	1557	5	Bay	J. P. Warden, Goondiwindi
Kenneth	1552	6	Bay	F. C. Schubert, Bowenville
Kerrestondale	1153	5	Brown	P. J. Dukes, Upper Undulla, Tara
King of the Ring	1219	5	Bay	T. P. Keilbach, Homebush
Kingsford	1590	Aged	Dark bay	J. M. C. Hyde, Tarong road, Nanango
Leo	1591	5	Bay	Ford and Proctor, Coalstoun, Lakes
Lion	1513	5	Bay	J. J. Shine, D. J. Shine and W. Stokes, Fernvale
Lochaber Lad	1592	5	Bay	T. Laidler, Mundubbera
Lord Marmion	1154	5	Bay	G. G. Wilson, Lilydale, Bell
Lord Wheeler	1220	Aged	Bay	A. Williams and Co., Homedale, Nebo
Lord Wheeler	1188	5	Bay	C.Q.M.E. Co., Lake's Creek
Major Dale	1155	Aged	Bay	D. Keeshan, Goranba
Major Wallace	1558	5	Bay	G. Cross, Campbell's Plains, Warwick
Master Gladfield	1559	5	Black	P. W. Flynn, Clifton
Nelson	1560	Aged	Bay	Scottish Australian Co., Texas
Noble	1221	6	Black	J. Adams, Eungella
Noble	1156	5	Brown	G. Tennyson, Chinchilla
Noble Premier	1593	5	Iron grey	J. V. B. Jamieson, Netherby
Nugget	1540	Aged	Bay	B. E. Geary, Kingston
Our Hope	1594	Aged	Bay	P. Booth, Brooweena
Patent	1541	5	Brown	G. L. Opperman, Ormeau
Pilot	1222	5	Brown	T. J. Hoey, Sarina
Pip	1223	Aged	Bay	E. G. Lascelles, Proserpine
Plain Huntley	1224	5	Bay	F. de Costa, Orkabie
Prince	1189	5	Bay	H. A. McCartney, Kunwarara
Prince	1595	Aged	Bay	E. H. Scotney, Oakwood
Prince	1157	5	Brown	Schulz Bros.', Neuve, *via* Haden
Prince	1225	5	Bay	P. S. Brook, Koumala
Prince	1226	Aged	Brown	F. Dibben, Mount Marlow, Proserpine
Prince	1542	Aged	Bay	J. H. Gaven, Riversvale, Southport
Prince Dale	1227	5	Brown	A. D. Shannon, Oxford Downs, Nebo
Prince Meadie	1596	5	Bay	F. E. Mitchell, Byee, Murgon
Punch	1514	5	Brown	O. Reinke, Ashwell, Rosewood
Robin	1543	6	Dapple grey	M. M. J. Sheehen, Hope Islands, Coomera
Royal	1228	6	Black	N. Richards, Carrinyah, Nebo
Royal Hope	1565	5	Bay	P. Canavan, P.O., Warwick
Royal Prince	1158	5	Bay	W. G. Bidgood, Emu Creek, Crow's Nest
Royal Shepherd	1159	5	Bay	C. A. Kahler, Geham
Royal Windsor	1597	Aged	Bay	W. Brandon, Tirroan
Sandy Burton	1229	Aged	Bay	A. D. Shannon, Oxford Downs, Nebo
Shannon	1230	5	Red roan	E. G. Lascelles, Proserpine
Sir Richard	1160	5	Bay	J. Armstrong, Chinchilla
Sir Trump	1598	6	Bay	H. C. Paulsen, Mundubbera
Sonoma	1238	Aged	Brown	Massey Bros., Sonoma, Collinsville
Star	1544	5	Bay	W. Johnston, Strathpine
State Matthew	1161	Aged	Bay or brown	L. H. Corser, Goombi Siding
Statesman	1231	5	Brown	Wright Davidson, Nebo
Talgai Refiner	1561	5	Black	H. Sprott, Talgai West
The Duke	1162	Aged	Bay	G. H. Gazzard, Undulla Creek, Tara
The Intent II.	1599	6	Black	M. Gould, Nanango
The McIntosh	1232	5	Bay	F. de Costa, Orkabie
Tiger	1600	5	Bay	G. M. Gallaty, Gayndah
Trooper Lad	1233	6	Bay	C. L. Schilling, Club Hotel, Bowen
True Blue	1615	5	Bay	Dalton Bros.', Spring Creek, Clifton
Tulpin	1234	6	Brown	F. Maltby, Box 94, Bowen
Wallace	1601	5	Bay	C. F. Stumcke, Rangeview, Proston
Welford	1163	6	Bay	E. W. Watson, Welford, Cecil Plains
Whare Pumi Desire	1545	5	Black	J. M. Smith, North Otago
Wilangi Lad	1190	5	Brown	Beak Pastoral Co., Rockhampton
Windsor's Pride	1602	Aged	Bay	F. A. Nahrung, Boompa
Woorilla Regal George	1603	5	Bay	Fairymead Sugar Co., Ltd., Bundaberg
Worthy Craig	1546	6	Bay	Walsh Bros.', Laravale
Young Banker	1235	Aged	Bay	A. H. Tones, Homebush
Young Barron	1604	6	Bay	T. Patteson, Walker's Bag, Nanango
Young Barron's Pride	1562	6	Bay	A. G. Hammond, Swan Creek
Young Boom	1164	6	Bay	M. J. Ryan, Cambooya
Young Kingsford	1515	5	Bay	W. A. and M. Scott, Toogoolawah

BLOOD STALLIONS CERTIFICATED FOR THE YEAR 1935-36.

Astor King	923	4	Bay	R. Stark, M.P. Creek, Wondai
Banjo	924	3	Chestnut	J. Lye, Cania road, Monto
Beauvalette	1054	3	Chestnut	W. H. Gillham, Nebo
Blue Spear	688	3	Bay	W. P. Casey, Milbong
Brownlie	1039	4	Brown	W. H. Smith, Ubobo
Brown Lock	689	3	Brown	J. Reid, Glamorganvale
Brown Poitrel	925	4	Bay or brown	A. G. Cross, Ellesmere, *via* Kingaroy
By Golly	926	4	Bay	F. H. Cockerill, Archookoora

BLOOD STALLIONS CERTIFICATED FOR THE YEAR 1935-36.—*continued.*

Name.	No.	Age.	Description.	Owner.
Cylis..	1078	4	Brown ..	R. Pomeroy, Ruthven street, Toowoomba
Don's Pride ..	927	4	Brown ..	C. S. Svensson, Ashfield, Bundaberg
Duinatic	687	4	Bay	J. Drinan, Wallaville
Emble Mat ..	928	4	Grey ..	W. Elsebach, Gayndah
Emble So	929	4	Bay or brown	L. Wedemeyer, Eidsvold
Glengarry	1040	4	Brown ..	W. C. Dickinson and Sons, Boynedale
Gun Mark	887	4	Black ..	T. Phelan, Gladfield
Hebronze	735	3	Bay	J. T. Scrymgeour, Netherby, Warwick
Jackoli	1041	3	Brown ..	Coochin Estates, Camboon
King Leo	690	3	Brown ..	J. Stenzel, Carney's Creek
Loch Syce	930	4	Bay	A. A. Petrie, Madoora, Gayndah
Loud Report ..	691	3	Brown ..	J. Betts, Junr., Boonah
Morning Glory ..	931	3	Brown ..	W. Barrett, Bella Vale, Nanango
Mutiara	932	4	Bay	A. W. Jarvis, Monto
Petition	933	3	Bay	T. J. Downing, Gooroolba
Real Felt	692	4	Bay	R. Mahaffey, Grantham
Sarcheson	934	3	Iron grey ..	D. A. Proctor, Kalliwa, Mount Perry
Sarlu	1042	3	Iron grey ..	C. A. Becker, Paranui, Theodore
Sea Laddie	693	3	Brown or black	T. J. Ford, Gatton
Serf King	1055	3	Chestnut ..	A. T. Wellby, Glenella, Mackay
Sir Dignity ..	888	4	Chestnut ..	C. A. Rae and M. Doyle, Bungunya
Sir Sydney	1056	4	Bay	G. Massey, Sonoma, Collinsville
South Kerman ..	694	3	Chestnut ..	J. H. Heck, Glamorganvale
St. Hero	984	4	Chestnut ..	J. A. Bridge, Tara
The Mikado ..	983	5	Bay	Rawdon, Briggs and Co., Mount Perry (Provisional)
Thorm	1057	3	Bay	E. Thormahlen, Bowen
Tooloomba	1043	4	Bay	J. W. Mylrea, Kunwarara
Townie	935	Aged	Bay	S. B. Trigger, Hopewell, Lakeside (Provisional)
Treken	685	4	Chestnut ..	S. C. Luck, Warwick
Trent Bernie ..	936	3	Chestnut ..	J. Frame, Inverlaw, Kingaroy
Turkish Prince ..	937	4	Bay	E. C. Zillmann, Wallaville
Warrigal	985	3	Chestnut ..	J. F. Lowien, Cooyar East
Warwick Bachelor	986	3	Brown ..	F. J. C. Martin, Kumbarilla

PONY STALLIONS CERTIFICATED FOR THE YEAR 1935-36.

Ace of Hearts ..	978	3	Chestnut ..	C. E. Pascoe, Ceratodus
Ankor II.	919	3	Dark grey ..	W. Gilmore, Temuka, Allora
Basra	920	3	Bay	R. A. Howell, Killarney
Black Pride ..	724	3	Black ..	A. Kubler, Boonah
Bonnie Boy ..	979	4	Bay	C. Jose, New Moonta
Bonny Lad ..	725	4	Roan.. ..	I. G. Bonnie, Rosewood
Boonah Jewel ..	726	4	Black ..	G. C. Kirchner, Boonah
Bright Lad ..	682	3	Bay	C. Cotter, Hargreave street, Ipswich
Bright Laddie ..	1035	3	Bay	Ziesemer Bros.', Bongeen
Bright Laddie II. ..	727	3	Black ..	V. C. Schelback, Boonah
Circus	736	4	Skewbald ..	W. Rudd, Mudgeeraba
Danny Boy ..	921	4	Bay	J. Flynn, Clifton
Darby	980	3	Chestnut ..	L. J. Mackaway, Goomeri
Friskie's Pride ..	728	3	Black ..	P. Burnell, Boonah
Golden Laddie ..	729	3	Chestnut ..	W. A. Embrey, Tallegalla
Johnny	981	4	Cream ..	F. McD. Hooke, Boowoogum
La Cigale	922	4	Bay	R. C. Cooke, Upper Pilton
Little Sam	982	3	Black ..	E. O. Althouse, Cloyna, Murgon
Prince Saud ..	684	4	Blue grey ..	O. Ridge, Windsor, New South Wales
Silver King II. ..	731	3	Taffy.. ..	E. Grace, Maroon
Spotlight	1036	4	Black ..	H. V. Farquharson, Newtown, Toowoomba
Tim	1037	3	Black ..	A. Tame, Kulpi
Tom Thumb ..	1058	4	Black ..	S. McKay, Pinnacle
Treasure	737	4	Light chestnut	V. W. Francis, Cooran
Wildfire	731	3	Chestnut ..	A. Moore, Crowley Vale, *via* Gatton

TROTTER STALLIONS CERTIFICATED FOR YEAR 1935-36.

Abdul A. Meier ..	1038	4	Brown ..	H. G. McKnight, Gowrie Junction
Brown Bells ..	732	4	Brown ..	G. S. Hooper, Mutdapilly
Direct Dean ..	733	3	Brown ..	C. A. J. Tillack, Hatton Vale
Great Audo.. ..	738	3	Bay	W. E. Scrivener, Kitchener road, Kedron
Monto Wilkes ..	1044	4	Black ..	A. Thomasson, The Caves

DRAUGHT STALLIONS CERTIFICATED FOR YEAR 1935-36.

Aerial Mail	1045	3	Bay	Coochin Estates, Camboon
Allora Crystal ..	987	4	Brown ..	M. Lysaght, Milmerran
Andrew Lad ..	988	4	Brown ..	W. Biegel, Rywung
Arraglen	938	3	Bay	Pownall and Pownall, Mount Perry
Attraction	989	3	Bay	T. A. Gaske, Chinchilla
Baron Fancy ..	990	4	Bay	S. Otto, Burn Burn Creek, *via* Crow's Nest

DRAUGHT STALLIONS CERTIFICATED FOR YEAR, 1935-36—*continued.*

Name.	No.	Age.	Description.	Owner.
Baron's Pride ..	889	4	Bay	F. Mundey, Gladfield, *via* Warwick
Beau Ideal	939	4	Bay	A. H. Greenup, Echo's Bancroft, *via* Gladstone
Beau Laddie ..	695	3	Bay	S. J. Draper, Stoney Creek, Woodford
Black Prince ..	1046	4	Black ..	L. C. Walker, Bingera Cattle Station, Bundaberg
Black Prince ..	991	3	Black ..	W. J. A. Prasser, Kulpi
Black Prince ..	992	4	Black ..	J. Simmons, Coo-ee Ville, Milmerran
Blaze	993	4	Bay	E. Armstrong, Oakwood, Bell
Blucher	1047	3	Brown ..	J. E. Holland, Wycarbah
Blue Prince.. ..	1059	4	Liver chestnut	S. C. Zahmel, Finch Hatton
Bold Boy	1505	5	Bay	L. A. Armstrong, Rosewood (Provisional)
Bold Laddie ..	696	4	Bay	T. Armstrong, Rosewood
Bold Noble ..	697	4	Brown ..	V. Voigt, Glamorganvale
Bold Prince ..	698	4	Bay	G. A. Heise, Minden
Bonnie Intent ..	940	3	Bay	W. Elsebach, Gayndah
Bonnie's Male ..	699	3	Brown ..	E. Scells, Mount Alford
Bounce	890	4	Bay	Percy Canavan, P.O., Warwick
Bounce	1075	Aged	Bay	B. J. D. Clark, Range road, Sarina (Provisional)
Brilliant Master ..	941	4	Bay	R. Stark, M.P. Creek, Wondai
Brilliant Treasure ..	739	3	Bay	A. A. Stoke's, Abbotsford, Victoria
British King ..	942	3	Bay	R. Kahler, Deep Creek, Gympie
British Prince ..	943	3	Bay	C. F. Draheim, Crownthorpe, via Murgon
British Prince ..	700	4	Bay or brown	M. O'Neill, Peak Crossing
Brooklyn Keynote's Dignity	891	4	Bay	T. J. Brosnan, Killarney (Provisional)
Brooklyn Keynote's Sport	740	3	Brown ..	F. Powell, Richmond, Victoria
Brown Bob ..	1060	4	Brown ..	F. J. Simonsen, Sarina
Brown Carlyle ..	994	3	Bay	Alexander Estates, Inverai
Bruce	1061	3	Bay flecked ..	P.C. Brooks and Co., Sarina
Burrundale George	944	3	Bay	J. E. Stanton, Goomeri
Cambyses	741	3	Brown ..	Moore Hunter Estate, Hawera, New Zealand
Campbell Prince ..	701	3	Bay	H. A. Glover, Dayboro'
Captain	945	4	Bay	H. H. O. Kopp, Emu Creek, Degilbo
Captain	946	3	Bay	Mulcahy Bros., Nanango
Captain Keynotes ..	742	4	Bay	F. Powell, Richmond, Victoria
Captain Wallace ..	702	3	Bay	W. E. Houston, Blackbutt
Captain Wallace ..	947	3	Bay	A. Perrett, Coolabunia
Carlyle	995	4	Bay	M. J. Sommer, Goombungee
Carlyle Boy ..	996	3	Bay	F. and N. Alexander, Inverai
Carlyle Pet ..	997	3	Bay	Alexander Estates, Inverai
Carlyle's Hero ..	948	3	Bay	R. Maudsley, Murgon
Carrick Flash Chevalier	743	4	Bay	F. E. Barton, Rhodesia, Durong
Cedric	998	3	Black ..	E. C. Stark, Pineland, via Crow's Nest
Chief	999	3	Brown ..	J. A. Hick, Wyoming, Jackson
Chrystal	1074	4	Brown ..	N. R. Trousdell, Crow's Nest
Clematic Flash Mac	1076	3	Brown ..	J. M. Newman, Caboolture
Clyde	892	4	Black ..	J. S. O'Leary, Fontainbleu, Leyburn
Clyde Hill Intent ..	704	4	Bay	J. Lehmann, Coolana
Clydemere	1000	4	Brown ..	S. Hartwig, Goomville, *via* Pechey
Crown Duke ..	1001	4	Bay or brown	H. Dornbusch, Cross Hill, *via* Oakey
Crystal Glen ..	893	3	Bay	F. J. Gay, Wheatvale
Crystal King ..	949	3	Brown ..	J. B. Edwards and Sons, Kingaroy
Crystal's Pride ..	894	4	Bay ..	F. Watts, Freestone
Cub	950	4	Bay	G. A. Pollock, Mt. Kolan, *via* Avondale
Culverthorpe Favourite Hero	1002	3	Bay or brown	T. W. Caldicott, Vandilla
Dale Square ..	1003	3	Brown ..	B. McGovern, Greenmount
Damsel's Lad ..	705	3	Bay	A. Miller, Stanmore, *via* Woodford
Danny	1004	3	Bay	L. Lloyd, Wandoan
Darwin	951	4	Bay	C. Cavanagh, junr., Kybong, Gympie
Dobin	1005	4	Bay	S. Marriage, Narko
Dollfuss	686	3	Bay	M. J. Brosnan, Clifton
Donald Wallace ..	952	4	Bay	D. Birch, Memerambi
Duke	1062	4	Chestnut ..	G. F. Hicks, Glenella, Mackay
Dunure Intent ..	1063	4	Black ..	A. Williams and Co., Homevale, Nebo
Earl Marshall ..	1064	4	Bay	G. W. Orchard, Parapi
Fairbal Gaiety's Best	895	3	Bay	W. S. McKee, Clifton
Farleton Bon Voyage	1006	4	Bay or brown	Jondaryan Estates, Jondaryan
Farleton John ..	1007	3	Brown ..	H. Handley, Pampas
Farmer's Favourite	1008	3	Bay or brown	F. Wockner, Newington, *via* Jondaryan
Fashion Prince ..	896	4	Bay	E. Dwan, Deuchar
Gay Lad	744	4	Bay	G. White, Petrie
General Dale ..	706	3	Brown ..	F. Weier, Hatton Vale
Glen II.	1009	3	Bay	J. Tennyson, Chinchilla
Glen Donald ..	1010	3	Bay	Ada Perina and Sons, Glenmore, Crow's Nest
Glenlea's Pride ..	746	3	Brown ..	R. Stokes, Collingwood, Victoria
Glen Pedder Pride	745	3	Bay	R. Stokes, Collingwood, Victoria
Glenroy	953	3	Brown ..	B. H. Lehmann, Bundaberg
Grand Major ..	954	4	Bay	C. E. Pascoe, Ceratodus
Greenlea Favourite	747	4	Bay	J. M. Smith, N. Otago, New Zealand
Grovely King ..	1048	3	Bay	Beak Pastoral Co., Rockhampton

