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QUEENSLAND AGRICULTURAL JOURNAL

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Event and Comment

Farming as a Way of Life.

BY its very nature the agricultural problem is just as much an urban problem as it is a rural problem, and there is far more in it than a question of cheap and plentiful food supplies.

In its highest expression farming is a way of life, although we cannot get away from the fact that farming is a business as well. A right relationship to the land brings with it right human relationship —the natural relationship of people engaged in the same job, who know the job and have a job worth knowing. In farming, when regarded as a way of life, there is wisdom and contentment. Such contentment, however, is often mistaken by unthinking townsmen for slowness in the uptake, but farmers know from experience that "the mills of God grind slowly and they grind exceeding small." A lot is heard about the innate conservatism of the farmer and his dislike for regimentation. Well, there is nothing much wrong with that, and there is a lot to be said for independence of thought, independence of outlook, and independence of action when it is the right sort of action and in conformity with social needs, duties, and responsibilities. Regarded broadly, the farmer's mental conservatism, as it is called, is wholly natural and fundamentally sound. It comes from an attitude of mind which is absorbed rather than consciously acquired by people who live in constant contact with living things. Farmers know that the behaviour of living things, whether plants or animals, does not

necessarily conform to the ideas of theorists, and that nature will not be speeded up. They know from experience that their business cannot, of its very character, accommodate itself to rapidly changing conditions. They know that nothing can alter the facts that most crops and small farm animals take a big part of a year to come to maturity; that the growth of larger animals takes several years; that the building up of a herd takes many years; a fruit tree may have a life of very many years; and the building up of the condition of the soil, which is the foundation of everything, can never be said to be finished. The characteristics of a valuable flock or herd cannot be altered, and altered back again to suit the capricious demands of a fluctuating market. A farmer has to think and plan ahead, not for a month or a year but possibly for two to five or even ten years; all the time balancing every factor—weather and general seasonal conditions, pasture, cultivation, livestock, fertilizing, and man-power; and watching growth and planning for improvement—yet, not only thinking and watching, but working strenuously and making quick decisions all the time. Truly a man's job, but one that can be easily spoilt by chopping and changing what should be settled policy.

So farmers naturally do not take too kindly to any form of interference based on purely theoretical considerations. They know that farming cannot be treated as merely "a mixture of chemistry and cost accountancy." They know that nature will not be driven and that if you try she hits back—slowly, perhaps, but very, very hard.

Farmers have a reputation for individualism and independence. These are sound qualities compatible with the highest forms of social organisation—in fact, they give it undoubted value, for when individualism and independence are the characteristics of the members of an organisation they put the stamp of quality on a whole organisation. "Nothing can grow downwards from the top."

Farming certainly calls for a high degree of skill and as much, if not more intelligence than most town occupations. Farming is more than an industry, it is an art and a craft and at its highest it is a way of life.

Agriculture in Practice.

WAR-TIME farming in Britain has brought out the soundness of many of the old maxims which guided our forefathers in the right use of the land. Those old producers may not have had any scientific training, but they had plenty of common sense. And if science may still be defined as organised common sense—well, they had plenty of science, too.

The checking of soil exhaustion and the maintenance of balance in the soil especially are practices which are bearing the test of the intense cultivation necessary for the war-time feeding of the people. The problem of maintaining humus and soil fertility under modern systems of farming and the extent to which chemical fertilizers can make up for organic manures is a subject in which there are still differences of opinion. Taking the common-sense view, however, in absence of humus or vegetable matter in the soil, overdoses of chemical or mineral fertilizers may contribute to soil exhaustion without our knowing it.

That was demonstrated in New Zealand—which has probably the finest and least adulterated pastures in the world—by excessive dressings of nitrogenous fertilizers in areas suffering from serious phosphatic starvation.

In the Old Country it has been found that, although less fertilizer is used by the average small farmer there than in other countries, much money is wasted by those who can least afford it under the impression that the same medicine, provided by the chemist, is applicable to all soil and plant requirements.

One very important thing is emerging from war-time experience in Britain, and that is "the need for more comprehensive planning of the nation's agriculture and the nation's needs, and a more economic system of using available implements and labour over larger areas than existing farm units."

Other teachings of war-time experience are that "the least skilled man on a farm needs more wit than the so-called unskilled labourers of other industries." It is also advocated that financial assistance should "go to the good farmers who feed the land, as tradition says it should be fed, and none should go to those who merely exploit the land." That is how one acknowledged agricultural authority has put it and he goes on to say: "We are surrounded by a world of nonsense, built out of pieces of sense, put together wrongly. This nonsense world has too much chemistry, forgetting the living earth."

Perhaps he is right. Looking at it another way, many of us try to obtain health from a medicine bottle or a pill box when our common sense tells us we should maintain fitness by eating the right sort of food in the right proportion at the right time, and also taking the right sort of physical exercise at the right time. The same thing, it seems, applies largely to our soil in crop production.

When the War is Over.

THERE is a lot of talk these days about what should be done to meet the problems which are sure to develop when the war ends. Plainly, the first thing to be done is to clarify the general principles of reconstruction and think hard about those principles before going on with the planning. There is already a strong feeling against the repetition of the mistakes made after the last war when thinking came after the planning, or rather lack of planning. The immediate urgency is the preparation of plans for the post-war period, so that when peace does come nothing of real importance shall have been left undone. Vision of possibilities should be reinforced with a determination to make the best of the opportunities which peace will bring, and that will ensure steadiness in the time of ordeal yet to come and a stimulus to co-operate in the work of rebuilding with something of the unity and energy at present displayed in the national war effort.

Tremendous demands are sure to be made on what has been called "the intelligent use of our resources on scientific lines"—in other words, the lines of common sense. Among other obvious things to be considered are the interlocking of rural and other industries and food production policy and nutrition. After all, national planning is a vital part of the national war effort and one of the ways in which we can make "democracy not only something to fight for, but something to fight with."

What are required are foresight, constructive imagination, clear thinking, and sound planning in preparation for the new problems and the new opportunities which are certain to arise when the war is over.

The Sorghum Midge.

D. O. ATHERTON, M.Sc., Research Officer.

DURING recent years there has been a rapid expansion of the area sown to grain sorghums in districts with an annual rainfall of 20 to 30 inches, such as the Darling Downs, Maranoa, Upper Burnett, Dawson Valley, and similar parts of south-eastern and central Queensland. Yields have, however, been appreciably reduced in some areas by a very small fly known as the sorghum midge*. This insect was first found in Queensland during 1928, but may have been present for some years previously. It was originally described from Texas, in the United States of America, in 1898, but is said to have been introduced into that country from Southern Asia. The insect has now been recorded in most of the countries where fodder and grain crops of the genus *Sorghum* are grown. In Queensland, the injury is most important and obvious in the grain sorghums, but other crops, such as broom millet, Sudan grass, and saccharine sorghums, are also attacked. The notorious weed, Johnson grass, is also a host in Queensland, but as yet there is no evidence that native grasses are attacked, though hosts outside the genus *Sorghum* are reported from other countries.

Injury.

Many farmers have suffered crop damage from sorghum midge without realising the cause of their losses. When a well-grown grain sorghum crop shows a large percentage of sterile or partially sterile heads, it is likely that the sorghum midge has been active. Damage by this pest is confined to the young seeds developing in the head and no other part of the plant is affected in any way. The effects of severe infestation are very similar in appearance to frost damage in a late planted crop, but may readily be distinguished from the latter on close examination. When a sorghum crop has been frosted, none of the seeds develop into mature grain, but even in a heavily midge-infested crop one or more grains usually occur on otherwise sterile heads (Plate 158). Injury is usually more severe in late maturing crops than in those which mature early and, in varieties whose tillers mature some weeks later than the central head, the damage is principally in the tillers.

Life History.

The sorghum midge passes through the usual developmental stages —egg, larva, pupa, and adult. The adult (Plate 159; figs. 4 and 5) is a very small fly about one-twelfth of an inch long with relatively long antennæ, orange abdomen, dusky thorax, and transparent wings. The female is slightly larger than the male and bears a well-developed ovipositor at the tip of the abdomen. The midge may be seen swarming about the heads of any heavily infested crop during the summer, particularly on a sunny morning. The female lives only a day or two after emergence in the summer, but even in so short a life it lays about 100 eggs; the male probably survives not more than a few hours.

The extremely small, white elongate eggs (Plate 159; fig. 1) are laid singly between the glumes of the flower shortly after it opens. From the egg, which has an incubation period of about two days in

* *Contarinia sorghicola* Coq.

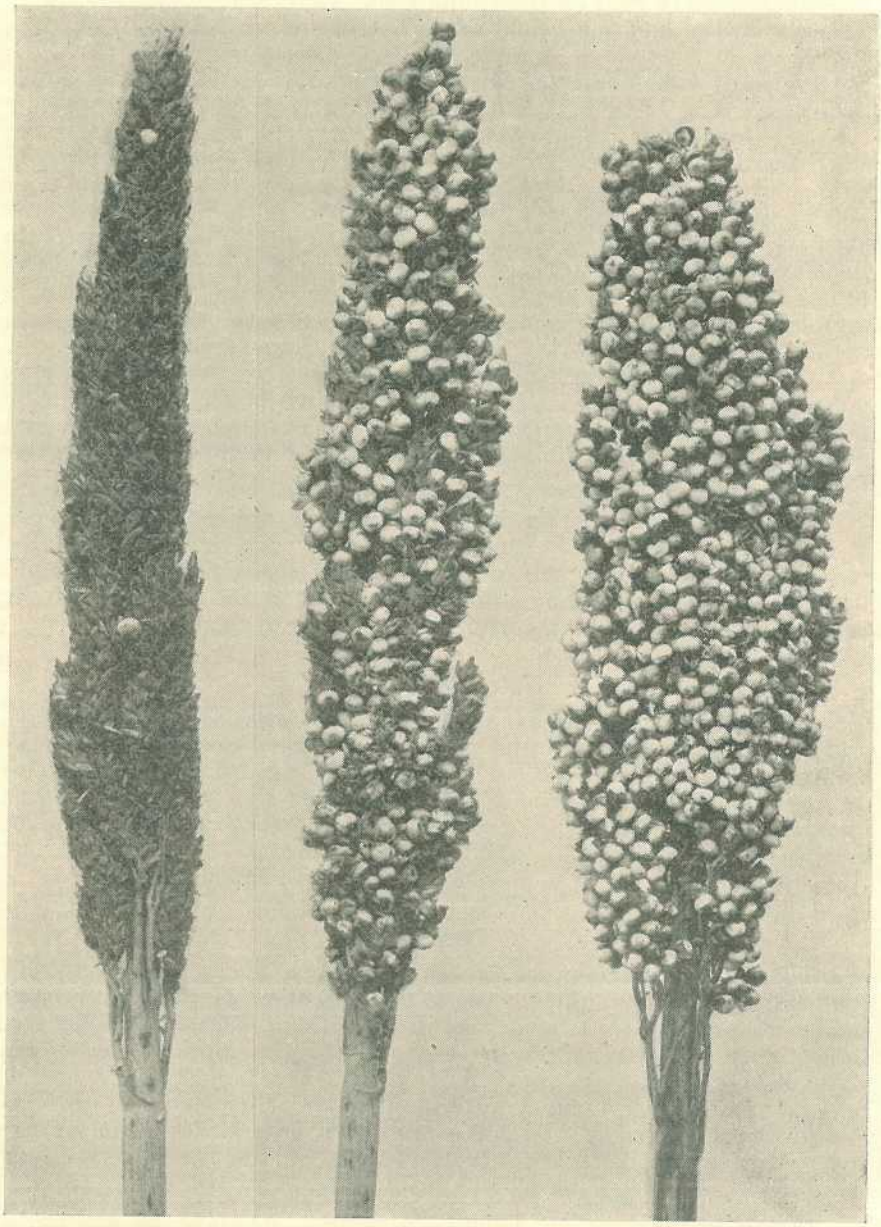

Fig. 1. Fig. 2. Fig. 3.

Plate 158.

SORGHUM HEADS INJURED BY MIDGE—Fig. 1.—Severely infested head with few grains; fig. 2—moderately infested head with about one-third of the grains developed; fig. 3—normal head with almost all the grains developed.

summer, a very small, white, legless larva (Plate 159; fig. 2) emerges and commences to feed on the young seed. Several larvæ may occur in a single flower, and the injury is such that the seed fails to develop. The larva is full-grown in a week or ten days after it emerges from the egg and is then orange-red in colour and about one-twelfth of an inch long. The full-grown larva may or may not spin a very delicate cocoon before changing into the pupa (Plate 159; fig. 3). The latter, when first formed, is nearly one-sixteenth of an inch long and uniformly reddish-orange in colour, but within a day or two the head and appendages turn dark-brown or nearly black. The pupal stage lasts about three days in summer, and by that time the pupa has moved up the now sterile flower until it protrudes from the tips of the glumes (Plate 159; fig. 7). Here the adult fly emerges and development is complete, the whole life-cycle having occupied from twelve to fifteen days. At the onset of winter, the full-grown larvæ spin flimsy cocoons and development ceases until spring, when most of the over-wintering larvæ pupate and later emerge as adults, which begin the first spring generation. A few hibernate right through the summer, however, and do not emerge until the following spring, about eighteen months after reaching full size.

When the adults emerge in the spring they are comparatively few in number, but as females can lay about 100 eggs each and the time required for a summer generation is only a fortnight, a very rapid increase in the midge population occurs early in the season wherever host plants are continuously available in the flowering stage.

Natural Enemies.

Small insectivorous birds take their toll of these, as of other insects, and enormous numbers of the pest can be found securely caught in spider webs spun about the seed heads in an infested field. Ants also destroy numbers of larvæ and pupæ. At least two very small wasps are parasitic on the larval or pupal stages of the sorghum midge in south-eastern Queensland. Sometimes these wasps are abundant, but they are far from being sufficiently effective to control the pest.

Control.

The economic loss caused by the sorghum midge is almost entirely confined to grain sorghums, though the reduction of yield in related fodder crops grown for seed may be serious at times. Obviously a fodder crop still has fair value even though the grain is destroyed, while broom millet loses little of its value even though many of the flowers are sterile. Consequently, control recommendations are concerned almost exclusively with the protection of grain sorghum crops; any reference to other hosts is incidental and due to their influence on the yield of grain sorghums.

Owing to the breeding habits of the pest, it would be extremely difficult to apply an insecticide effectively, quite apart from the prohibitive expense of using any such direct control measures on a field crop.

DESCRIPTION OF PLATE 159.

SORGHUM MIDGE.—Fig. 1—Egg x 200; fig. 2—half-grown larva x 25; fig. 3—pupa x 25; fig. 4—female, side view x 25; fig. 5—male, top view x 25; fig. 6—part of damaged head showing odd sound grains x 7; fig. 7—tip of flower, showing cast pupal skin x 25.

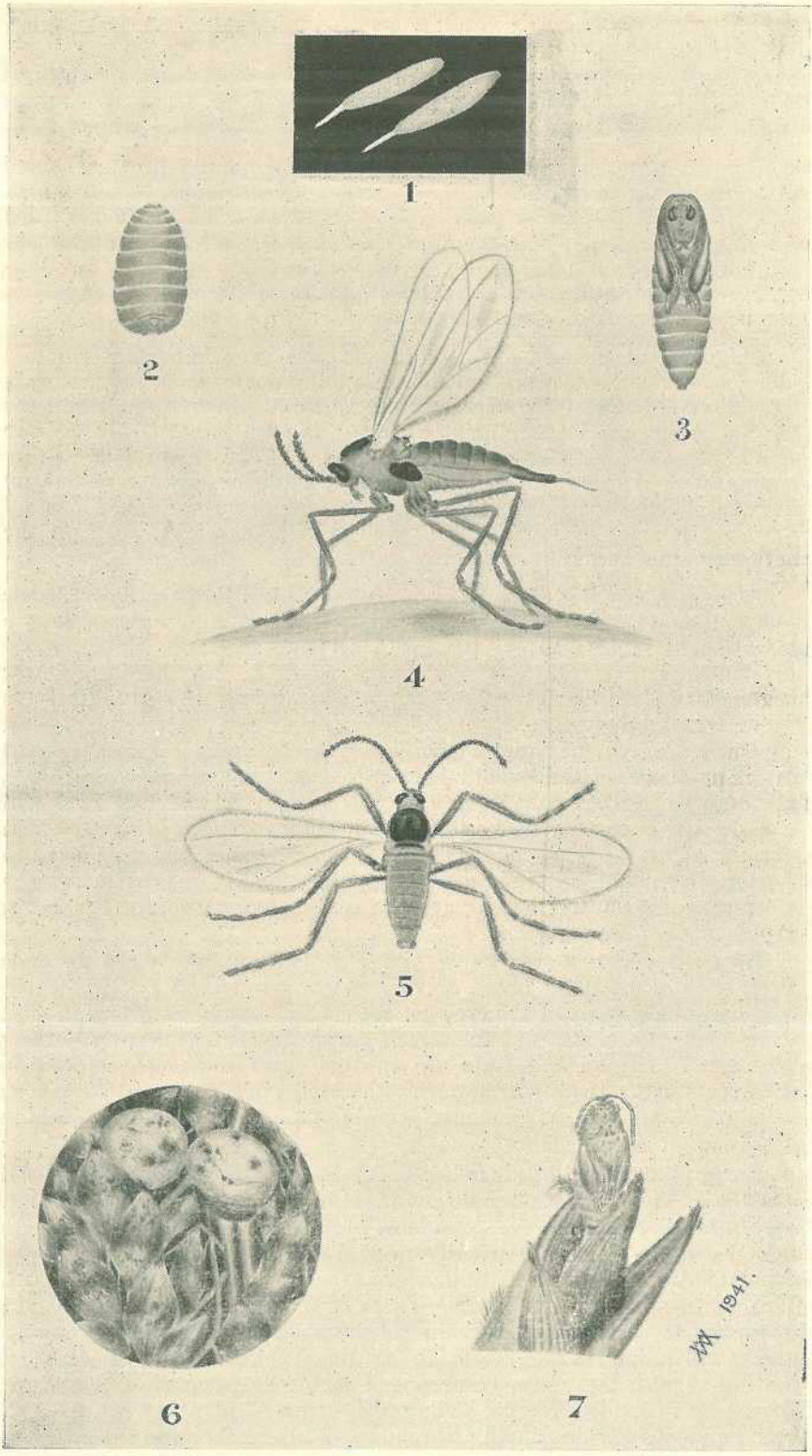

Plate 159.
SORGHUM MIDGE.

Consequently, the losses caused by midge can only be reduced by cultural operations and cropping practices, which tend to keep the midge population at low levels when the crop is in the flowering stage.

For all practical purposes the list of host plants in Queensland can be restricted to grain sorghums, saccharine sorghums, broom millet, Sudan grass, and Johnson grass. Johnson grass is normally regarded as a dangerous weed, and the fact that it is an alternative host for sorghum midge is but one more reason for its eradication. If eradication is not practicable, at least it should not be allowed to flower earlier than near-by crops of grain sorghums.

Sudan grass and saccharine sorghums are very important summer fodder crops in the Queensland districts climatically suitable for grain sorghum production. The acreage under broom millet is small and the varieties grown are late-maturing; hence this crop is not likely to have much effect on infestation in grain sorghums. The cultural and cropping problem is therefore a question of devising a farming system by which saccharine sorghums, Sudan grass, and grain sorghums can all be grown in more or less close proximity without midge losses in the grain sorghums becoming excessive.

To ensure this, Sudan grass must be handled so that the flower heads produced by it are not left in the field long enough to breed out a generation of midges before the grain sorghum flowers. Sudan grass is normally planted with the early spring rains. It may therefore flower some weeks before the later planted grain sorghum. If this is likely to happen, the crop should be cut for hay a week after flowering begins. Sudan grass hay made from a non-flowering crop may be as dangerous to stock as the grass itself would be if grazed at the same stage of growth. Bulk may be lost by so haying the crop, but any loss of this kind will be negligible compared with that which can be expected in the grain sorghums if this precaution is omitted. Saccharine sorghums usually take longer to mature than grain sorghums and, if planted after the latter, they should not accentuate the midge infestation in the grain crop.

In areas where the sorghum midge is common, the yield depends largely on the tillering habit of the variety grown. Varieties which carry the greater part of the crop on the central heads, or, alternatively, mature their tillers at about the same time as the central head, generally suffer least. Hegari and Kalo are credited with these characteristics. Whatever variety is grown, however, the seed must be true to type, or irregular flowering will create conditions favourable for midge infestation.

Early planting will reduce losses, for the crop then heads before the sorghum midge population becomes high in late summer and autumn. Early planting is, however, seldom practicable because the labour resources of the farm are usually needed for preparing the land and sowing fodder crops such as Sudan grass, white panicum, and Japanese millet when spring rains occur. There is a further difficulty, too, in the fact that early planted grain sorghum crops will mature during summer when harvesting is apt to be difficult owing to wet weather. Planting should, therefore, be arranged so far as is possible to mature the crop by the end of March. The precise time of planting will depend on the incidence of rains during November and December and the growing

period of the variety to be sown. Of the better-known varieties, Wheatland Milo is somewhat slower to mature than Kalo or Hegari, and should be planted earlier.

As the pest over-winters on the remnants of grain sorghum, saccharine sorghum, and Sudan grass crops, all paddocks should be cleaned up by mid-September in each year. This may be done by ploughing alone or, preferably, by ploughing after the old plants have first been raked up and burned. Large numbers of the midge will then be destroyed.

To sum up, control measures should be based on the reasonably well-established fact that midge damage on the farm is directly correlated with the management of crops in the *Sorghum* group. The farmer must, therefore (*a*) destroy all residues of grain and fodder sorghums by mid-September; (*b*) sow saccharine sorghums after the grain sorghum crop has been planted; (*c*) cut and hay any Sudan grass a week after flowering begins should there be any likelihood of its heading before the grain sorghum; (*d*) sow only one true-to-type variety of grain sorghum in a single planting so that it will mature towards the end of the wet season.

POTATO SEED TREATMENT.

Two methods are available for disinfecting seed potatoes—hot formalin solution; and acid corrosive sublimate. The latter is more convenient, as no heating is required. The potatoes should be washed but not cut before treating.

Hot Formalin.—Prepare a formalin solution by mixing 1 pint of commercial formalin (40 per cent. formaldehyde) with 15 gallons of water. Heat to 125 deg. Fahr. and arrange for maintaining the temperature at this point by building a small fire under the tank or by keeping some of the solution hot in a boiler so that a little of this may be added from time to time as the rest cools. No more than a 5 deg. variation in temperature either way during the operation should be allowed. Dip the seed tubers into the solution for two and a-half minutes in successive small quantities in crates or open sacks. Remove, and after draining excess solution back into the tank, cover the potatoes with bags or canvas for one hour to keep in the formalin fumes. Finally spread out to dry before planting.

Acid Corrosive Sublimate.—Add ¼ lb. of corrosive sublimate and 1¼ lb. of hydrochloric acid (spirits of salts) to 12½ gallons of water. A wooden or well-painted vessel must be used, as this mixtures corrodes metal. When all the corrosive sublimate has dissolved, immerse the tubers (in lots of convenient size) for five minutes, and then spread out to dry thoroughly. The dipping is preferably carried out in wooden crates rather than bags. The solution loses its strength gradually, so that a fresh quantity should be made up after not more than ten successive lots have been treated.

Acid corrosive sublimate is best applied to the seed at least three months before use or, if this is not possible, then immediately prior to planting. Otherwise some injury or delay in germination may occur. Corrosive sublimate is a deadly poison and must be used with care. All treated tubers must be planted or buried to avoid the possibility of their being consumed by any person or domestic animal. The solution may cause some irritation to the hands unless they are greased well before immersion.

These treatments are only effective if the soil on which the crop is grown is free from the parasitic fungi concerned. It is of little use treating seed to be planted in land which has borne a badly-diseased crop of potatoes within recent years.

The Avocado in Queensland.

R. L. PREST, Instructor in Fruit Culture.

THE avocado has for many years been a staple diet of the natives of Central and South America and the West Indies. From there it was introduced to the United States of America, where it is now extensively produced. Because of its highly nutritious qualities, it has been called "the fruit sensation of modern agriculture." The fruits of some varieties are pear-shaped, and because of this it is sometimes referred to as avocado pear. Its only resemblance to a pear, however, is the shape of some varieties. The fleshy edible portion inside the skin of the fruit may be upwards of an inch in thickness, and normally surrounds a single large seed. When ripe, the flesh is of the consistency and colour of butter and possesses a rich nutty flavour. The best varieties have a very high fat content—an average of 20 per cent. Because of its rich fat content, the avocado is not at first agreeable to all palates and is therefore often classed as a fruit for which a taste must be cultivated. Once having acquired the taste, however, people have been known to pay very high prices for the fruit. It may be eaten fresh or with the addition of pepper, salt, or vinegar, while it is a tasty addition to green vegetable salads.

In Queensland, in the commercial sense, it is a comparatively new fruit. The history of its introduction is somewhat obscure, but records indicate that the earlier introductions were planted as seedlings about thirty years ago. Many of these trees are still fruiting.

Plate 160.

A SMALL SOUTH COAST FOOTHILLS PLANTATION.

Observations show that avocados may be grown successfully on good soils along practically the whole of the Queensland seaboard. Trees planted in the foothill districts along the North and South Coasts and in North Queensland have grown vigorously and some are now in heavy bearing. These trees were mainly grown from seed introduced from time to time by the Department of Agriculture and Stock and the Queensland Acclimatisation Society. In recent years, budwood and grafted trees of promising varieties have also been imported from the United States by private individuals, while selections have been made of several locally-raised seedlings of excellent quality.

In the course of the past three years, investigations into the many angles of avocado-growing have been conducted, and though they are incomplete some valuable information has been compiled which will be of interest and value, not only to intending planters, but to orchardists already established.

In view of the fact that seedling avocados cannot be relied on to produce fruit true to type, and also because of the desirability of only planting trees of merit, it is considered advisable to indicate the direction in which improvement can be effected as the information is collated.