DRAUGHT STALLIONS CERTIFICATED FOR YEAR, 1935-36—*continued.*

Name.	No.	Age.	Description.	Owner.
Hermitage Lad ..	897	4	Bay	H. H. Gillespie, Hermitage
Hero	955	4	Chestnut ..	J. M. Taylor, Childers
High Degree ..	748	3	Brown or black	J. Hamilton, Forest Hill
Highfield Challenger	1049	4	Bay	R. H. Aplin, Biloela
Highland Lad ..	1011	4	Bay	E. H. Volker, Preston
Intent	1065	4	Bay	Land Bros., Pastoral Co., Etonvale
Intent's Laddie ..	1012	4	Bay	J. V. Willis, Meringandan
Irton Lustre ..	707	4	Bay	West Moreton Horsebreeders' Association, Laidley
Jelbyn Jock ..	749	3	Bay	Walsh Bros., Laravale
Jondaryan Darnley	956	3	Bay	C. and S. J. Jenkins, Dickabram
Jondaryan Duke ..	1013	3	Bay	G. W. Hartmann, Bowenville
Jondaryan Janitor..	957	4	Bay	G. G. Walker, Tarong road, *via* Nanango
Jondaryan Mac ..	708	4	Brown ..	B. G. Kerle, Minden
Jondaryan Worthy John	898	3	Bay	W. A. Deacon, Allora
Jondaryan Worthy Minstrel	1014	3	Bay	W. W. J. Lloyd, Harrow
Jondaryan Worthy Sheriff	1015	3	Bay	Mrs. Eva B. A. Armstrong, Curzon street, Toowoomba
Kerlock	709	3	Black ..	R. E. A. Schafferius, Ingoldsby
Kerrston Again ..	710	3	Black ..	P. Ryan, Viewlands, Gatton
Kerrston's Viceroy	958	3	Black ..	W. D. Porter, Kumbia
Kimbar Mail Boy Jack	750	3	Bay	S. Wendt, Chamber's Flat, Kingston
King George ..	1016	3	Bay	L. Hogarth, Cambooya
Lad	1050	3	Black ..	A. Nightingale, Goovigen
Laddie	1017	3	Bay	L. A. Ruhle, Motley
Lawson's Choice ..	876	3	Brown ..	O. Ridge, Windsor, New South Wales.
Lincoln	1066	3	Brown ..	F. O. Schmidt and G. Bonaventura, Eton
Lyon	899	3	Bay	M. J. McMahon, Freestone
Major Dale ..	711	4	Bay	C. A. Kanofski, Grandchester
Major Lace ..	960	3	Black ..	H. Seiler, Tingoora
Major Wallace II. ..	877	4	Bay	F. A. Doeblien, Yatala
Major Wyllie ..	712	3	Bay	J. H. Summerville, Kholo
Marvel	713	4	Bay	H. Wood, Mt. Berryman
Master Carlyle ..	1018	3	Bay	F. Wood, Inverai
Master Wallace ..	961	3	Bay	G. S. Lee, Broadmere, Nanango
Master Wallace ..	900	3	Bay	T. O'Dempsey, Freestone
Master Wheeler ..	1067	4	Black ..	F. Bundesen, Eton Range
Max	959	3	Bay	S. B. Anderson, Tingoora
Monte Carlo ..	901	3	Bay	T. C. Hoffmann, Gladfield, Warwick
Mountain View ..	1051	3	Bay	E. A. Russell, Thangool
New Hope	1019	4	Bay	E. Ehrich, Greenmount
Ngaio Juvenal ..	878	3	Brown ..	Moore Hunter Estates, Hawora, New Zealand
Nigger	1020	3	Black ..	C. Dunemann, Murra Murra, Crow's Nest
Noble Hero ..	1021	3	Brown ..	E. Ehrlich, Murra Murra
Noble King ..	1022	3	Brown ..	M. J. O'Neill, Hurstvale
Noble Lad	902	4	Roan ..	W. J. Ryan, Upper Freestone
Nobleman	1024	4	Blue Gray ..	J. Frizzell, Southbrook
Norwood	879	3	Black ..	J. M. Smith, N. Otago, New Zealand
Oakflat Chancellor..	962	4	Bay	F. E. Mitchell, Byee, Murgon
Peel River Monarch	1024	3	Bay	J. C. Bligh, Brookstead
Pinevale Mainmast	1025	3	Black ..	Jondaryan Estates, Jondaryan
Premier's Pride ..	714	4	Bay	W. P. Kelly, Silverdale, Kalbar (Provisional)
Pride of Dartmoor..	1026	4	Bay	Mrs. E. H. Egan, Mt. Tyson
Pride Shepherd ..	1027	4	Bay	W. F. Welke, Kleinton
Prince	715	4	Bay	R. E. Turpin, Lowood
Prince	903	4	Bay	J. W. Bickers, Kurrumbul
Prince	1068	4	Chestnut ..	A. J. Deicke, Proserpine
Prince	1069	4	Chestnut ..	J. McFarlane, Eton
Prince Almond ..	716	4	Chestnut ..	R. Farrow, Dayboro'
Prince Campbell ..	717	4	Bay	J. McKenzie, Dayboro'
Prince Dale ..	880	3	Bay	W. Rudd, Mudgeeraba
Prince Dale ..	963	3	Bay	F. C. Rekow, Bundaberg
Prince Henry ..	1028	4	Brown ..	F. D. Lipp, East Greenmount
Prince Isles ..	964	4	Bay	G. A. Steinhardt, Murgon
Prince Roy ..	1029	3	Bay	P. G. Ruhle, Motley
Prince Thomas ..	1030	4	Brown ..	A. Orr, Aubigny
Prince Valley ..	965	4	Chestnut ..	Aplin Bros., Gin Gin
Punch	1070	3	Bay	J. M. McCane, Gumlu
Punch	1052	3	Bay	A. Thomasson, The Caves
Rajah	1071	4	Chestnut ..	H. Ivers, Rosella
Rare Champion ..	718	3	Bay	H. G. A. Bartholomai, Boonah
Revenue	718	4	Bay	P. Connole, Helidon
Rielly	904	4	Bay	J. Nolan, Glengallon, *via* Warwick
Ripplevale Treasure	881	4	Bay	R. Stokes, Collinwood, Victoria
Roan Tom	1053	4	Roan ..	J. B. Shannon, Rockhampton
Robin	720	3	Bay	N. V. Behrendorff, Boonah
Robin	966	4	Bay	H. Kennedy, Kumbia
Rob Roy ..	721	3	Bay	H. Williams, Blackbutt
Royal Banker ..	905	3	Black ..	Hart Bros., Headington Hill, Clifton
Royal Dale ..	882	4	Bay or brown	C. A. Sproxton, Maleny

DRAUGHT STALLIONS CERTIFICATED FOR YEAR, 1935-36—*continued.*

Name.	No.	Age.	Description.	Owner.
Royal Glencoe ..	906	4	Brown ..	J. Thompson, junr., Stanthorpe
Royal Lamington ..	967	3	Black ..	A. Birch, Murgon
Royal Shepherd ..	1031	3	Bay	W. F. Peters, Maclagan
Royal Top	907	3	Bay	A. McKechnie, Stanthorpe
Shamrock	908	3	Bay	M. Bourke, Yangan
Shepherd Hill Prince Charlie	968	4	Bay	R. B. Jefferies, Johnstown, Nanango
Shepherd's Robin ..	1032	3	Brown ..	D. Polzin, Plainby, *via* Crow's Nest
Sir Charles	969	4	Bay	V. C. Potter, Speedwell, *via* Proston
Sir Walter Sampson	970	3	Bay	R. S. McKenzie, Wallaville
Snip	1072	4	Bay	Mrs. S. Stanbury, Bowen road, Proserpine
Sonny Baronet ..	909	3	Bay	J. T. Boal, Loch Lomond, Warwick
Special Mack ..	1077	5	Bay	D. G. McIntosh, Tansey, Goomeri
St. Helen's Captain Windermere	971	4	Bay	A. Sippel, Redgate, Murgon
Stepford Belted Knight	910	5	Bay	J. M. Hagenback, Freestone (Provisional)
Stepford Blockadge	911	3	Brown ..	V. C. Cutmore, Mt. Sturt
Sterling Slade ..	883	3	Black ..	F. Powell, Richmond
Talamoniac ..	912	4	Bay	Evans Bros., Gooray
Talgai Model ..	913	3	Bay	J. J. Rynne, Goomburra
Toby	972	4	Bay	T. Clark, Weitalaba
Top Halls	722	4	Bay	A. Wienholt, Washpool Farm, Kalbar
Ulupua Carl ..	1033	3	Bay or brown	A. A. Treasure, Bungalow
Viron	973	3	Bay	F. R. Briggs, Mt. Perry
Wallace	974	3	Bay	W. H. Lamke, Gundiah
Wallace Monarch ..	884	4	Bay	J. Murray, Beaudesert
Wickside Brilliant Son	975	3	Bay	W. G. Currant, junr., Gunalda
Wildash Pride ..	976	3	Black ..	W. J. Borchert, Murgon
William Wallace ..	915	3	Bay ..	J. Sprott, Ellenthorpe
William Mac ..	885	4	Roan ..	McAulay Bros., Maroochy River
Windermere Cellus	977	4	Bay	L. C. Walker, Bingera Cattle Station
Worthy Carlyle ..	734	5	Brown ..	J. Lehmann, Coolana (Provisional)
Wyaga	916	4	Bay	Munro and Turner, Goondiwindi
Yaccum	1073	4	Bay	J. Renwick, Proserpine
Young Douglas ..	886	3	Bay	R. Stokes, Collingwood, Victoria
Young Hero ..	723	4	Brown ..	G. Reinke, Minden
Young Intention	917	3	Bay	D. I. Free, Elphinstone
Young Ivanhoe ..	1034	4	Black ..	J. N. Kahler, Geham
Young Scotchman	918	4	Chestnut ..	J. T. Boal, Loch Lomond ,Warwick (Provisional)

LIST OF REJECTED STALLIONS.

List of Stallions in respect of which Certificates of Registration were refused, on account of either lack of type and/or conformation, lack of size, or unsoundness during the year 1935-36. These horses are prohibited from service, either public or private:—

BLOOD STALLIONS REJECTED DURING 1935-36.

Name.	No	Age.	Description.	Owner.
Brownie		Aged	Bay	J. McConville, Swan Creek
De Letle		5	Bay	W. C. H. Dingle, Wolca
Gallaphil		Aged	Bay	S. A. Clapham, Kumbia
Mintoi		6	Bay	F. T. Foxley, Lamington
Nettah		3	Chestnut ..	E. Hatten, Chinchilla
Pride		3	Bay	A. L. Pullinger, Station street, Helidon
Pyramid		5	Bay	A. Perrett, junr., Elgin Vale, Nanango
Say Lever		4	Bay	F. W. Grimes, Saddle Top Mail, *via* Clifton
Sir Sarchadon		Aged	Chestnut ..	M. S. E. Hewitt, Glenmoral
Tam O'Shanter		3	Brown ..	J. Ball, Kudo
Tonkaway		3	Bay	H. S. Pocock, Boonah
Unnamed		5	Bay	S. S. Hobbs, Moogerah, Kalbar
Walla Spear		4	Bay	G. Chapman, Calliope
War Leo		6	Brown ..	G. Scott, Mt. Elliott, *via* Woodhill
Wedgebah		Aged	Bay	A. N. Brady, Goondiwindi
Xmas		6	Bay	J. Jorgensen, Wooroolin

PONY STALLIONS REJECTED DURING YEAR 1935-36.

Name.	No.	Age.	Description.	Owner.
Joker	..	3	Brown	T. H. Saville, Greenmount
Laddie	..	5	Iron grey	S. J. Singleton, Boonah
My Boy	..	Aged	Bay	R. Bracken, Maryvale
Peter	..	3	Skewbald	A. N. Rodd, Glenvale, Toowoomba
School Boy	..	Aged	Bay	J. Mullins, Mill Hill
Silver King	..	Aged	Grey	W. H. O. Smith, Ceratodus
Tarcoola	..	3	Brown	J. Sandemann, Aratula
Wifier	..	3	Chestnut	M. T. Clarke, Tara

DRAUGHT STALLIONS REJECTED DURING THE YEAR 1935-36.

Baby Austin	..	3	Bay	J. Hardy, Eukey
Bob	..	Aged	Bay	T. Nolan, Gladfield
Booming	..	Aged	Black	L. Duff, senr., Tingoora
Briton	..	3	Brown	G. Wilkins, Mt. Gee's Creek, *via* Limevale
Bugler	..	..	Bay	C. R. Banditt, Milford
Captain	..	3	Chestnut	Muspratt Bros., Littlemore
Carlie	..	5	Bay	J. Nass, Preston
Cavalier	..	5	Bay	W. Jacob, Gladfield
Content	..	4	Roan	W. King, Clintonvale
Culverthorpe High Regard	..	3	Bay	S. B. Trigger, Lakeside
Duncan	..	Aged	Bay	F. G. Dumma, Kuttabul
Duncanson	..	3	Bay	Dr. A. Horn, Toowoomba
Fairfield Prince	..	4	Black	Mrs. E. Thomson, Calliope
Fairhill Young Champion	..	Aged	Bay	J. Brownlie, Junabee road, *via* Warwick
Hopeful	..	4	Chestnut	J. A. Bradley, Dayboro'
Iron Duke	..	5	Grey	A. E. Missen, Clifton
Jack	..	4	Bay	A. J. Ferris, Wondai
Jacko	..	4	Brown	T. J. Barton, Plainby
Jim	..	Aged	Bay	E. H. Horton, Chatsworth
Josh	..	Aged	Bay	J. L. Dickson, Gelobera
Kerr Boy	..	3	Brown	F. O. Jackwitz, Blenheim
Lord Elphinstone	..	Aged	Bay	A. Williams and Co., Homevale
Lucky Bill	..	Aged	Black	L. W. Horne, Takura
Nigger	..	Aged	Black	A. A. Reinke, Hivesville
Noble	..	Aged	Black	N. Warhurst, Woolooga
Nuggett	..	5	Bay	M. Roebeck, Rockside
Nuggett	..	Aged	Grey	C. Ashcroft, Alligator Creek
Paisley	..	3	Black	J. H. Litzow, Chinchilla
Prince	..	3	Bay	E. and W. J. Ensbey, Glenview, *via* Mooloolah
Prince	..	4	Bay	C. Head, Yangan
Prince	..	3	Bay	R. J. Inwood, Boodua
Prince	..	4	Bay	J. C. Evans, Moola
Punch	..	5	Bay	W. J. Barnes, Crow's Nest
Punch	..	3	Bay	E. Hawkins, Widgee
Royal Pride	..	4	Iron-grey	J. A. Ramsay, Upper Freestone,
Royal Prince II.	..	5	Bay	G. S. Mant, Brooweena
Royal Salute	..	6	Bay	T. Smith, Nanango
Sapphire	..	6	Grey	C. Davis, North Gooburrum
Sergeant Wallace	..	4	Bay	J. Upritchard, Blenheim
Shepherd Lad	..	3	Bay	J. V. Willis, Meringandan
Silver King	..	5	Chestnut	W. F. Clayton, Yeppoon
Son William	..	4	Bay	G. A. Finch, Canungra
Studleigh Premier Lad 2nd	..	4	Bay	E. Turkington Pilton road, *via* Clifton
The Pride	..	Aged	Bay	F. Turner, Chinchilla
————	..	3	Bay	T. Webb, Brigalow
————	..	3	Chestnut	J. R. Smith, Kerry
————	..	5	Bay	J. B. Pennell, Kalbar
————	..	Aged	Brown	J. Muir, Blackbutt

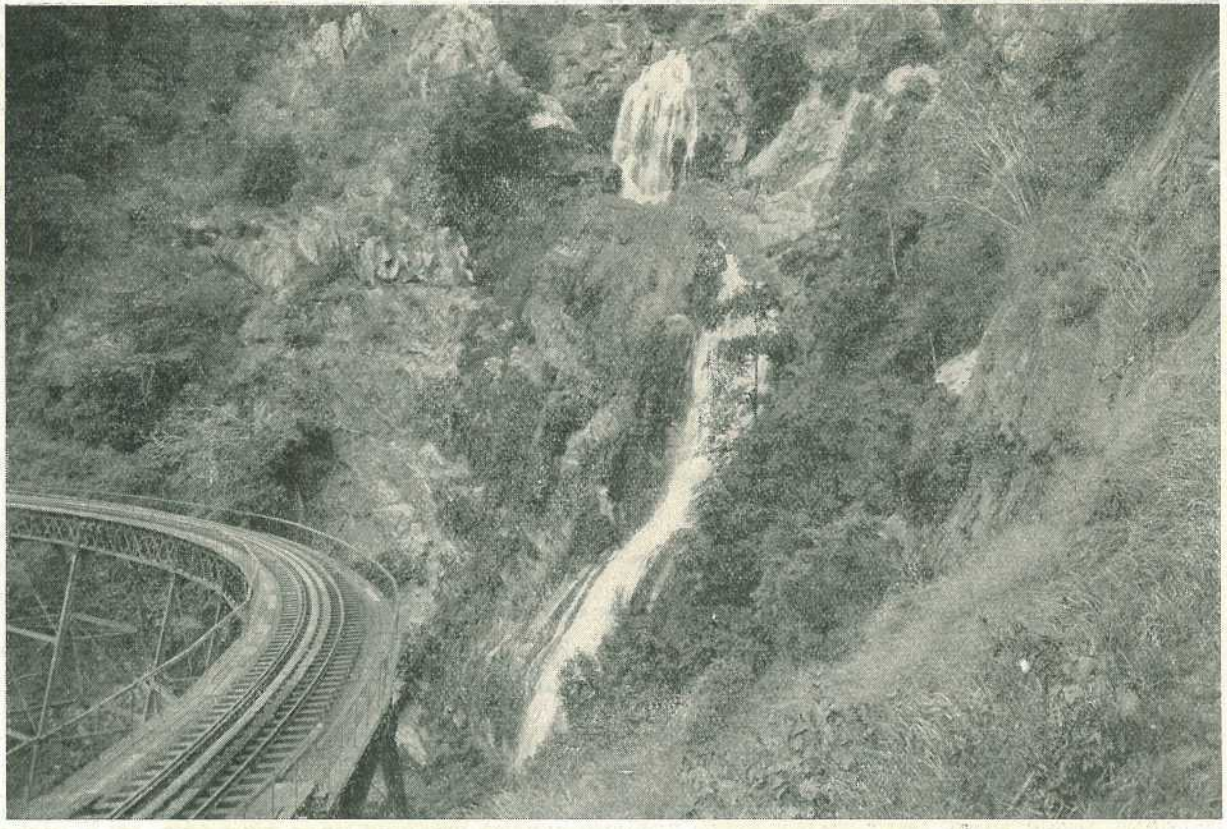


PLATE 304.
Stoney Creek Falls, near Cairns, North Queensland.