Plate 161.
Young Avocado Tree, "Nabal."

Botanical Status.

Botanically the avocado belongs to the genus *Persea*, and is a member of the laurel family. The home of the cultivated species of the genus is generally conceded to be Central and South America.

Plate 162.

"NABAL" AVOCADO FRUITING.

The early classification of the avocado grouped all varieties in one species, *Persea americana.* Later studies, however, have resulted in the making of two distinct species, *P. americana* and *P. drymifolia. P. americana* includes all varieties horticulturally grouped in the Guatemalan and West Indian races, and *P. drymifolia* those of the Mexican race.

Guatemalan Race.—The fruit of this group matures during winter and spring and possesses a woody granular skin of comparative thickness.

West Indian Race.—The fruit of varieties belonging to this group is summer and autumn maturing; is medium to large in size; the skin is of medium thickness and of a leathery texture.

Mexican Race.—In these varieties also, the fruit ripens during the summer and autmn; it is small to medium in size and thin skinned. The strong aniseed aroma given off by the crushed leaves is commonly used for identifying the members of this group.

The avocado is an evergreen, though some varieties are virtually leafless for a short period during blossoming. The habit of growth is variable, some trees being tall, upright, and unbranched, while others are small, well-branched, and spreading. The leaves also vary considerably in size and shape. Young foliage often exhibits various shades of red and bronze, but when mature it is usually a bright green in colour.

Plate 163.

"FUERTE" TREE.—Note straggling type growth.

The flowers are borne in terminal clusters; they are small, and pale-green or yellowish in colour. Each flower is perfect, having male and female organs. Differentiation between calyx and corolla does not occur; the petal-like structures are in reality perianth lobes. There are nine stamens arranged in series of three, and near their base are orange-coloured glands which secrete nectar. The anthers have four cells and are opened by means of small lids or valves which are hinged at the upper end. The ovary is one-celled with a single ovule. The style is slender and hairy, whilst the stigma has only one lobe.

The fruits of different varieties vary greatly in size, shape, and colour. In shape they may be round, oval, pear-shaped, or any gradations between these forms. The colour may be light yellow, green, dark-green, maroon, purple to purplish-black.

Soils.

In Queensland, the avocado is thriving on a comparatively wide range of soils. Loams, sandy loams, and sandy soils are all regarded as suitable.

In considering the question of soils, although chemical properties are of importance, suitability largely depends on the physical properties, such as porosity and aeration on which depend good drainage; good depth also is important. Some of the loams of basaltic origin on the coastal ranges and the sandy loams along the foothills of these are excellent soils for avocados. The more sandy soils, reddish to brown in

colour, occurring in the North and South Coast districts vary in physical properties. They are often too well-drained, especially where they immediately overlie a subsoil of gravelly wash and, unless they can be well irrigated, are often unsuitable for fruitgrowing generally. Where the subsoil at 18 to 30 inches deep is of a heavier nature and a deep red in colour, the soils are often good fruitgrowing soils.

Heavy clay soils and the grey sands found in low-lying areas should be avoided.

The ideal soil for avocados is a loam of medium texture overlying a medium but porous subsoil which, in turn, overlies a gravelly wash. In no circumstances should trees be planted on poorly-drained soils, as the roots are extremely sensitive and quickly succumb to "wet feet."

Plate 164.

"BENIK."

Climatic Conditions.

As the avocado is a subtropical fruit, its commercial culture must necessarily be confined to tropical and subtropical regions. Generally, it is conceded that avocado and citrus trees have a similar range of climatic adaptation. This, however, should only be taken as a very general guide, for in practice it has been observed that the avocado is more susceptible to low winter temperatures; and, in addition, during the blossoming period, variable weather conditions, such as changes from fine to wet or warm to raw and cold, considerably interfere with the

normal floral cycle. The chief climatic factors limiting the commercial culture of the avocado in southern Queensland appear to be—

(*a*) Low winter temperatures;

(*b*) High spring and summer temperatures;

(*c*) Low atmospheric humidity during the blossoming and fruit-setting period;

(*d*) Heavy winds.

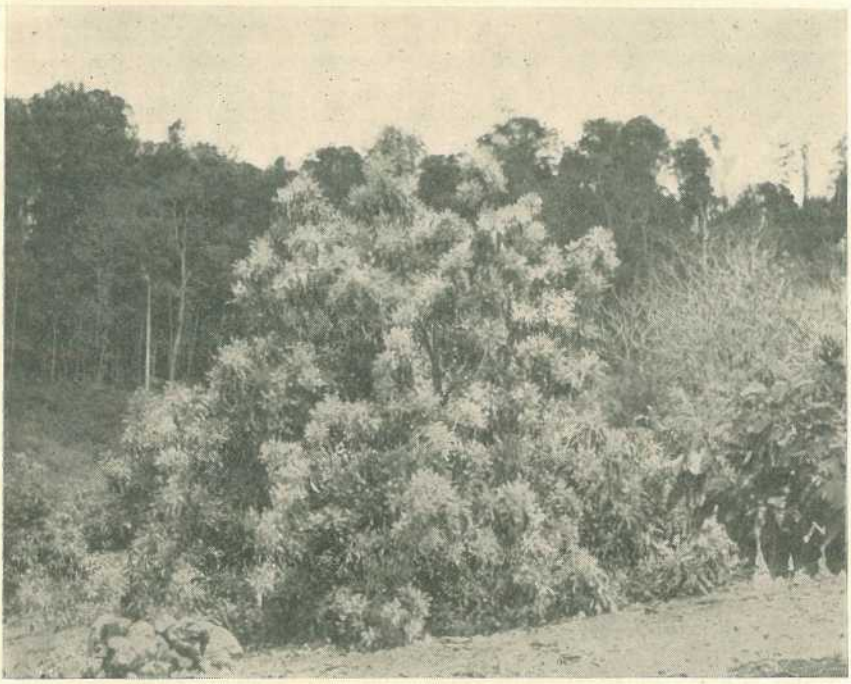

Plate 165.
Avocado Tree in Blossom.

Location.

In selecting the site for an avocado orchard, aspect should be carefully considered. Avocados thrive best in frost-free, well-sheltered, warm situations. Where winds are likely to interfere with normal tree growth, belts of standing timber should be retained for protection; while in districts denuded of the natural timbers, shelter belts should be planted.

The site should be an area of unbroken, nearly level, or gently sloping land. Steep hillsides should be avoided, for, in addition to the risk of irreparable losses by soil erosion, the costs of cultivation are materially increased.

Where hillside orchards are contemplated, contour planting should be undertaken. In this method of planting the contour grading will vary from 1 to 3 per cent., according to the length of the tree rows.

Plate 166.
AVOCADO TREE IN BLOSSOM.

Pollination.

Studies of avocado blossom behaviour in Queensland has adduced evidence similar to that obtained in other avocado-growing countries, and suggests that mixed plantings of certain varieties of different groups are essential to ensure satisfactory cross pollination. These blossom studies have demonstrated that avocado flowers have two distinct opening periods, one during the morning and one during the afternoon; and all varieties observed can, as regards flower-opening periods, be grouped into two classes which, for convenient reference, have been designated groups "A" and "B."

At the first opening of the flowers, all the stamens are spread out in a nearly flat plane (Plate 167) and the stigma is then receptive. On the second opening the inner whorl of stamens, three in number, are folded about the style (Plate 168). The outer whorl of stamens (six) do not open as widely as at their first opening, and do not fold inwards until the pollen has been discharged and the flower is about to close. The time of discharging is indicated by the opening of small lids or valves on the anthers. On the second opening of the flowers, the style appears to have elongated and the stigma is elevated above the anthers. The pollen appears as a sticky mass.

Observations have shown that the flowers of varieties in group A (page 457) open for the first time in the morning when they are receptive. They close usually between noon and 2 p.m. and open a second time during the afternoon of the following day, when they shed pollen. On occasions, a part of the third day may be required to

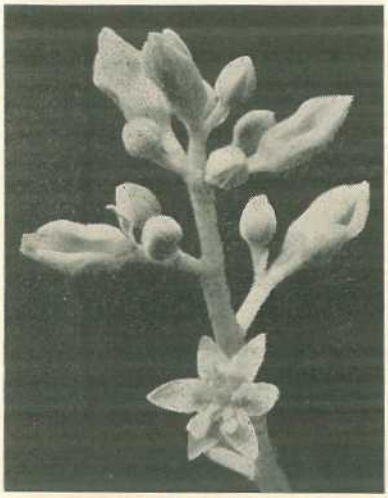

Plate 167.

Avocado Blossom.—First opening period (receptive). Note that stamens are spread out in a flat plane.

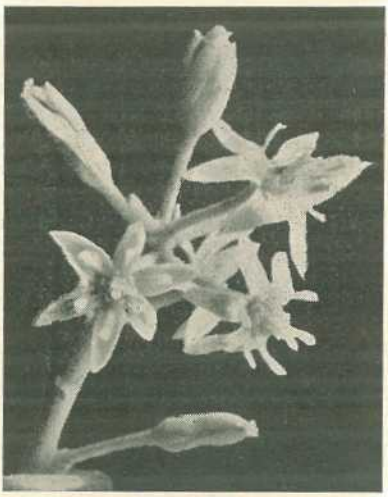

Plate 168.

Avocado Blossom.—Second period opening (pollen shedding). Note in whorl stamens folded about style, also small anther lids opened signifying the discharge of pollen.

complete the cycle. The flowers of varieties in Group B open for the first time in the afternoon when they are receptive, and open a second time the following morning when they shed pollen.

Sudden changes of weather conditions from fine to wet, raw, or cold upset the normal floral cycle, delaying the flower opening, and restraining the regular functioning of the floral parts. Sometimes up to eighty hours are required to complete a cycle in both "A" and "B" groups.

As has been stated, all the varieties so far studied fall into these two groups ("A" and "B"), shedding their pollen for the most part at different hours of the day; and from this it is probable that varieties selected from these two groups and interplanted will enhance the opportunities for fruit-setting.

So far, the undermentioned varieties growing in Queensland have been studied and placed in the groups "A" and "B":—

Group "A".		Group "B".	
Anaheim	G.	Campbelli	H.
Benik	G.	Fuerte	H.
Dickinson	G.	Ganter	M.
Karlsbad	G.	Nabal	G
Mayapan	G.	Northropp	M.
Princess	G.	Panchoy	G.
Puebla	M.	Queen	G.
Spinks	G.	Tamborine 68	G.
		W.P.I.	M.

The letter following the varieties denotes the race: G. Guatemalan, M. Mexican, and H. those considered to be of Hybrid origin.

Varieties.

In selecting varieties for trial plantings, some of the desirable characteristics to be considered are:—

(1) Hardy and vigorous-growing trees.
(2) Regular and heavy croppers.
(3) Uniformity in size and shape of fruit.
(4) Quality of fruit which should be fleshy, free from fibre, and of a rich nutty flavour.
(5) Seeds should be small and tight in the cavity.
(6) Thickness of skin. A thick skin is desirable, although it makes maturity more difficult to determine. Early thin-skinned varieties are susceptible to damage by fruit fly.
(7) Synchronisation of blossom periods of the varieties planted.

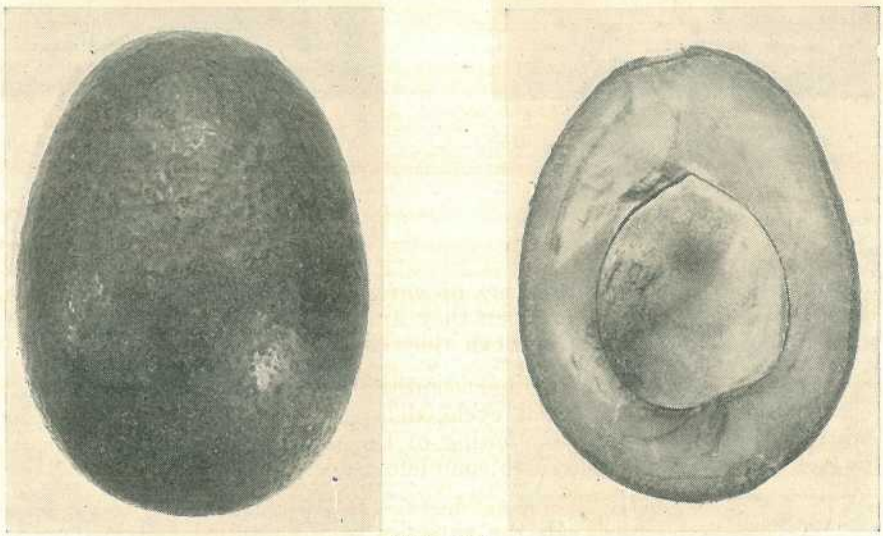

Plate 169.
ANAHEIM.

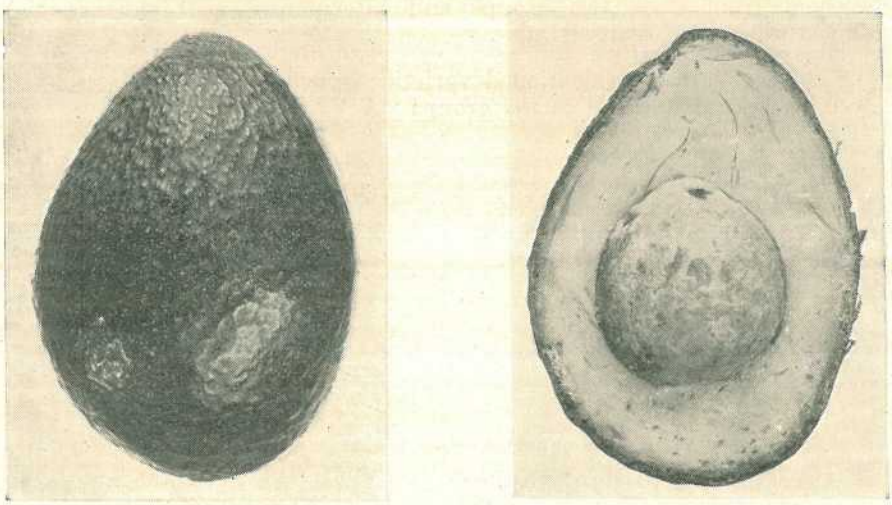

Plate 170.
BENIK.

The study of varieties is as yet far from complete, and it is quite possible that at a later stage new names will be added to the foregoing list and some may have to be removed. The varieties named and now described have all shown evidence of being sound commercial fruit. In these descriptions allowances should be made for normal variation in the fruits and the season of maturing, which will differ to some extent in different localities.

Anaheim (Guatemalan).—Tree tall with upright growth, blossoms midseason September to October, a prolific bearer, though the fruit is easily shed; fruit elliptical; skin rough, glossy, green; flesh creamy; flavour good; seed medium size and tight in cavity; matures during July and August; pollination group "A".

Benik (Guatemalan).—Tree spreading, well branched; blossoms midseason September and October. Fruit pear-shaped; skin inclined to be rough, maroon purple; flesh creamy-yellow; flavour good, quality excellent; seed small and tight in cavity; matures September to October; pollination group "A".

Dickinson (Guatemalan).—Tree well branched, spreading, blossoms midseason September and October; fruit oval to pear-shaped, apex rounded, surface roughish; purple; skin thick; flesh buttery, pale yellow, pleasant flavour, quality good; seed roundish flattened at the poles, tight in cavity; matures September and October; pollination group "A".

Plate 171.
DICKINSON.

D.C. 68 (Guatemalan).—A Queensland-raised seedling by Messrs. D'Arx and O'Conner, Tamborine Mountain.—Tree large, well branched, blossoms midseason; fruit pear-shaped, shiny green in colour, the skin medium, smooth granular; flesh pale yellow, buttery texture, slight fibre, flavour good; seed medium, firm in cavity; matures September; pollination group "B".

Fuerte (Hybrid).—Tree straggling, spreading; blossoms very early July and August; fruit pear-shaped, oblong, base somewhat pointed, apex obliquely flattened; green with numerous yellow dots, pebbled;

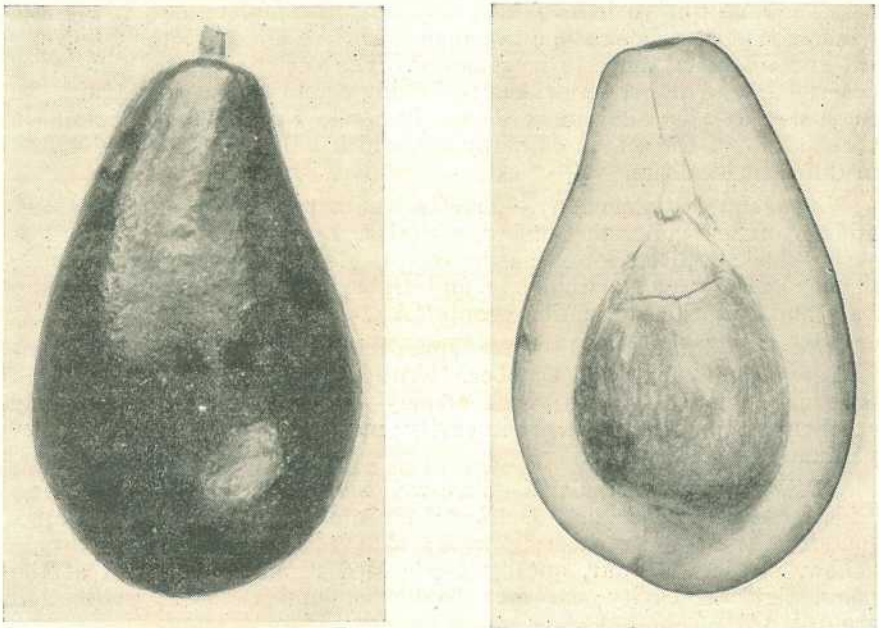

Plate 172.
CAMPBELLI.

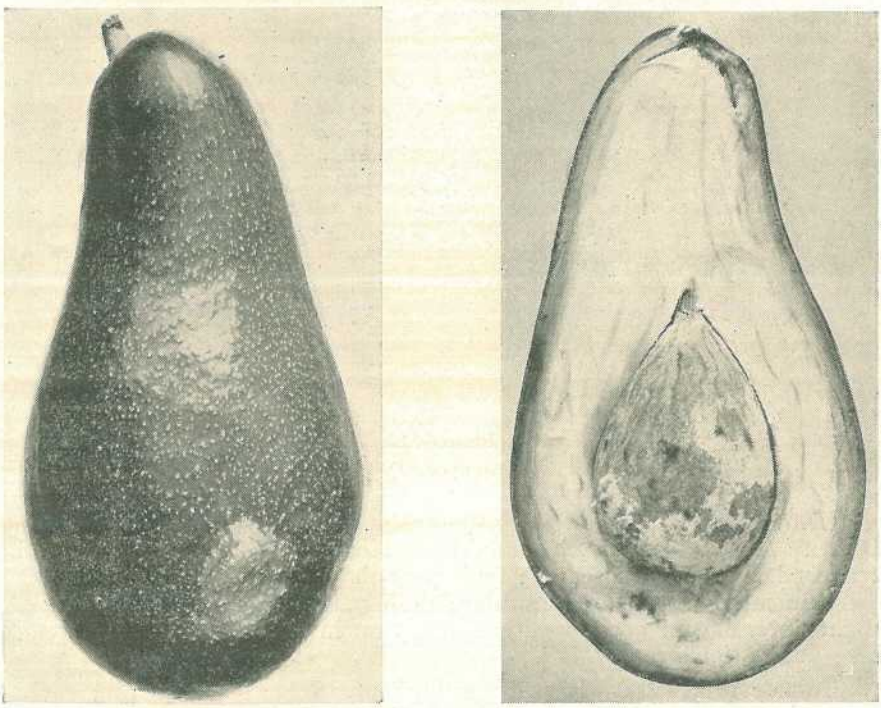

Plate 173.
D. C. SEEDLING 68.

skin thin, pliable, leathery; flesh creamy-yellow, greenish near skin, texture buttery, very rich flavour, quality excellent; seed tight in cavity; matures April and May; pollination group "B".

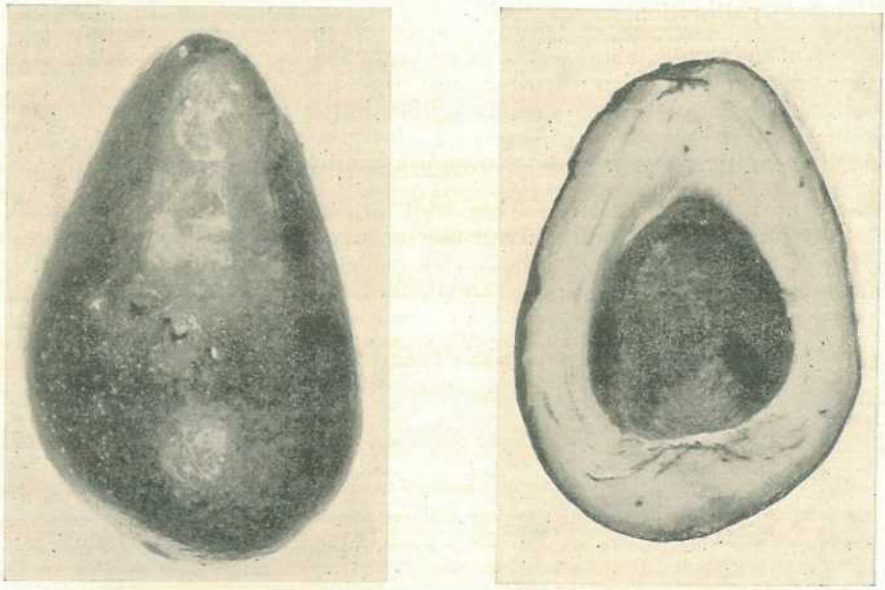

Plate 174.
FUERTE.

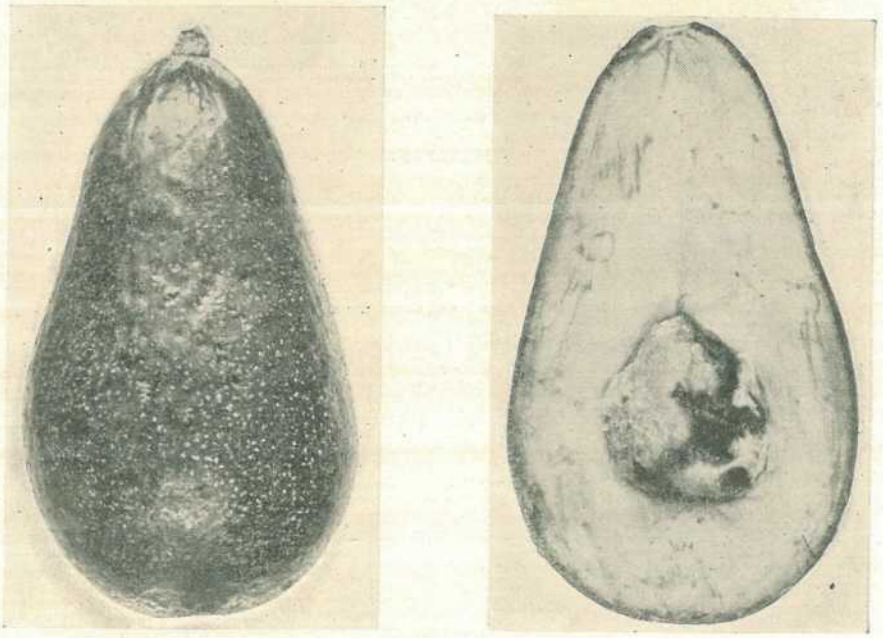

Plate 175.
KARLSBAD.

Mayapan (Guatemalan).—Tree rather upright, well branched; blossoms late October and November; fruit almost round, smooth, dark purple; skin thick, granular; flesh creamy colour, texture buttery; flavour good; seed rather large, tight in cavity; matures September and October; pollination group "A".

Nabal (Guatemalan).—Tree well branched, spreading; blossoms late October and November; fruit almost round, smooth, green in colour, skin thick granular; flesh creamy-yellow, buttery texture, greenish near skin; flavour exceptionally good; quality excellent, seed small, tight in cavity; matures October and November; pollination group "B".

Queen (Guatemalan).—Tree well branched, spreading; blossoms late October and November; fruit oblong, pear-shaped; skin rough, deep purple, thick, and woody; flesh rich yellow, greenish near the skin; flavour rich, quality good; seed small, tight in cavity; matures October; pollination group "B".

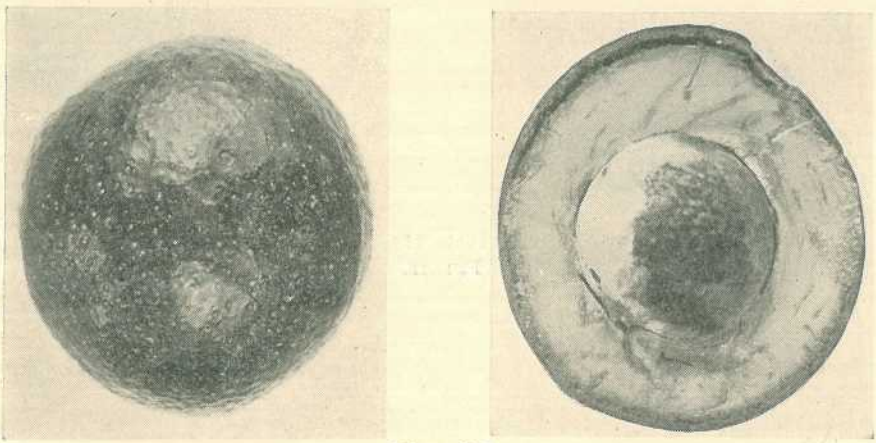

Plate 176.
MAYAPAN.