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 Book of the Australian Illawarra Shorthorn Society and the Jersey Cattle Society, production charts for which were compiled for the month of October, 1935 (273 days period unless otherwise stated).

Name of Cow.	Owner.	Milk Production.	Butter Fat.	Sire.
		Lb.	Lb.	
AUSTRALIAN ILLAWARRA SHORTHORNS.				
SENIOR, 2 YEARS (OVER 2½ YEARS), STANDARD 250 LB.				
Trevor Hill Mayflower	G. Gwynne, Umbiram	6,953·98	258·773	David of Columna
JUNIOR, 2 YEARS (UNDER 2½ YEARS), STANDARD 230 LB.				
Euroa Princess 3rd	H. L. Lindenmayer, Mundubbera	8,132·54	294·868	Swagman of Clonagan
Palmatt's Honeycake	Rex Tweed, Kandanga	6,170·35	271·303	Glengallon Major
Happy Valley Valaree	R. R. Radel, Coalstoun Lakes	6,772·08	268·296	Burradale Emperor
JERSEY.				
MATURE COW (OVER 5½ YEARS), STANDARD 350 LB.				
Glenview Lady Lynn of Woodbine	F. P. Fowler and Sons, Coalstoun Lakes	7,788·25	457·693	Retford Thorn's Viscount
Trecarne Bertha 5th	T. A. Petherick, Lockyer	7,186·27	388·657	Trecarne Sultan
SENIOR, 4 YEARS (OVER 4½ YEARS), STANDARD 330 LB.				
College Stella	A. L. Walker, Dawn	7,413·05	389·703	Bremerside Renown
JUNIOR, 4 YEARS (UNDER 4½ YEARS), STANDARD 310 LB.				
Majesty's Lavender of Brooklands	W. Bishop, Kenmore	8,832·45	357·098	His Majesty of Dalebank
SENIOR, 3 YEARS (OVER 3½ YEARS), STANDARD 290 LB.				
Inasfayl Noble Girl	McGeehan Bros., Kairi	7,185·6	346·986	Inasfayl Wyandotte's Noble
SENIOR, 2 YEARS (OVER 2½ YEARS), STANDARD 250 LB.				
White Rose of Hamilton (365 days)	J. Wilton, junr., Raceview	9,812·18	654·07	Retford May's Victor
Dawn Noble's Filibet	A. L. Walker, Dawn	4,833·5	261·816	Noble of Fairview
JUNIOR, 2 YEARS (UNDER 2½ YEARS), STANDARD 230 LB.				
Lermont Pearlette	J. Schull, Oakey	5,128·56	297·263	Trecarne Fernlea
Glenview Sunray	F. P. Fowler and Sons, Biggenden	5,770·97	295·605	Carlyle Larkspur Empire
Trinity Fancy Star (270 days)	J. Sinnamon and Sons, Moggill	4,852·82	286·497	Some Hope
Trinity Wedding Bell	J. Sinnamon and Sons, Moggill	5,302·5	254·728	Some Hope
Glenview Blossom	W. S. Kirby, Byrnestown	4,396·79	254·041	Glenview Goldfinder
Glenview Lark	F. P. Fowler and Sons, Biggenden	3,995·17	230·266	Glenview Goldfinder

PLATE 305.
On the road from Yungaburra to Lake Barrine, Atherton Tableland.

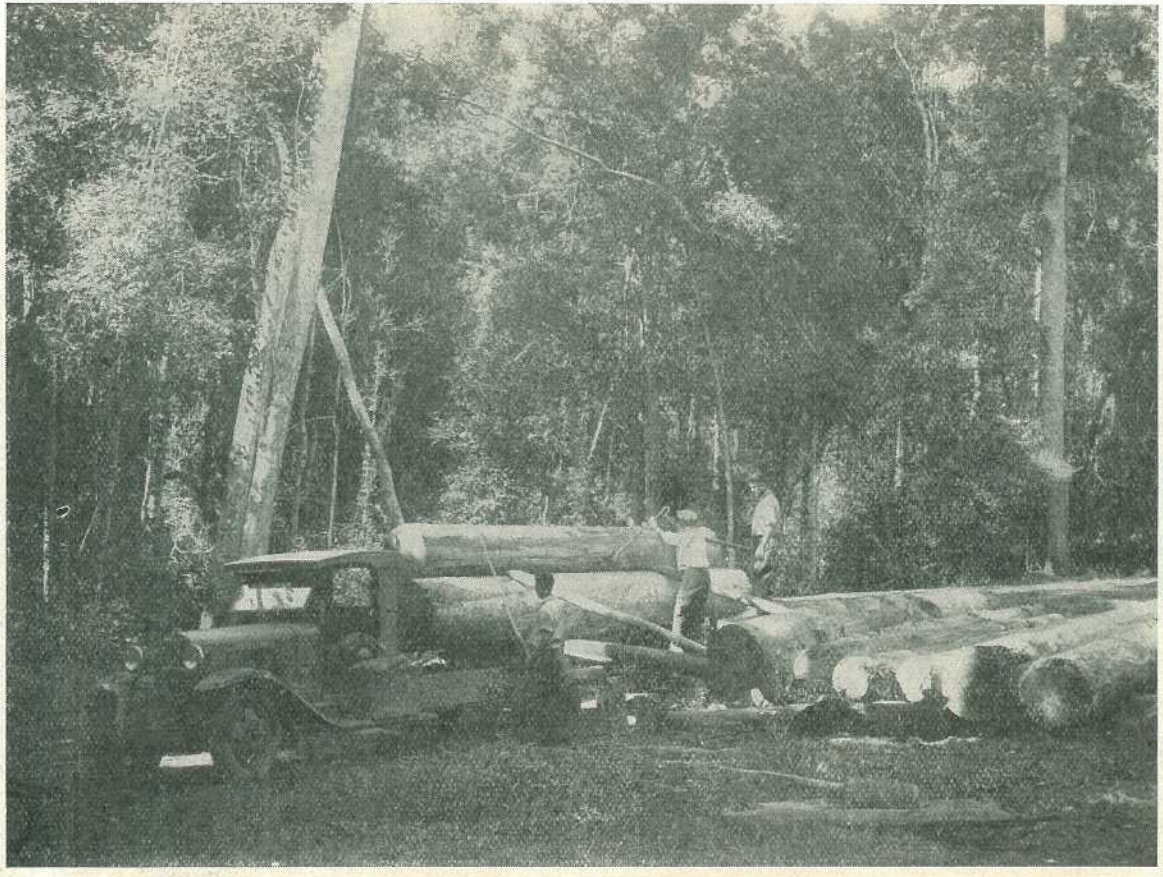


PLATE 306.—MECHANICAL LOGGING IN A HOOP PINE FOREST.
Unprecedented activity in logging on Crown forests during the year resulted in sales amounting to 143,000,000 super. feet. [*Photo. J. A. Lynn.*

PLATE 307.

MILL LOGS OF THE FUTURE.

An eleven-year-old plantation of Pine, one of the most important species in the softwood planting programme of the Forestry Service. 13,481 acres of plantation of all species have been established in Queensland.

[*Photo. by J. A. Lunn.*

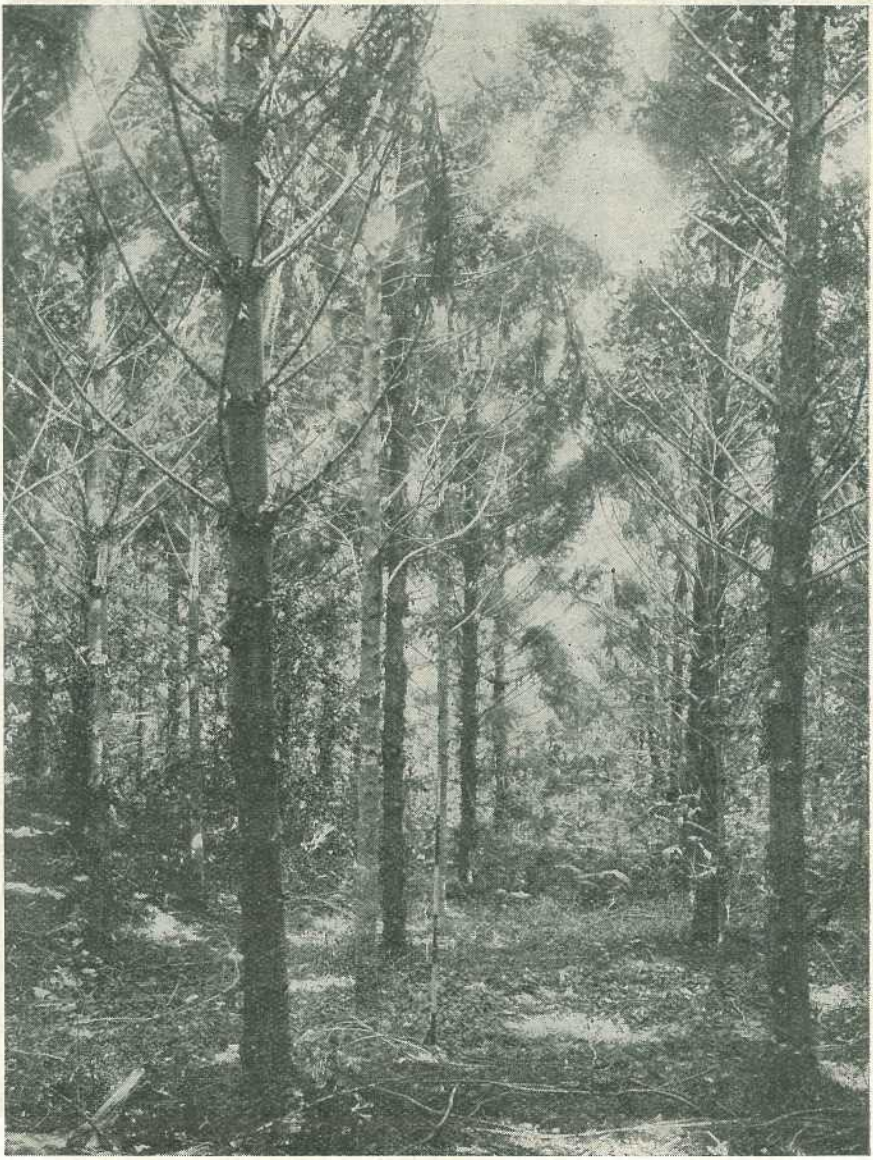


PLATE 308.

A YOUNG HOOP PINE PLANTATION, THE GROWTH OF ELEVEN YEARS.

[*Photo. by J. A. Lunn.*

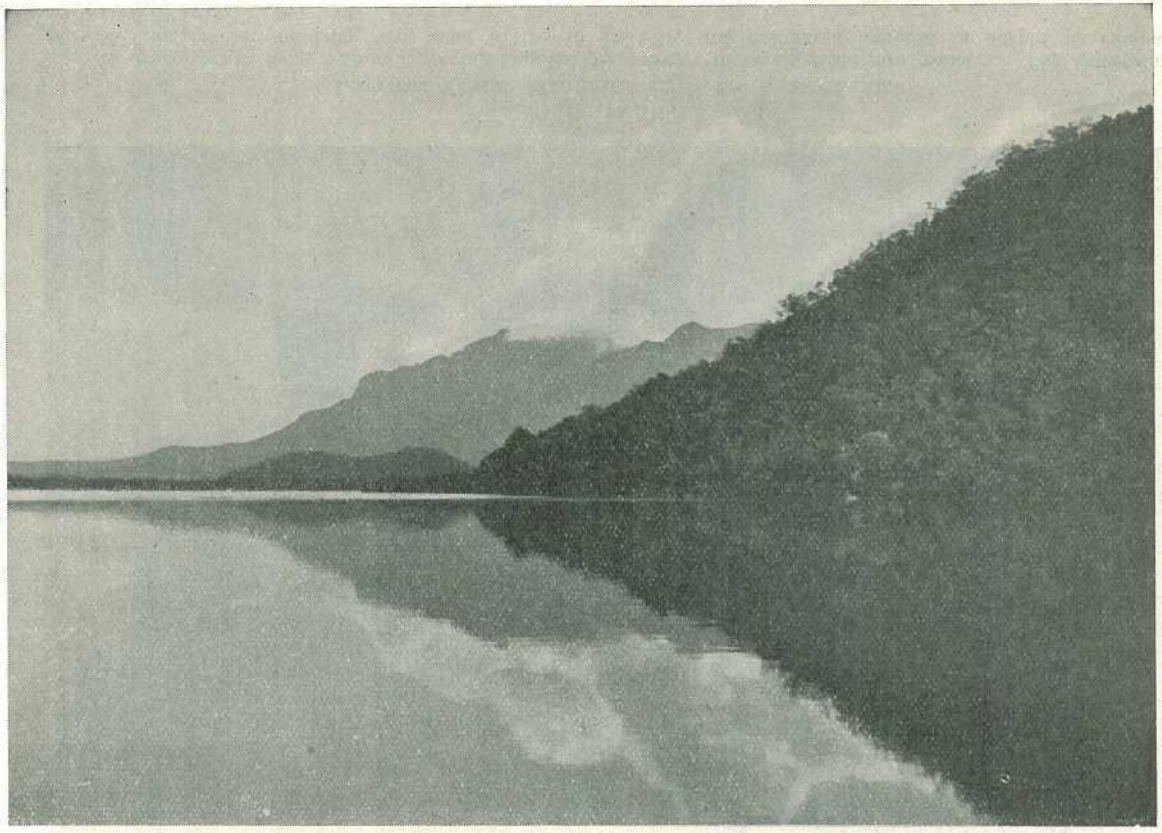


PLATE 309.

THE SCENIC BEAUTY OF QUEENSLAND'S NATIONAL PARKS IS ATTRACTING GREATER ATTENTION EACH YEAR.
A view of Hinchinbrook Island, the whole of which has been declared a National Park by the Government.

[*Photo. Queensland Government Tourist Bureau.*

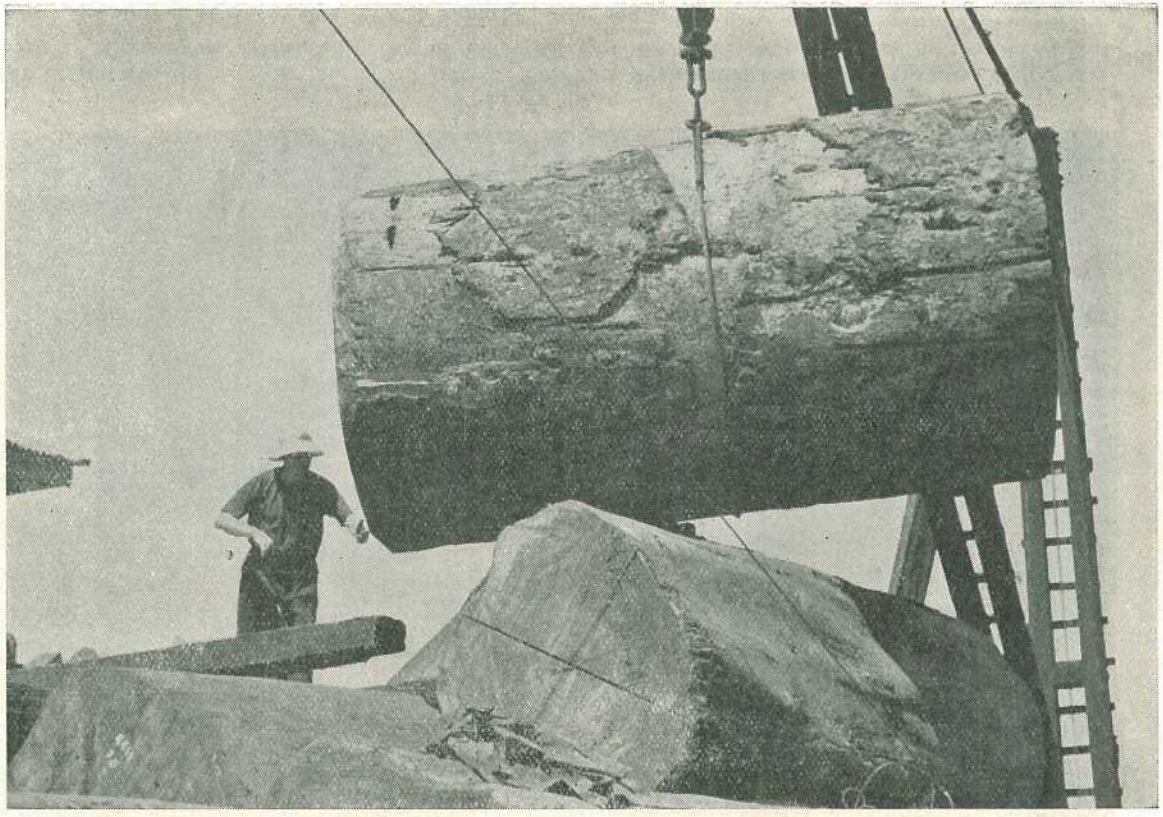


PLATE 310.

LOGS FOR VENEER MANUFACTURE, NORTH QUEENSLAND.

An exceptionally large walnut log being handled preparatory to being sliced into veneers. The Queensland plywood and veneer industry was most active in 1934-35, the estimated increase in output as compared with 1933-34 being 50 per cent.

[*Photo. by courtesy Telegraph Newspaper Co., Ltd.*

Answers to Correspondents.

BOTANY.

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

Milky Cotton Bush Poisonous to Stock.

E.G.L. (Byrnestown, Gayndah Line)—

The specimen represents the Milky Cotton Bush (*Asclepias curassavica*), a very common weed in Queensland. It favours creek banks and similar situations. The plant has been proved by feeding tests to be definitely poisonous to stock, but our experience is that stock rarely eat it to any great extent. Its eradication, of course, is recommended.

Burr Trefoil.

J.M. (Eidsvold)—

The specimen represents burr trefoil (*Medicago denticulata*). This trefoil should do well in your district, as it is one of the most widely spread in the State, and has a wide range of climatic and soil conditions. It is an annual germinating during winter or spring rains, growing through the late winter and spring, and dying off about the end of October and early November. Even when the plants are drying off, or practically dead, the pods which are still left make a valuable fodder.

Barley Mitchell Grass.

R.N.T. (Eulo)—

The specimen forwarded represents *Astrebla pectinata*, barley Mitchell. Four species of Mitchell grass are found in Queensland. Of these I think the commonest is *Astrebla lappaceæ*, the curly Mitchell.

A Valuable Legume (*Alysicarpus vaginalis*).

F.F. (Ingham)—

The specimen is a legume and has been determined as *Alysicarpus vaginalis*. This is fairly common in Queensland and the Northern Territory, although it is not confined to this country, spreading through New Guinea and the Malayan Archipelago to the Philippine Islands. It is an exceedingly valuable fodder and a legume worth encouraging. Dr. Gilruth told us that when he was Administrator of the Northern Territory he found this plant about Darwin, and by fostering it it improved very greatly the carrying capacity of his cow paddock. The plant seeds very heavily, but does not spread to the same extent as the "wild lucerne" (*Stylosanthes sundaica*) common in North Queensland. "Wild Lucerne" spreads by means of the little hooks on the ends of the pods, i.e., the seedpod, or the last joint of it at least, clings to the feet of animals, and in this way is distributed widely. A similar plant in South Queensland is the burr trefoil which owes its spread in comparison with other clovers and trefoils to the hooks which are on its small twisted pods.

Candle Nut.

A.E.G. (Brisbane)—

The specimen represents the candle nut (*Aleurites moluccana*), a native of the rain forests or jungle of North Queensland, and it is found also on the islands of the Pacific and throughout the Malayan Archipelago. The nuts are edible, but they do not seem to agree with all stomachs. In some cases we have known them to cause purging and vomiting, which may be due to the oil in them being a bit rancid. The seeds are very rich in oil, and the name "candle nut" arises from the fact that in the Pacific the nuts are strung together in the form of a candle. The dried nuts burn for some time, but give off a thick black smoke. The oil is a drying oil, and could be used in soapmaking, varnish manufacturing, etc., but it is not equal to the oil of the allied *Aleurites Fordii*.

Horseradish Tree.

E.R.A. (Bowen)—

The specimen is the horseradish tree, *Moringa pterygosperma*. The name, horseradish tree, comes from the fact that in India the beans are used as a substitute for the European horseradish. The young pods are said to be used in that country as a culinary vegetable and to make a good substitute for asparagus. The flavour of the pods or beans varies very considerably from bitter to quite sweet. Fortunately, you evidently possess one of the latter type. We were quite interested in your remarks about animals being fond of the pods.

Countries of Origin of Some Well-known Grasses.

O.C.H. (Berrembea, via Bundaberg)—

Wimmera Rye grass (*Lolium rigidum*) is a native of the Mediterranean region, i.e., Southern Europe, North Africa, and Western Asia. Perennial Prairie grass (*Bromus marginatus*) is a native of British Columbia and western United States. White Clover (*Trifolium repens*) is a native of Europe and temperate Asia. Cocksfoot (*Dactylis glomerata*) is a native of Europe and temperate Asia. Italian Rye grass (*Lolium multiflorum*), same as Wimmera Rye grass.

Wild Tobacco.

D.M.C. (Mackinlay)—

The specimen represents the wild tobacco (*Nicotiana suaveolens*). Reports concerning the toxicity of this plant vary very considerably. The late Dr. J. M. Petrie, who did a great amount of work on the chemistry of Australian poisonous plants, estimated from chemical analysis of samples of *Nicotiana suaveolens* from Western New South Wales that half a pound of the plant was sufficient to kill a sheep, and experimental feeding tests carried out by Drs. Seddon and McGrath, of the Glenfield Veterinary Research Station, confirmed this. We have, however, repeatedly received reports from Western Queensland that graziers have noticed sheep eating this plant to a limited extent without any ill effects following, and previous feeding tests had given negative results. This is probably explained by the fact that although Seddon and McGrath found that 12 oz. of the dried leaf of the plant were repeatedly poisonous to sheep, repeated small doses (of less than 12 oz.) were not toxic. The plant is very distatsteful to stock and, generally speaking, they don't eat the plant in quantities sufficient to cause trouble, although now and again losses from it are recorded. The poisonous principle is the alkaloid nicotine, and the chief symptoms are inco-ordination of movement and ocular disturbance. We should say it would be dangerous to feed the wild tobacco in the form of ensilage.

Creeping Knapweed.

INQUIRER (Pittsworth)—

Creeping Knapweed (*Centaurea repens*) may become a very serious weed pest, and should be treated immediately as a pest when it first makes its appearance in any locality. Frequent cutting off close to the ground with a strong scythe, so as to starve the underground runners by depriving them of the food from the green leaves is probably the best method of eradication. A flamethrower could be employed with equal success, but flame-throwing, cutting, or even poisoning would probably have to be done several times before the weed is eradicated and the underground runners finally starved out.

Mint Weed.

J.H. (Tara)—

The specimen represents the common mint weed (*Salvia reflexa*), a native of South-West United States, now a very serious pest in parts of Queensland. It is poisonous to stock, but most of the trouble in Queensland has been among travelling stock—ordinary paddock or resting stock apparently not being affected, or only to a limited extent. The poisonous principle is not known. If you only have a small patch of it, of course, eradication is immediately recommended.

Grasses and Fodder Plants.

J.L. (Dalby)—

There is no general book dealing with the grasses and pasture plants of Queensland. A book you would find very helpful is "The Grasses and Fodder Plants of New South Wales," by Mr. E. Breakwell, obtainable from the Government Printer, Sydney, or through any bookseller, price 6s. 6d. It is a very useful work, and with very few exceptions the grasses described and figured are either found growing naturally in Queensland or cultivated.

We will always be pleased to name and report on any specimens you can send. Of grasses, a shoot bearing seed-heads, doubled back and fore so as to fit comfortably in a sheet of newspaper is sufficient, but a few additional seed-heads included in the packet are always acceptable. Of weeds, shrubs, &c., a shoot a few inches long, bearing leaves and, if possible, either flowers or fruits, should be sent. When more than one specimen is sent, number each and retain a duplicate, when names corresponding to numbers will be returned.

Brush or Scrub Box.

H.T. (The Leap, via Mackay)—

The specimen represents the brush box or scrub box (*Tristania conferta*), a tree widely distributed through the coastal parts of Queensland and Northern New South Wales. Although called brush box or scrub box, it is frequently a native of open eucalyptus forest. The tree is grown extensively about Sydney as a shade tree, and is pruned to a very shapely tree. It is frequently grown and sold under the name of *Lophostemon australe*, but the name *Tristania conferta* has priority, and is the correct one to use. Writing of this timber, E. H. F. Swain in "The Timbers and Forest Products of Queensland" says:—"The special qualities of brush box, however, result in special applications. It is regarded as the best Australian hardwood for bridge and wharf decking, for wooden tram-rails, mauls and mallets. It is specified also for naves of wheels, wedges, and even golf-heads. It is liked in dockyards for large wedges, because it floats. Natural bends of brush box are used in shipbuilding as knees. It makes good bullock yokes, although the bow-holes are inclined to wear. In New South Wales it is used largely in general building, principally for studding and plates, but also for flooring and weather-boards. It becomes very hard with age. It may be classified as a good second-class general building hardwood, or an excellent timber for bush carpentry. Toughness, non-splitting, non-checking, non-wearing, and nonslipping surfaces are the special advantages which brush box offers in wood use. It is also abundant and cheap. It is difficult to season, and is liable to shrink, warp, and twist in small sizes."

A Close Relation of the Darling Pea (*Swainsona luteola*).

M.F.S. (Clermont)—

The specimen is *Swainsona luteola*, a plant very closely allied to the Darling pea. It is very common in parts of Queensland and New South Wales, and has caused considerable trouble amongst stock, particularly horses, in Central Queensland. As you say, horses do not recover from this plant, even when taken off the pea country. No poisonous principle from either this plant or the Darling pea has been isolated. No antidote, we believe, is known. Some years ago exhaustive work on the Darling pea was done by Sir Charles Martin, and his experiments showed that the nature of the symptoms indicated a disordered condition of some part of the brain, spinal cord or peripheral nerves. If animals are returned to proper feeding after a month or six weeks on the pea and before the symptoms are evident, they should recover completely; but when once the paralitic symptoms are shown they will not recover, but if returned to proper feeding will remain in much the same condition, becoming neither better nor worse. Although no antidote or direct remedy for the disease is known, pastoralists can take advantage of the fact brought out in Sir Charles Martin's experiments that it takes about a month to produce definite symptoms by feeding upon the pea, and so arrange that animals shall not remain in a pea-infested paddock for a longer period than four to six weeks at one time.

The Smaller Grass Tree—Is it Poisonous to Stock?

R.S. McI. (Rockhampton)—

There has always been an opinion among stock owners that the smaller grass tree (*Xanthorrhoea hastilis*) on the wallum country in Central Queensland is poisonous to stock. It is also an opinion that the larger growing tree in the ordinary forest is quite harmless. In fact, some graziers regard it as quite good fodder. Feeding tests were carried out some years ago at Yeerongpilly, but only with the ordinary forest kind taken from rather poor country. These yielded negative results. That experience seems to indicate that the trouble is a deficiency one, although, of course, it does not exclude the possibility of the grass tree being accessory.

Dr. J. B. Cleland, in the "Agricultural Gazette" of New South Wales for June, 1914, has notes on "Experimental Feeding with some Alleged Poison Plants of New South Wales," and under *Xanthorrhoea* he mentions:—"Cattle at Karuah said to become crampy. The cattle swell in the legs, fall off in condition, and continue unthriftly, even some of them dying. If removed to good, sound country, they do well." ("Agricultural Gazette," New South Wales, 1899, p. 859). In reference to this statement, Mr. Pottie, then Lecturer in Veterinary Science at the Hawkesbury Agricultural College, is reported as saying that conditions identical with those described are produced in cattle which eat the young shoots of the grass-tree after rain. He states that the shoots contain a resin, and the effects upon the animal's system are loss of appetite, condition, energy, and vitality, followed by weakening of the hind quarters, which eventually become paralysed, the animal dying of exhaustion and exposure.

Maiden ("Agricultural Gazette," New South Wales, Vol. 8, Part I., January, 1897, p. 22) quotes J. S. Allen as saying that the settlers in the vicinity of Jervis Bay had informed him that the shoots of the grass-tree, which when in blossom and eaten by cattle, give them a complaint called "cripples." It appears to affect their joints, and doubles them up.

Experiment at Milson Island.—A calf was fed from 5th November, 1912, until 2nd May, 1913. It was given from 1 lb. up to 32 oz. almost daily for this period. During part of the time, at the beginning of the experiment, the young shoots were taken from flowering plants, and portion of the flowering stem was also used. Later, when the flowering was over, just the young leaves were cut up and given. The animal was also given lucerne hay in the morning, the grass-tree being cut up and mixed with chaff in the evening. The animal ate the grass-tree well. No ill-effects were noticed at any time.

Comment.—This experiment does not support the view that the condition referred to was due to the eating of grass-tree leaves. It does not quite exclude the possibility in the special circumstances mentioned by the recorders, namely, young shoots in plants which are flowering, and young shoots after rain. It seems, however, hardly worth while to repeat experiments of this nature. "It is probable that cattle only eat the leaves when there is a scarcity of other more natural fodder, and the symptoms are perhaps explained on the fact that all necessary sustenance is not contained in the food they have access to under these circumstances."

The matter seems to be worth following up, as we should think it would be worth while securing young leaves and flowering branches from the wallum country and from forest country and making feeding tests or analyses to see if there is any difference in nutrition value.

Buttercup Bush.

W.S.C. (Roma)—

The specimen represents *Cassia australis.* Buttercup bush is a name applied to several species of cassia in the scrubs of the Maranoa and Western Darling Downs. Your particular species is very widely distributed, and mostly grows as a large shrub. We have not often seen it attaining tree size. We have no information on the quality of the plant as a fodder, but probably if eaten in any quantity it would cause slight purging, as the genus contains several species, which produce the senna leaves of commerce.

Pigeon Grass.

CORRESPONDENT (Reid's Creek, Gayndah)—

In the course of the month we received a letter from Reid's Creek, addressed to the Under Secretary, Department of Agriculture and Stock, Brisbane, unsigned, and containing a specimen of grass for identification. It was postmarked "Gayndah, 2nd November, 1935."

The specimen is pigeon grass (*Setaria glauca*), widely spread over the warm temperate regions of the world, and closely allied to the millets grown in Australia under the name of panicum, Hungarian millet, &c. The grass is quite a good fodder, but mostly grows as a weed of cultivation, although it is not a serious pest. The correspondent also asked about Toowoomba canary seed. If he writes to the Director of Agriculture, giving his name and address, the information will be supplied to him. It grows best in the autumn and winter months.

Downs Grasses Identified.

Secretary of SUMMER GRASSES AND FODDERS CLUB (Groomsville, via Pechey)—

A. *Poa caespitosa*—Tussock grass; common in Southern Queensland on mountain slopes and similar elevated situations; usually regarded as an inferior grass.

B. *Koeleria phleoides.*—A small grass found in the Southern States and the colder parts of Queensland; of no particular consequence as a fodder.

C. *Microlaena stipoides.*—Meadow Rice grass; a small slender grass, very common in shady situations.

D. *Danthonia sp.*—A species of Wallaby grass; most of the wallaby grasses are very good fodders.

E. *Sporobolus elongatus.*—Rat's tail grass; an inferior grass common in Eastern Australia; usually rejected by stock.

F. *Bothriochloa decipiens.*—Bitter or Pitted Blue grass; an inferior grass very common in Eastern Australia. In the Southern States it has caused much concern, since it invades pastures, thereby considerably reducing their carrying capacity. It has been found that top-dressing with superphosphate encourages the growth of better-class grasses, which are then able to crowd out this species.

G. *Fimbristylis diphylla.*—Not a true grass, but a sedge. Nothing is known of its fodder value.

H. *Eremochloa bimaculata.*—Poverty grass; a grass usually rejected by stock.

I. *Cenchrus australis.*—Burr grass; common in Queensland, frequently as a weed of cultivation, along roadsides, &c. The burrs cling tenaciously to wool, hair, clothing, &c. Stock seem to eat the plant. Insects may frequently be seen trapped in the burrs, but they provide no nourishment for the plant.

A Rye Grass Relation. Hedge Mustard. "Saucy Jack."

V.C. (Gympie)—

(1.) *Lolium temulentum* Drake or Darnel; a grass closely allied to the rye grasses. The seed or grain is generally regarded as poisonous, the grass only being safe for feeding in the seeding stage. The grass is a common weed of cultivation in Europe and America, and a good deal has been written around it. Although we have noticed it here frequently, both on the coast and on the Downs, we cannot recall to mind any trouble being given by it.

(2.) *Sisymbrium officinale,* hedge mustard, one of the weeds frequently known in Queensland as mustard weed. It is not usually eaten by stock, although it is a common weed of cultivation. When eaten, like other weeds of this type, it taints milk rather badly.

(3.) *Centaurea melitensis,* a cockspur thistle or "Saucy Jack," a very common weed in the Southern States. In Queensland, it is most abundant on the Darling Downs. It is not poisonous to stock, but is only eaten in the young stages.

General Notes.

Staff Changes and Appointments.

Mr. A. C. Murray, of Coorparoo, has been appointed Inspector under the Dairy Produce Acts, Diseases in Stock Acts, and the Slaughtering Act, Department of Agriculture and Stock.

Mr. G. H. Sigley, Inspector under the Diseases in Stock Acts, the Slaughtering Act, and the Dairy Produce Acts, Department of Agriculture and Stock, has been transferred to Biggenden as Inspector under the Dairy Produce Acts, the Diseases in Stock Acts, and the Slaughtering Act.

Mr. J. Cattanach, Inspector under the Dairy Produce Acts, the Diseases in Stock Acts, and the Slaughtering Act, Department of Agriculture and Stock, has been transferred from Esk to Beaudesert.

Constable T. A. Smith, Rathdowney, has been appointed also an Inspector under the Slaughtering Act.

Mr. J. Eigenhuis has been appointed Consulting Mill Engineer, Bureau of Sugar Experiment Stations, Department of Agriculture and Stock.

Mr. Norman Smith, B.Sc., M. App. Sc., Plane Creek Central Mill Co., Sarina, has been appointed Assistant Mill Technologist, Bureau of Sugar Experiment Stations, Department of Agriculture and Stock.

Mr. R. E. Churchward, B.V. Sc., H.D.A., has been appointed a veterinary surgeon, Department of Agriculture and Stock.

Mr. J. H. Smith, Entomologist, at present attached to Atherton, will be transferred to Nambour.

Mr. G. W. J. Agnew, Inspector under the Diseases in Plants Acts, will be transferred from Nambour to the Bureau of Tropical Agriculture, South Johnstone, where he will perform work as Pomologist. Mr. P. Mitchell, Agent under the Banana Industry Protection Act, has been appointed also Inspector under the Diseases in Plants Acts, and will be attached to Nambour.

Mr. K. D. Hoffmann has been appointed Inspector under the Diseases in Plants Acts and Agent under the Banana Industry Protection Act, and will be stationed in the Granite Belt.

Messrs. E. S. Keehn and W. E. Hamley have been appointed Acting Inspectors under the Diseases in Plants Acts, the latter also an Agent under the Banana Industry Protection Act, and to be stationed at Burleigh.

Mr. C. Schindler, Inspector under the Diseases in Plants Act at present attached to Tallebudgera, will be attached to Warwick.

Constable H. Devantier, Nudgee, has been appointed also an inspector under the Slaughtering Act.

Mr. R. A. Blake, Tamaree, has been appointed an Honorary Ranger under the Animals and Birds Acts.

Foreshores of Hervey Bay a Sanctuary.

An Order in Council has been issued in pursuance of the provisions of the Animals and Birds Acts declaring the foreshores of Hervey Bay (Urangan, Torquay, Scarness, Pialba, and Point Vernon) to be a sanctuary for the protection of native animals and birds.

Police as Stock Inspectors.

A regulation has been issued in pursuance of the provisions of the Diseases in Stock Acts, authorising police officers to inspect travelling stock under or in pursuance of Section 19 (2) of such Acts.

Rural Topics.

Stock Grazing—Capacity of Lucerne.

With a view to ascertaining the carrying capacity of a 55-acre lucerne paddock at the Cowra (New South Wales) Experiment Farm, particulars of its stocking have been recorded annually, by the experimentalist (Mr. Pearson).

The paddock, which was sown to lucerne in August, 1930, with 4 lb. of seed and 56 lb. of superphosphate, was situated on a hillside and comprised from good to inferior wheat land. Since 1932 it has been spring-toothed and top-dressed each year. It was found that during the twelve months ending 30th September, 1935, slightly under two sheep to the acre had been fed on the area.