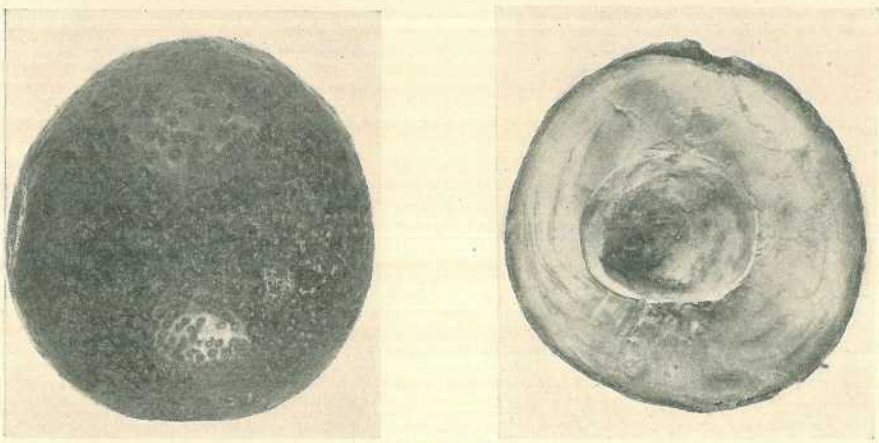

Plate 177.
NABAL.

Spinks (Guatemalan).—Tree well branched, spreading; blossoms late October and November; fruit broadly obovate; surface rough, somewhat warty at the base, dark purple; skin thick, woody, granular; flesh firm, smooth, creamy; flavour pleasant, quality good; seed large, tight in cavity; matures October and November; pollination group "A".

Wilsonia (Guatemalan).—A Queensland-raised seedling by Mr. J. Wilson, Hunchy; tree well branched, spreading; blossoms early August and September; fruit oval, dark green in colour, smooth skin, thick,

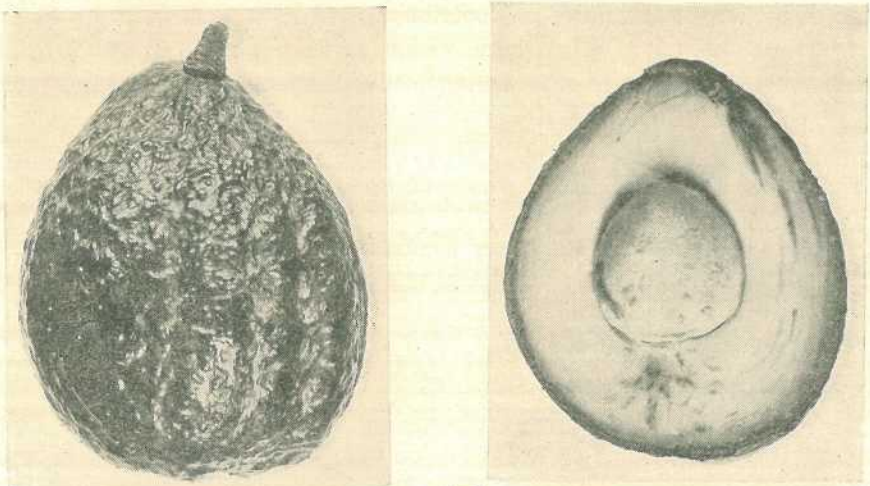

Plate 178.
SPINKS.

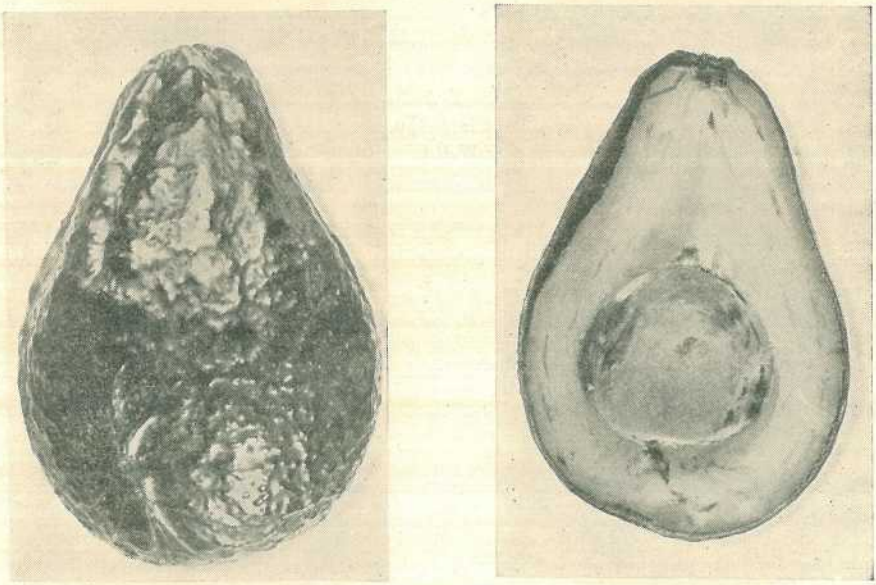

Plate 179.
QUEEN.

shell-like, granular, woody; flesh creamy coloured, greenish near skin, flavour good; seed medium large, firm in cavity; matures July and August.

W.P.I. (Mexican).—A Queensland-raised seedling; tree spreading, well branched; fruit obovoid, slightly oblique; size small to medium; surface slightly pebbled; dark green in colour; numerous yellow dots; skin particularly thin, peeling readily from the flesh; flesh firm in texture, creamy colour greenish near skin, rich nutty flavour; seed large, tight in cavity. Campbelli and Karlsbad although illustrated are not recommended at this stage.

Rootstocks.

Rootstock trials have been commenced, but the study is not sufficiently far advanced to form any conclusions or make recommendations.

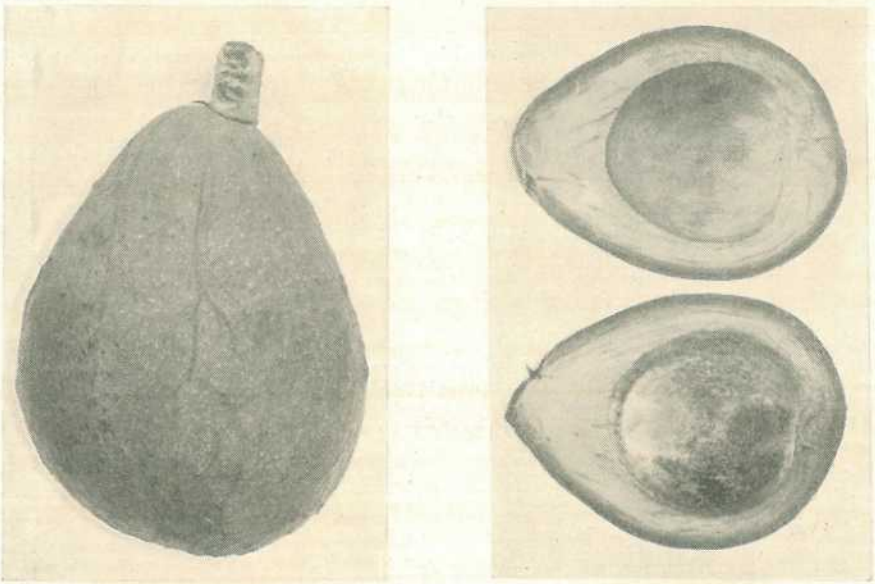

Plate 180.
W.P.I.

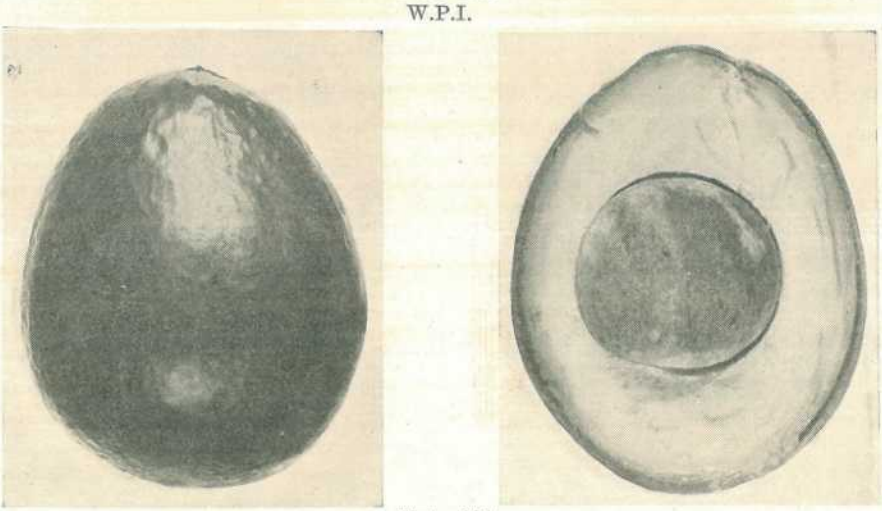

Plate 181.
WILSONIA.

It has been noted, however, that there is apparently some differences in varieties worked on Mexican rootstocks, even when the scion also is of Mexican origin. On the other hand, trees of both Mexican and Guatemalan races worked on to Guatemalan stocks generally appear to be vigorous and thrifty.

Propagation.

Raising the Seedlings.—Seeds for the propagation of avocado trees should be selected from properly matured fruits from healthy and vigorous seedlings, and should be washed, cleansed, and planted as soon as possible after removal from the fruit. They may, however, be held, if necessary, for several months without apparently impairing germination, providing care is taken to prevent them from drying out.

Germination may be induced by planting the seed in tins, seed boxes, or seed beds. A mixture of equal parts of clean sand and loam is used. The seeds are placed in the soil with the base down and with the apex just protruding above the surface. The soil should be kept moist, but not soaked. During hot weather, shading will be necessary; hessian or lath screens are useful for this purpose. Under favourable weather conditions, germination will take place within a few weeks.

When grown in a seed bed, the seedlings should be transplanted to nursery rows upon attaining a height of 6 to 8 inches. When lifting, care should be taken to prevent root damage, because avocado seedlings have a particularly long tap root.

In the nursery row, the plants are set out at 12 to 18 inches apart in the row, and the rows 30 to 36 inches apart. Immediately after planting, the seedlings should be watered to prevent wilting. Temporary protection from the sun is necessary; shading on the north-east side is particularly advisable. Frequent waterings are again necessary, but soaking should be avoided.

Budding.—When the stocks have attained a diameter of about three-eighths of an inch at their base, and the sap is flowing freely, they may be budded. In Queensland, this is usually done during autumn or spring, but it may be continued as long as the sap is flowing very freely.

Plate 182.
Bud Inserted and Tied.

Plate 183.
Bud Shoot Supported by Tie.

When the stock is ready to receive the bud, a "T" cut is made in the bark, preferably 6 to 8 inches above the ground level. The perpendicular cut should be from 1½ to 2 inches in length and just through the bark to the cambium layer in depth; damage to the cambium should be avoided. The "T" cut should be made preferably on the south side of the stock, for on that side the bud will not be exposed to the sun.

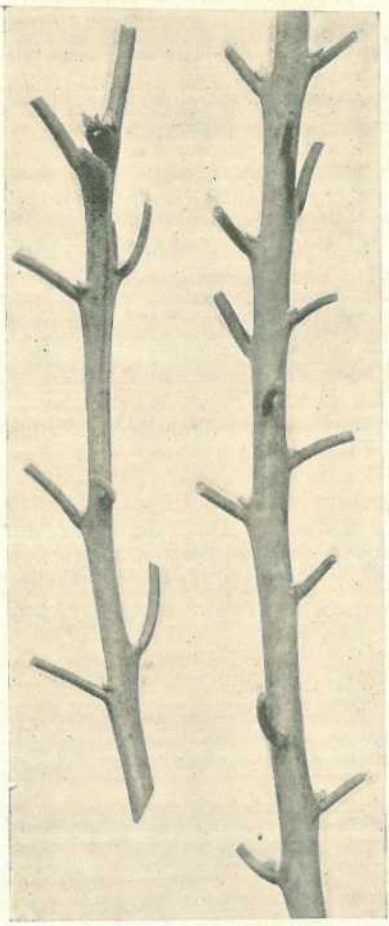

Plate 184.
BUDSTICKS.

Budwood should be carefully selected from branches of recent growth which have been permitted to mature. The terminal growth should be rejected and either of the two previous growths used. Budding avocados has been found to require rather more care than is required with some other fruits, because while the union of the stock and scion takes place readily enough, the bud often fails to grow, and the eye falls out. It is necessary, therefore, to select only the plump full buds in the middle of the bud stick. Buds at the top of the stick rarely develop, while those at the base are inclined to shed the eye. If required, budwood may be stored for from four to six weeks by packing it in trays in moist sphagnum or peat moss. Actually, storing is of advantage in so far that buds which may be over-developed are shed and the budstick may be rejected.

Before the buds are cut from the budstick the leaves should be trimmed off, leaving a piece of the leaf stalk or petiole to permit of easier handling after the bud has been cut.

The bud may be cut either from above or below, the general practice being from below the bud upwards, commencing from ¾ of an inch to 1 inch below the bud and ending from ¾ of an inch to 1 inch above it. The cut should be made with a sharp, thin-bladed knife and just deep enough to remove a thin layer of wood. Where the removal of the wood can be done without injury, the chances of a successful union are increased.

The bud is inserted in the "T" cut in the stock and gently pushed down between the bark and the cambium layer. In order to bring the bud and stock into close contact, they are then bound closely together

with raffia. About three weeks are required for the bud to unite with the stock, and during this period the tie should be inspected frequently, and where bulging appears the tie should be loosened to prevent restriction.

As soon as the union takes place, the stock may be headed back a few inches in order to force the bud into growth.

The ties should not be removed from the point of insertion until the bark flaps have entirely healed over, which should take place in from six to eight weeks after budding.

As soon as the bud has made 3 or 4 inches of growth, it should be tied to the stem of the stock and later trained to a stake. The final removal of the stock stub may be done when the bud shoot has reached 12 to 18 inches in length and has become somewhat hardened and capable of remaining erect. The cut is made at a slope just above the union, and should be sealed with some suitable substance, such as Bordeaux paste or lime sulphur.

Plate 185.
Bark Graft: Scion Inserted.

Plate 186.
Bark Graft: Scions Inserted.

Reworking.

In Queensland avocado plantings there are some unprofitable types of seedlings which can be reworked to good commercial varieties.

Reworking by means of bark grafting and by side grafting has been successful. Either method, as in budding, should only be used—except in the case of large trees, or trees with no branches close to the ground—during the growing season when the sap is flowing freely.

Bark Grafting.

When using the bark graft, three or four limbs evenly spaced round the trunk of the tree are selected and sawn off square about 2 or 3 feet from the trunk. The cut surfaces should be smoothed over with a sharp knife and two scions inserted opposite each other in each limb. If both

Plate 187.

TOP WORKED BY BARK GRAFTING. —Whitewashed to prevent sun scald; paper-bag protection of scions.

scions grow, the weaker one may later be removed. The scions are easily inserted by making a cut about 3 inches long for each scion through the bark at the end of the stumps and then pushing the scions down between the bark and the wood.

The scions should be selected from well-matured second-growth wood, the terminal growth being discarded, and each should contain two or three plump buds, which at the same time should not be too far advanced. Where possible, it is an advantage to include a node, as adventitious buds often develop from this zone. The scions are prepared by making a long sloping cut about 2 inches to 2½ inches long on one side (Plate 188). The cut surface is inserted next to the wood, or more correctly, the cambium layer. When the scions have made good growth, the remaining branches of the tree which have not been cut back for grafting may be completely cut away.

Very large trees, or trees with no branches within 3 or 4 feet of the ground, require slightly different treatment. During winter, when

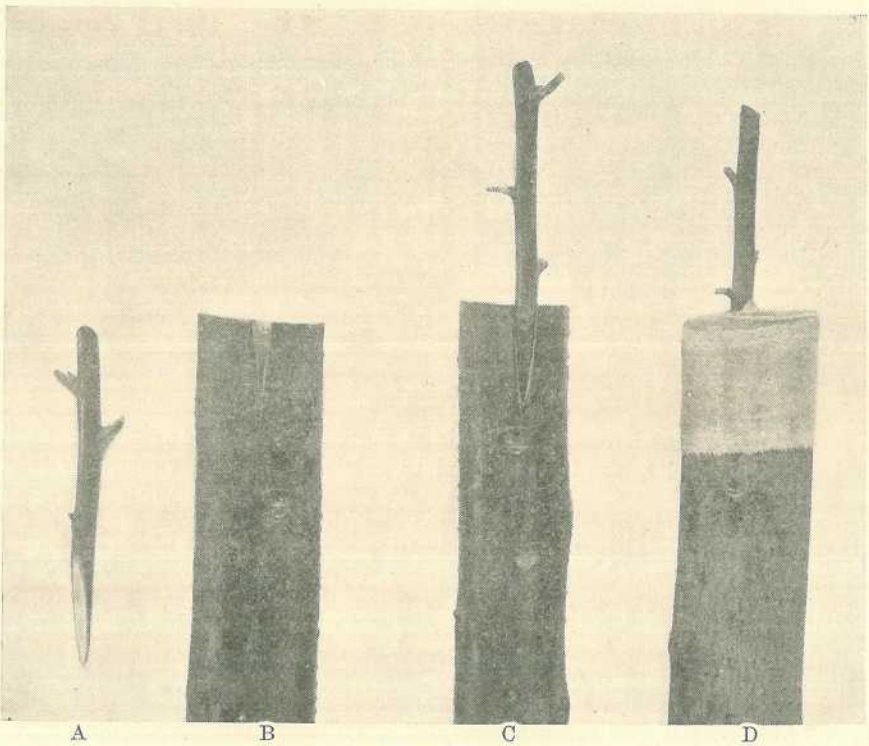

Plate 188.

BARK GRAFTING.

A. Scion prepared ready for insertion.
B. Bark opened about 3 inches at the top of the stump.
C. Scion inserted under the bark.
D. Graft completed and tied with waxed cloth.

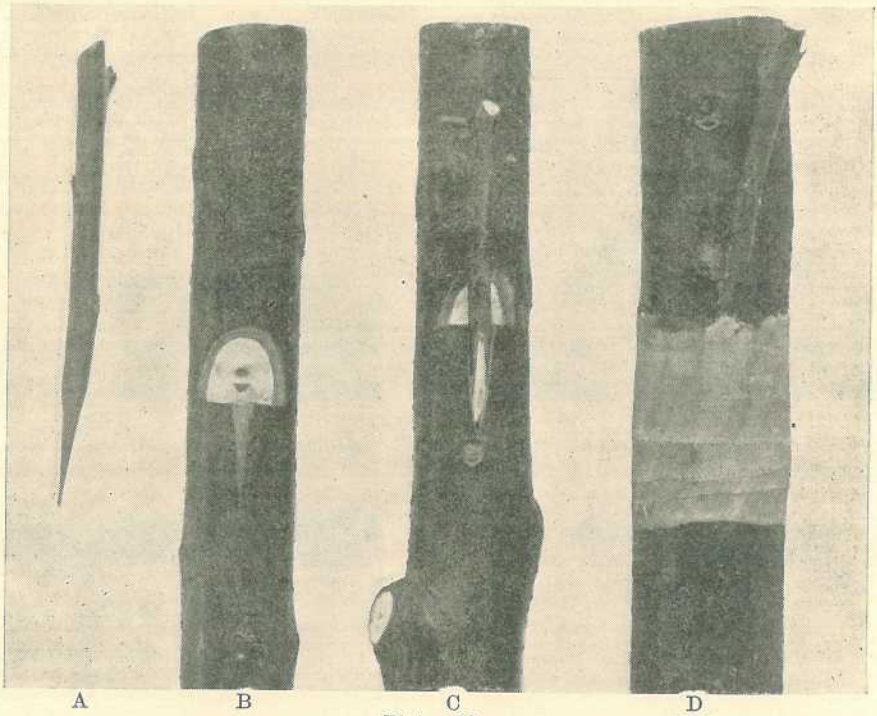

Plate 189.
SIDE GRAFTING.
A. Scion cut ready for insertion.
B. Stock prepared.
C. Scion inserted in stock.
D. Graft completed and tied with waxed cloth.

the trees are dormant, the whole of the top of the tree may be removed by sawing through the trunk at a height of 3 feet from the ground, and at the beginning of spring inserting three or four scions under the bark. Two of these, or at most three in the case of very large trees, may be allowed to grow.

Side Grafting.

Side grafting differs from bark grafting in that it is not necessary at the outset to remove any of the top of the tree. Three or four limbs up to about 3 inches in diameter and evenly spaced round the tree should be selected. Semi-circular pieces of bark should be removed and "T"-shaped incisions should be made through the bark of each of these (see Plate 189), similar to the "T" cut made for budding, and the scions pushed down between the bark and the wood. The scion is prepared similarly to that for the bark graft.

The scions may be firmly fastened to the limbs by driving a fine tingle through them, but care must be taken that they are not bruised or split. In any case, the scions should be securely tied with twine and waxed cloth and all cut surfaces properly sealed.

If the scions are still green after three weeks, the head of the tree may be gradually removed during the following months in order to force the sap into the scions. When these have made a good growth, the whole of the original head of the tree may be removed.

Any limbs which have been exposed in the course of reworking should be whitewashed to prevent sunscald.

Plate 190.
NEW HEAD GROWING.

Plate 191.
WHERE TWO SCIONS GROW, THE WEAKER IS REMOVED.

Plate 192.
SIDE GRAFT.

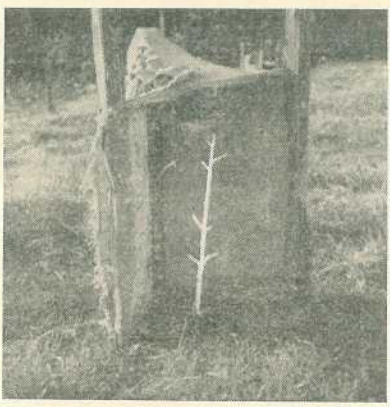

Plate 193.
NEWLY PLANTED TREE PROTECTED FROM SUN AND WIND.

In grafting, the following work is of great importance. The trees require to be gone over frequently and the sucker growth removed, in order to confine the flow of sap to the scions, which will also require supports to prevent them being blown out by the wind. All the large cut surfaces will also require to be painted with Bordeaux paste or lime sulphur solution to prevent the entrance of organisms causing decay.

Planting.

On level lands and those with a gentle slope, orchards are generally laid out on the square system. On the steeper hillsides, contour or modified systems of contour plantings should be adopted.

When planted on the square system, the planting distances may vary from 25 feet by 25 feet to 30 feet by 30 feet. Avocados are vigorous-growing trees and require plenty of room.

The union of the stock and scion is always a weak spot in a tree and liable to attack from fungous diseases. It should, therefore, where trees have been worked low down, be kept above the level of the soil.

If the land has been properly prepared, there is no need to dig big holes for the trees. So long as the holes are wide enough to spread the roots, they need not be more than 12 inches deep. The roots should be evenly spaced at a downward angle of about 45 degrees, and the hole then almost filled with fine top soil and tramped firmly. Before the hole is completely filled, the application of 3 to 4 gallons of water to each tree will drive out any dry air from round the roots and assist the tree to get a good start.

The season of planting may be governed by local conditions. Spring plantings often entail frequent waterings, as the young trees should never want for moisture. Planting in February during the wet period, therefore, is often preferable.

Cultivation.

General cultivation during the drier spring months to suppress weed growth and prevent its competition with the trees for soil moisture is important. Summer and autumn rains are utilised for the growing and turning under of green manure crops. These, however, should never be permitted to carry over to the spring, but should be ploughed in not later than the middle of July. Not only do such crops improve the physical condition of the soil, but their presence reduces soil losses by erosion.

With young trees, deep cultivation is advisable in order that large quantities of organic matter, such as manure and green manure crops, can be deeply incorporated with the soil. There should be no danger of injury to the roots of young trees in cultivation to a depth of 8 to 10 inches. However, as the trees become older, their rooting systems extend widely in all directions, and, therefore, as such deep cultivation will be liable to cut too many feeding roots, shallower cultivation is advisable, particularly close to the trees.

Avocados up to two or three years old occupy a relatively small proportion of the total area on which they are planted, thus during the early years of an avocado plantation an excellent opportunity is afforded for building up a reserve of vegetable matter in the soil. At this stage, cultivation, even early in the season, may be confined to the immediate vicinity of the trees, and the space down the middle of the tree rows occupied by growing and turning under summer, autumn, and winter green manure crops.

Pruning.

The avocado tree requires little or no pruning, once its framework has been established. In general, the aim should be to establish a strong symmetrical tree having well-spaced branches which will readily support heavy crops of fruit.

At planting, the young tree should be headed back in order to counterbalance the loss of roots as a result of digging from the nursery and to assist in establishing a strong framework. Such pruning should be done just above the strongest of the dormant buds which terminate the growth cycles of the trunk of the young tree. On starting, these buds usually make upright growth. The practice of heading back to laterals with the hope of developing one of these into a head has not been successful. Subsequent pruning consists in pinching out terminal buds and the removal of crossing and crowding branches. The kind

and amount of pruning differs with varieties. Trees of a straggling and spreading habit should be pruned to direct the growths upwards. On the other hand, tall-growing varieties require to be topped and cut to buds pointing outwards to preserve low heads. As the trees grow older, the lower limbs require to be shortened back and finally removed to make room for the upper larger ones which bear down.

Harvesting.

Considerable difficulty has been experienced in the harvesting of some varieties. The avocado does not soften on the tree, and with many varieties external indications of maturity are hardly perceptible. The correct stage at which to harvest is thus difficult to determine.

In the case of most of the dark-coloured varieties, the fruits develop their colour when maturity is reached. With such varieties harvesting is relatively easy, but in the case of varieties which retain their green colour, it is much more difficult to decide when to harvest. A close observation of the fruit usually shows a slight change in colour in the skin and stem as it approaches maturity. The brightness of the fruit is not quite so pronounced and a yellowish tinge is perceptible on both skin and stem, indicating that maturity is approaching.

The fruit of some varieties will hang for weeks after the normal season for harvesting has passed. On the other hand, the seed may sprout in the cavity of some fruits which have been permitted to hang too long.