During the year 1931-32 the average carrying capacity was 3½ sheep to the acre, while in addition 40 tons of hay were cut. Since then the carrying capacity has been approximately two sheep to the acre. The experimentalist pointed out that although these figures were not particularly high, the value was higher when resolved into monthly records. These showed that the lucerne provided the first green feed after a dry spell, and furnished a bulk of grazing over the difficult period in the early summer, and also supplied succulent fodder in April, May, and June, when the ewes were lambing.

Origin of Side-saddle.

Replying to a Brisbane correspondent, "The Australasian" quotes this interesting note in a London publication of 1892:—

"In a book entitled 'Remains Concerning Britain,' published in 1614, it is stated that Queen Anne, wife of Richard II., taught English women to ride on side-saddles, when, heretofore, they rode astride. As late as 1772, Queen Mariana Victoria, of Portugal always rode astride. There has been some discussion as to whether this ancient practice should not be revived and the side-saddle abandoned.

"In May, 1890, a lady, wife of an English baronet, appeared in the Row, attended by her groom, and mounted cross-legged. Her riding-habit was not only somewhat longer than the new fashion enjoins, but longer than the old one as well, and was simply a very voluminous divided skirt. The fashion [of riding astride], however, does not appear as yet to make much way in this country, although a well-known saddler some time ago wrote to the 'Field,' 'That it was not so uncommon for ladies to ride cross-saddle as might be supposed.'

"A curious side-saddle is used by women in Iceland. It has a seat with a back like a common chair, and has, instead of a stirrup, a little shelf on which both the feet can rest."

Points in Flock Management.

During the hot weather the flock should be handled as little as possible. The sheep should be in paddocks where there is good shade and water, and a supply of salt should always be available. Any work necessary with them should be done during the cooler parts of the day, and if water is available it should be sprinkled on the yards to keep them as free from dust as possible.

Any badly fly-struck sheep should be kept by themselves in a "hospital" paddock, where they can be given special attention and will not constitute a menace to the others, a fly-struck sheep always being attractive to flies. Such a paddock may be used for any sheep that are ailing, animals badly affected with grass seed, either in the eyes or generally, coming within this category.

Where mating is still in progress it will be found of advantage to shear the belly, and even the lower sides and under the neck, of rams on country where grass seed is prevalent.

It is at this time of the year that the value of shade trees in the sheep paddock becomes evident. There is no question that during the hot weather sheep will, if possible, spend the bulk of the day under the trees, doing their feeding in the early morning or evening. Admitting the claims of pasture and crop, far too little allowance is made for shelter on the average property.

Is the Crow a Pest?

The question as to whether the redeeming qualities of the crow outweigh its reputed sins has been raised more than once in recent years. The subjoined correspondence, taken from the "Sydney Morning Herald," is illustrative of the wide difference of opinion that exists:—

Mr. A. F. Basset Hull writes—

"I have read with much interest Mr. Willmott's questionnaire appearing in your issue of the 7th instant, and I freely admit that I have not seen all the dreadful things done by the crow as set out by Mr. Willmott. I am, however, aware of the general feeding habits of both the crow and raven from personal observation. My letter appearing in your issue of 22nd August last, and to which Mr. Willmott refers, was written merely as an officer of the Royal Zoological Society of New South Wales, the originator of the request that some measure of protection should be afforded to both crows and hawks where it can be shown that they are doing more good than harm in any particular locality. My society has for many years urged the necessity for careful collection of data before absolutely condemning any so-called pest, on the general grounds that there is always some good, even in the worst of creatures. To strike a balance and act accordingly is our aim.

"To show that even pastoralists of life-long experience differ in their views as to the value of the crow and eagle, I quote from a letter received by me from Sir Frederick McMaster under date 22nd August last: 'I would like to take this opportunity to congratulate you and heartily endorse your article in this morning's "Herald" on the protection of bird life. From a life-long experience as a pastoralist, very early in my career I formed the definite opinion that man was building up a heap of trouble for himself in the wholesale destruction of bird life. I am the first station in my district to lamb, and, consequently, attract hawks and crows from near and far. But, valuable as my lambs are, I have decided that it is better in the common interest to let the birds take their share of them, than in any way to contribute to the upsetting of "the balance of Nature." For years, as a member of the Merriwa P.P. Board, I was instrumental in preventing a bonus on hawks and crows, but, unfortunately, such a condition is the exception in this great country. If any of my remarks or experiences will help you to maintain the fight for the protection of bird life, I shall be very glad if you will use them.'

"I have other letters in the same vein from pastoralists in the Cooma, Quirindi, and other districts. Surely there is need for a full investigation when so many and such expert witnesses agree to disagree. As far back as November, 1918, Mr. W. W. Froggatt, then Government Entomologist, published in the 'Australian Zoologist,' the journal of my society, a lengthy summary of the question as regards the crow, quoting the opinions of many then prominent pastoralists pro and con, and summing up decidedly in favour of affording at least partial protection to this much-abused bird."

Mr. W. R. Murray, of Green Grove, Manildra, writes—

"Of late I have noticed in the 'Herald' several letters for and against the protection of the crow, one being from Mr. Wilfred Wilmott. He certainly gives a lot of the crow's faults, which are perfectly true. But so far none of the writers have mentioned one of the cursed crow's worst faults; that is, the destruction of both eggs and young of our most valauble insect eaters, all the small birds that abound in the inland districts. These small birds are invaluable to both farmer and grazier.

"Of these the crow takes a terrible toll; in fact, he has in some districts almost wiped out some of our most valuable birds—the little peewee for one. These birds always build near the water, mostly in the water-gums along rivers and creeks. Of these the crow takes fully 25 per cent. of both eggs and young; besides tens of thousands of eggs and young of all other of our insect-eating birds.

"I can endorse every word of what Mr. Willmott has written. Like him, I have had over sixty years' experience in bush life amongst both stock and crops; and I can say that the crow is the worst enemy that the man on the land has to contend with. The fox and the dingo we can beat; the rabbit we can control; but the crow—never. He, like the poor, will always be with us. I consider as a pest he stands right out on his own."

Valorous Youth.

Each year when the awards of the Royal Humane Society are announced the number of boys and girls who have displayed courage, resource, and self-sacrifice is notable. Valour is not confined to either sex, nor to any age, for in this year's list there are several women and girls and men and boys of all ages. The youngest is a little fellow from Kyneton, who receives a certificate of merit. He is Albert John Ashby, aged eight years, who rescued his little sister, aged seven, from drowning in the Campaspe River. "Oh, I wish I could swim," was his first cry as he saw his sister fall off a plank bridge, but that did not deter him, for he plunged in, and with resource remarkable in one so young, told another sister to run for help, while he seized the one in distress by one hand and hung on to a willow branch with the other. He had finished his rescue work by the time help arrived.

Thelma May Jones, a little girl, aged 10 years, has been awarded a bronze medal for a very courageous act. Several children were playing near a fire in the bush when her baby sister aged three years went too near the fire, and her clothing was soon alight. Thelma, the eldest of the party, went to the rescue. With her bare hands she tore the clothing off her little sister, and taking the baby in her arms pressed her to her bosom. She was severely burned herself, and had to be taken to hospital. Her efforts were unavailing for her little sister succumbed, but she had great satisfaction in knowing that she did all that was possible. Phyllis Mary Shoebridge, of Bulimba, Queensland, was sitting on the beach at Sandgate, when she heard cries of distress, and looking out to sea saw two children in difficulties. With quick decision and prompt action she plunged in and saved them both.

Two boys, Mervyn Read, aged 16 years, and his brother, Ray, aged 15 years, came from Robinvale to receive certificates of merit for saving a man from drowning in the Murray. Mervyn went to his rescue first, but could not cope with the heavy burden, and the younger boy went to his assistance, and between them they effected the rescue.

The eyes of youth shine brightly when these deeds of valour are performed. As each year the recital of these rescues is made one is impressed by two facts; first, the courage and unselfishness which prompt them; second, the urgent necessity for every boy and girl to be taught to swim.—R. W. Wilmot, in "The Australasian."

Maryborough Dairy Association—Butter Output.

To have increased within the present century its output of butter from 15 tons to 6,529 tons per annum, and its payments to cream suppliers from £1,388 in 1901 to £586,484 in the year ended June 30th last is the wonderful record of progress of the Maryborough Co-operative Dairy Association as revealed by the balance-sheet and reports presented at the association's thirty-sixth annual meeting of shareholders at Wondai.

Of the association's five factories—Maryborough, Kingaroy, Biggenden, Mundubbera, and Wondai—the output of the last named is second only to that of Kingaroy factory, and, since its establishment in 1932 has manufactured 5,376 tons of butter (an average of 1,344 tons per annum) and has paid to suppliers £472,621, whilst the quality of the article turned out is proved by the winning of many of the best awards in world-wide competition.—"South Burnett Times."

Crossbred Lamb Breeding.

In an address to the Southern District (New South Wales) Agricultural Bureau Conference at Junee, Mr. B. J. Stocks, of Linden Hills, Cunningar, one of the most successful fat-lamb raisers in Cootamundra district, attributed the success of his production to the supply of adequate feed to the breeding ewes and the lambs at all times, supplementing the supply with chaff and oats before it became necessary. During the last two seasons, using Southdown rams mated with first-cross Border Leicester or Romney Marsh ewes, he had trucked 110 per cent. of lambs from 1,005 ewes, and 122 per cent. from 1,150 ewes respectively.

Relying mainly on lucerne supplemented with paddocks of subterranean clover and Wimmera rye he had found the best arrangement was to make both lucerne and grass paddocks always available to the sheep by leaving the gate open between the paddocks. During the winter months he had found that a supplementary ration of 1 lb. to 2 lb. of green wheaten chaff, with a sprinkling of bran added, fed in troughs each day, was of great value in giving the sheep resistance to disease and parasite infestation, and was well worth the extra expense and trouble. The secret of success in fat-lamb breeding was to never allow the lambs to suffer a check, and, with a plentiful supply of well-balanced fodder, made possible by top-dressed pastures and lucerne, the road to successful fat-lamb breeding was sure.

Feats of Horsemanship.

In the "Questions and Answers" column of "The Australasian" for 12th October, "Record" (Hillston, New South Wales) recalls that "Big" Bowden, of Penola (South Australia), frequently rode 80 miles one day and home the next. "Rider and gear" weighed 21 stone. Mr. Bowden had property at Portland (Victoria). Members of his family believe him to have been the first white child born in Tasmania. His father, who was with Collins's expedition as surgeon, is mentioned in the diary of the Rev. R. Knopwood.

The correspondent encloses cuttings of articles on similar achievements from the "Sydney Mail" of July 31, 1929 (signed "Yarri"), and from the "Land" of January 13, 1934 (signed "Murrungurry"). Among the feats recorded are these:—

A one-time commissioner of police in Adelaide, Alexander Tolmer, rode from a police camp to the city, 120 miles, in one day, on a horse called Buckshot.

A lad, afterwards widely known as Cockatoo Jack, was sent from Rosebrook to Cooma (New South Wales) for the doctor. As the doctor was out the boy rode on to Queanbeyan, 79 miles from Rosebrook. There he found a doctor, and at once started back with him. The doctor's town hack knocked up. He mounted Jack's grass-fed stock-horse, which carried him to Rosebrook and completed the full journey of 158 miles in 27 hours.

When the Montebello was wrecked at Kangaroo Island in 1906 a selector's son carried the news to Kingscote, 79 miles away, inside nine hours, on a 13-hands pony. The same pony carried a man weighing 11 stone 97 miles between sunrise and sunset.

A Queensland squatter, A. E. Hanslow, in January, 1898, rode a four-year-old mare from Mount Morris to Boothalla and back, 124 miles, in 14 hours.

Another Queenslander—a drover, Charlie Turner—having to inspect cattle at various places on specified dates, rode from Leigh's Creek (South Australia) to Winton (Queensland), 800 miles, in 14 days, with three changes of horses.

A prospector, Dave Collins, aged 80 years, rode from Clare (South Australia) through the Northern Territory and into Western Australia, covering 7,816 miles. The time taken on the journey is not known.

A policeman rode out from the Darling to inquire about two swagmen who had died of thirst on a far western track and to bury them. He left a homestead on the river at 10 o'clock on a summer night, and was back at 9 o'clock on the following night, covering 136 miles.

A boy aged 12 years, Archie Danvers, of Wellington (New South Wales), was trailing horses that were making back to their native run, somewhere near Tumut. He left Wellington on a Monday, and overtook the horses at Gundagai on the following Friday. He was mounted on a pony, and in the five days he rode 300 miles.

In 1857 Sylvester Fraser was the only survivor of the massacre at Hornet Bank, on the Dawson River. His brother, Billy Fraser, was in Ipswich with the station teams. To tell him of the tragedy the boy rode from Hornet Bank to the town, 320 miles, in three days, with two changes of horses. The return journey was accomplished in the same time, with three changes of horses—640 miles in six days. Sylvester Fraser's age was 14 years.

In the Northern Territory in 1919 Mat O'Connor, about 60 years of age, became blind. He set out for the railhead at Katherine, 350 miles away, over difficult country, and the distance was covered in 11 days. A mate led his horse, while the blind man led their packhorse. From the railhead he journeyed to Darwin, thence to Sydney.

In 1910 two daughters of Sir Sydney Kidman rode from Kapunda (South Australia) to Cunnamulla, on the Warrego, more than 1,000 miles, and much of it over trackless country. On some days they covered 60 miles. Their father journeyed with them in a waggonette containing food and baggage, and there was a black guide.

In 1885 Frank Howson, a wool-scouring contractor, rode an eight-year-old grey mare from Booligal (New South Wales) to Killera Station in one day and back the next, 221 miles. On the two following days he rode the mare 100 miles more. This mare was fond of beer, and she was given some of it on the road whenever the rider had a drink.

In September, 1860, one Skillicorn made a wager of £150 with a Bathurst hotelkeeper, Job Manning, that he would ride from Bathurst to Sydney, 125 miles, in less than 20 hours. On bad roads he did the journey in 19 hours 50 minutes, but he lost the wager because he had walked about 100 yards with a man who had asked him to have a drink. It was said that the man had been stationed at a wayside inn to cause the conditions to be broken; it had been stipulated that Skillicorn was to ride all the way.

Following are additional extracts from recent issues of "The Australasian":—

R. (Melbourne) sends an extract from a recent number of the English journal "Horse and Hound":—

In these days of marvellous speed records achieved by mechanical locomotion it is interesting to read of a record ride on horseback, set up in 1745, and of the widespread interest it caused. To quote from a print contemporary with the ride:—"Mr. Cowper Thornhill, keeper of the Bell Inn at Stilton, in Huntingdonshire, set out from his house at Stilton at 4 in the morning, came to the Queen Arms against Shoreditch Church in 3 hours and 52 minutes, returned to Stilton again in 4 hours and 12 minutes, came back to London again in 4 hours and 13 minutes, for a wager of 500 guineas.

"He was allowed 15 hours to perform it in, which is 213 miles, and he did it in 12 hours and 17 minutes. It is reckoned the greatest performance of the kind ever yet known. Several thousand pounds were laid upon the affair, and the roads for many miles were lined with people to see him pass and repass."

The average rate required to win the wager was a little more than 14 miles per hour, but the rider averaged over 17. It is not stated how many horses were used for the ride, which is more remarkable for the endurance of the rider than for the speed of his mounts; but to maintain on horseback an average of 17 miles per hour for over 12 hours is no mean feat for a horseman.

Mr. H. M. Warburton, inspector of stock, Nyngan (New South Wales) writes:—

Mr. Alfred Lodge, of Bonnington, Warren, who owns a station property, Hornseywood, rode a well-fed horse from Warren to Hornseywood, a distance of 80 miles, in 14 hours. He gave the horse 2 hours' spell at dinner-time, and three half-hour spells during the trip.

Mr. Lodge was 77 years of age last March. Both horse and rider were O.K. on arrival at the destination. This is a wonderful endurance test for a man of Mr. Lodge's age, and would take a lot of beating.

Feeding—The Cow that Fills the Bucket.

"Any good cow will give a lot of milk just after calving—Nature sees to that—but it is what she averages after six months that counts in a 273 days' test," pointed out Mr. G. F. Shirley, in an address at the recent western district conference of the New South Wales Agricultural Bureau.

"Only a good cow will stand that strain, and you can hardly expect an animal that has been deprived of some of the essentials of life in her early youth to be able to stand the racket of high production later on. Dairying is one of those industries where a 'long-distance' view must be taken when laying the foundations for future performances. I have found that many breeders do not fully realise that it is just as important to 'build them right' as to 'breed them right.' You can over-feed, yet stunt, the best bred poddy in such a way that she will never be a producer, whilst surprising results can be obtained from moderately good animals by judicious feeding."

Manure-sack Filler.

It is a great convenience to have both hands free when filling manure sacks after mixing. The following is useful and as satisfactory as anything which can be used. Take an out-of-commission milk can (ordinary one) and cut out the bottom; draw the bag to be filled over the top end until it just comes over the handles. Then invert the can and attached bag and fill. When full grasp the handles of the can, with bag over them, and lift up, when the sack will be filled easily and quickly. If you weigh the contents of one filling you will know almost exactly what each bag holds, which will be found of great assistance when regulating the quantities through the top-dresser or drill.—"The Canegrowers' Weekly" (Mackay).

Pasture Management.

The falling off in the lambing percentages in a number of districts in New South Wales is a problem that is to-day engaging the attention of scientists. On a number of stations on the northern tablelands the lamb-marking this season will not average 50 per cent.

Referring to the problem, Colonel H. F. White, of Bald Blair, stated recently that he believed this to be another phase of the mismanagement of pastures. The pastures, he said, were not standing up to the demands made upon them. Up to the present, nature had been milked through the pastures, from which 60 per cent. of the national wealthh of the country emanated, without anything having been put back to replace the wastage. He believed that the day was fast coming when pasture improvement would become compulsory.

Depleted pastures were responsible for weed growth, and to an extent soil, he said. Wherever you look you will see where weeds have taken possession of places that have been eaten out. England had been grazing on the same pastures for hundreds of years, and they were as sound as ever because of a definite system of pasture improvement. This excellent example had also been followed extensively in New Zealand and Argentina.

Nor was it as widely recognised as it should be that the rays of the sun were the best and cheapest fertilising agent known. The more the grazier and farmer tickled the soil the better were the pastures and crops. By means of the chain harrow the crust of the soils hhould be broken after rain, thereby permitting the sun's rays to enter the soil, and at the same time forming a surface mulch that conserved the moisture.

Nine Good Reasons for Milk Recording.

There are nine convincing reasons given by the Louisiana State University for keeping records of dairy cows, which are universal in their application. They enable the dairyman to feed each cow according to the quantity of milk she produces. They form the only basis on which a herd can be improved. No careful dairyman will buy a herd bull whose dam has not got an authentic record showing creditable milk and butterfat production. Records alone will sell cows when no other quality will; grade cows with records can be sold for from 25 to 50 per cent. more than those without records. A system of records is the first step in building up a herd; the unprofitable cows are the most expensive; their heifer calves are usually low producers and should not be raised. Records stimulate better feeding and breeding; the dairyman who keeps records usually keeps a balanced ration and becomes interested in winter dairying, which has numerous advantages over breeding cows to freshen in the spring. The weighing of the feed and milk keeps the owner in close touch with the daily condition of each cow. Records stimulate better milking; milk scales serve as a check on the milker, and induce him to milk more thoroughly than when the milk is not weighed. A knowledge of what each individual animal is doing develops personal pride and interest in the herd. Finally, records make dairying a business proposition, and in various incidental ways mean more money to the man who milks.

Wild Bird Life.

In South Africa special provision has been made to protect wild bird life. The Wild Birds' Protection Act came into force recently. The Act provides that no person shall capture any wild bird (except under certain specified conditions), and no person shall sell, purchase, or barter any live wild birds unless such capture, sale, purchase, or barter is effected in accordance with a permit issued by the Minister for Agriculture and Forestry. Any person who conveys any live wild bird over a public road, or is in possession of any live wild bird on land whereof he is not the owner or occupier, will be deemed to have contravened the provisions of the Act. The penalties for contravention are heavy. The spread of insect pests in Africa has been attributed in part to the destruction of bird life. In Australia also there is room for more protection of wild birds. Queensland farmers are fully alive to the economic value of insect-eating birds, and the policy of the Department of Agriculture and Stock in proclaiming wild life sanctuaries in different parts of the State is becoming appreciated more widely every year.

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.

THE PRE-SCHOOL CHILD.

So little is known of the work of our Baby Clinics, that we sometimes hear it said that there is an unfilled gap between their activities and those of the School Medical Service. There is absolutely no foundation for these statements. Our service extends to all children up to school age. Our earliest and most urgent work was concerned with the first year of life, is now well established, and has given great results. Not that it is yet complete; many districts in this State still remain without our services and there are still mothers within easy reach of our clinics who fail to make use of them. Even those who cannot possibly reach our clinics might obtain help by writing to the nearest clinic. But our chief anxiety for some years past has been over those who have passed their first year, for there are so many distressing cases of badly fed, ill-nourished children, whose mothers have not yet realised that toddlers require as much knowledge and skill in the building up of strong and healthy bodies as do young babies.

Of course, toddlers require many things that we cannot supply. Kindergartens, nursery schools, playgrounds, and above all wise mothers it is beyond our power to supply; but for the development of the toddler's mind and character a sound healthy body is the basal requirement, and to ensure this is our most earnest endeavour.

THE NEW MOTHER'S BOOK.

The last remaining copies of this book are being fast exhausted, and we are preparing a new and revised edition, which will, we hope,

soon be printed. Science has been advancing during the last two years, and so has our knowledge of the actual present condition of our Queensland children. Consequently, the whole section dealing with nutrition has been revised and largely rewritten. The section on maternity has also been much enlarged and improved. In the remaining sections the alterations have been less extensive. This book is not intended to supersede the work of our nurses, but to assist it. A book can teach general principles to an intelligent reader; their application to the individual child is always a special problem, and needs personal attention.

THE FORCE OF EXAMPLE.

Some two years ago I entered the breakfast room of a small boarding-house in Tasmania. A young mother of a common type—healthy, good-looking, with little knowledge, but very pleased with herself—was trying to make her little girl of five eat her porridge, and not succeeding. The cause of the trouble was evident at a glance—the mother herself was eating fried sausages. I should have remained a silent spectator of this little drama, had not the mother at my entrance said to her child, "Here comes the doctor! You had better eat your porridge quickly, or he will give you a dose of castor oil." This I could not endure, so I said quietly, "No, I do not do that sort of thing. I can show you a better way of getting your child to eat her porridge than telling her to do so." The mother looked up surprised. "A little example would be much more effective." Just then my own breakfast was brought in. I turned to the little girl and said, "See what the doctor has for breakfast. I eat my porridge and milk because it is good for me, and because I like it!" The little girl turned to her plate and emptied it without a word. I narrate this little incident for the benefit of other mothers.

THE POWER OF SELF SUGGESTION.

The other day I was consulted by a young nurse-probationer, whose diet was unsatisfactory. She declared that milk always gave her indigestion. I did not doubt her word, but asked her if she could take junket. She could and did. Should I have told her that every drop of milk she drank turned into junket soon after being swallowed? Would this have cured her of milk-indigestion? More likely, I fear, she would have found that junket also did not agree with her. Such is the power of auto-suggestion!

I imagine that this young woman had had a mother who disliked milk, and allowed her child to see it. Or perhaps she tried to force her child to drink milk. Worse still, she may have done both. In this way food aversions are forced on to children to the grave detriment of their future health.

HEALTH AND MOTHERCRAFT TEACHING IN SCHOOLS.

We shall never be a really healthy people until we have health teaching in our schools, practical as well as theoretical. Children are keenly interested in health talks. We have proved this all over Queensland. But something more than talk is needed. The school lunch should be a practical demonstration of wholesome and attractive food; very different from what it is at present.

Mothercraft is a part of health, there is no distinction between them. Mothercraft and health are naturally taught together.

COMMON DANGERS ON REEF AND SHORE.*

A RECENT tragedy in the waters of North Queensland has demonstrated the dangers awaiting the unwary on sandy beaches or on the reefs along our sea shore. It is especially desirable that children and adults should be warned of these dangers, for with the coming of the warmer season and the holidays of Christmas and New Year the beaches and coastal waters will be thronged with many thousands of people to whom such a warning might come very opportunely.

The accompanying photographs depict objects which should be avoided. Advice for curing or relieving pain is given where possible.

THE PORTUGUESE MAN-OF-WAR.

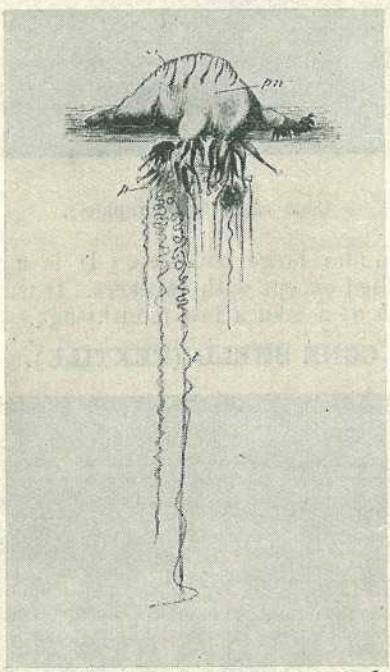


Plate 311.
The Portuguese Man-of-War.

Blue-tinted sausage-balloon often found in the water or on the beach near the edge. It has several long blue strands which may sting a person so severely that paralysis and even death may follow. The photograph shows the balloon (pn.), polyps (p), and stinging strands (t.).

Cure.—Apply sal volatile as quickly as possible to the affected parts. Sal volatile may be used also for jelly-fish stings.

---

* Reprinted from the "Education Office Gazette," through the courtesy of the Department of Public Instruction.

CONE SHELL (GEOGRAPHUS).

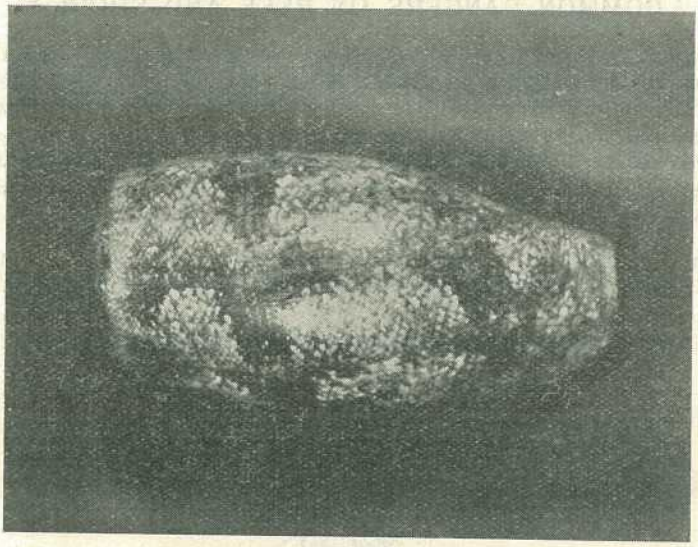


PLATE 312.
Cone Shell (Geographus).

Usually found under large boulders. It is a pretty shell, which should *never* be handled except with tweezers. It was one of these shells that caused the death of a man a few months ago.

CONE SHELL (TEXTILE).

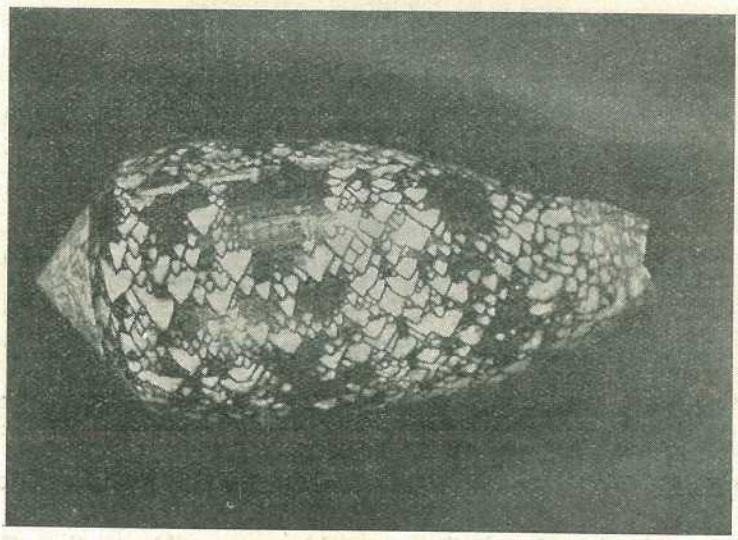


PLATE 313.
Cone Shell (Textile).

This textile cone is the commoner of the two cones and is considered not quite so deadly.

CONE SHELL (GEOGRAPHUS).

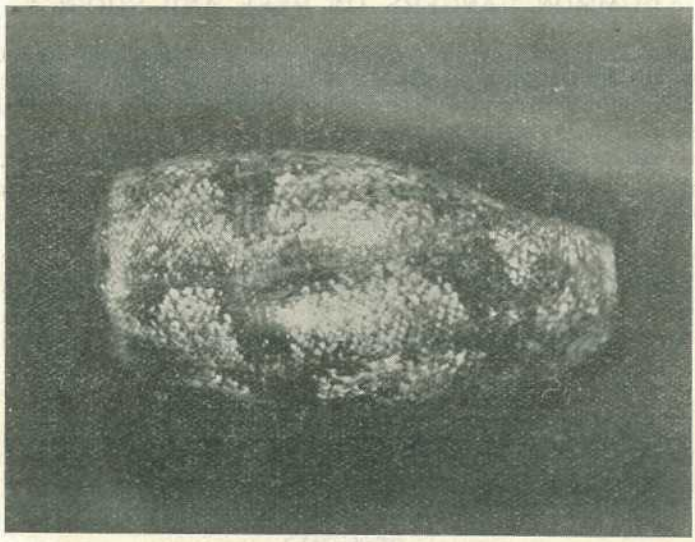


PLATE 312.
Cone Shell (Geographus).

Usually found under large boulders. It is a pretty shell, which should *never* be handled except with tweezers. It was one of these shells that caused the death of a man a few months ago.

CONE SHELL (TEXTILE).

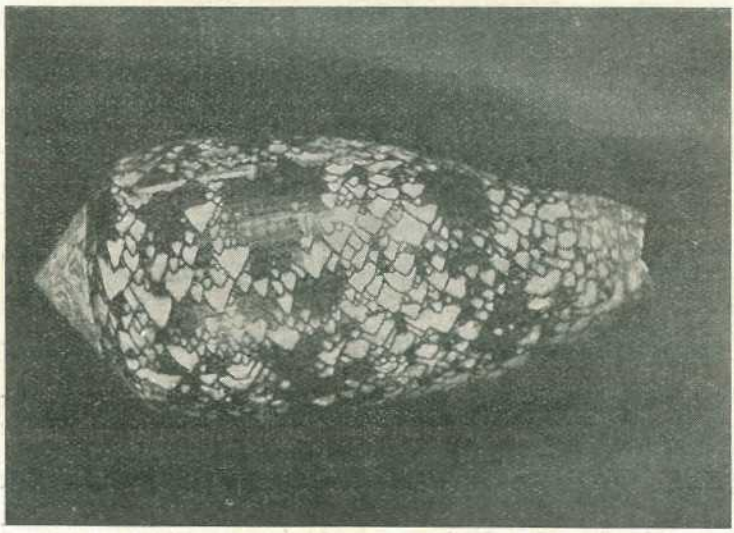


PLATE 313.
Cone Shell (Textile).

This textile cone is the commoner of the two cones and is considered not quite so deadly.

STONEFISH.

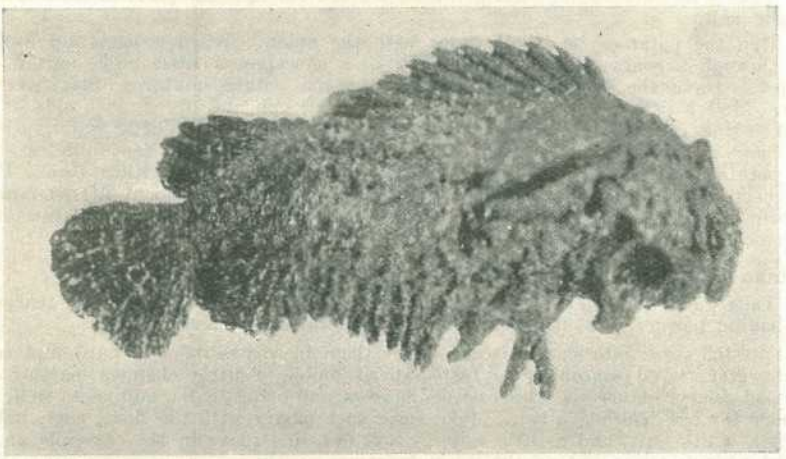


Plate 314.
Stonefish.

Sluggish in habit. When danger threatens it raises its thirteen dorsal spines. Usually hidden among weed and sand. Causes excruciating pain, relieved only by morphia, and lasting in effect for as long as six months. Sometimes found in Moreton Bay.

Cure.—Relief may be obtained by applying heated onion. Medical aid should be summoned immediately.

CUTSHELL (OR RAZOR SHELL).

Usually so embedded in the muddy sand as to have its sharp razor edges just level with the surface. If a wound has been inflicted by a razor shell (or an oyster), care should be taken to clean the wound of all pieces of shell and then cover with collodion, which will form a seal over the injured part.

GENERAL ADVICE.

Never go wading unless stout shoes with thick leather soles are worn; sandshoes are not a really suitable covering.

Never touch any strange object in the water or on the beach.

IN THE FARM KITCHEN.

ECONOMICAL AND WHOLESOME DISHES.

It is not necessary to have an elastic house-keeping allowance in order to provide tasty dishes. In fact, many a woman who is able to order anything she fancies fails to achieve distinction as a cook, while her next-door neighbour, who must count all of her pennies, serves attractive and wholesome fare to her family. In order to do this one must have a knowledge of the cheaper cuts of meat (which, incidentally, are often the most nourishing) and know how to serve them to the best advantage.

The cost of each dish made from the following recipes is approximately ninepence. This cost prohibits recipes made with expensive cuts of meat, and therefore ingenuity has to be used in substituting the less expensive materials instead of cutting out the many delicious dishes usually made with the more costly goods. These recipes are intended to help the busy housewife, and the many quick dishes and casserole dishes (which require very little attention) will be found invaluable.—E.P., in the "Sydney Morning Herald."

Skirt Steak and Savoury Potatoes.

Take ½ lb. skirt steak, ½ lb. potatoes, 1 large onion, small piece of butter, milk, pepper, salt.

Boil the potatoes in salted water with the onion. When cooked and drained put through a coarse sieve. Have ready in a saucepan a little milk, butter, and pepper. Have the liquid very hot, and add the potato mixture. Stir over the heat. Melt a little butter or dripping in a frying pan and brown each side of the steak. Make some gravy after the meat is done by adding a little water, pepper, salt, and a dash of any bottled sauce. Stir and cook for a few minutes. Put the potatoes round the edge of a flat casserole and rough up with a fork. Place the meat and gravy in the centre and put into the oven for about fifteen minutes to brown. Before serving spread a little butter over the steak, also a few drops of lemon juice, and sprinkle with chopped parsley.

Seaman's Pudding.

Take ½ lb. chuck steak, 1 large onion, ½ lb. flour, 2 oz. chopped suet, 1 teaspoonful baking powder, salt, pepper, a few outside stalks of celery.

Cut the steak into small pieces. Place them in a casserole (or pan) and cover with water. Add seasoning to taste, sliced onion, a little chopped parsley and chopped celery. Place the casserole in the oven and bring to the boil, skim well, and simmer for one hour (gently). Make some suet pastry with the flour, suet, baking powder, a litle salt, and a little water. Roll out, and place in the casserole on top of the cooked meat. Put on the lid and simmer gently for about forty minutes.

Steak Mignon.

Take ½ lb. chuck steak, a little salad oil, parsley, butter, salt, pepper, two small rounds of toast.

Cut the steak into two rounds and about an inch thick. Brush over with salad oil and grill. Have ready some green butter, made as follows:—Chop some parsley very fine and work into a little butter, with salt and pepper to taste. When the steak is cooked put a nut of the butter on to each round. Have ready two rounds of toast slightly larger than the steak. Place the steak on these and serve at once with chipped potatoes and gravy. Garnish with sprays of parsley or watercress.

Viennese Fried Veal.

Take ½ lb. fillet of veal, 1 hard boiled egg, 1 egg, 1 dozen capers, 3 anchovies, 1 lemon, breaderumbs, dripping.

Cut the veal into thin slices, put it on a board and beat with a rolling-pin. Season with pepper and salt on both sides and brush over with beaten egg. Toss in breaderumbs, and when evenly covered fry in a little dripping. Crush the hard-boiled egg with a fork and sprinkle in the middle of each slice of cooked meat. Put a few capers and a curl of anchovy in the centre of each piece. Serve with thin slices of lemon.

Ragout of Mutton.

Take 1 lb. neck mutton, 1 tablespoonful pearl barley, 1 oz. butter, 1 tablespoonful flour, 1 onion, 1 carrot, sprig of mint, piece celery.