All fruits should be clipped from the tree, and double cutting done so as to ensure that the stem is cut flush with the fruit. Pulling the fruit should be avoided, as damage to the button usually occurs, facilitating entry of decay organisms.

Investigations in Progress.

Large scale field trials have been established at Woombye, Flaxton, and Manly. These projects are being developed in co-operation with officers of the Research Division of the Department of Agriculture and Stock. The trials embrace soils typical of those considered suitable for commercial avocado culture in the southern Queensland coastal region.

The work at present in hand includes (1) rootstock trials, (2) scion compatabilities, and (3) the commercial values of varieties considered superior.

A compilation of the data from this work will be undertaken and information of interest and value published through the *Queensland Agricultural Journal* from time to time.

Acknowledgment.

Criticisms and suggestions made in the course of preliminary investigations in connection with avocado culture in Queensland and also in the preparation of this publication by Mr. W. A. T. Summerville, Senior Research Officer (Horticultural Section), Department of Agriculture and Stock, have been very helpful and have been appreciated accordingly.

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Cross Breeding Experiments in the Bowen District.

S. F. KAJEWSKI, Fruit Branch, Bowen.

CLIMATIC conditions in the Bowen district make it eminently suitable for the production of winter- and spring-grown fruit and vegetable crops. Because of difference in climate, varieties which are grown successfully in southern Queensland are naturally not always so suitable for the north. They often do not produce as prolifically and are more subject to disease. Growers have made their own selections for a number of years and have succeeded in no small way in overcoming preliminary difficulties. There is, however, still room for improvement. The following report on cross-breeding experiments, with tomatoes and with passion fruit in particular, is, therefore, of especial interest:—

Tomatoes.

Tomatoes are grown extensively in the Bowen district. Local selections have been made for many years, and this has resulted in the production of many types of plants, vigorous, heavy bearing, and more or less resistant to disease. There are difficulties, however, in that the fruit is not standardized; it often ripens a dull pink colour on the market and is not always of the best quality.

About three years ago, with the approval of the Department of Agriculture and Stock, it was decided to undertake some cross-breeding work in an effort to raise improved varieties suitable for the district. As a commencement, a thorough examination was made of local types, and one was selected finally as a parent. This was a Buckeye-Globe combination, which showed evidence of wilt resistance, heavy cropping, long life, and large fruit. Points against it were that it was subject to mosaic disease, and the fruit when ripe was a dull pink colour. This was crossed with the canning tomato, San Marzana. This variety was subject to fusarium wilt, but was immune to mosaic disease. The fruit, when ripe, had a bright red colour and a tough skin, but was small and elongated.

Difficulty was experienced in making the cross, because the local variety was derived from two imperfectly fused flowers, while the San Mazana has a single type flower with delicate pistil. After several attempts a number of fruits was obtained and the seeds of these were sown. As is usual with hybrids, the resultant seedlings grew very vigorously and completely outstripped plants of other varieties of the same age.

The foliage structures and habits of the seedlings were midway between those of the parents, and there was no noticeable variation in the growth of any of the plants. The fruit on each of the plants also was similar and was shaped like capsicums with large air spaces and a fiery red skin when ripe. Seed from the best plants and fruits was selected and sown and the second generation of seedlings raised. These, when fruited, produced a very wide range of types, and both fruit and leaf structures varied to a marked degree. Many reverted largely to the original parent types, but a few showed indications of promise.

Seed from these was selected and a third generation of seedlings raised. These, when fruited, showed a further wide range of types, but the degree of resistance and susceptibility to disease was now being manifested and better types of fruit appearing.

Seed from the best was again selected and a fourth generation of seedlings raised, which yielded much more promising results. The growth of the plants was more uniform; they were smaller than most of those grown at Bowen and more compact. There was a greater degree of disease resistance. The fruit was solid and of rich scarlet colour when ripe, and of good marketable size.

The smaller bush was one of the objects aimed at for the reasons that it will ensure easier, cheaper, and more effective dusting. Secondly, the harvesting period is reduced to six weeks, which will enable growers to pick their green fruit nearer to maturity. Thirdly, the shorter cropping period will mean less handling of the bushes, which is one of the means by which mosaic and other diseases are spread. The length of the season will, of course, be maintained by plantings made at intervals.

At the present time, Bowen tomatoes are planted at distances varying from 8 feet by 8 feet to 12 feet by 12 feet apart, and the growth is so vigorous that the vines completely cover the ground. Complete dusting is, consequently, almost impossible, and the crops, though very large, are often reduced by half through wastage. The harvesting period from these huge bushes is extended and makes the picking of green fruit for maturity difficult; also the frequent handling of the bushes over an extended period provides a greater risk of spreading diseases.

For the purpose of determining the degree of resistance of the type which has been selected as the best from these experiments, a severe test was made by planting and growing a crop under adverse hot conditions when the degree of resistance is low. For comparison, plantings of three other selected hybrids were made at the same time. In the case of the three latter types, mosaic affected two of the types 100 per cent. and 28 per cent., respectively, and did not affect the third; while estimated fusarium wilt infection was 30 per cent., 20 per cent., and 30 per cent., respectively. In respect of the selected variety, mosaic affected 8 per cent., and fusarium wilt infection was estimated at 10 per cent. During the cooler months when the main crop is grown, the infection would, of course, not be nearly as high.

Preparations are now being made for planting a considerable area for the fifth generation from which seeds of the best plants will be distributed to growers.

Passion Fruit.

The purple-fruited passion fruit, *Passiflora edulis*, is the most popular on the market in Queensland, and is, consequently, the most largely grown. It finds, however, difficulty in adapting itself to the climatic conditions of North Queensland, where it is very subject to disease and its life is short.

There is, however, in the North a golden-fruited American variety (*Passiflora incarnata*) which grows with exceptional vigour and is apparently not subject to the diseases common to *P. edulis*.

The yellow colour, hard shell, and lesser flavour of *P. incarnata*, however, makes it less attractive commercially than *P. edulis*.

In regard to maturity, *P. edulis* ripens its fruit in the Bowen district during November and December, and *P. intcarnata* during April and May.

In 1939, an effort was made to combine the desirable characteristics of each variety and, at the same time, extend the harvesting season by the production of hybrids. Pollen was transferred from the flowers of ***P. edulis*** to those of *P. incarnata,* but, because pollination of the latter variety is not readily accomplished, the crossing resulted in many failures. However, eventually, two fruits set, and from these 100 hybrids were raised. These were uniform in type, the foliage in each instance being midway between *P. incarnata* and *P. edulis.* In this respect, they resembled the result of the first crossing with the tomatoes, with the exception that the leaves of the hybrid passion vines were twice the size of those of the parents. The hybrids were found to be mules and as difficult of pollination as *P. incarnata.* They flowered profusely, but would not set fruit. A careful examination of thousands of flowers borne by the 100 plants showed that certain flowers would almost set, having an unfertilized embryo fruit much larger than ordinary. Technically, this condition is known as a diploid structure. Pollen from *P. edulis* was used in a straightforward effort to pollinate these flowers, but with no success. Pollen of different ages from *P. edulis* was then experimented with, as also were different stages of maturity of the receptive flower, and eventually two fruits set. These fruits when grown could easily be distinguished as diploids, as they were the size of teacups when ripe. The seed was saved and planted and the plants set out in what is later referred to as Block 1.

By continuously trying similar methods of pollen transference from one hybrid plant to another, using ordinary flowers and not diploids, several fruit set eventually from ordinary flowers. In all about 1,000 flowers were treated to obtain these fruits, which were about one-quarter the size of the diploids. The plants grown from the seeds of these fruits were subsequently planted out in what is hereafter referred to as Block 4.

In addition, pollen from the flowers of the hybrids was crossed back on to *P. edulis.* This work was easy, being 100 per cent. effective. Seeds selected from the fruits of this cross were subsequently planted out in what are referred to as Blocks 2 and 3.

The result of all the foregoing work was that a total of 489 plants were set out in the field on trellises as follows:—

Block 1 = 2 parts *Edulis* plus 1 part *Incarnata* on hybrid plants (diploid structure).

Block 2 = 2 parts *Edulis* plus 1 part *Incarnata* on *Edulis* plant (ordinary structure).

Block 3 = Duplicate of 2.

Block 4 = 1 part *Edulis* plus 1 part *Incarnata.*

To complete possibilities of the cross, 2 parts *Incarnata* plus 1 part *Edulis* is necessary, but because of the poor setting qualities of *Incarnata* this has not been attempted.

A number of *P. edulis* vines were grown adjacent to the experimental blocks for comparative purposes, and in the following analysis of results from the blocks to date, the plants described as "specials" are better than the control *Edulis*; those described as "good" are equal

to the control *Edulis,* while those described as "inferior," even though setting fruit, are not as good as *Edulis.* All of the vines in the blocks flowered, so that the analysis is based on spring fruiting only. Another calculation will be made for autumn fruiting:—

Block 1 produced—

2 specials
8 good
14 inferior
33 infertile

57

Forty-two per cent of the vines thus fruited, showing the influence of the better setting qualities of *P. edulis.* This block, which was planted from seeds from the diploid fruits, also has a higher percentage of plants setting fruit than the cross represented in blocks 2 and 3.

Block 2 produced—

4 specials
10 good
34 inferior
108 infertile

156

In this block, 31 per cent. of the plants fruited.

Block 3, which was a duplicate of Block 2, produced—

4 specials
5 good
18 inferior
69 infertile

96

In this block, 27 per cent. of the plants fruited.

Block 4 produced—

4 specials
4 inferior
172 infertile

180

The fruiting in this block was only 4·4 per cent., indicating the non-setting influence of *P. incarnata.* The plants all flowered, and it is possible that some at least may set heavy crops in the autumn.

What appeared to be a virus disease resembling mosaic in tomatoes showed up severely in 25 plants in Block 4 and 16 of them were so severely affected as to be useless. Neither parent or any plant in Block 1, 2, and 3 showed any signs of the trouble. Why it should appear in Block 4 is a question still to be answered. Back crossing may put additional vigour into the strains and prevent infection.

Further progress reports on both tomato and passion fruit crossing experiments will be made from time to time.

Poultry Farming in Queensland.

(*Continued from page* 403, *November*, 1941.)

FEEDING OF POULTRY.

ROOTS AND TUBERS AS POULTRY FOOD.

Because of their bulk, most roots and tubers have a limited value as poultry foods, but when market values are low they may be fed economically. Principally on account of their heavy yielding capacity, however, mangels, sweet potatoes, and pumpkins may be grown, especially as supplementary foods. The value of these crops must not be overestimated, and care must be taken not to incorporate too great a quantity of any of these roots or tubers without giving due consideration to the ration in conjunction with which they are fed. As previously mentioned, the total daily food intake of poultry is limited to approximately four ounces dry weight daily, and they cannot cope with an exceedingly bulky ration.

Root crops and tubers range in moisture content from about 70 per cent. in sweet potatoes to 90 per cent. in mangels, the total dry matter, therefore, being from as low as 10 per cent. to slightly under 30 per cent. The nutritive ratio of these crops is very wide when compared with the usual concentrated foods usually fed to poultry. At the same time, as most of the bulk of these crops is water and not fibre, it has been found practicable to include them in the ration to the extent of 50 per cent. of the total weight of food.

In an experiment conducted at the National Institute of Poultry Husbandry, England, potatoes were used to supplement the poultry rations. Four pens of birds were used and these were fed as follows:—

—	Mash.					Grain. Oz. per bird daily.	Potatoes. Oz. per bird daily.
	Maize Meal.	Pollard.	Bran.	Meat Meal.	Clover Meal.		
	Parts.	Parts.	Parts.	Parts.	Parts.		
Pen 1 ..	37½	27½	20	10	5	1	0
Pen 2 ..	25	27½	20	10	5	1	2
Pen 3 ..	12½	27½	20	10	5	1	3
Pen 4 ..	..	27½	20	10	5	1	4

NOTE.—During the first two months fish meal was fed, but this was substituted by meat meal 9 parts, plus 1 part of salt. Oyster shell was provided *ad lib* to all pens.

Although the average daily intake of food per bird is approximately 4 ounces, some birds in this experiment consumed as much as 4 ounces of dry food in addition to 4 ounces of potatoes.

Therefore, when attempting to induce birds to consume the maximum quantity of root and tuber crops, it is advisable to feed them on a good laying mash, working in about 30 to 40 per cent. of steamed roots or tubers, and feeding grain at night. With this method the amount of grain fed could be reduced considerably.

Potatoes.

Of the roots and tubers dealt with in this chapter, potatoes are the highest in feeding value, but because of their market value, it is only at odd times that they may be fed profitably to poultry. They contain 2·2

per cent. of protein and 17·4 per cent. of carbohydrates. By feeding them in a cooked state, mixed with the mash, there is practically no waste, and the birds are encouraged to eat fairly large quantities.

Sweet Potatoes.

Sweet potatoes contain only 1·6 per cent. of protein, but are as high as 26·4 per cent. in carbohydrates; therefore, although their nutritive value is lower, they may be used to approximately the same extent as potatoes. Because of their size, and the fact that they are palatable to poultry, sweet potatoes may also be fed in the raw state. Before being fed raw they should be chopped or split.

Mangels.

Mangels are useful as poultry food, and may be used largely as roughage and fed as a mid-day meal to poultry. Although not taking the part of green feed, mangels are useful as an adjunct to any ration, being ready for harvesting in the spring when dry conditions usually prevail in South-eastern Queensland. Mangels contain only ·8 per cent. of protein and 6·1 per cent. of carbohydrates, and are nearly 90 per cent. water, but as the average yield per acre is high, they are suggested as a good supplementary feed. They are palatable and poultry have a natural liking for them. If split and hung up just within reach of the birds, poultry are provided with a profitable pastime in pecking at them. Overfeeding of mangels may induce scouring.

Pumpkins.

Pumpkins are fed in much the same manner as potatoes, but as the seeds are reputed to be poisonous, these must be removed before cooking or before being fed in a raw state. Pumpkins contain 1·7 per cent. protein, 5.2 per cent. carbohydrate, and about 90 per cent. moisture. Therefore, as it is low in feed value, the quantity of pumpkin in a ration should be less than that of potatoes or sweet potatoes when it is being utilized in their stead.

Swede Turnips.

Swede turnips may be fed in much the same manner as mangels, but are usually pulped or cooked and mixed with a wet mash, or split open and fed as a supplement to green feed and mash They have about the same feed value as mangels and pumpkins, containing 1·3 per cent. protein and 7·2 per cent. carbohydrates.

Carrots.

Carrots contain vitamin A, and when available would make a valuable addition to the ration. They have about the same nutritive value as mangels, but should be fed in a minced state, mixed with mash.

Coconut Meal.

The need for a substitute for wheat bran is always in evidence, and as this shortage is likely to exist permanently the poultry farmer may, at times, be forced to incorporate a substitute for bran in his rations.

Apart from its nutritive value, bran is used to give bulk to a ration and improve its physical condition, thus encouraging a healthy intestinal action.

Coconut meal has a similar effect, and when available may be used extensively. Its protein content (19·0 per cent.) is higher than that of bran, whilst the oil content (5·0 per cent.) is almost double.

English experiments, in which coconut meal replaced bran on a weight basis, demonstrated that a ration containing coconut was slightly superior for egg production to one containing the same quantity of bran. In these experiments coconut meal was used to the extent of 25 per cent. of the ration.

However, as birds cannot tolerate large amounts of oils and fats, it is not recommended that the whole of the bran portion of the ration be replaced by coconut meal unless most of the other ingredients of the ration are particularly low in fat or oil content.

FEEDING OF DUCKS.

Ducklings should not be fed until forty-eight hours after hatching. Water and coarse sand may be supplied when the ducklings are placed in their brooding quarters. Coarse sand should always be supplied to ducks as its consumption aids digestion. Ducklings should be fed mashes similar to those used for feeding chickens. The mash should be moistened to a crumbly consistency and several feeds given daily. This system of feeding should be adopted until they are four weeks of age, and the numbers of feeds then reduced to three, and then later to two.

From four weeks, mashes similar to those used for laying hens may be employed, but each mash should have its bulk increased by the inclusion of 25 per cent. of good succulent green feed. Bran and pollard have formed the major part in duck rations, and when available a mixture of pollard 2 parts, bran 1 part, green feed 1 part, with the addition of meatmeal and salt may be used. Meatmeal should be added to the mash at the rate of 1 lb. for every 10 lb. of bran and pollard, and salt at the rate of 2 oz.

When skim milk is available curds may be used to replace the meatmeal. The curd from 1½ gallons of milk would be almost equivalent to 1 lb. of meatmeal. Although milk is a most valued food, it is not desirable to supply it to ducks as a liquid because of their method of drinking.

Root crops and pumpkins, when available at reasonable prices, form a useful addition to the ration of ducks. They should be fed as recommended in the section dealing with such fodders.

The feeding of grain to ducks is not practised extensively. A little at mid-day may be fed. Some breeders prefer to soak grains for ducks.

Clean water should be kept continuously before the birds, and the water should be sufficiently deep to permit of the birds totally immersing their heads. This enables the bills and eyes to be kept clean The constant supply of water is equally essential for both young ducklings and adults, but with the former the vessel should not permit of ducklings gaining access for the purpose of swimming.

FEEDING OF TURKEYS.

Feeding should be commenced twenty-six to forty-eight hours after hatching. Water and grit (coarse sand) may be given when they are placed in the brooder. The water should be given by means of a fountain to protect the young birds from drowning. The feeding practice may be either dry mash and grain, wet mash and grain, or an all-mash. If the all-mash method is employed, it should be changed when the young turkeys are about ten weeks of age to mash and grain.

In the feeding of wet mash, frequent feedings should be employed during the early life. Start with five feeds per day, gradually reducing

to one feed of mash and one of grain when the turkey chicks are ten weeks old. The mash should be placed in small receptacles that offer the maximum protection from fouling and, if dry, that avoid wastage.

Turkeys, like chickens, require different rations for different ages. The starting ration should contain approximately 20 per cent. of crude protein. This may be continued until ten weeks of age, when the protein level may be reduced to 15 per cent.

The kinds of food that they should receive are largely dependent upon what foodstuffs are available in the locality in which the turkeys are reared. There is one point that turkey raisers should remember, and that is that no single food supplies all the requirements of the young birds, and that it is more economical to purchase some additional foods to supplement home-grown grains than to limit the ration to the foodstuffs grown on the farm.

The following ration used at the Oklahoma Agricultural Experiment Station, U.S.A., has been reported as giving results, and is one that could be used in many districts in Queensland:—

25 lb. bran
25 lb. pollard
25 lb. yellow corn
7 lb. lucerne meal
5 lb. meat meal (63%)
3 lb. cottonseed meal
5 lb. dried buttermilk
¾ lb. salt
¾ lb. powdered limestone
1½ lb. bonemeal

The average weights of turkeys raised in this experiment are most interesting and are as follows:—

Age.	Males.	Females.	Average Weight.
	Lb. oz.	Lb. oz.	Lb. oz.
4 weeks	..	..	0 12
8 weeks	2 6	1 14	2 2
12 weeks	5 1	4 0	4 8
16 weeks	8 9	6 0	7 4
20 weeks	12 0	7 14	9 14
24 weeks	15 8	9 9	12 8

In an experiment conducted in Great Britain at the Newton Rigg Farm the following rations were used:—

—	Starting. 1 to 10 weeks.	Growing. 10 to 24 weeks.	Fattening. 24 to 27 weeks.
	Lb.	Lb.	Lb.
Pollard	25	25	..
Bran	22	26	20
Maize Meal	20	25	..
Sussex Ground Oats	10	10	10
Fish Meal	6	3	10
Soya Bean Meal	8	5	..
Cod Liver Oil	2	1	..
Salt	½	½	..
Ground Limestone	..	2	..
Dried Skim Milk	7	..	..
Crude Protein content of the above ration was :—	18%	15%	14%

Grain Mixture :—2 parts of wheat and 1 part of cracked maize.

Practice of Feeding.—A very crumbly mash was fed five times daily during the first week and half grain and half mash for the last feed in the day. This was reduced to four of mash and one of half grain and half mash for the second week, three of mash and one of half grain and half mash for the third and fourth weeks, after which they received two mash and one half grain and half mash to within three weeks of killing. For the first four weeks chopped clover leaves were mixed with the mash. At eight weeks narrow-stemmed kale was fed at the rate of 12 lb. daily. Growers' mash was fed from ten weeks to within three weeks of killing, when fattening mash was given three times daily in a crumbly state.

In the feeding of turkeys, consideration must be given to the class of food they are likely to gather while on range. Insect life and grass seeds plus succulent grass are all possibilities. Insect life is of a high protein nature, and when plentiful it may be very desirable to reduce the animal protein that is used with any mash mixture. In general practice, however, farm poultry and turkeys generally suffer from a lack of protein.

Feeding the Breeding Stock.

Turkey hens may lay as early as seven months when given a good start in life and fed a ration that is conducive to production, but production can usually be expected at about eleven months. For breeding purposes the turkey hen should not be too fat. A mash of bran 1 part, pollard 2 parts, plus 10 per cent. of meat and bone meal, with grain at night, will promote production and keep the birds in the best breeding condition. In addition to the above a plentiful supply of succulent green feed should be given, and a shell grit should be available at all times. Where it is impossible to obtain greed feed, lucerne chaff of good quality could be added to the mash to the extent of 10 per cent. When this is to be used it is better to soak it overnight. There may be localities where crushed grains would prove more economical than bran and pollard. When such is the case they may be used to advantage, but it is advisable to have some bran to give a mash a crumbly consistency, and where possible to use a mixture of crushed grains in order to add variety. When skim milk is available, it may be used to mix the mash or may be given to the birds to drink. The meat and bone meal may then be reduced by 1 lb. for every 1½ gallons of skim milk supplied.

American investigators of the United States Range Live Stock Experiment Station found that the following average quantities of food were consumed per bird per week over a period of forty-eight weeks:—Males, 5·88 lb.; females, 3·15 lb. A breeding pen of one male and fifteen females would, therefore, consume, during a period of twelve months, 2,762 lb. of food.

FEEDING OF GEESE.

On most farms sufficient food in the form of grazing will be available for the adult flock of geese. Geese are good foragers, but when vegetation is scarce green feed and grain should be provided. About 2 or 3 oz of grain should always be given per bird as an evening meal

With goslings which are being prepared for market a ration such as is recommended for the feeding of other table poultry is recommended.

Goslings require no food for upwards of thirty-six hours after hatching, although up to this period they may be supplied with water and grit or coarse sand. At thirty-six hours they may be given their

first feed which may consist of equal parts of bran and pollard and the same quantity of some grain, such as sorghum, wheat, maize, or barley, moistened preferably with milk to a crumbly mash. Finely-chopped green feed may also be mixed with the mash and will prove beneficial to the goslings. Clean sand which should always be available to the goslings may be sprinkled over the mash. Three feeds per day of the above mixture should be given for about one month. After this period, provided there is plenty of good grazing available in the form of succulent greenstuff, the number of feeds may be reduced to one.

To obtain a good marketable carcase goslings need to be fed liberally up to four months of age.

Geese, both young and adult, should always be kept supplied with good, clean drinking water, but the drinking vessels for the goslings should be so constructed that they can only get their heads into them.

The sitting goose should always be given a supply of grain as she is usually unable to collect sufficient food during the short time she is off the eggs.

MEDICINAL DRUGS FROM WEEDS AND TREES.

In England, Boy Scouts, Girl Guides, and women volunteers are gathering an unusual wartime harvest. They are picking stinging nettles, dandelion roots, meadow saffron, and other herbs containing useful medicinal drugs.

Before the war most of these drugs were imported. To-day, skilled gatherers are earning quite a lot by clearing the countryside of what to the farmer and the gardener are just weeds. For example, dried nettles fetch £30 to £50 per ton, and dandelion roots as much as £5 per cwt.

And according to a report from an American university, inexpensive substitutes for novacaine, antiseptics, and possibly sulfanilamide and its derivatives may soon be made from corn cobs, oat hulls, and other farm waste materials.

Similar work is being done in Australia at the present time. Conditions arising out of the present world situation have prompted science workers at Canberra to start experiments in the cultivation of plants yielding certain important drugs. At the same time, they have sponsored a survey of the natural flora of Australia, with a view to bringing into use any medicinal plants already known and other plants, the medicinal properties of which have yet to be discovered.

One particular Australian plant which has become important as the source of a valuable drug is Duboisia, a tree known to most of us as corkwood. Corkwood leaves contain in commercial quantity a powerful sedative drug known as hyoscine. There is a world shortage at present of hyoscine, because of its greatly-increased usage in the treatment of mental disorders arising out of the war. As a matter of fact, drug manufacturers are now paying as much as 3s. 6d. a lb. for corkwood leaves.

Dr. Joseph Bancroft, who is well remembered in the Burnett district—at Eidsvold and other places—is credited with the discovery of the value of corkwood as a source of hyoscine. How he found out about it is rather interesting. One day his daughter got some of the green plant material of the corkwood in her eye. Like other plants of the same natural order, one of its properties causes dilation of the pupil of the eye. It was this peculiarity observed by Dr. Bancroft while treating his daughter for the injury to her eye that started him on his investigation of the cause of the trouble, and so discovered that corkwood leaves contain the drug called hyoscine.

Anyone gathering corkwood leaves should be very careful in handling them, for the hyoscine they contain is a powerful poison and its ingestion into the human system in the very smallest quantities may cause serious ill effects. And especially is it necessary to be careful to prevent any of the plant material entering one's eyes, nose, or mouth, or coming in contact with broken skin or tender parts of the body.

The corkwood tree is common to the coastal belt of Queensland, and also northern New South Wales.

Queensland Gum Trees.

SCRIBBLY GUM OR WHITE GUM (Eucalyptus micrantha).