Cut the mutton into neat pieces. Season the flour with salt and pepper, and dip in the meat. Melt the butter in a pan and fry the meat. Cut the vegetables into dice. Put the meat and vegetables in a casserole with the pearl barley. Add a pint of water and cook in the oven for about one and a-half hours.

Kidney Fritters.

Take 3 sheep's kidneys, ¼ lb. flour, 1 egg, 2 tablespoonfuls milk, salt, deep frying fat.

Boil the kidneys for a quarter of an hour. When cold cut in half lengthways. To make the batter put the flour into a basin with a pinch of salt. Mix the well-beaten egg with the milk and pour slowly into the flour, stirring all the time, until a smooth batter is formed. Dip the halves of kidney in the batter, and when well covered fry in the boiling fat until a golden brown.

Grilled Sausages and Cabbage.

Take ½ lb. beef sausages, 1 small cabbage, 1 onion, a little butter, seasoning.

Parboil the cabbage, after it has been well washed. Drain thoroughly. Melt the butter in a casserole and add chopped onion. Cut up the cabbage and cook for half an hour. Grill the sausages, putting these on top, and mix in a small piece of butter. Put on the lid, heat thoroughly in the oven, and serve with mashed potatoes.

Sausage Meat and Potato Cakes.

Take ½ lb. sausages (beef), 1 lb. potatoes, 2 oz. butter, ½ gill milk, flour, stock, seasoning, parsley.

Skin the sausages (this can be easily done by putting them in cold water for a minute or two) and shape into small rolls with flour. Cook in a little stock for twenty minutes. When cold cut into slices and cover each slice with potato that has been mashed with a little butter and milk and seasoned with pepper and salt. Put on a well-greased tin in a hot oven. Bake until brown, then turn so that both sides are brown.

Cannelon of Beef.

Take 1 lb. lean rib steak, 2 rashers bacon, 1 egg-yolk, a little nutmeg, grated lemon rind, pepper, salt, parsley, thyme, gravy.

Chop the meat very fine and pass the bacon through the mincer. Mix both together thoroughly, then mix the grated lemon rind with the parsley (chopped) and thyme. Add to these the grated nutmeg, pepper, and salt, to taste. Add all these ingredients to the chopped meat and mix well together with the egg-yolk. Form the mixture into a roll and wrap it round with a well-buttered paper. Bind round the paper with tape to keep it together and in shape. Put into a well-greased baking tin and bake in a moderate oven for about three-quarters of an hour. Place the roll on a dish and pour a rich brown gravy round it.

Breast of Lamb Stuffed and Baked.

Take ½ lb. breast of lamb, 3 oz. breadcrumbs, 1 oz. suet, 1 teaspoon mixed herbs, 1 dessertspoonful chopped parsley, salt, pepper, grated lemon rind, a little milk.

Remove the bones from the meat. Make a seasoning of the breadcrumbs, chopped suet, parsley, herbs, grated lemon rind, pepper, and salt, and bind all together with a little milk. Spread the seasoning down the middle of the meat and make into a roll. Tie this round securely, cover the outside with any odd bits of fat, and bake in a moderate oven with a piece of greaseproof paper over the top. Remove the paper ten minutes before serving. Serve with mint sauce.

ORANGES AND LEMONS.

Fruit Salad in Orange Cups.

Take three large oranges; 2 slices pineapple, diced; 12 marshmallows, quartered; one-third of a cup of chopped nuts; two-thirds of a cup of strawberries, halved; lettuce.

Cut oranges in two, remove pulp carefully, leaving shell clean. Mix pineapple, marshmallows, nuts, and strawberries with orange pulp. Fill orange cups, cover with cream mayonnaise, and garnish with nuts. Serve on lettuce.

Orange Cream Custard.

Take 2 eggs, ¼ cup of sugar, 2 teaspoons flour, ⅛ teaspoon salt, 2 cups milk, ½ teaspoon vanilla, 5 tablespoons sugar, 4 oranges.

Beat egg-yolks, add ¼ cup of sugar, flour and salt, and mix thoroughly. Add milk and cook in a double boiler until thick enough to coat spoon. Cool, add vanilla, and turn into serving dish containing peeled and sliced oranges. Beat egg-whites with 5 tablespoons sugar. Heap on top of custard and serve.

Orange Bavarian Cream.

Take 1 tablespoon granulated gelatine, ¼ cup of cold water, 1 cup orange juice and pulp, 1 tablespoon limejuice, ½ cup sugar, sprinkling salt, 1 cup cream.

Soak gelatine in cold water for five minutes and dissolve by standing cup containing mixture in hot water. Add to orange juice and pulp. Add limejuice, sugar, and salt. When it begins to jelly fold in whipped cream; turn into cold mould to become firm.

Orange Blancmange.

Take 4 oranges, 1¾ pints milk, 2½ oz. cornflour, 4 oz. caster sugar.

Grate the rinds of the oranges, then squeeze them. Strain and measure the juice. Mix the cornflour to a smooth paste with the orange juice. If there is not as

much as a quarter-pint of juice from the oranges, a little extra milk must be added after the juice has been mixed with the cornflour. Put the milk and sugar into a saucepan and heat them. Pour the hot milk on to the mixed cornflour, then return it all to the saucepan, bring to the boil, and boil for eight minutes, stirring all the time. Add a few drops of cochineal (sparingly), pour into a wet mould, and leave until set. Turn out carefully on to a dish and serve.

Orange Creams.

Take 3 dessertspoonfuls of caster sugar, 2 oranges, ¼ pint cream, 1 egg-white, ¼ oz. gelatine, ½ gill water, angelica.

Cut the oranges into halves and remove the pulp, without splitting the rinds. Take out the pips, rub the pulp through a fine sieve, and mix well with the caster sugar. Whip the cream until it thickens, and add half of it to the orange pulp. Whisk the egg-white and fold in lightly. Dissolve the gelatine in the water, but do not let it boil. When cool, strain it into the orange mixture, and mix all thoroughly together. Wipe the orange rinds, stand them on a plate, and fill each half with the orange cream. Leave until set, then decorate the top with the remainder of the cream and a few stalks of angelica. Stand on a lace paper, and serve in the orange cases.

Orange Pudding.

Take 4 sponge-cakes, 1 pint milk, 3 eggs, 1 orange, some orange marmalade, 3 dessertspoonfuls sugar.

Separate two of the eggs and beat the third whole egg and the two yolks together. Crumble the sponge-cakes finely, and add to the eggs, with the finely-grated orange rind and strained juice. Stir in the marmalade and sugar, and mix all together, then turn into a fireproof dish and gradually stir in the milk. Whisk the egg-whites to a stiff froth, and fold in lightly. Bake gently until set, being careful not to let it boil. Serve cold, decorated with a few quarters of orange.

Orange Salad.

Take 2 large oranges, 1 large ripe pear, a few glace cherries, a few almonds.

Cut the oranges in half, across the sections. Remove the pulp carefully, and cut the peel round the edges. Peel and quarter the pear and remove the core. Cut the fruit into pieces, then mix with the orange. Blanch and split the almonds. Cut the cherries in quarters. Arrange the pear and orange in the orange cups and decorate with almonds and cherries. Serve with cream. (Tinned pears may be used).

Mixed Orange Salad.

Take 2 oranges, 1 small pineapple, 2 oz. walnuts, 1 cream cheese, French dressing. Peel the oranges and pineapple and cut them into dice. Mix the cream, cheese, and chopped walnuts together, then shape into small balls. Arrange the fruit on lettuce leaves and garnish with cream cheese balls. Sprinkle just before serving with French dressing.

Orange and Grape-fruit Cocktail.

Take 1 cupful grape-fruit pulp, 1 cupful orange pulp, 2 tablespoonfuls lemon juice, caster sugar to taste.

Cut the fruit into neat pieces, and mix together. Sprinkle with caster sugar and lemon juice and put in a cool place. Just before serving, fill the glasses with the fruit and place a glace cherry on top. Serve very cold.

Orange Sauce.

Take 1 cupful orange juice, 1 teaspoonful grated orange rind, 1 cupful caster sugar, juice 1 lemon, grated rind ½ lemon.

Cook all the ingredients together for fifteen minutes. Skim, cool, and serve with vanilla ice cream.

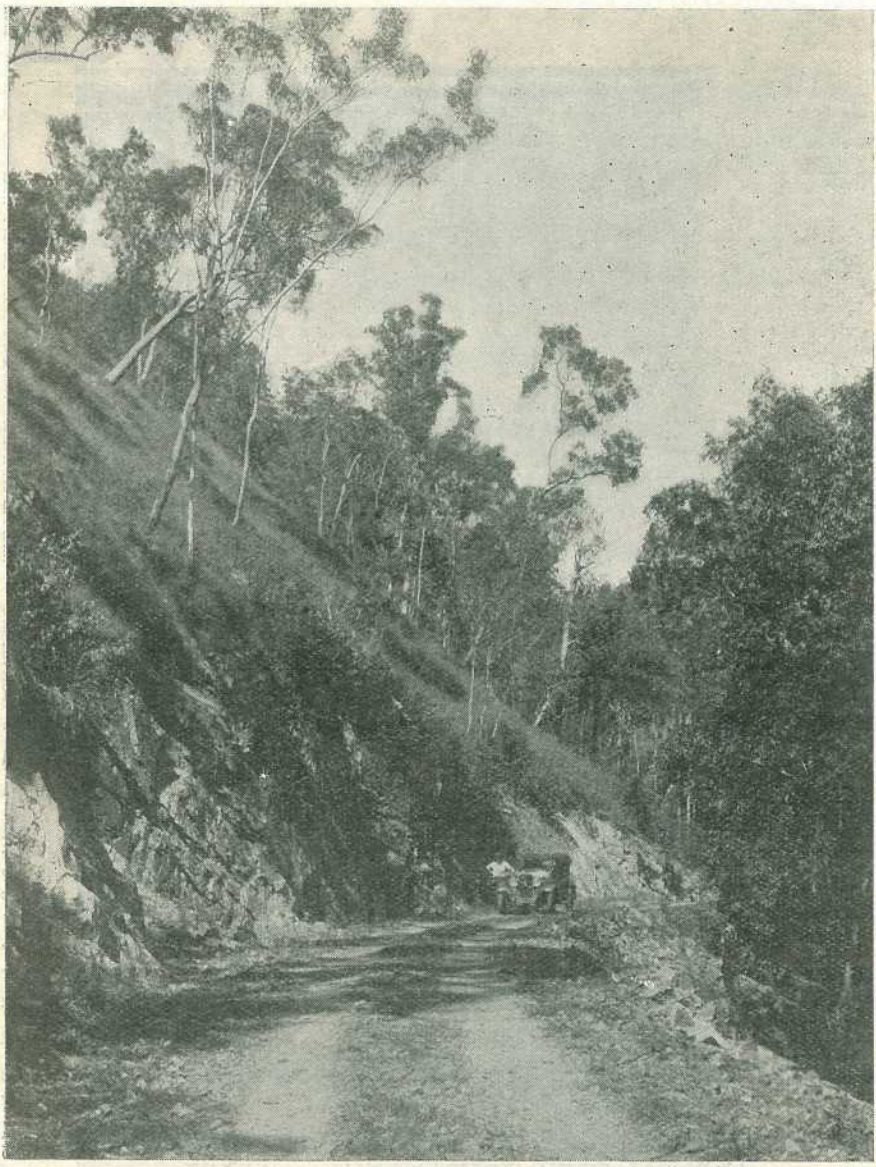


PLATE 315.
A FOREST SERVICE LOGGING ROAD.

With the development of mechanical haulage road improvement work becomes necessary and profitable. The Forest Service expended £12,360 in this direction in 1934-35.

[*Photo. by J. A. Lunn.*

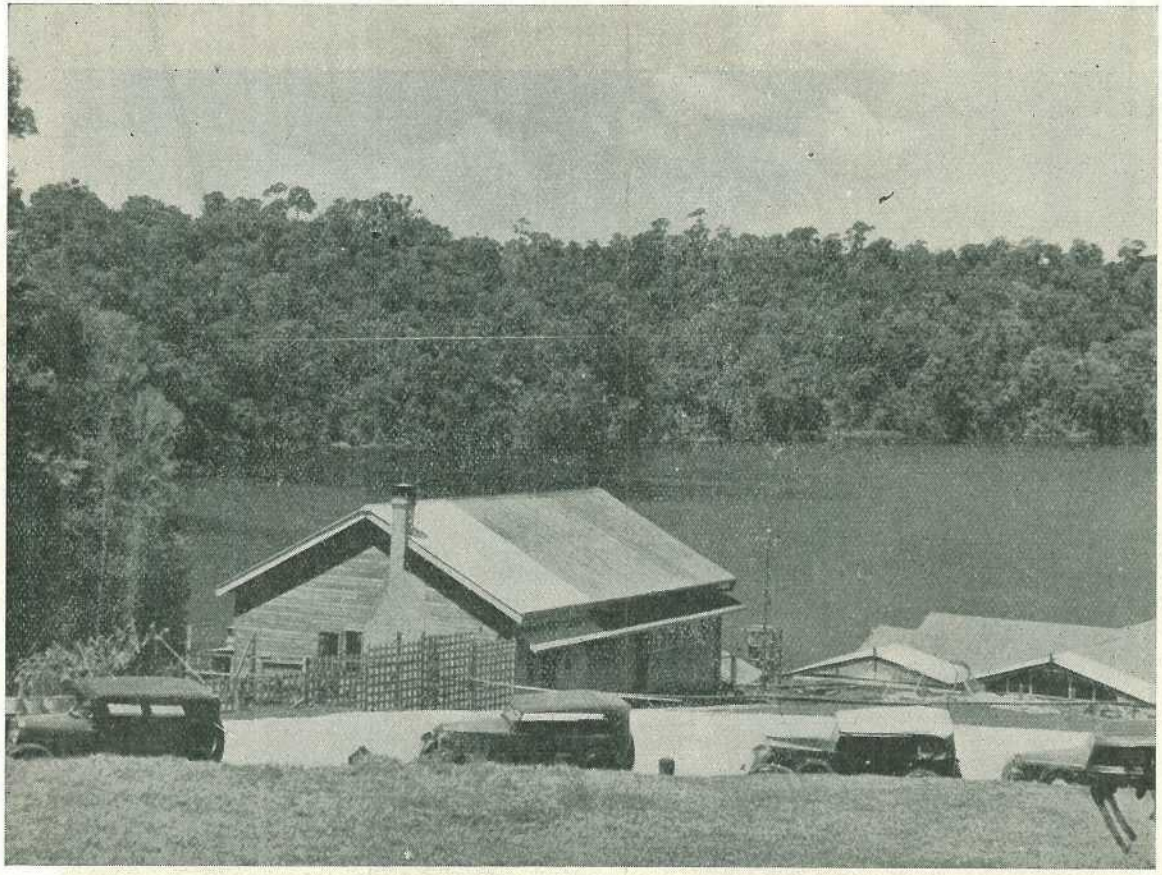


PLATE 316.
A GLIMPSE OF LAKE BARRINE NATIONAL PARK.
Three National Parks (including Lake Barrine) were gazetted in the course of the year, bringing the number up to 40, totalling 335,892 acres.
[*Photo. by courtesy Telegraph Newspaper Co. Ltd.*

Orchard Notes for January.

THE COASTAL DISTRICTS.

ALL orchards, plantations, and vineyards should be kept well cultivated and free from weed growth; in the first place, to conserve the moisture in the soil, so necessary for the proper development of all fruit trees and vines; and, secondly, to have any weed growth well in hand before the regular wet season commences. This advice is especially applicable to citrus orchards, which frequently suffer from lack of moisture at this period of the year if the weather is at all dry, and the young crop of fruit on the trees is injured to a greater or less extent in consequence.

Pineapple plantations must also be kept well worked and free from weeds, as when the harvesting of the main summer crop takes place later on, there is little time to devote to cultivation. If this important work has been neglected, not only does the actual crop of fruit on the plants suffer, but the plants themselves receive a setback.

Banana plantations should be kept well worked, and where the soil is likely to wash badly, or there is a deficiency of humus, a green crop for manuring may be planted. Should the normal wet season set in, it will then soon cover the ground without injury to the banana plants. When necessary, banana plantations should be manured now, using a complete manure rich in potash and nitrogen. Pineapples may also be manured, using a composition rich in potash and nitrogen, but containig no acid phosphate (superphosphate) and only a small percentage of bonemeal, ground phosphatic rock, or other material containing phosphoric acid in a slowly available form.

Bananas and pineapples may still be planted, though it is somewhat late for the former in the more southern parts of the State. Keep a good lookout for pests of all kinds, such as Maori on citrus trees, scale insects of all kinds, all leaf-eating insects, borers, and fungus pests generally, using the remedies recommended in Departmental publications.

Fruit fly should receive special attention, and on no account should infested fruit of any kind be allowed to lie about on the ground to become the means of breeding this serious pest. If this is neglected, when the main mango crop in the South and the early-ripening citrus fruits are ready, there will be an army of flies waiting to destroy them.

Be very careful in handling and marketing of all kinds of fruit, as it soon spoils in hot weather, even when given the most careful treatment. Further, as during January, there is generally more or less of a glut of fresh fruit, only the best will meet with a ready sale at a satisfactory price.

Grapes are in full season, and in order that they may be sold to advantage they must be very carefully handled, graded, and packed, as their value depends very much on the condition in which they reach the market and open up for sale. Well-coloured fruit, with the bloom on and without a blemish, always sells well, whereas badly coloured, immature, or bruised fruit is hard to quit.

One of the greatest mistakes in marketing grapes is to send the fruit to market before it is properly ripe, and there is no better way to spoil its sale than to try and force it on the general public when it is sour and unfit to eat.

Bananas for sending to the Southern States require to be cut on the green side, but not when they are so immature as to be only partially filled. The fruit must be well filled but show no sign of ripening; it must be carefully graded and packed and the cases marked in accordance with the regulations under the Fruit Cases Acts and forwarded to its destination with as little delay as possible.

Pineapples should be packed when they are fully developed, which means that they contain sufficient sugar to enable the fruit to mature properly. Immature fruit must not be marketed, and if an attempt is made to do so the fruit is liable to seizure and the sender of the fruit to prosecution under the abovenamed regulations. Further, the fruit must be graded to size and the number of fruit contained in a case must be marked thereon. Immature fruit must not be sent. For canning, the fruit should be partly coloured; immature fruit is useless; and over-ripe fruit is just as bad. The former is deficient in colour and flavour and the latter is "winey" and of poor texture, so that it will not stand the necessary preparation and cooking.

Should there be a glut of bananas, growers are advised to try and convert any thoroughly ripe fruit into banana figs.