THE scribbly gum or white gum is a large tree with a smooth white or blotched bark. The bark is nearly always marked with scribbly, brown lines, hence the common name. The "sucker" leaves or leaves on stump shoots are large, up to 9 inches long and 4 inches wide. The leaves on the adult tree are much smaller and narrower, being mostly about 5½ inches long and about 1 inch at the widest part. The contrast is well shown in the accompanying plate. The tree flowers in spring or early autumn. The flowers are borne in the axis of the leaf on a rather slender stalk with six to fifteen flowers in a bunch. The flower buds are club-shaped. Stamens are numerous. The seed capsules are very broadly top-shaped, about ¼ inch in diameter, and with a broad, usually reddish, rim.

Distribution.—A native of eastern Australia from southern New South Wales to central Queensland.

Plate 194.

Scribbly Gum or White Gum (*Eucalyptus micrantha*).—From left to right: Fruiting branch with seed capsules; "sucker" leaf; flowering branch.

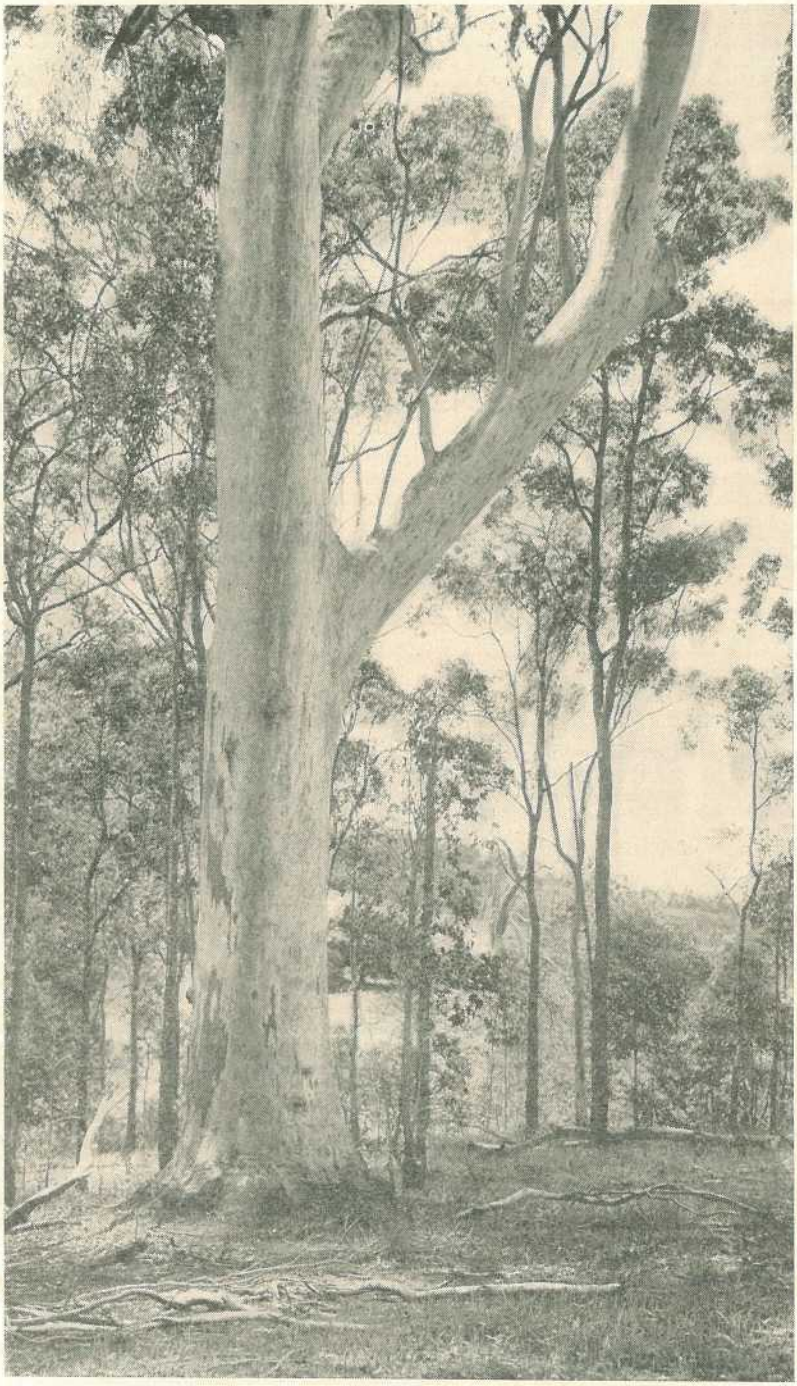


Plate 195.

SCRIBBLY GUM OR WHITE GUM.—A fine specimen growing at Sunnybank, near Brisbane.

Botanical Name.—Eucalyptus comes from the two Greek words—eu = well and calypto = I cover, in allusion to the cap of the flower bud which acts as a protection to the centre parts of the flowers—that is, the stamens and pistil, and which is thrown off as these reach maturity. Micrantha comes from the two Greek words micros = small and anthos = a flower, and refers to the flower being smaller than those of a closely-allied species.

Common Name.—Most commonly the tree is known as "scribbly gum," in allusion to the scribble-like markings almost always present on the trunk. It is also known as "white gum," "sugar gum," and "cabbage gum," local names also given to other trees, however. The Queensland Forest Service proposes the name of "white gum" for the timber.

Timber.—The timber is comparatively light for a hardwood and has an average dry weight of about 55 lb. per cubic foot. According to the Queensland Forest Service it has no durability in the ground and little in the weather. Palings of fences at Beerwah rotted completely off at ground level, but the upper parts weather comparatively well. As house stumps it had to be replaced in 3 years. The average life of 55 sleepers replaced by the Queensland Railways during 18½ years was 16·83 years, as against 22·33 years for ironbark. It is an excellent fuel timber and can be used for general building purposes out of the weather.

Oil.—According to the Technological Museum, Sydney, the oil is of the peppermint type used in the mining industry in the separation of mineral sulphides from ores by a flotation process. The principal species distilled is eucalyptus dives, common in the coastal ranges of New South Wales and Victoria. It has a much heavier yield of oil than the Queensland *E. micrantha.*

A SELF-CLOSING GATE.

A farm gate that is self-closing is made like an ordinary gate except that the top bar is 4 inches shorter than the bottom one. Also the upper hinge pin is longer than the lower one by the same amount. When the gate is swung open the latch end will be elevated so that it will swing shut of its own weight no matter how much or how little it is opened.

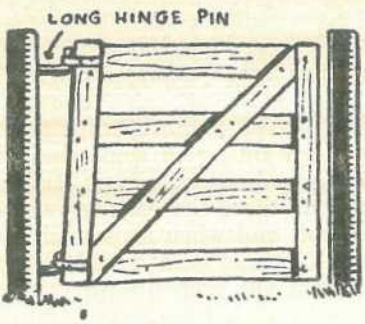


Plate 196.

New Green Manure Crops.*

By N. J. KING.

AMONG the various activities of the Bureau of Sugar Experiment Stations is the testing of green manure crops from abroad or produced in Australia. From time to time this Bulletin has contained articles dealing with the Gambia pea (*Crotolaria goreensis*) and the New Zealand blue lupin, and as a result of our experiments and writings on these two crops both have attained some degree of interest on the part of cane growers.

Plate 197.

SHOWING THE GROWTH MADE BY THREE "GIRU" BEAN VINES, BUNDABERG STATION.

Many new species of green manure crops are tried on the Experiment Stations, are found wanting in some desirable feature—such as good early cover, quick germination, vigour, and resistance to bean-fly attack—and are discarded; these the cane grower hears nothing about. The work goes on, however, and when a promising species is found, due publicity is given to the fact and seed is collected to form a nucleus of commercial supplies should the demand warrant it.

* Reprinted from *The Cane Growers' Quarterly Bulletin* (Bureau of Sugar Experiment Stations, Department of Agriculture and Stock) for July, 1941.

At the present time two promising species are under preliminary trial at the Bundaberg Sugar Experiment Station. During 1940 the Director (Dr. H. W. Kerr) noticed some plants of a green manure type growing wild in the Giru area. The plants appeared vigorous, though not receiving any attention, and it was thought that any crop of such a nature which would grow without care in an area of such low rainfall may have valuable drought-resisting qualities. Dr. Kerr collected a few mature seeds and these were planted on the Experiment Stations. In Bundaberg only three seeds germinated, and these have grown vigorously; by mid-May they covered an area 20 feet by 12 feet. The conditions were fairly good, and it is possible that Poona pea would have developed just as well. However, the crop appears to have at least one valuable feature not possessed by the Poona pea—and that is a

Plate 198.

ILLUSTRATING THE GROWTH OF *Dolichos biflorus*, WITH SORGHUM NURSE CROP.

prolonged growing period. The seeds were planted in mid-November and only began to flower in early May. The rapid maturing of the Poona pea is in many ways undesirable. It generally forms mature pods in February—in the middle of the wet season—when it is not practicable to plough it in. The result is a thick, volunteer crop necessitating further cultivation to kill it; if planting of cane follows rapidly on the ploughing-in of the Poona pea the volunteer crop may be costly to eradicate from the young cane. Cane growers, particularly in the wet areas, require a crop which would not seed so early in the wet season—in other words, a crop with a long growing period. If this newly discovered species lives up to its present promise it may be a valuable variety in such wet areas. Tentatively the crop has been named the "Giru bean" until such time as it can be identified by the Government Botanist.

The other variety under trial was imported from South Africa. It is named *Dolichos biflorus*. Mr. F. Manson Bailey, one time Government Botanist for Queensland, lists this species as being a native plant in far North Queensland, where it was called "Mal-kan" and "Tandaji" by the aborigines. It is also known as "Horse Gram" in India. This variety is a fine-stemmed creeping plant and it is recommended by South African authorities that it be grown with a nurse crop; this is some tall growing plant, such as sorghum, on which the Dolichos can climb. This species flowered about a week earlier than the Giru bean and is setting a good crop of seed. It is yet too early to state whether this crop has any definite value, but in areas where moisture is plentiful and there is no restriction on maize growing a planting of alternate rows of each may serve a dual purpose—the maize crop could be grown for grain and a green manure crop obtained from the Dolichos at the same time.

The two photographs illustrate the type of crop obtained from the Giru bean and the *Dolichos biflorus*. The latter was planted with a grain sorghum so that it would have a nurse crop on which to climb.

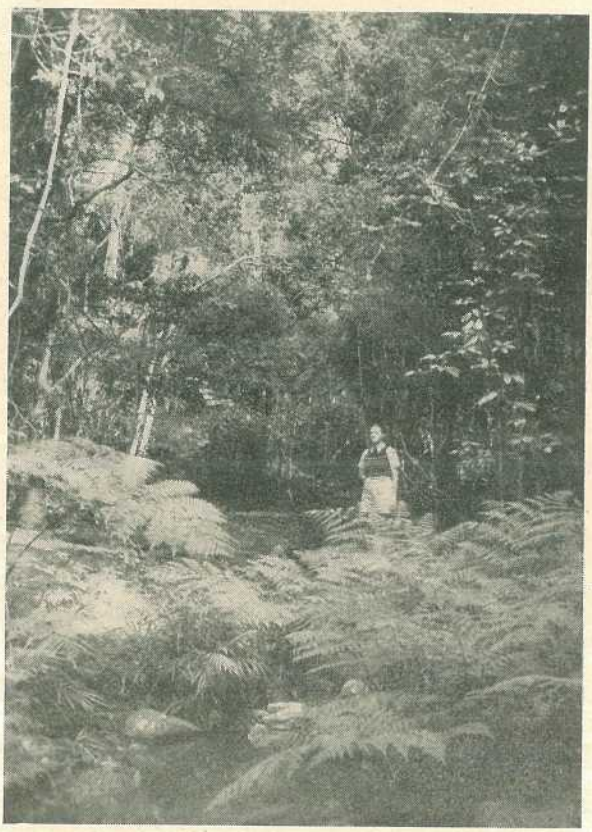


Plate 199.
A RAIN FOREST GLADE, BUNYA MOUNTAINS, QUEENSLAND.

One Year after the 1940 Burdekin Flood.*

By H. W. KERR.

EARLY in April, 1940, the Lower Burdekin district experienced the most disastrous flood in its history. A full account and illustrations of the damage which it caused were presented in the Quarterly Bulletin for July, 1940. Since that time, the writer has visited the district on several occasions, and it may be of interest to record what has been done, both by the farmers and the Government, to repair the damage and guard against a recurrence.

Soil tests made immediately following the flood showed that the subsoil of these river lands, as well as the sands washed from the eroded soils and deposited as the velocity of the flood waters was checked, exhibit a degree of fertility not usually met with under these conditions; and it was forecast that the damaged lands, as well as the fine sand deposits, would be capable of producing crops at no distant date, if the inevitable nitrogen deficiency were made good. That this has been possible is amply demonstrated by the excellent crops of mature cane now to be seen on many such fields. The speed with which the job was tackled and the trouble put right is a high tribute to the courage and determination of the farmers who were so badly hit by the flood.

Plate 200.

ILLUSTRATING THE EXTENT AND NATURE OF THE SANDING WHICH CERTAIN FIELDS EXPERIENCED.—What remained of the mature crop had been harvested when the photograph was taken.

A further interesting set of pictures has been obtained in the course of farm visits and some of these are published at this time. We reproduce, first of all, a view of a badly-sanded field of plant cane (Plate 200), which was printed in the October Bulletin last year. When

* Reprinted from *The Cane Growers' Quarterly Bulletin* (Bureau of Sugar Experiment Stations, Department of Agriculture and Stock) for July, 1941.

the same field was inspected later in the year, it was found that the farmer had graded and ratooned the block: the ratoon shoots originated, of course, from the eyes of the buried plant crop sticks, and these had been present in great profusion. However, the farmer destroyed such of these as were not wanted, by the use of implements, to enable him to irrigate the crop if necessary. The block then appeared as shown in Plate 200, and at the present time, this is an excellent crop of mature Badila. Doubtless, the field will be ratooned once more, and continued under such crops as long as possible; this will give the sand a chance to mellow into fertile surface soil before it has again to be planted. The existence of the buried surface soil has certainly contributed much to the nutrition of the present crop.

Plate 201.
ILLUSTRATING THE FIELD SHOWN IN PLATE 202 AFTER THE RATOONS WERE WELL ADVANCED.

The Badila ratoons illustrated in Plate 202 were produced under similar conditions, and are estimated to yield at least 35 tons per acre.

It will be recalled that the Government took early action with a view to repairing the breaks in the river bank, and granted a substantial sum of money to cover the cost of the work. The engineer (Mr. Fison) who was delegated by the Co-ordinator General of Public Works to control the job decided that the repair work might be carried out according to two alternative plans—(1) the construction of earth levees, provided a supply of suitable filling were handy to the job, or (2) the erection of permeable bulkheads (Plate 203). The former type of construction would be the cheaper, but it presented a measure of risk should further damaging floods supervene before the earth works were thoroughly consolidated and protected. The majority of the jobs were therefore of the bulkhead type, but a few earth levees were successfully installed. Fortunately, the 1941 wet season was free from heavy floods, while it was generally favourable for the establishment of protective vegetation on the bared banks.

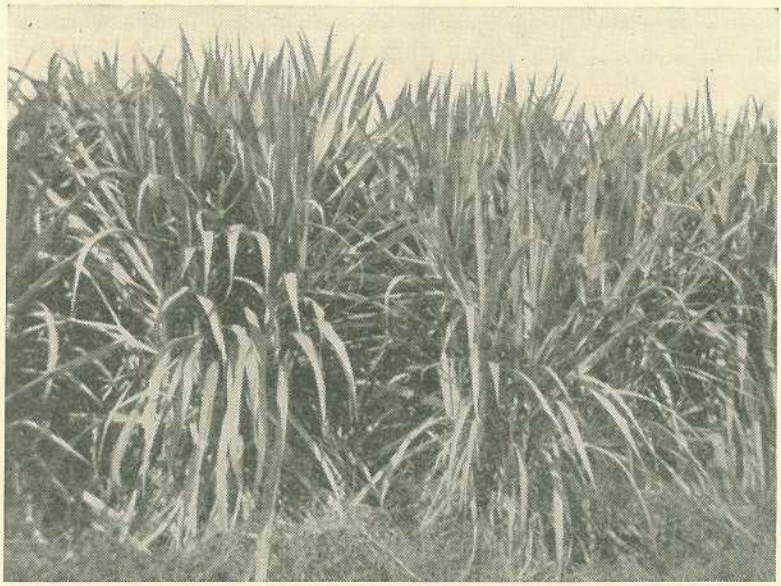


Plate 202.
AN EXCELLENT CROP OF BADILA RATOONS PRODUCED ON A HEAVILY SANDED FIELD.

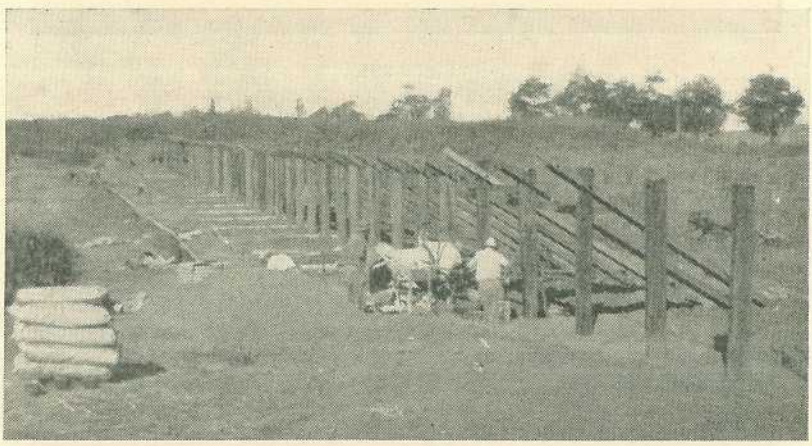


Plate 203.
ILLUSTRATING THE DETAILS OF THE PROTECTING BULKHEAD: NOTE CONCRETE APRON IN COURSE OF CONSTRUCTION.

The illustrations presented provide some conception of the construction of the bulkheads: the purpose of these is to obstruct and restrict the flow of flood waters at the low points adjacent to the river banks, thus effecting a greatly reduced water flow, and inducing silting of the gullies. These are built of piles and sheeting timbers, and are intended primarily as a safeguard in times of future high floods, until a thicket of protecting shrubs and trees can become established both in front of and behind the bulkhead, to provide a heavy vegetative cover. Wherever such a flora existed during the 1940 flood, no damage was caused by the waters pouring over the banks or through existing gullies.

The species of shrub most highly favoured is the Duranta, a well-known hedge plant which thrives in coastal Queensland. The accompanying illustration (Plate 205) shows how well it grows under the dry Burdekin conditions. This is portion of a farm hedge, and had attained a height of about 15 feet. Its virtue in times of flood lies in its thicket growth and especially in the retention of a mass of lower branches and leaves which extend practically to the ground.

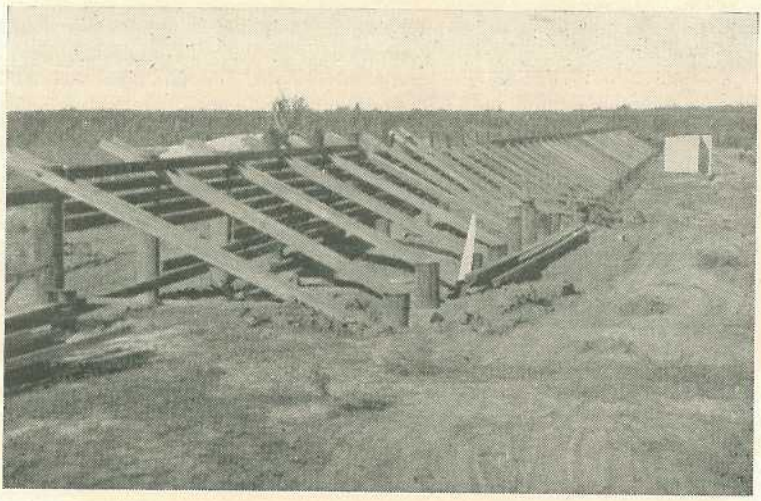


Plate 204.
FRONT VIEW OF PARTIALLY CONSTRUCTED BULKHEAD.

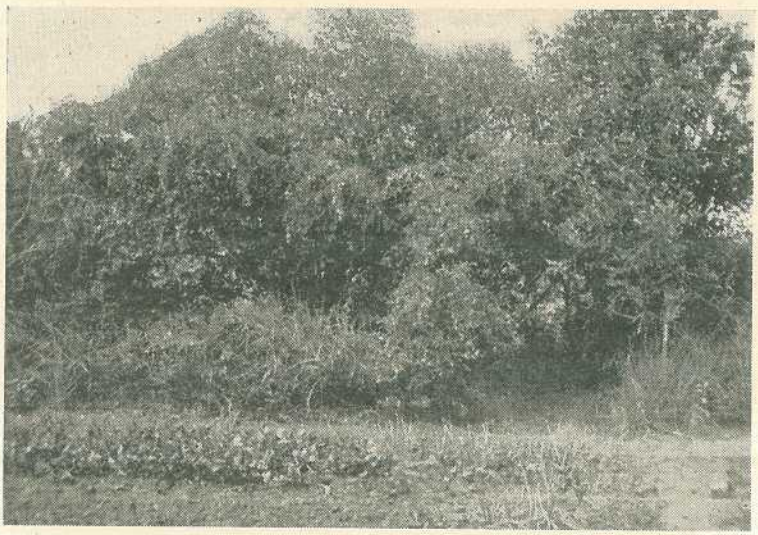


Plate 205.
SHOWING AN OLD DURANTA HEDGE ON A BURDEKIN FARM.

Several thousand cuttings of this species were grown by the Forestry Department, and at the Mackay and Meringa Sugar Experiment Stations, to be transported to the Burdekin and planted several

rows wide along unprotected portions of the banks. Fortunately the rainfall conditions were generally favourable following planting, and the majority of the shrubs should become established.

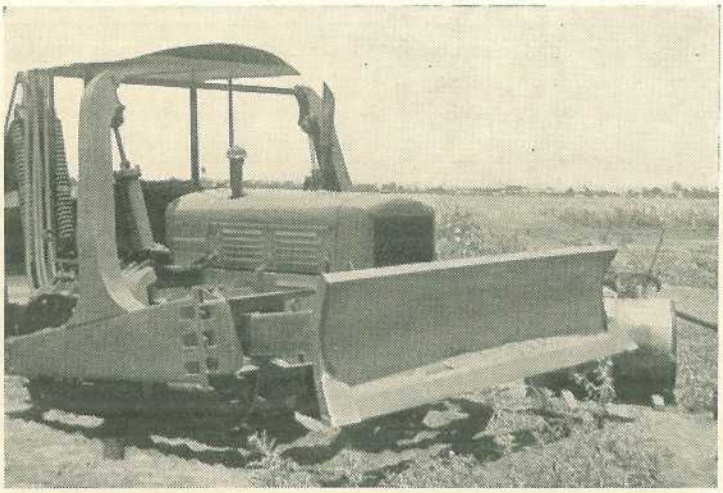


Plate 206.
ILLUSTRATING THE HIGH-POWER TRACTOR AND BULL-DOZER ATTACHMENT.

Plate 207.
TRACTOR AND SCOOP AT WORK IN THE CONSTRUCTION OF AN EARTH LEVEE.

Of special interest was the heavy tractor equipment made available for the construction of the earth levees. The 85 H.P. Diesel tractor (Plate 206) was provided both with bull-dozer, and hydraulically-operated scoop, which had a capacity of 8 cubic yards. It is shown (Plate 207) putting the finishing touches to the first earth levee which was formed on the Home Hill bank. As soon as this job was completed, the

farmer set to work planting all types of grasses or other vegetation which could be expected to grow—anything, in short, which would provide cover and binding power through its root system—in advance of the 1941 wet season. This was successfully accomplished by the aid of irrigation, and in the course of a year or two the more permanent vegetation which has been planted should assure the security of the work.

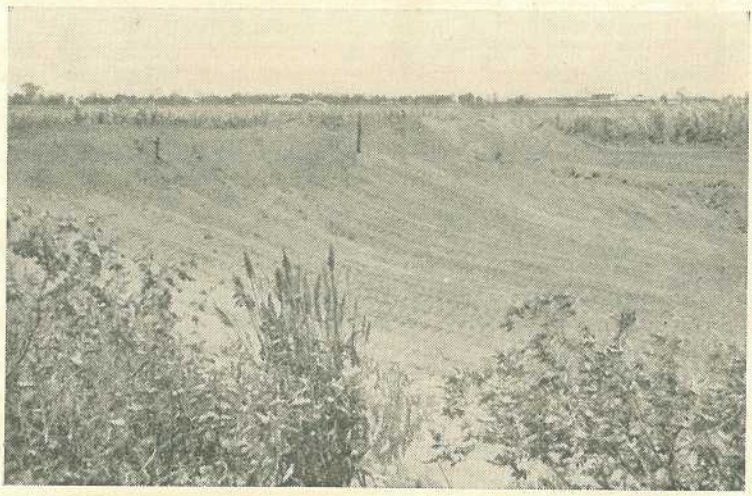


Plate 208.

THE EARTH LEVEE PRACTICALLY COMPLETED, HOME HILL FARM.

A CHUTE IDEA.

On an Iowa farm is a stationary loading chute built in front of the hog-house door (says an American exchange). As the bottom is loose it is easily changed into an approach to and from the building as shown. When used as a loading chute the outer end is held up by means of a gas pipe slipped through the holes in the legs. By removing the gas pipe the outer end drops and is in position for the approach.

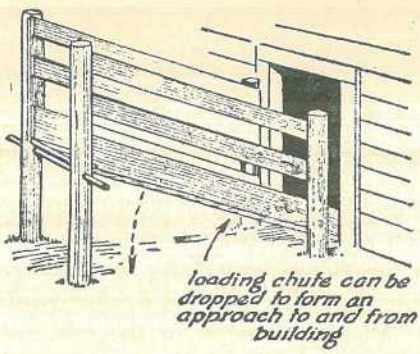


Plate 209.