The fruit must be thoroughly ripe, so that it will peel easily, and it should be laid in a single layer on wooden trays and placed in the sun to dry. If the weather is settled, there is little trouble, but if there is any sign of rain the trays must be stacked till the weather is again fine, and the top of the stack protected from the rain. To facilitate drying, the fruit may be cut in half lengthways. It should be dried till a small portion rubbed between the finger and thumb shows no sign of moisture. It can be placed in a suitable box to sweat for a few days, after which it can be dipped in boiling water to destroy any moth or insect eggs that may have been laid on it during the process of drying and sweating. It is then placed in the sun to dry off any moisture, and when quite dry it should be at once packed into boxes lined with clean white paper. It must be firmly packed, when, if it has been properly dried, it will keep a considerable time. It can be used in many ways, and forms an excellent substitute for raisins, sultanas, currants, or other dried fruits used in making fruit cakes and other comestibles. Banana figs will be found useful for home consumption, and it is possible that a trade may be built up that will absorb a quantity of fruit that would otherwise go to waste.

THE GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

JANUARY is a busy month in the Granite Belt, and orchardists are fully occupied gathering, packing, and marketing the crop of midseason fruits, consisting of plums of several kinds, peaches, nectarines, pears, and apples. The majority of these fruits are better keepers and carriers than those that ripen earlier in the season; at the same time, the period of usefulness of any particular fruit is very limited, and it must be marketed and disposed of with as little delay as possible.

With the great increase in production, owing to the large area of new orchards coming into bearing and the increasing yields of those orchards that have not come into full profit, there is not likely to be any market for immature or inferior fruit. There will be ample good fruit to fully supply the markets that are available and accessible. Much of the fruit will not carry far beyond the metropolitan market, but firm-fleshed plums, clingstone peaches, and good firm apples should stand the journey to the Central District, and, if they are very carefully selected, handled in a manner to prevent any bruising, and properly graded and packed, they should carry as far as Townsville. Growers must remember that, given a market fully supplied with fruit, only such fruit as reaches that market in first-class condition is likely to bring a price that will pay them; consequently the grower who takes the trouble to send nothing but perfect fruit; to grade it for size and colour, to pack it carefully and honestly, placing only one-sized fruit, of even quality and even colour, in a case and packing it so that that it will carry without bruising, and, when opened up for sale, will show to the best advantage, is pretty certain of making good. On the other hand, the careless grower who sends inferior badly graded, or badly packed fruit is very likely to find when the returns for the sale of this fruit are to hand that after paying expenses there is little, if anything, left. The expense of marketing the fruit is practically the same in both cases.

Then why "spoil the ship for a ha'p'orth of tar" after you have gone to the expense of pruning, spraying, manuring, and cultivating your orchard? Why not try and get a maximum return for your labour by marketing your fruit properly? The packing of all kinds of fruit is a fairly simple matter, provided you will remember—

(1.) That the fruit must be fully developed, but yet quite firm when gathered.

(2.) That it must be handled like eggs, as a bruised fruit is a spoilt fruit, and, when packed with sound fruit, spoils them also.

(3.) That only one-sized fruit, of an even degree of ripeness and colour, must be packed in a case.

(4.) That the fruit must be so packed that it will not shift, for if it is loosely packed it will be so bruised when it reaches its destination that it will be of little value. At the same time, it must not be packed so tightly as to crush the fruit.

If these simple rules are borne in mind, growers will find that much of the blame they frequently attribute to the fruit merchants or middlemen is actually the result of their own lack of care. Fruit that opens up in the pink of condition sells itself, whereas any fruit that opens up indifferently is hard to sell on any except a bare

market, and on a glutted market is either unsaleable or realises such a poor price that the grower is frequently out of pocket, and would have been better off had he not attempted to market it.

If spraying with arsenate of lead and systematic bandaging has been properly carried out, there will be comparatively few codlin moths to destroy the later ripening pip fruits; but if these essential operations have been neglected or carelessly carried out a number of moths will hatch out and the eggs laid by them will turn to larvæ that will do much damage, in some cases even more than that caused by the first broods that attack the fruit as soon as it is formed. Where there is any likelihood, therefore, of a late crop of moths, spraying with arsenate of lead must be continued if the late crop of pip fruits is to be kept free from this serious pest.

Fruit fly must be systematically fought, and on no account must any fly-infected fruit be allowed to lie about on the ground and breed this pest, to do further damage to the later ripening fruits.

Citrus orchards will need to be kept well cultivated in the drier and warmer parts of the State, and, where necessary, the trees should be irrigated. If scale insects are present, the trees should be either sprayed or, better still, treated with hydrocyanic acid gas.

Western grapes are in full season, and if they are to be sent long distances by rail then they are all the better to be cut some hours before they are packed, as this tends to wilt the stems and keep the berries from falling off in transit. The fruit must be perfectly dry when packed, and should be as cool as possible. It must be firmly packed, as a slack-packed case always carries badly and the fruit opens up in a more or less bruised condition.

Farm Notes for January.

FIELD.—The main business of the field during this month will be ploughing and preparing the land for the potato and other future crops, and keeping all growing crops clean. Great care must be exercised in the selection of seed potatoes to ensure their not being affected by the Irish blight. Never allow weeds to seed. This may be unavoidable in the event of long-continued heavy rains, but every effort should be made to prevent the weeds coming to maturity. A little maize may still be sown for a late crop. Sow sorghum, imphee, Cape barley, vetches, panicum, teosinte, rye, and cowpeas. In some very early localities, potatoes may be sown but there is considerable risk in sowing during this month, and it may be looked upon merely as an experiment. Plant potatoes whole. Early-sown cotton will be in bloom.

On coastal and intercoastal scrub districts, where recently burnt-off scrub lands are ready for the reception of seed of summer-growing grasses, sowing may commence as soon as suitable weather is experienced. Much disappointment may be saved, and subsequent expenditure obviated, by ensuring that only good germinable grass seed is sown, of kinds and in quantities to suit local conditions, the circumstances being kept in mind that a good stand of grass is the principal factor in keeping down weeds and undergrowth.

In all districts where wheat, barley, oats, canary seed, and similar crops have recently been harvested, the practice of breaking up the surface soil on the cropped areas should invariably be adopted. Soil put into fit condition in this way will "trap" moisture and admit of the rains percolating into the subsoil, where the moisture necessary for the production of a succeeding crop can be held, provided attention is given to the maintenance of a surface mulch, and to the removal, by regular cultivation, of volunteer growths of all kinds. If not already seen to, all harvesting machinery should be put under cover, overhauled, and the woodwork painted where required.

Where maize and all summer-growing "hoed" crops are not too far advanced for the purpose, they should be kept in a well-cultivated condition with the horse hoe. Young maize and sorghum crops will derive much benefit by harrowing them, in the same direction as the rows are running, using light lever harrows with the tines set back at an angle to obviate dragging out of plants, but the work should not be done in the heat of the day.

Quick-maturing varieties of maize and sorghum may still be sown in the early part of the month in coastal areas where early frosts are not expected.

Succession sowings may be made of a number of quick-growing summer fodder crops—Sudan grass, Japanese and French millet, white panicum, and liberty millet (panicum). In favourable situations, both "grain" and "saccharine" sorghums may still be grown; also maize, for fodder purposes.

Fodder conservation should be the aim of everyone who derives a living from stock, particularly the dairyman; the present is an important period to plan cropping arrangements. Exclusive of the main crops for feeding-off (when fodder is suitable for this purpose), ample provision should be made for ensilage crops to be conserved in silo or stack. As natural and summer-growing artificial grasses may be expected to lose some of their succulence in autumn, and more of it in winter and early spring, the cropping "layout" to provide a continuity of succulent green fodder throughout the season calls for thorough and deep cultivation and the building up of the fertility and moisture-holding capacity of the soil. Planter's friend (sorghum) may be sown as a broadcast crop at the latter end of the month for cutting and feeding to cattle in the autumn and early winter. Strips of land should be prepared also for a succession sowing about the second week in February, and for winter-growing fodder crops.

MEAT PROBLEMS.

Lecturing to the members of the Metropolitan Branch of the Agricultural Bureau in Sydney on 14th November on the subject of "The Meat Industry of the World," Mr. Edmund Burke, of the Newcastle Abattoir Board, made the following points in dealing with the Australian situation in relation to world progress:—

The intensive publicity on the subject of meat production is being so well handled by the Empire Press that reports from all Dominions indicate definite progress in dealing with the problems of correct breeding and better feeding.

The initiative inborn in the stockmen of Australia, properly backed by constructive planning, will surely place this branch of agriculture well in the forefront of world quality within the next few years.

The differences in agricultural policy in dealing with the production and marketing of beef, mutton and lamb, and pork will give scope for the co-operation of the small farmer with the large breeder.

Australia's problem is as much one of transportation for inland development as it is for marketing.

Smaller subdivision in relation to a vast extension of water supply will be the means of giving quality as well as continuity of supply its much-needed assistance.

Railway transport in the many extensive yet slightly developed areas is a national matter of grave importance, and the surest incentive to a vigorous increase in national population.

All parties to the meat industry in Australia—producers, distributors, and consumers—must be brought into line in their mutual interests if Australia is to speed up development.

Properly used by means of better pastures, water, and transport, Australia lacks nothing that others have, but is blessed naturally by a climate that is becoming world-famous.

The growing youth of Australia will be proud of its agricultural achievements, and keen to join in the work if he is kept informed of the marvellous developments in scientific agriculture.

There is, notwithstanding a fierce economic nationalism to-day, a ray of hope that the world's demand for bread and meat will be so insistent that it must be met.

Agricultural development in Australia, with its call to human happiness, if made known to the citizens of Great Britain, will be the most popular public policy of the twentieth century.

In our plea for better stock, let us be convinced that pedigree grasses are just as necessary to Australia as pedigree stock if we are to give ourselves and the oversea markets the best of quality in the most economical way.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF OCTOBER IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALL DURING 1935, AND 1934, FOR COMPARISON.

Divisions and Stations.	Average Rainfall.		Total Rainfall.		Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	Oct.,	No. of Years' Records.	Oct., 1935.	Oct., 1934.		Oct.,	No. of Years' Records.	Oct., 1935.	Oct., 1934.
North Coast.	In.		In.	In.	*Central Highlands.*	In.		In.	In.
Atherton	0·92	34	1·75	0·91	Clermont	1·33	64	1·04	2·09
Cairns	2·11	53	5·47	1·26	Gindie	1·41	36	..	3·11
Cardwell	2·07	63	2·99	2·10	Springsure ..	1·66	66	2·14	2·74
Cooktown	1·05	59	0·77	1·37					
Herberton	0·98	49	1·46	0·58					
Ingham	1·95	43	1·73	1·99					
Innisfail	3·20	54	9·94	3·03					
Mossman Mill ..	3·04	22	5·55	3·62	*Darling Downs.*				
Townsville	1·37	64	0·19	0·40					
Central Coast.					Dalby	2·06	65	1·72	1·45
					Emu Vale	2·21	39	2·17	2·98
Ayr	0·96	48	0·08	0·30	Hermitage	1·91	29	2·15	2·26
Bowen	1·04	64	0·05	0·44	Jimbour	1·89	47	2·32	1·33
Charters Towers ..	0·72	53	1·53	0·91	Miles	2·05	50	2·34	2·62
Mackay	1·70	64	2·53	3·65	Stanthorpe	2·57	62	1·89	3·98
Proserpine	1·70	32	0·12	0·89	Toowoomba	2·56	63	3·89	3·12
St. Lawrence ..	1·78	64	2·73	2·06	Warwick	2·31	70	2·91	2·53
South Coast.									
					Maranoa.				
Biggenden	2·43	36	3·44	3·39					
Bundaberg	2·12	52	1·40	2·89	Roma	1·77	61	2·72	2·64
Brisbane	2·57	84	4·93	1·34					
Caboolture	2·51	48	4·18	1·94					
Childers	2·72	40	3·19	3·87					
Crohamhurst ..	3·27	42	4·92	2·22					
Esk	2·51	48	3·61	1·76					
Gayndah	2·41	64	2·20	3·26					
Gympie	2·71	65	3·34	2·66	*State Farms, &c.*				
Kilkivan	2·63	56	1·88	3·55					
Maryborough ..	2·79	64	1·94	3·88	Bungeworgorai ..	1·50	21	..	2·75
Nambour	3·06	39	5·64	4·81	Gatton College ..	1·99	36	2·81	1·95
Nanango	2·24	53	4·24	1·47	Kairi	1·02	21	..	0·59
Rockhampton ..	1·80	64	0·74	3·21	Mackay Sugar Experiment Station	1·41	38	2·62	2·14
Woodford	2·54	48	4·60	1·60					

A. S. RICHARDS, Divisional Meteorologist.

CLIMATOLOGICAL TABLE—OCTOBER, 1935.

COMPILED FROM TELEGRAPHIC REPORTS.

Districts and Stations.	Atmospheric Pressure. Mean 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	29·93	85	70	89	26	67	2	77	4
Herberton	..	80	59	91	23,24,31	45	31	146	8
Rockhampton	30·04	86	66	101	29	60	1, 3	74	5
Brisbane	30·08	79	61	91	23	55	3	493	11
Darling Downs.									
Dalby	30·04	82	55	91	29	41	6	172	7
Stanthorpe	..	75	48	84	28	30	13	189	7
Toowoomba	..	75	54	88	28	43	6	389	9
Mid-Interior.									
Georgetown	29·92	96	71	105	31	63	30	52	2
Longreach	29·96	95	59	106	30	51	25	161	5
Mitchell	30·01	84	55	95	28	40	6	100	6
Western.									
Burketown	29·90	93	73	98	24, 31	64	2	77	2
Boulia	29·92	96	66	105	29, 31	55	6, 7	63	3
Thargomindah	30·00	86	61	103	28	49	13	192	3

ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY D. EGLINTON AND A. C. EGLINTON.

TIMES OF SUNRISE, SUNSET, AND MOONRISE.

AT WARWICK.

	December, 1935.		January, 1936.		Dec., 1935.	Jan., 1936.
	Rises.	Sets.	Rises.	Sets.	Rises.	Rises.
					a.m.	a.m.
1	4·49	6·32	5·0	6·50	9·19	11·24
					p.m.	p.m.
2	4·49	6·33	5·1	6·50	10·20	12·27
3	4·49	6·34	5·1	6·50	11·24	1·31
					p.m.	
4	4·49	6·34	5·2	6·51	12·26	2·33
5	4·49	6·35	5·2	6·51	1·29	3·37
6	4·49	6·36	5·3	6·51	2·35	4·40
7	4·50	6·36	5·3	6·51	3·41	5·38
8	4·50	6·37	5·4	6·52	4·49	6·29
9	4·50	6·38	5·5	6·52	5·52	7·23
10	4·50	6·38	5·6	6·52	6·54	7·53
11	4·50	6·39	5·7	6·52	7·48	8·27
12	4·51	6·39	5·7	6·52	8·38	9·0
13	4·51	6·40	5·8	6·52	9·20	9·31
14	4·51	6·41	5·9	6·51	9·55	9·59
15	4·51	6·41	5·10	6·51	10·27	10·30
16	4·52	6·42	5·11	6·51	10·58	11·0
17	4·52	6·43	5·11	6·51	11·27	11·34
18	4·52	6·43	5·12	6·51	11·56	
					a.m.	
19	4·53	6·44	5·13	6·51	a.m.	12·10
20	4·53	6·44	5·14	6·50	12·28	12·55
21	4·53	6·45	5·15	6·50	1·1	1·46
22	4·54	6·46	5·16	6·50	1·37	2·42
23	4·54	6·46	5·17	6·50	2·17	3·43
24	4·55	6·47	5·18	6·50	3·6	4·48
25	4·55	6·47	5·18	6·49	4·0	5·59
26	4·56	6·48	5·19	6·49	5·1	7·2
27	4·56	6·48	5·20	6·49	6·3	8·10
28	4·57	6·49	5·21	6·49	7·9	9·13
29	4·58	6·49	5·21	6·48	8·14	10·19
30	4·59	6·50	5·22	6·48	9·17	11·23
31	5·0	6·50	5·23	6·48	10·21	12·29

3 Dec.	☾ First Quarter	5	28 p.m.
10 ,,	○ Full Moon	1	10 p.m.
18 ,,	☽ Last Quarter	7	57 a.m.
26 ,,	● New Moon	3	49 p.m.

Perigee, 26th December, at 8.6 a.m.
Apogee, 18th December, at 12.42 p.m.
Perigee, 31st December, at 1.24 a.m.

At 5 o'clock in the morning of the 23rd the Sun will reach its extreme southern Declination, 23 degrees, 27 minutes south of the Celestial Equator. At midday it may be seen to light up the hearthstone at Rockhampton, wherever the chimney is perfectly straight. By the 31st the Sun will be distinctly on its way northward. A transit instrument will show that by that time it has returned a quarter of a degree on its long six months journey northwards of nearly 47 degrees.

A peculiarity of the month of December this year is that so many of the general phenomeua are of a negative character as far as Queensland is concerned. The last of the unusual number seven of eclipses will be over an hour and 34 minutes before the Sun rises at Brisbane on the 26th. Seldom does the magnificent phenomenon of an Annular Eclipse take place where there are fewer persons to enjoy it. Far down in the South Pacific Ocean spectators will be limited almost entirely to those on board ship. South America and New Zealand get merely a glimpse of the Sun being affected, but not of the golden ring. Those in the Altantic Ocean will be less restricted even to as near the equator as we are some indication of the eclipse will be possible. Mercury sets at 6.11 p.m., 21 minutes before the Sun on the 1st and at 6.49 p.m., only 8 minutes before the Sun on the 15th.

Venus rises at 2.11 a.m. on the 1st and at 2.13 a.m. on the 15th.

Mars sets at 9.57 p.m. on the 1st and at 9.44 p.m. on the 15th.

Jupiter rises at 4.39 a.m. on the 1st and at 3.54 a.m. on the 15th.

Saturn rises at 11.13 a.m. and sets at 12.12 p.m. on the 1st; on the 15th it rises at 10.19 a.m. and sets at 11.19 p.m.

When the Southern Cross comes into view about 10 p.m. on the 1st it will be about 15 degrees west of the Southern Meridian and will remain above the horizon till day-dawn. The same will occur on the 16th an hour earlier.

Phases of the Moon, Occultations, &c.

2 Jan.,	☾ First Quarter	9	12 a.m.
9 ,,	○ Full Moon	12	42 a.m.
17 ,,	☽ Last Quarter	10	36 a.m.
24 ,,	● New Moon	12	36 p.m.
31 ,,	First Quarter	9	36 a.m.

Apogee, 15th January, at 9.48 a.m.
Perigee, 26th January, at 3.30 a.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.