Cheese Production and Gradings.

G. B. GALLWEY, A.F.I.A., A.A.I.S.

BECAUSE of the importance that cheese has assumed in the changed conditions of the dairying industry, a survey of the yields of cheese and the average test of the milk received at the factory would be useful.

An extension of cheese grading to cover all markets and the recording of results has been welcomed by the industry. Consequently, the first period covered by this survey was the half-year ended the 30th June, 1941, and the results are indicated in the tables that follow.

The sources from which the figures have been compiled are (1) the monthly returns furnished by factories; and (2) the grading reports of State and Commonwealth officers.

It would be well for all concerned with factory management to study the position and ascertain any weakness that may be revealed and consider possible means of putting it right.

In considering the production and yields, variations are noted, and as this is the first survey issued it would be well for factories to keep these particulars for comparison with the results of future surveys.

It is pleasing to observe a big improvement in gradings. While the percentage of choice gradings is not as high as desirable, the lower grades show a considerable decline. It should, obviously, be the aim of every manager to raise the standard of his factory. It might not be out of place to indicate the position to suppliers and obtain their co-operation in improving the grading results of the factory.

SUMMARY OF PRODUCTION AND YIELDS OF ALL CHEESE FACTORIES FOR THE HALF YEAR ENDED 30TH JUNE, 1941.

—	Lb.	—
Milk received	59,584,775	Yield of cheese per 100 lb. milk, 10·44 lb
Cheese made	6,225,996	Yield per lb. of butter fat, 2·72 lb.
Butter fat paid	2,283,742	Average test 3·83 per cent.

GRADES OF CHEESE.

Total.	Choice.	First.	Second.	Third.
3,962,723	308,260	2,447,497	1,101,436	105,530
	7·79%	61·76%	27·79%	2·66%

PRODUCTION AND YIELDS OF ALL CHEESE FACTORIES FOR THE PERIOD 1ST JANUARY TO 30TH JUNE, 1941.

RESULTS OF CHEESE GRADED FOR CHEESE FACTORIES FROM 1ST JANUARY TO 31ST DECEMBER, 1940.

Factory.	Milk Received Lb.	Cheese Yield per 100 lb. Milk.	Cheese Made (Green Weight). lb.	Yield per lb. Butter Fat.	Butter Fat lb.	Average Test. %	Total.	Choice.	First.	Second.	Third.
Aubigny	1,049,241	10·47	109,959	2·79	39,394	3·75	95,270	..	30,609 32·12%	43,128 45·27%	21,533 22·61%
Biddeston	3,602,816	10·81	389,595	2·80	139,029	3·86	296,410	59,206 19·97%	236,604 79·83%	600 ·2%	.. ..
Coalstoun Lakes ..	583,228	10·93	63,780	2·81	22,710	3·89	..	..	..	..	..
Danedale	995,220	9·68	96,311	2·61	36,842	3·70	60,098	..	49,122 81·74%	10,204 16·98%	772 1·28%
Downs	4,057,355	10·39	421,815	2·52	167,334	4·12	179,622	62,768 34·94%	104,924 58·41%	11,930 6·65%	..
Dundanah	893,142	10·57	94,412	2·77	34,041	3·81	10,158	..	..	5,295 52·12%	4,863 47·88%
Felton	1,244,766	11·13	138,553	2·83	49,019	3·94	114,392	..	105,435 92·17%	8,957 7·83%	..
Greenmount	696,077	10·5	73,481	2·68	27,414	3·93	64,849	..	12,375 19·08%	44,694 68·92%	7,780 12·00%
Highgrove	754,339	10·28	77,536	2·81	27,616	3·66	53,244	..	7,462 14·01%	40,343 75·77%	5,439 10·22%
Gomorran	935,871	10·15	95,000	2·52	37,748	4·03	100,197	..	12,245 12·22%	87,952 87·78%	..
Irongate	1,475,393	10·51	155,019	2·74	56,580	3·83	52,188	..	51,240 98·18%	948 1·82%	..
Kooroongana ..	1,733,002	10·44	180,929	2·85	63,460	3·66	180,130	..	170,709 94·77%	9,421 5·23%	..
Lilyvale	653,219	11·04	72,114	2·83	25,486	3·9	14,903	..	5,573 37·39%	9,330 62·61%	..
Malling	1,849,803	9·31	172,191	2·50	68,803	3·72	..	..	..	..	..
Maclagan	2,055,894	10·4	213,789	2·76	77,498	3·77	..	..	..	..	..
Kulpi	1,752,507	10·4	182,240	2·83	64,309	3·66	20,899	..	19,356 92·62%	1,543 7·38%	.. ..
Cooranga North ..	2,174,723	10·32	224,376	2·60	86,295	3·97	210,619	..	39,770 18·88%	170,849 81·12%	.. ..

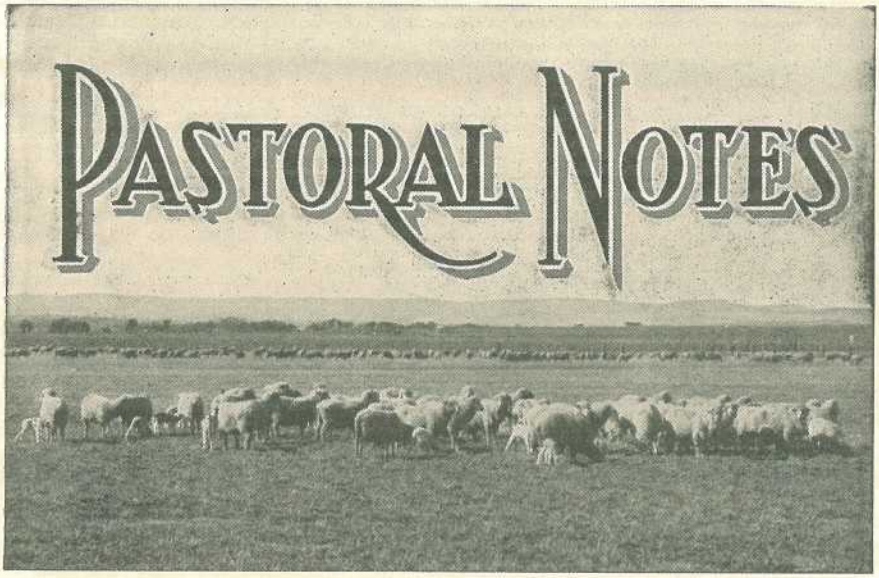
Moola..	2,595,003	10·43	270,671	2·76	97,048	3·78	239,882	67,896	144,214	27,772	..
								28·3%	60·12%	11·50%	..
Mount Sibley ..	941,262	10·36	97,550	2·65	36,765	3·91	95,934	..	54,611	41,323	..
									56·92%	43·08%	..
Mount Tyson ..	3,253,637	10·69	347,789	2·80	12,009	3·81	202,661	106,825	95,836	..	..
								52·70%	47·30%		
Kelvinhaugh ..	940,832	9·94	93,472	2·63	35,588	3·78	77,417	..	74,887	2,530	..
									96·73%	3·27%	
Pittsworth	1,525,854	10·8	164,836	2·71	60,916	3·99	87,419	8,046	78,102	1,271	..
								9·2%	89·34%	1·46%	
Brookstead	1,101,643	10·73	118,184	2·87	41,145	3·73	66,002	..	61,806	4,196	..
									93·64%	6·36%	
Linthorpe	1,455,545	10·58	153,945	2·76	55,700	3·83	101,509	78	93,920	7,511	..
								00·08%	92·52%	7·4 %	
Scrubby Mountain ..	579,950	10·63	61,645	2·82	21,868	3·77	53,682	..	4,564	43,745	5,373
									8·5%	81·49%	10·01%
Springside	1,331,221	10·56	140,461	2·89	48,689	3·66	55,645	..	49,261	6,384	..
									88·69%	11·31%	
Yarranlea	1,270,706	10·36	131,619	2·82	46,673	3·67	110,097	..	67,014	40,401	2,682
									60·87%	36·70%	2·43%
College	9,124	9·17	837	2·27	376	4·12	..	..	..	..	..
Quinalow	2,260,597	10·45	236,154	2·8	84,470	3·74	115,179	..	114,052	1,127	..
									99·02%	00·98%	
Ramsay	1,414,851	10·25	144,988	2·65	54,616	3·86	168,851	..	55,824	91,617	21,410
									33·06%	54·26%	12·68%
Rockview	845,450	11·22	94,713	2·7	35,069	4·15	87,671	..	87,071	600	..
									99·31%	00·69%	
Rocky Creek ..	1,523,625	10·39	158,358	3·06	51,804	3·4	84,222	..	24,372	52,832	7,018
									28·94%	62·73%	8·43%
Rosemount	868,737	9·83	85,435	2·74	31,227	3·59	49,454	..	7,323	39,381	2,750
									14·81%	79·63%	5·56%
Southbrook	2,075,990	10·44	216,784	2·70	80,301	3·87	195,570	2,490	191,757	1,323	..
								1·27%	..	00·69%	
Sugarloaf	1,021,601	10·4	106,630	2·56	41,508	4·00	115,391	..	108,357	7,034	..
									93·9%	6·1%	
Sunnyvale	1,186,136	10·46	124,107	2·56	48,424	4·08	102,164	..	11,199	84,406	6,559
									10·96%	82·62%	6·42%
Greymare	853,077	10·23	87,239	2·61	33,466	3·92	47,830	..	5,952	38,147	3,731
									12·44%	79·75%	7·81%

PRODUCTION AND YIELDS OF ALL CHEESE FACTORIES FOR THE PERIOD 1ST JANUARY TO 30TH JUNE, 1941—*continued.*

Factory.	Milk Received Lb.	Cheese Yield per 100 lb. Milk.	Cheese Made (Green Weight). lb.	Yield per lb. Butter Fat.	Butter Fat lb.	Average Test. %
Lord John Simms ..	391,843	10·34	40,533	2·65	15,319	3·91
Talgai	564,984	10·34	58,414	2·79	20,966	3·71
Victoria Hill ..	498,770	10·13	50,533	2·87	17,574	3·52
Wellcamp	1,199,099	10·51	125,986	2·67	47,165	3·93
Woodleigh	921,830	10·34	95,318	2·79	34,128	3·7
Yamsion	1,243,504	10·42	129,564	2·72	47,613	3·83
Yargullen	1,203,308	10·73	129,167	2·76	46,745	3·88

RESULTS OF CHEESE GRADED FOR CHEESE FACTORIES FROM 1ST JANUARY TO 31ST DECEMBER, 1940—*continued.*

Total.	Choice.	First.	Second.	Third.
4,556	..	..	3,173	1,383
			69·64%	30·36%
34,397	..	8,645	18,043	7,709
		25·13%	52·45%	22·42%
21,659	..	11,382	5,162	5,115
		52·55%	23·83%	23·62%
81,239	..	8,876	72,363	..
		10·93%	89·07%	..
67,375	..	44,075	21,887	1,413
		65·42%	32·48%	2·1%
120,281	951	94,050	25,280	..
	00·79%	78·19%	21·02%	..
123,657	..	104,636	19,021	..
		84·62%	15·38%	



Home-made Stock Licks.

GRAZIERS and farmers situated at long distances from manufacturing or distributing centres are often inclined to do without certain aids to progress, or use an inferior article on the score of cost. This is well exemplified in the case of licks for stock. Most producers know that salt, lime, and phosphates are the main ingredients of a lick. This has led to a growing tendency to reduce costs by mixing licks on the property, but there still remain some stockowners who use nothing, or perhaps salt alone, when a more complete supplement is required. Where it is possible to obtain wood ash it should be incorporated in the lick. It is not the complete solution of the problem, but its use is a decided help—particularly to breeders.

In general, the poorer the country the greater the lime content of the ash and the lower the phosphate. There are a few plants which give an ash rich in both lime and phosphate and, correspondingly, poor in potash. For example, the well-known "stinking rodger" gives an ash containing about 16 per cent. phosphoric anhydride and 27 per cent. lime; while the ash from the blue gum contains 14 per cent. phosphoric anhydride and 19 per cent. lime. These ashes may represent the greater proportion of a lick. The obvious drawback is the limited quantities obtainable and the difficulty of collection. Grey gum, crow's foot elm, bloodwood, cane tops, and iron bark come next, in that order.

Belah, bottle-tree, apple-tree, box, and tallow-wood are very low in phosphate. Belah contains about one-fiftieth of 1 per cent. and must rank as the lowest. This is readily understood when it is remembered that belah will flourish on a soil poor in phosphate. In striking contrast is its 50 per cent. lime content. Ash from tallow-wood and gidgee also show a 50 per cent. lime. Their phosphate content ranges from .5 per cent. to 1 per cent. Most of the unlisted trees give ashes with a phosphate content of from 1 per cent. to 2 per cent.

Collection.—Ashes from the home fires should be collected and stored throughout the year. When practicable, material from burning off should be collected. It should be gathered as soon after burning as possible, because rain soon damages it. The ashes from the burnt sawdust of timber mills are a useful source of cheap material. In short, all available ashes should be kept, for it takes a lot to make a ton and it is a hopeless task trying to get enough ashes just when needed.

Preparation.—Fresh ashes are caustic in nature, but if allowed to age under cover they gradually lose this distasteful quality, and, after a few weeks, they may be fed to stock with safety. See that the material is as free as possible

from dirt and antbed. Screen out the coarse charcoal. This may be done easily by setting an old spring mattress at an angle against a wall and shovelling the ashes on to it. The fine ash is collected, and the charcoal returned to the fire or thrown into the pig sty.

Mixing.—No set rule for mixing can be given. The proportions required vary with the composition of the ash. The phosphate-rich ashes may represent as much as two-thirds of the mixture. In the case of low-phosphate high-lime ashes, this proportion usually limits the intake markedly and, consequently, must be altered. Here again a definite figure cannot be given, but 30 per cent. to 40 per cent. may be used, unless experience or supplies indicate to the contrary.

CLASSING THE EWE FLOCK.

Many grazing properties in Queensland are now stocked well up to their carrying capacity, and, with the coming crop of lambs to be provided for, some reduction in numbers will be necessary. It is more profitable to own a flock of good ewes than a flock containing a mixture of good and bad stock. Besides being more profitable, it should give the owner far more satisfaction to have a flock near as possible to uniformity in type and which will cut a heavy fleece of good quality wool.

On most large holdings, crossing the ewe flock forms part of the station routine, and there is no reason why smaller flocks should not be classed in the same way.

Just before shearing is the most suitable time to do the classing and, usually, the flock can be classed in three groups to advantage. The tops should consist of all the large-framed deep-bodied ewes carrying a covering of even type, well grown, and showing the character and colour typical of the breed. Ewes selected for the main flock should be as free from fault as possible, but need not be so even or up to the standard of the tops. The third class will be the culls, including light cutters, ewes producing inferior wools in quality or colour and ewes rejected for defective frames, weak constitution, or objectionable folds or wrinkles. The rams to be mated with them should be classed in the same way, the best being selected for the top line. All culled ewes should be fattened, and sold as soon as possible; the same may be said of those cast for age.

DRUG TREATMENT FOR REDWATER.

There are two kinds of redwater in Queensland. Both are caused by minute blood parasites and are carried by the tick. The differences between these two organisms are so small that they can only be recognised under the microscope. It is impossible to determine which type of redwater is present by an examination of an animal in the field. Fortunately, this is not necessary.

During the last few years intensive efforts have been made to find a suitable drug which would be effective in treatment and yet easy to apply. For many years piroblue held favour. This is effective in the treatment of one kind of redwater, but is ineffective against the other. Unfortunately, the common form in Queensland is unaffected by piroblue. Moreover, piroblue has a great disadvantage in that it requires to be used intravenously—i.e., it must be inoculated into the jugular vein.

Acaprin is now used largely in the treatment of redwater outbreaks, and is known to be effective against both forms of the disease. It is easily applied because the dose is small and it can be injected subcutaneously—under the skin. Supplies of the drug are kept on hand at the Department of Agriculture and Stock and by leading chemists. It is put up in the form of a solution and in single doses.

In areas where redwater is common, owners should keep a few doses of the drug on hand, together with a small hypodermic syringe.

Cases should, of course, be treated as early as possible, but even those which look hopeless at the start will, within an hour or two, show improvement, and so go on to recovery. A second injection can also be given without harming the animal in any way.

Plate 210. [*Photo.: T. B. Watkins, Blackall.*

Demonstration School on Sheep Blowfly Control in the Shearing Shed, Northampton Downs, Blackall.—Opening address to assembled stockowners. Other schools have been held at Longreach, Winton, Julia Creek, Charleville, Hannaford, Roma, Goondiwindi, and Dirranbandi.

The Central Queensland group of schools, organised by the Director of Veterinary Services, were conducted by Dr. F. H. S. Roberts, Parasitologist, Mr. G. R. Moule, B.V.Sc., Government Veterinary Surgeon, and Mr. C. J. Swinburne, Sheep and Wool Instructor. Other veterinary and sheep and wool officers are also engaged in the instructional work, as some schools have, necessarily, to be conducted concurrently.

At the Blackall School Dr. J. H. Riches and Mr. Ian Johnstone, B.V.Sc., of the Council for Scientific and Industrial Research Station at Gilruth Plains, assisted in the instructional and demonstrational work.

Plate 211. [*Photo.: T. B. Watkins, Blackall.*

A DEMONSTRATION OF SHEEP BLOWFLY CONTROL METHODS IN PROGRESS.

Plate 212. [*Photo.: T. B. Watkins, Blackall.*

SHEEP BLOWFLY CONTROL.—A demonstration of the fold removal operation.

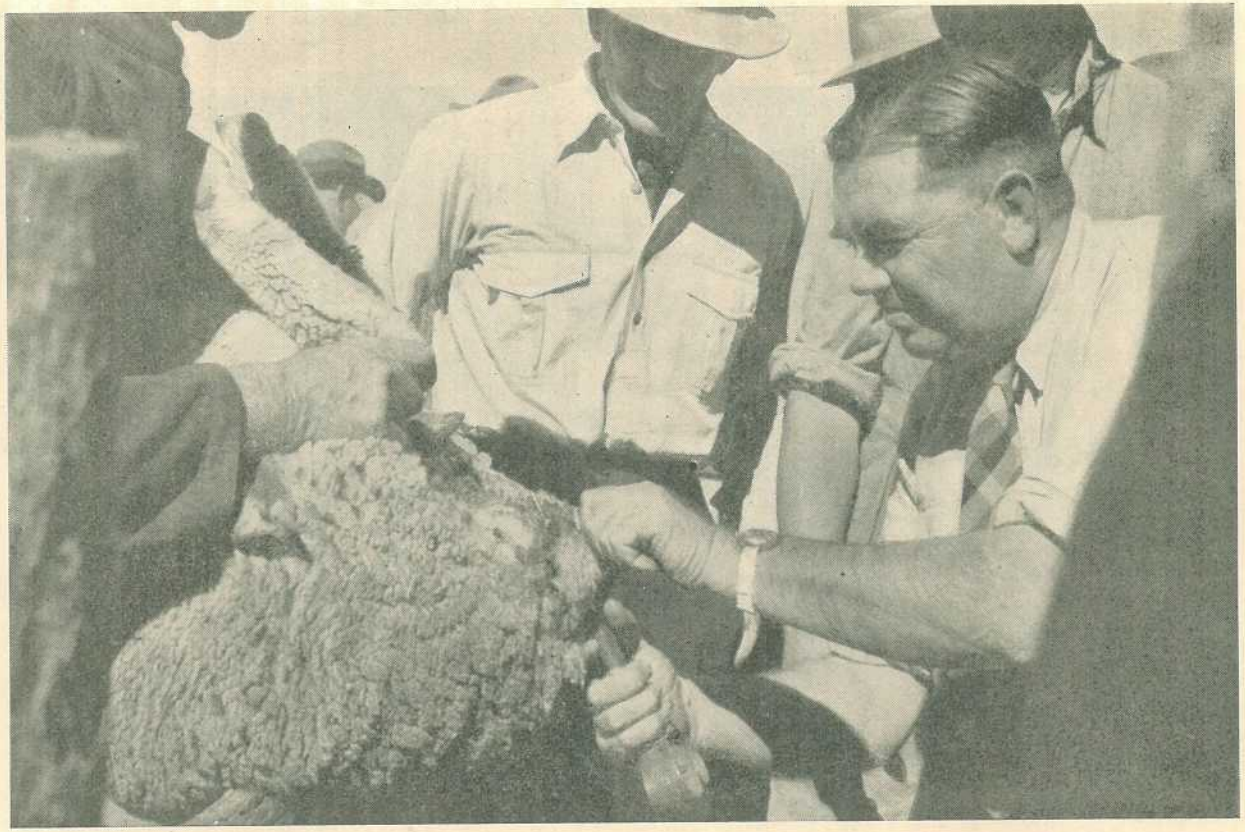


Plate 213. [*Photo.: T. B. Watkins, Blackall.*

A SHEEP-OWNER UNDERTAKES A DEMONSTRATION.—Sheep blowfly control schools are essentially practical, and pastoralists attending are invited to practice the methods under the supervision of instructing officers so that any fault may be corrected.

Olive Growing.

THE Olive is a native of Asia Minor and also of Africa. Its cultivation is recommended in Queensland principally for parts of the tablelands extending westwards from the Coast Range. Extremes of heat and cold are not favourable to fruit production, and according to experience in other countries a mean temperature of about 60 degrees Fahr. is ideal for its development. It will stand light frosts without injury.

SOILS.

Good sandy and medium loams are the most suitable for growing olives, and good soil moisture is essential. Soils containing plenty of lime and potash are especially suitable.

PROPAGATION.

Propagation may be carried on by means of seeds, cuttings, truncheons, and also by planting suckers, root cuttings, and layers, though the last three methods are rarely used. The most common method is to raise trees from seed and bud these with good varieties. Seeds do not germinate readily unless carefully cracked and the kernels only planted. Spring is the best time for sowing. Specially prepared seed-beds should be used, and the seed should be sown about 2 inches deep. Germination will occur in three to four weeks, and when the plants are 8 to 10 inches high—i.e., when nine to twelve months old—they may be planted into nursery rows. All lateral branches should be removed and straggling roots trimmed. Budding by the "T" method, described in the Departmental pamphlet "Propagation of Fruit Trees," is performed when the plants are in vigorous growth in the spring, with the qualification that the buds should be cut somewhat bigger and longer than citrus buds. Waxed cloth should be used for tying.

Cuttings should be selected during July or August; they require to be 12 to 15 inches long, and should be laid in trenches at an angle of 45 degrees, permitting only the top 3 or 4 inches to remain exposed

above the soil surface. When the cuttings have made a few inches of growth they may be transplanted out. They are usually not as long-lived as seedlings.

PLANTING AND PRUNING.

The plants should be set from 25 to 30 feet apart each way. Pruning should take place from the beginning to induce the "vase" form of pruning adopted for peaches, plums, &c. All unwanted wood should be removed right back to its base. The fruit is borne on two-year-old lateral branches.

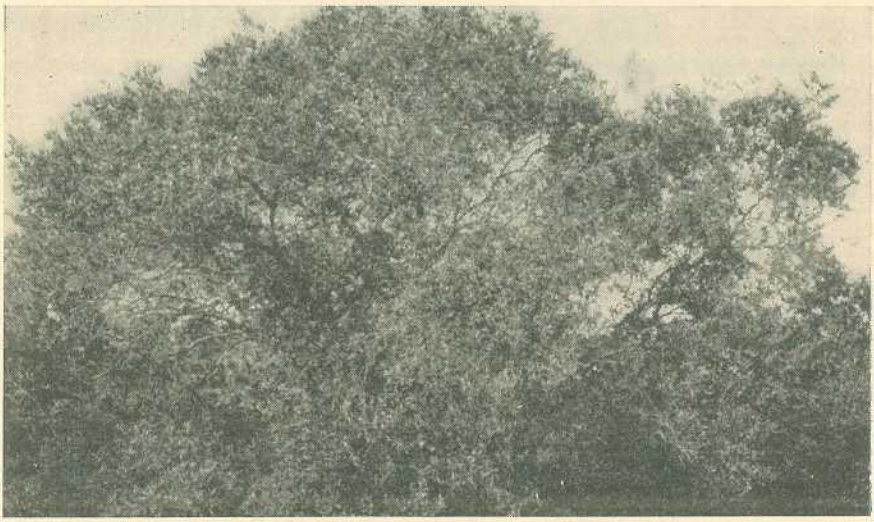


Plate 214.
A WELL-GROWN OLIVE TREE NEAR BRISBANE.

HARVESTING.

The fruit is picked green or ripe according to whether green or ripe olives are required for pickling. Usually the largest olives are selected for pickling, whilst the smaller fruit is raked or shaken from the tree and used for oil extraction.

VARIETIES.

Varieties have not been extensively tried out in this State up to the present, but the following would probably yield good results:—

For Oil—Lucca and Blanquette.

For Pickling—Ascalano and Manzanillo.

Fruitgrowing in the Central-West.

THE Minister for Agriculture, Hon. Frank W. Bulcock, as the representative for the Barcoo Electorate, knows from personal experience and long residence in the West, the necessity for fruit in the dietary of the people in the Great Outback. He knows, also, how expensive it is for people to purchase fruit which has had to be transported long distances from coastal fruit districts and that, for this reason, it is not eaten as extensively as it should be.

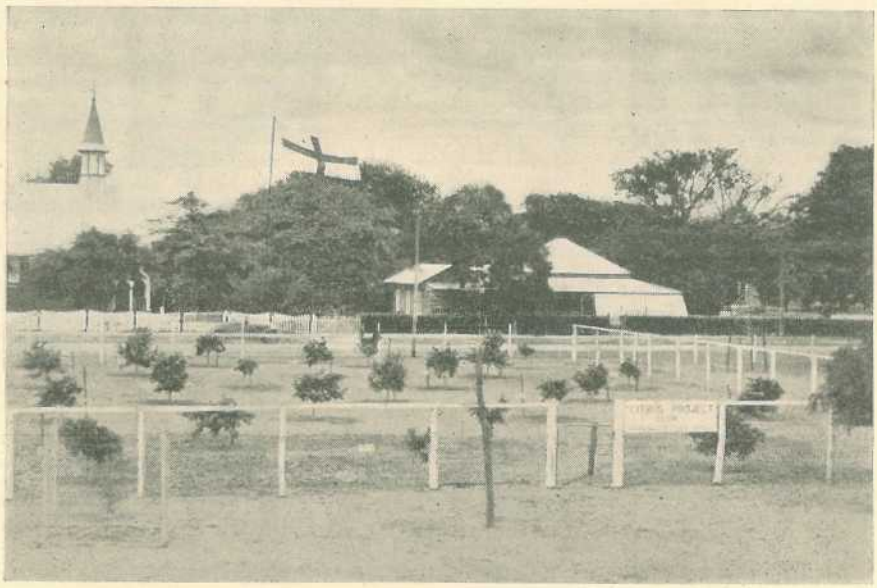


Plate 215.

ORANGE GROVE ESTABLISHED BY THE SCHOLARS' CITRUS PROJECT CLUB IN THE GROUNDS OF THE BARCALDINE STATE SCHOOL.

The obvious solution is for Western people to grow their own fruit, and Mr. Bulcock has made every effort to foster "orchardmindedness" among far inland dwellers. As a result of this close interest, in addition to that of the officers of his own Department, large acreage of citrus trees—and also of bananas, mangoes, dates, pineapples, and papaws—have been planted in the West. Enthusiastic masters of the Barcaldine and Blackall State Schools have added impetus to the departmental effort by establishing citrus groves in their school grounds to inculcate the principles of fruitgrowing in a practical way. The accompanying photographs illustrate the keenness of Western children, who are made responsible for the care of their own school ground groves, which are kept clean of weeds, regularly cultivated and watered, and pruned by themselves under the guidance of a departmental field officer.

Incidentally, the photographs also serve to show very strikingly the remarkable rate of growth of citrus fruit trees in the West. The trees were planted in August, 1940, and had attained a height of 5 feet after only fifteen months of growth.

The bananas illustrated are growing along a bore drain in the Blackall district.

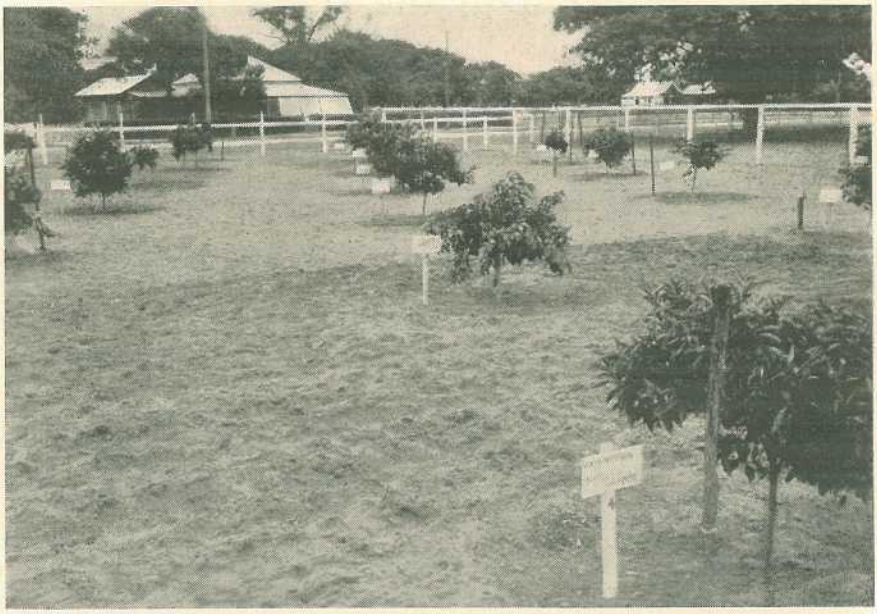


Plate 216.

ANOTHER VIEW OF THE BARCALDINE STATE SCHOOL ORANGE GROVE, SHOWING THE REMARKABLE GROWTH OF THE YOUNG CITRUS TREES, 15 MONTHS AFTER PLANTING.

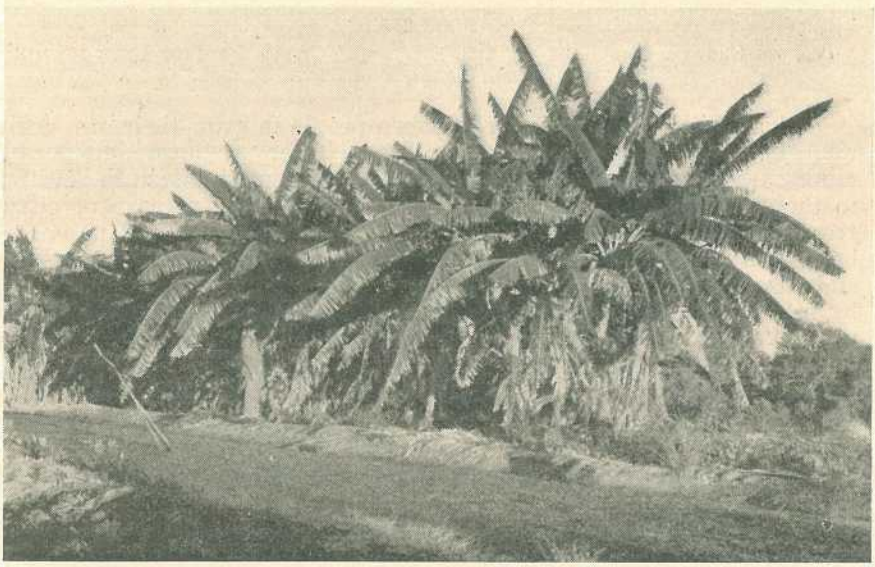


Plate 217.

A BORE DRAIN BANANA GROVE AT BLACKALL.

THE FRUIT MARKET.

JAS. H. GREGORY, Instructor in Fruit Packing.

MARKET conditions in all capital cities are now undergoing a great change as hot summer conditions become more regular in their development. Growers sending fruit to distant markets should now harvest fruit in less advanced and coloure condition. Examination of papaws and pineapples on the Sydney market during the last week of November revealed that many lines were in too far an advanced condition to allow fruit to be held on the sections against a possible higher price. Advanced lines must be sold immediately they arrive on the market section, as it is a better policy for a salesman to take a lower price and get out quickly than to push the fruit going off while holding it for a higher price. When any fruit becomes overripe, it has to be sacrificed for what is offered, usually to the barrowmen, whose buying rates are low. Water blister and yeasty rot made an unwelcome appearance in the middle of October. Practically all specimens found were affected at the base. If growers intend to get the best values for their pines on distant markets they will have to cut fruit and leave a small end of stalk projecting beyond the base to keep the fruit from contact with the sides of the box. Separating the coloured from the partly-coloured fruit is also a necessity. This enables the country-order buyer to select less coloured fruit which will carry a distance, instead of mixed coloured fruit with a risk of its going off before the consumer gets it. The importance of better handling and proper packing practice is again strongly stressed.

Plate 218.

A "Quiet" Morning at the Sydney Markets.

Prices during the last week of November were:—

TROPICAL FRUITS.

Bananas.

Brisbane.—Cavendish: Sixes, 7s. to 10s.; Sevens, 9s. to 12s.; Eights and Nines, 10s to 15s.

Sydney.—Cavendish: Sixes, 10s. to 14s.; Sevens, 13s. to 16s.; Eights and Nines, 16s. to 18s.; specials higher.

Melbourne.—Cavendish: Sixes, 7s. to 10s.; Sevens, 9s. to 12s.; Eights and Nines, 11s. to 14s.

Brisbane.—Cavendish in bunches, 2d. to 9d. dozen.

Brisbane.—Sugars, 3d. to 6d. dozen; Lady Fingers, 2d. to 1s. per dozen.

Pineapples.

Brisbane.—Smooths, 4s. to 8s. case; loose, 2s. to 6s. 6d. dozen. Roughs, 8s. to 11s. case; loose, 1s. 6d. to 5s. dozen.

Sydney.—South Queensland, 7s. to 10s.; North Queensland, to 14s.

Melbourne.—8s. to 12s.; special packs, to 13s.

Adelaide.—11s. to 14s.

Papaws.

Brisbane.—Locals, 2s. to 3s. 6d. bushel; Yarwun, 5s. to 9s. tropical case; Gunalda, 4s. to 5s. bushel.

Sydney.—6s. to 12s.; specials, to 15s. tropical case.

Melbourne.—10s. to 16s.

Apples.

Brisbane.—New season's Stanthorpe Lord Nelsons, 16s. to 20s. bushel.

Mangoes.

Brisbane.—Commons, 9s. to 11s.; specials, 12s. to 14s.

Sydney.—Some lines of commons were seen, this type is practically unsaleable. Special varieties, to 24s. case.

OTHER FRUITS.

Avocado.

Sydney.—Supplies of this fruit have practically ceased. Prices to 14s. would be obtained for good sound lines.

Rockmelons.

Brisbane.—7s. to 9s. bushel case.

Sydney.—To 12s. bushel case.

Melbourne.—14s. to 16s. bushel case.

Passion Fruit.

Brisbane.—Firsts, 8s. to 12s.; Seconds, 5s. to 7s.

Sydney.—10s. to 14s.; specials, to 18s.

Melbourne.—12s. to 20s. half bushel.

Tomatoes.

Brisbane.—Coloured, 3s. to 8s.; Ripe, 3s. to 6s.; Green, 3s. to 7s.

Sydney.—South Queensland, 6s. to 8s.; few specials, to 10s.

VEGETABLES.

(Brisbane prices only, unless otherwise stated.)

Beans.—Brisbane, 5s. to 8s.

Peas.—Brisbane, 7s. to 12s.; inferior lines lower.

Cabbage.—Locals, 6d. to 4s. dozen; Stanthorpe, 4s. to 7s. bag.

Carrots.—3d. to 2s. 6d. bundle.

Beetroot.—3d. to 1s. bundle.

English Potatoes.—2s. 6d. to 7s. sugar bag.

Sweet Potatoes.—3s. 6d. to 4s. 6d. sugar bag.

Cucumbers.—Brisbane, 2s. to 3s. bushel; Melbourne, 6s. to 10s.; Sydney, 6s. to 8s.; specials, to 12s.; inferior unsaleable.

Rhubarb.—9d. to 1s. 3d. bundle.

Chokos.—9d. to 1s. 6d. dozen.

Marrows.—Brisbane, 1s. to 3s. dozen; Melbourne, 8s. to 10s. case; Sydney, no demand.

Lettuce.—1s. to 2s. 6d. dozen.

Pumpkins.—Brisbane, 15s. to 17s. cwt.; Sydney, 18s. to 22s. bag.

PRODUCTION RECORDING.

List of cows and heifers officially tested by Officers of the Department of Agriculture and Stock which have qualified for entry into the Advanced Register of the Herd Books of the Australian Illawarra Shorthorn Society, the Jersey Cattle Society, and the Friesian Cattle Society, production charts for which were compiled during the month of October, 1941 (273 days unless otherwise stated).

Name of Cow.	Owner.	Milk Production.	Butter Fat.	Sire.
		Lb.	Lb.	
AUSTRALIAN ILLAWARRA SHORTHORN.				
MATURE COW (STANDARD, 350 LB.)				
Model of Alfa Vale	W. H. Thompson, Nanango	11,470·75	564·328	Greyleigh of Greyleigh
Merrivale Tulip 4th	W. Soley, Malanda	13,944·2	512·043	Greyleigh Honorarium
Pilton View Cora	P. D. Fiechtner, Pilton View, via Greenmount	9,909·5	396·935	Sunrise 3rd of Rosenthal
White Park Thelma 13th	W. T. Savage, Barnesmore, via Toowoomba	8,856·25	359·212	Corunna Viscount
SENIOR, 2 YEARS (STANDARD, 250 LB.).				
Vision 20th of Meadow Vale	W. J. Freeman, Trevlac, Rosewood	6,986·9	291·680	Triumph of Park View
Pilton View Venus	P. D. Fiechtner, Pilton View, via Greenmount	7,420·00	289·506	Navillus Venies Sheik
Trevor Hill Dove 2nd	G. Gwynne, Umbiram	7,039·59	288·997	Corunna Supreme
JUNIOR, 2 YEARS (STANDARD, 230 LB.).				
Cedargrove Irene 25th	P. D. Fiechtner, Pilton View, via Greenmount	8,038·5	307·805	Cedargrove Windlad
Murrays Bridge Roanie	P. D. Fiechtner, Pilton View, via Greenmount	7,146·00	264·686	Murrays Bridge De Valera's Pride
Pilton View Lola	P. D. Fiechtner, Pilton View, via Greenmount	6,614·5	254·221	Navillus Venies Sheik
JERSEY.				
JUNIOR, 4 YEARS (STANDARD, 310 LB.).				
May of Gem	W. Bishop, Kenmore	8,569·75	487·945	Laces Volunteer of Ardroy
SENIOR, 3 YEARS (STANDARD, 290 LB.).				
Grasmere Calm 22nd	W. Davis, Brisbane road, Redcliffe	7,463·00	357·524	Grasmere Duke
SENIOR, 2 YEARS (STANDARD, 250 LB.).				
Inverlaw Wild Rose	E. Matthews, Yarraman	5,516·25	259·058	Oxford Royal Lad
JUNIOR, 2 YEARS (STANDARD, 230 LB.).				
Lermont Golden Pearl	J. Schull, Oakey	5,959·2	326·061	Woodside Golden Volunteer
FRIESIAN.				
JUNIOR, 2 YEARS (STANDARD, 230 LB.).				
Rockview Secret	J. P. Larson, Miriam Vale	7,430·95	261·508	Ryefield Curtis

General Notes

Staff Changes and Appointments.

All field officers of the Department of Agriculture and Stock have been appointed also local supply officers under the *National Security (Emergency Supplies) Rules* of 1941.

The underlisted officers of the Department of Agriculture and Stock have been appointed also inspectors under *The Tobacco Industry Protection Act* of 1933:—

Messrs. C. H. P. Defries, Instructor in Agriculture, Ayr; G. W. Smith, Instructor in Agriculture, Toowoomba; E. W. Baird, Instructor in Agriculture, Atherton; L. Wood, Field Officer (Silo Construction), Brisbane; J. McAully, Field Assistant, Rockhampton; C. E. Whitehead, Field Assistant, Mareeba; E. McDonald (South Johnstone), and J. Hart (A.I.F.).

Mr. A. K. Sutherland, B.V.Sc., Department of Health, Canberra, has been appointed to the Veterinary Staff of the Department of Agriculture and Stock, Brisbane.

Mr. S. M. Staines, Jamberoo, Taroom, has been appointed an honorary inspector of stock.

Messrs. J. W. Fleming (Mount Merchinson, Biloela) and W. C. Paroz (Le Nid, Biloela) have been appointed honorary protectors of fauna.

Constable P. E. O'Brien (Leyburn) has been appointed also an inspector under *The Slaughtering Act.*

Stanthorpe Fruit and Vegetable Levy.

The Stanthorpe Fruit and Vegetable General Levy Regulation, published in April, 1936, and extended from time to time, has been further extended for a period of two years from 24th December, 1941.

An amendment has been made in respect of the altered weight which now operates for apples—viz., 45 cases instead of 40 cases to the ton.

The levy is at the rate of 3s. 4d. per ton on fruit and/or vegetables despatched by rail or road, and all sums raised by the levy are expended only in the interests of the fruit and vegetable growers in the Stanthorpe area.

Price of Arsenic Pentoxide.

The Prickly-pear Land Commission has notified that as from 1st December, 1941, the price of arsenic pentoxide will be increased from 7s. 6d. to 8s. 9d. per 20 lb. tin. Railage is free to purchasers within the State. The reason for the rise is an all-round increase of materials and production cost. The new price is the actual cost to the Department of Public Lands.

Unauthorised Introduction of Animals and Birds—Danger to Australia.

It is probably not generally realised that in so far as the major animal plagues are concerned, Australia is not only remarkably free but that many of these diseases have never obtained a footing here. Some, such as Rinderpest and Fowl Pest, have gained access in times past, but were speedily eradicated; only, however, at some cost.

As diseases we fear are present in South-Eastern Asia and the islands between there and Australia, there is an ever-present risk of their introduction, this being guarded against by strict regulations under the Commonwealth Quarantine Act.

In some of these diseases the position is rendered more difficult by reason of the fact that apparently healthy animals may be "carriers"; whilst in the case of rabies, a dog may be affected for several months before developing symptoms. For these reasons the introduction of such animals as dogs and birds from these countries is prohibited.

Movement of troops has not infrequently been accompanied by spread of disease, largely owing to difficulties of ensuring proper restriction of movement of animals which may convey disease, and, therefore, the quarantine authorities ask that the attention of not only the general public, but especially of soldiers, sailors, and airmen be drawn to the risk from the unauthorised introduction of animals and birds from foreign countries.

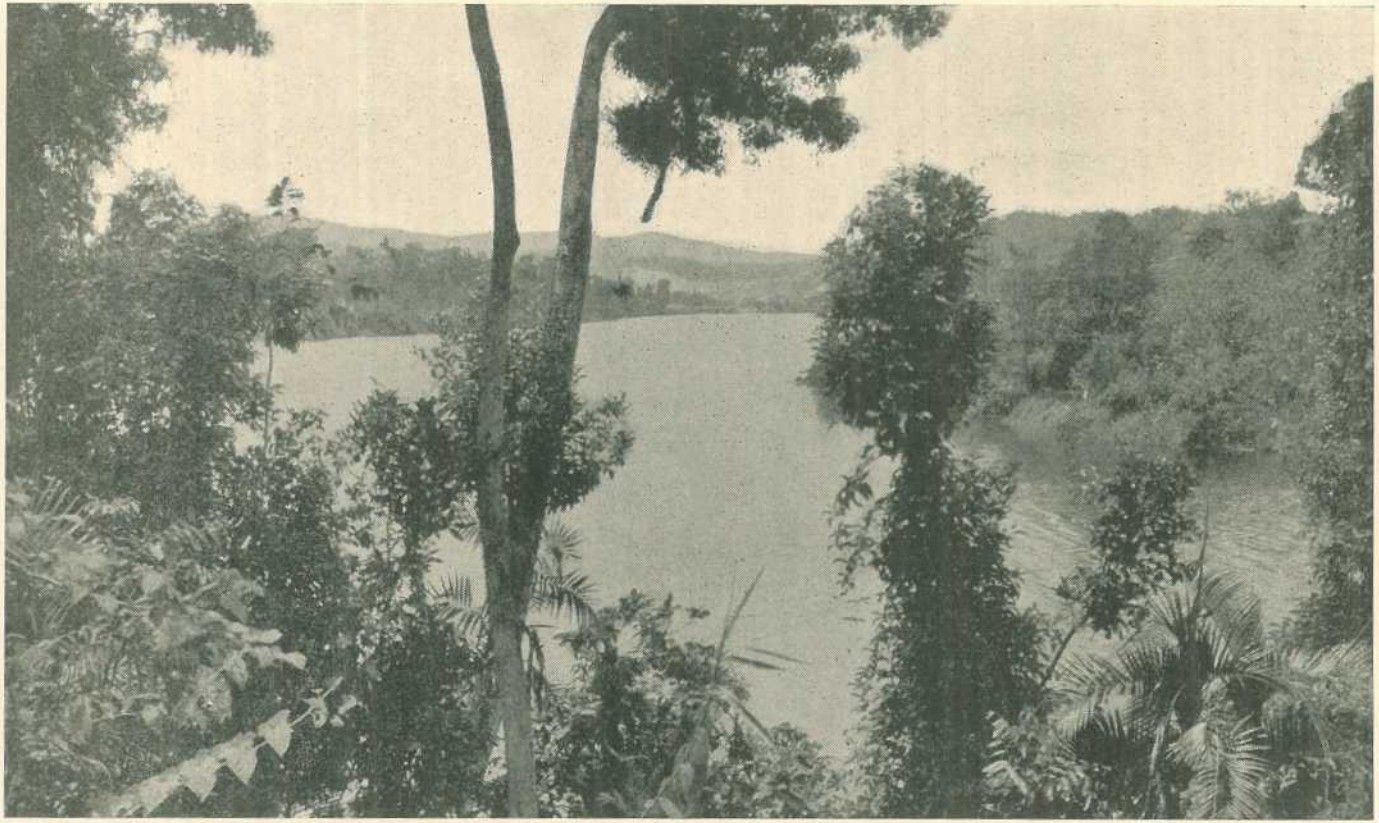


Plate 219.

The Broad Waters of the Daintree River. One of North Queensland's Finest Streams.—On the banks of the Daintree is a wealth of jungle land, a potential source of rich tropical production. Dairying is already an established local industry, and butter from the Daintree Factory has achieved a reputation for quality, although produced in the torrid zone. Beef-cattle fattening is another well-founded Daintree District enterprise. A good road connects Daintree with Mossman, Queensland's most northerly sugar town, possessing many modern social amenities. The Cook Highway—one of the finest coastal roads in the Commonwealth—provides rapid communication with Cairns, the thriving commercial and social centre of the rich cane lands north of Townsville.

Answers to Correspondents

VETERINARY ADVICE.

(Selections from the outgoing mail from the office of the Director of Veterinary Services.)

Calf Poisoning (Pepperina)—Fistula—Cause of Cow's Death—Castration of Pigs.

H.H.T.—

Poisoning of poddy calf with pepperina leaves.—The calf should be given a purgative, and it is suggested that it be given 4 to 8 oz. of Epsom salts, the dose, of course, depending on the size of the animal. A well-grown calf up to a year old would take very nearly a ½ lb. Epsom salts should be dissolved in about a pint of water, which is sufficient to fill a beer bottle. To this might be added a level dessertspoonful of ground ginger.

Fistulous wither.—Usually this condition does not clean up unless it is treated surgically, and even then great difficulty may be experienced. Probably the best advice is to obtain the services of a qualified veterinary surgeon to attempt the job for you.

Death of cow.—From the description given, it is apparent that the animal died of Traumatic pericarditis. This is brought about through the animal swallowing a foreign body which is sharp or pointed. It lodges in the second stomach or honeycomb, and with the movement of the stomach penetrates the wall of the stomach, passes through the diaphragm or skirt and enters the heart. Once the condition develops little can be done to alleviate it.

Castration of pigs.—If you send your name and address information on this subject will be given.

Mange Mites.

A.W.B. (Nerang)—

The fluid you have in mind is probably lime sulphur wash. This is effective against mange mites.

It is not very useful against lice; nicotine sulphate is used for that purpose.

Lime sulphur wash is prepared as follows:—

Take 1 lb. slaked lime and mix to paste with water, sift in 1½ lb. flowers of sulphur, and add 2 gallons of water. Boil for two or three hours until golden or amber colour. Then allow to stand, and take off the clear liquor on top. Add water to this to bring it up to 6 gallons. Use two parts of this stock solution to seven parts water to wash the horse thoroughly.

Repeat this treatment in three weeks' time.

Mammitis.

A.M.C. (Tully, N.Q.)—

There are various methods whereby a cow may contract mammitis. Present knowledge on this point is still rather confused. It may be contracted through the canal of the teat, especially where sanitary methods of milking —such as washing the udders and hands, clean uddercloths and water—are not practised.

When not kept scrupulously clean, milking machines are frequent causes of infection. Where any cows are known to have mammitis they should be milked last, and always hand milked into a bucket of disinfectant. Flies have been proved to carry the infection from one cow to another. Where this is suspected, the udders should be wiped after milking as well as before.

The first obvious signs of mammitis are frequently minute specks of white matter in the milk. These are most easily seen by milking on to a black surface. This is frequently followed by an intense inflammation of the udder, which becomes tense, swollen and hot. The milk may become thin and watery or cheesy.

Vaccination, combined with local treatment of the udder, is the best method of treatment. A U.S.C. pamphlet explaining the treatment in detail has been posted to you.

BOTANY.

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

"Native Pomegranate."

J.R.B. (Toowoomba)—

The specimen from the range below Toowoomba is *Capparis Mitchellii*, a tree with a very wide distribution in Queensland and commonly known as Native Pomegranate. It is also called Bumble Tree and Wild Orange; the last name, however, is commonly given to a number of native plants.

It is well worth growing locally. It is ornamental and when well grown has a shapely top. The flowers are large and conspicuous. The fruit has a very pleasant odour and was eaten by the aborigines.

Bats' Wing Coral Tree. Flame Tree.

L.D. (Lowood)—

1. *Erythrina vespertilio*, the Bat's Wing Coral Tree. This tree has a wide distribution in Queensland from the coast to the far interior, and because of the lightness of its timber, it is often called Cork Wood. It is quite distinct from Duboisia and the leaves have no commercial value.
2. *Sterculia acerifolia*, the Flame Tree. This plant belongs to the same family as the Kurrajong and Bottle Tree. It is a very handsome tree in flower. The leaves do not possess any commercial value.

It is doubtful if Duboisia occurs in your locality.

Cestrum—Poisonous to Stock.

D.C. (Toogoolawah)—

The specimen is the Green Cestrum (*Cestrum Parqui*), a native of South America, now a naturalised weed in Australia. It is very common in vacant allotments around towns. It is difficult to eradicate because of its suckering habit. It is very poisonous, and has caused death among town cows about Brisbane and elsewhere.

Carpet or Mat Grass.

T.R. (Merriwinni, via Cairns)—

The specimen is Carpet or Mat Grass (*Axonopus affinis*). There has been much controversy about this grass during recent years because it is inferior in quality and likely to invade first-class country. On second-class country, however, we think it has a decided value. It thrives on low, somewhat swampy land of rather poor quality, where other grasses will not grow.

It was originally boomed as a fodder under the name of *Paspalum compressum*, and is, perhaps, the grass you sowed some years ago. It is closely allied to the Buffalo Couch of North Queensland.

Twiggy Mullein, a Common Weed.

Inquirer (Boonah)—

The specimen is the Twiggy Mullein (*Verbascum virgatum*), a native of the Mediterranean region, now a fairly common weed in Queensland. It was probably introduced originally as a garden flower. Although a weed, it has not shown itself to be a particularly aggressive one.

"Sausage Tree" or The Sacred Tree of Nubia.

J.L.C. (Lower Cowley, via Innisfail)—

The specimen is the Sausage Tree, *Kigelia pinnata*, a native of Africa. It is sometimes called the Sacred Tree of Nubia. Sausage tree, however, is the generally accepted local name. There are several examples in the Brisbane Botanic Gardens, and in a catalogue of the Gardens published by the late F. M. Bailey some years ago he says:—

"In Nubia this tree is held sacred; the negroes celebrate their religious festivals under it by moonlight, and poles made of its wood are erected as symbols of special veneration before the houses of their great chiefs. The fruit, cut in half and slightly roasted, is employed as an outward application in rheumatic complaints."

Rural Topics

Rust can Ruin Farm Implements.

Although rust is often accepted as a matter of course, there is much that can be done to prevent it, and, if necessary, to remove it, without damage to the implement.

In repairing machines that have been lying in the field, rusted nuts that cannot be removed with a spanner are the first trouble to be noticed. This is an easily seen example of the bad effects of rust, but rust also reduces the working efficiency of machines in less obvious ways.

For instance, lorry springs rusted between the leaves do not do their job of smoothing out shocks. Moreover, the springs may break under a heavy load, because the leaves of a rusted spring cannot slide over each other to allow the spring to bend. Cog wheels and levers on drills and distributors cannot work smoothly if their iron-to-iron bearing surfaces are rusty.

Soften Before Chipping.

Rust can be chipped away, or filed away, or rubbed off with emery paper. All this, however, takes away some of the good metal as well as the coating of rust. Often this does not matter, but sometimes, as in the case of a spindle and bearing, it may make the parts a sloppy fit when they are put together again.

Penetrating oil will soften the rust so that it can be chipped off more easily, and this will reduce the chipping away of the iron itself.

Penetrating oil will soften the rust, loosening rusted-on nuts. It should be squirted round the exposed threads of the bolt close against the nut and left for an hour or so to seep along the threads inside the nut.

For more delicate machine parts whose fit must not be upset by chipping and filing, it is better to dissolve the rust chemically. Each article to be cleaned must have a small contact place filed on its surface. A thin band of zinc is wrapped round the article to touch this clean place. Then the articles are placed in a trough containing a solution of 2 lb. of caustic soda to each gallon of water.

They should be left in the solution for forty-eight hours. At the end of that time the rust will be in the form of a coating of black powder, which can be rubbed off easily with a wire brush.

An old sink is very suitable for holding the solution. Caustic soda burns the skin of the fingers, so it should be handled carefully. Tongs can be used to place the articles into the solution.

Preserve with Paint.

When the iron or steel has been cleaned it ought to be treated to prevent it from rusting again. Oil, where it can be kept in contact with the surface of the metal and does not get washed off, is a good preserver.

But oil gets rubbed and washed off exposed pieces of iron, and—although it is difficult in some cases—they must be preserved by painting. The surface must be clean, and especially it must be dry and free from grease.

New steel that has been rolled in a mill is covered with a bluish-grey film. This film is really a layer of fine scale. In a few months' time this scale flakes off and takes with it any paint that was applied to the new steel.

This film can be removed by pickling the steel in acid, but this is not a process to be carried out on a farm. The best thing to do is to leave the steel article unprotected in the atmosphere until it acquires a thin coating of rust. Then this coating can be rubbed off with a wire brush and a good painting surface will be exposed.

The best paint for machinery is red lead paint.

For many structures, such as steel stanchions and fence posts, bitumen paint is a fine preservative. Also a very satisfactory paint for steel and iron can be made by mixing two parts of tar with one part of paraffin. The mixing is laborious and it must be done very thoroughly; but the result is a paint that covers well and dries hard.

MAKE NETTING LAST LONGER.

The life of galvanised iron wire-netting and pipes and guttering can be greatly extended by an application of a hot mixture of five parts of tar and one part of pitch. A new galvanised surface, however, does not take any paint or tar mixture readily. Moreover, like the film on new rolled steel, the outer surface of the galvanising flakes off in the first few weeks of use. It is well, therefore, to let the galvanised iron weather a little before it is painted.

When it is essential for the new galvanised iron or steel to be painted immediately, the surface ought to be treated first with a solution of 8 oz. of copper sulphate and 1 oz. of sulphuric acid in a gallon of water. This solution should be left on the article for two hours. Then the article should be washed with water. When it has dried it can be painted satisfactorily.—*The New Zealand Farmer Weekly.*

The Problem of Prices.

Deep thinkers see behind the problem of prices a definite moral issue. There are some who argue that right through recurring depressions our troubles have largely been a question of morals, and they're probably right. We talk about money and credits and production and distribution—morals underlie all of them. We had a world, we thought, organised on a moral basis, but apparently we've run short of morals, just like a cash business running out of cash. To moralise further, nothing great or worth while is easy. And just to amplify that idea, let it be said that the names of those immortals splashed over the pages of history are not the names of those whose lives were easy or particularly happy. Happy lives—in the very ordinary sense of creature comfort or holding winning casket tickets—never made history. The names which are etched indelibly on the tablets of the human race and sung by the poets of all nations are the names of "the men of sorrows who have known grief."

For the farmer on whom the problem of prices weighs heaviest, there may be some spiritual comfort at least in that reflection; and also in the knowledge that the reward of the industrious is not ease—it couldn't be. The reward of the industrious is more work and more responsibility, and for the farmer, very often, lower prices—unless he's on the Lockyer growing onions under irrigation in a dry time.

Old-Time Sailing Ships Gave Britain War-time Cattle Fodder.

Seeds accidentally taken to England last century in the holds of American sailing ships have given Britain's farmers a valuable war-time cattle fodder.

It is rice grass, or *Spartina townsendii*, a plant flourishing on coastal mud-flats or river estuaries, where it prevents the washing away of banks by the action of tides and currents. Much rice grass has spread naturally, but in recent years extensive plantations have been made for coastal protection.

The modern English variety, discovered at Hythe, in Southampton water, in 1870, is a cross between the native species and that brought from America, and is so vigorous that whenever it comes into competition with either of its parents it eliminates them completely.

Agricultural experts who have carried out cattle-feeding trials with rice grass have found that under good conditions it makes splendid hay. It is also grazed readily by all classes of livestock.

In New South Wales rice grass has been planted as fodder in the extensive saltlands of the Riverina district, where it absorbs the overflow from artesian wells.

Experiments with it are also being carried out in South Africa, India, and the Sudan.

Farming is a Complex Business.

Those who do not know anything about farming little realise that farming is one of the most complex of businesses. But at the same time it can be described very simply: It is the process of converting cheap, crude chemicals into valuable refined products and selling the latter to somebody at a profit. These chemicals must be bought or taken from the air. There is a moderate amount of them stored in the soil on every fertile farm, but this is in the nature of a reserve. If drawn upon it must be replaced. If not replaced, the enterprise is no longer farming but mining, and will presently go bankrupt. Apply these simple principles to every branch of agriculture and you will find no exceptions. No matter what your product, it is the result of running crude chemicals through a converting process and selling the product.

Farm Notes

JANUARY.

THE heaviest rains of the year occur usually during the January-March period, and, weather conditions permitting, the main field activity for the month will be the preparation of land for autumn and winter crops, together with the scarifying and chipping required for existing row crops.

In all districts where wheat, barley, canary seed, and oats have been harvested, ploughing should be continued in order to conserve moisture for the succeeding crop, and to eradicate troublesome summer weeds.

Early ploughing ensures the accumulation of subsoil moisture, which is invaluable in promoting the growth of winter cereals, at a time when seasonal rainfall is often deficient. The practice of early ploughing is recommended, especially to dairymen outside the wheat areas who normally sow oats, barley and wheat for green feed.

Land intended for the February potato planting will now be in an advanced stage of preparation. The selection of whole seed from disease-free crops is recommended for autumn planting, as losses may occur from rotting if hot, wet conditions prevail after the planting of cut sets. Very small whole potatoes, less than 2 inches in diameter, are not likely to give the same results as more robust potatoes.

Succession sowings of summer fodder crops—such as sorghum (saccaline, white African, and imphee), Sudan grass, white panicum, Japanese millet, and cowpea may be continued where land is available. Maize sowing may also be completed in districts where early frosts are not the usual experience, but preference should be given to early-maturing or mid-season varieties.

Full advantage should be taken of the opportunity to arrange for the adequate conservation of fodder during the summer growing season, when the production of bulky, green crops presents no great difficulty.

Well-grown crops of maize and the sweet sorghums cut at the right stage of growth and before full maturity will make excellent silage which may be economically conserved in pit, trench, stack, or overhead silo. Surplus green grass, and many other green crops also, will make satisfactory silage for winter feed, and as a reserve for dry periods. Many dairy farmers prefer to rely on a continuity of green fodder crops throughout the year, but provision also should be made for conservation, for if pastures are scarce because of dry conditions, crop growth is then also at a minimum.

January is usually a favourable month for the sowing of paspalum, Rhodes, and other similar grasses in districts suitable for their growth. Recently burnt scrub land or thoroughly cultivated areas provide a good seed-bed, given sufficient moisture, but care should be taken to ensure that the germination standard of the seed is sufficiently high, as a good cover and rapid early growth is the principtal factor in keeping weeds and undergrowth in check.

All harvesting machinery should be placed under cover. Repairs and adjustments may be regarded as wet-day jobs.

Orchard Notes

JANUARY.

THE COASTAL DISTRICTS.

ORCHARDS and plantations should now be carrying a good cover crop, which will help to check erosion during the wet season and, when cut and turned under, maintain the soil in good physical condition.

Pineapple plantations should be kept well worked.

Bananas and pineapples may still be planted, although it is somewhat late for the former in the southern parts of the State. It would be wise to keep a good lookout for pests of all kinds, including maori on citrus trees, scale insects, leaf-eating insects, borers, and fungus pests generally, using the remedies recommended by the Department of Agriculture and Stock.

Care is advised in handling and marketing of all kinds of fruit.

Grapes are in full season, and in order that they may be sold to advantage they should be very carefully handled, graded, and packed, as their value depends on the condition in which they reach the market. Well-coloured, mature fruit, with the bloom on and without blemish, always sells well. One of the greatest mistakes in marketing grapes is to send the fruit to market before it is properly ripe. A maturity standard for grapes is now in force and immature grapes are liable to condemnation.

Bananas for the interstate trade should be well filled, but showing no sign of ripening. The fruit should be carefully graded and packed and the cases marked in accordance with the prescribed regulations and despatched without delay.

THE GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

JANUARY is a busy month in the Stanthorpe district, and orchardists will be fully occupied gathering, packing, and marketing the crop of mid-season fruits.

Much of the fruit may 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 carefully selected and properly graded and packed, they should carry as far as Cairns.

Points to remember—

Fruit should be fully developed, but quite firm when gathered.

It should be handled carefully. Bruised fruit is spoilt fruit.

Only one-sized fruit, of an even degree of ripeness and colour, should be packed in a case.

Fruit should be so packed that it will not shift, for if it is packed loosely 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.

BRITAIN NEEDS CHEESE.

The vital importance of the drive for the production of as much cheese as possible, which has been going on vigorously over the Darling Downs, is indicated very strikingly by an extract from a cheerful letter from a New Zealand dairy instructor and grader who is now in the Old Country and who has been through recent air raids.

Among other things, this is what he says:—"Cheese is the best substitute for meat, and at present is a far more important item of diet than butter. If our dairy farmers in New Zealand—and Australia, too—could fully appreciate the need for more cheese, I feel sure that they would gladly make what comparatively small sacrifice this involves by having their milk converted into cheese instead of butter."

Maternal and Child Welfare.

Under this heading is issued each month an article, supplied by the Department of Health and Home Affairs Maternal and Child Welfare Service, dealing with the welfare and care of mother and child.

CARE OF MOTHER AND CHILD.

A TALK ON THE MANAGEMENT OF THE TODDLER.

OUR talk this month is for fathers as well as mothers, and we hope that all fathers will read it. In the pre-natal period, when the baby is being built up inside the body of the mother, and later after baby is born and in his first months of complete dependence, it is usually the mother who is almost entirely responsible for his care. Nature has decided that the place of the mother is in the home, and, although maternity does not endow a mother with all the necessary knowledge for bringing up a child, she does endow her usually with the adaptability for handling, and in short "mothering" the tiny helpless infant. We have met fathers who have also proved quite expert at this stage of baby's life, but his job at this period is usually the care and protection of the mother. When baby is over one year old, and has become what is known as a toddler, or in more up-to-date parlance, a pre-school child, the position does or should alter somewhat, and father should come forward and take equal share with mother in the care and management of his child at this difficult and often neglected stage of development. This applies very particularly where the child is a boy. Nowadays parents may obtain expert help in child management from trained Child Welfare nurses, kindergarten teachers, dental clinics, and hospitals and doctors—all ready and eager to help in the special aspect of child care with which they are most familiar.

Before birth the mother nourishes the baby's body from her own blood stream; after birth she not only continues to nourish his body but trains and develops his mind. As the child grows then, both parents must help to develop that mind and body so that a character will be formed which will stand baby in good stead all the rest of his life. It is this "sharing" in the work of child management which should make parenthood such an interesting and satisfying part of life. Although baby is born with certain character traits his character is not formed. He has a mind and a brain, the working of which must be guided into the right channels. This talk is meant to help parents with that guidance.

In life everything works in a circle; leave out one part of the circle and the life is incomplete. Surrounding a baby there should be a complete circle of love and care made up from twelve carefully thought-out points. These are:—Fresh air,

correct food, pure water, bathing, general cleanliness, muscular exercise, and sensory stimulation, correct clothing, warmth, mothering, management, regularity, and sufficient rest and sleep. Properly carried out this "care circle" will help the child to healthy happy childhood and the development of a sound adult personality. Parents must endeavour to build up a feeling of confidence and security round their children. Most problems of childhood, such as temper, tantrums, bed-wetting, thumb-sucking, and various fears are caused by the child's lack of confidence in the people who are handling him. Commence with good mothering, the first essential for confidence. Mother love is usually born with the child, but it must not be separated from its partners—common sense and good management. It is unwise to accede to the child's every whim because you cannot bear to thwart him. Have as few "don'ts" as possible, but having decided that those few are necessary for the child's protection and development, abide by them. Start carefully, and as you mean to carry on.

Regularity of routine is good and gives a sense of security as long as the child responds to it happily. If he does not you should seek advice from a qualified person. Remember, however, that good habits are as easy to establish as bad ones.

The habit of cleanliness is fairly easy to teach because children are good imitators and will do with great pleasure all the things mother and father do; washing hands before meals and after returning from the lavatory; taking delight in clean fresh clothes and in fresh air, the daily bath and cleaning teeth, and so on. All these can be quite simply taught to the child by father and mother's own example.

Play outdoors is the best exercise for a child, and the toys he uses should be chosen carefully so that they educate his eyes and muscles and train his memory. They should be used to teach colour, balance, vision, and the limits of his own safety. Teach him to know about the growth of plants and trees, animals, and insects; let him handle them and be interested in them. He will never be cruel if he is taught their history and habits in a simple way—with pictures or drawings if they can be procured. A child learns by touching and handling things and by asking questions, and every new thing he sees is full of interest for him. Mother is often too busy to answer questions, and so father can be very useful here. Always make a point of answering a child's questions yourself and answer them truthfully. If you do not know the answer tell him so and look for it with him in an encyclopædia or useful knowledge book. Share your child's interests, even if they pass quickly, because they are all a necessary part of his development and will leave their mark on his character.

Correct clothing is important for the health of the pre-school child. It is fortunate that these days there are so many fadeless boiling materials on the market. All clothes should be light in weight and hang from the shoulders with no tight bands or elastics to hamper breathing and movement and encourage the development of varicose veins. The clothes should be changed day by day according to the weather. Shoes and socks must always be big enough to give the foot full play and allow for growth, and it is important for grace of movement and good posture that the shoes have low heels and a straight line on the inner side of the foot.

The food of the growing child must be carefully chosen and cooked to preserve as much of its nourishment as possible. So important is the subject of food that next month we shall publish a special article on the food of the older child.

Lastly, we must mention sleep and rest for the toddler. As mother knows only too well he starts his day early. He wakes bright and eager and lives every moment of his day. Therefore, even if he does not sleep during the day he should have plenty of rest. One or two hours before the mid-day meal is necessary, and at least twelve hours unbroken sleep at night. Sleep refreshes the child's busy brain and helps the growth of his whole body, so watch carefully that he gets sufficient. Many toddlers do not. Do not allow over-stimulation by noise, bright lights or excitement at the end of his day. A simple story or a few tuneful lullabies at bed time while curled up in mother's or daddy's arms make a happy ending for a small boy or girl's busy day.

All of us who are concerned with the care of the pre-school child, parents, Child Welfare nurses, kindergarten teachers, &c., should "get together" and by exchanging knowledge and experience try to build up a generation who will be wiser and happier than ours.

Questions on this and any other subject concerning Maternal and Child Welfare will be answered by communicating personally with the Maternal and Child Welfare Information Bureau, 184 St. Paul's Terrace, Brisbane, or by addressing letters "Baby Clinic, Brisbane." These letters need not be stamped.

IN THE FARM KITCHEN.

A HOLIDAY MIXTURE.

Custard Tart.

Line a sandwich tin or ovenproof tart plate with shortcrust and fill with the following:—Beat 2 eggs slightly, add 2 tablespoons sugar, vanilla, and 1½ cups cold milk. Rub bottom of pastry with egg-white and pour in custard very gently. Sprinkle top with a little nutmeg and place in hot oven for a few minutes, then lower heat a little and bake until pastry is set. Reduce the heat to slow and continue to bake until custard is set.

Steamed Apple Pudding.

Peel and chop 4 or 5 apples into dice. Melt 1 tablespoon butter in a saucepan, add apples, and fry a little, add 1 cup sugar and fry until apples change colour. In the meantime, sift 2½ cups plain flour with 2 teaspoons baking powder and a good pinch salt. Rub in 3 oz. margarine and 1 tablespoon sugar. Add enough milk to form a firm paste. Line a basin with paste, reserving enough for top. Fill with apples, and, if liked, a few raisins and a little minced mixed peel may be added. Cover with remaining paste, cover with buttered paper, and steam for 2 hours.

Baked Tomatoes.

Well grease a pie dish and put in a layer of tomatoes, peeled and cut into thick slices. Sprinkle with salt, pepper, a little sugar, and curry powder. Add a layer of well-boiled rice, then another layer of tomato, &c., having the top layer tomato. Cover top with buttered crumbs and bake slowly for half an hour. Serve with fingers of fried bread.

Banana Charlotte.

Line a round, buttered cake tin with fingers of buttered bread, taking care to overlap each other. Put a layer of sliced bananas in the bottom and cover with apricot jam, then a layer of banana, and so on, until the dish is full, piling it much higher in the centre. Cover with a layer of bread and butter, sprinkle with sugar, and bake in a hot oven for half an hour.

Fresh Pea Soup.

Cook together 2 lb. shelled peas, 1 large sliced onion, a little chopped parsley, 2 cups boiling water, salt, pepper, 1 teaspoon sugar. Simmer until tender with a hambone, if liked. Remove bone and rub vegetables through a sieve. Melt 1 tablespoon butter in a saucepan, add 1½ tablespoons flour, cook a little, then add 1 pint milk, and, if liked, 1 tablespoon cream. Add vegetable puree and stir well together. Thoroughly heat and serve with sippets of toast or fried bread.

Christmas Pudding.

Take ½ lb. breadcrumbs, ½ lb. raisins, 1 oz. citron peel, 1 grated carrot, ½ lb. brown sugar, ½ lb. muscatel raisins, ½ lb. shredded suet, 2 oz. lemon peel, 6 eggs, 2 nutmegs, ½ lb. currants, ¼ lb. orange peel, 3 oz. almonds, 6 oz. flour, 1½ gills ale, salt.

Mix the breadcrumbs, sugar, grated nutmeg, chopped raisins, cleaned currants, minced peels, and a pinch of salt together in a basin. Stir in the suet, then the blanched almonds. Add well-beaten eggs and remaining ingredients, without the ale. Beat for two or three minutes with a wooden spoon, then stir in the ale, cover, and leave for several days, stirring once daily. Pack into two buttered basins. Cover with buttered paper, then a floured cloth. Steam for seven or eight hours in a saucepan with boiling water coming half way up the sides. When required, cook for three hours, then turn out, sprinkle with vanilla sugar, decorate with a sprig of holly, and serve with brandy or rum custard.

Economical Christmas Pudding.

Take ½ lb. beef suet, ¼ lb. flour, ¼ lb. breadcrumbs, 6 oz. cleaned currants, 6 oz. stoned raisins, ¼ lb. brown sugar, ¼ lb. cooked carrot, ¼ lb. cooked potato, 2 oz. candied peel (finely shredded), 1 teaspoonful salt, 2 tablespoonfuls brown treacle.

Rub the carrot and potato through a sieve. Mix together all the dry ingredients with the sieved carrot and potato, and this will require time, as it is not easy to mix them well without moisture. Last of all stir in the treacle, after warming it until it runs. Mix very thoroughly, and keep in the mixing basin several days, stirring the pudding every day. Then put into a large basin (well greased), cover with greased paper and thick dry paper over all, and steam for six hours. When reheating, allow two hours for steaming through. Serve with brandy sauce or custard.

Almond Sauce.

Take ¼ lb. ground almonds, 2 oz. castor sugar, 1 whole egg and 3 yolks, ¼ pint cream, ¼ pint milk, 1 wineglassful brandy, ½ teaspoonful essence of bitter almonds.

Pound the almonds and sugar together in a basin, and add the egg and egg-yolks (well beaten), then milk and cream by degrees. Turn into a jug, place this in a saucepan of hot water, and stir till the mixture thickens, which will take quite a quarter of an hour. Remove from the heat and continue stirring at intervals till nearly cold, add brandy and essence, and heat again in the saucepan before serving.

Brandy Sauce.

Take 2 oz. butter, 2 oz. flour, ½ pint milk, pinch of salt, sugar, brandy.

Dissolve the butter, and work into it the flour until perfectly smooth; then dilute with the milk, slightly warmed. Add the salt, and bring to the boil, stirring all the time. Boil for two minutes, then add a little thick cream or another pat of cold butter. Pour a wineglass of brandy over six lumps of sugar; when dissolved, stir into sauce, which should not boil again.

Punch Sauce.

Take 2 oz. sugar, 1 oz. butter, 1 teaspoonful rice flour, ½ wineglassful rum, ½ wineglassful marsala, ½ wineglassful brandy, lemon, orange, 1 gill water.

Put the sugar on to boil with the water, the rind of half a small lemon (pared very thinly), and a rather smaller quantity of orange-peel. Let them simmer for fifteen minutes, then take out the peel. Mix the rice flour quite smoothly with a little cold water, and stir into the boiling syrup. Add the butter in small pieces, then the strained juice of half the orange, also a teaspoonful of the lemon juice. Boil for ten minutes, then add the rum, marsala, and brandy, but do not let the sauce boil after they are added.

Hard Sauce.

Take 4 level tablespoonfuls of butter, 2 level tablespoonfuls castor sugar, 4 teaspoonfuls brandy, pinch of grated nutmeg.

Beat the butter to a cream, beat in the sugar, then the brandy and nutmeg. Heap the mixture in a glass dish, and put it on ice or in a cold place until required.

SUMMER FRUIT DRINKS.

Nothing is more refreshing or pleasing in warm weather than a well-prepared fruit drink, while from a health point of view the habit of drinking fruit juices needs no stressing. Their wholesomeness may be particularly emphasised as beverages for children, who, left to their own devices, are quick to acquire the taste for them. Many so-called orange and lemon drinks contain no fresh fruit at all, but are made from chemicals and artificial colouring matter. Not only do they not have the food value that the real fruit possesses, but they may be definitely injurious to the child's health.

The only drinks of this kind that the child should be permitted to have should be made from the fresh fruit juice. Mothers who make real fruit juice drinks for their children will not be teased for artificial soda and other harmful drinks. Fruit juices not only satisfy thirst; the natural fruit acids they contain supply beneficial elements to the child's diet.

Pineapple Drink.—Wash the skin of pineapple. Place in a lined saucepan with the core and enough cold water to cover. Cook slowly three-quarters of an hour. Add 3 tablespoons or more sugar and the juice of 1 orange or lemon. Strain and allow to cool. Chill and serve.

Fruit Punch.—Take ½ cup lemon juice, 1 cup orange juice, grated rind ½ orange, 1 tablespoon grated lemon rind, 1 quart water, 3 or 4 cups of sugar. Cook water and sugar for 3 minutes, cool and mix with orange and lemon juice, rind, &c. To this add the following ingredients:—(1) 1 quart ginger ale, ¼ cup preserved ginger cut up finely, (2) 1 cup grated pineapple, 1 pint soda water.

Fruit Cup.—Take 2 lemons, 1 quart boiling water, 2 oranges, 4 passion-fruit, 1 ripe pear (if available), 4 tablespoons sugar, few drops cochineal. Wash lemons, peel thinly into a large jug or bowl; squeeze juice and place it in jug with rind and sugar; pour the boiling water over this and cover till cold. Strain into glass jug, colour very pale pink, add slices of oranges, passion-fruit pulp, and cut pear or other fruit. Place in ice chest and serve very cold.

IN THE FARM GARDEN.

USING RUBBISH IN THE HOME GARDEN.

DR. D. A. HERBERT.

There need be very little waste in the home garden. When the annuals are finished they can be turned into the soil to improve its texture and to return some of the plant foods that they have taken out. The best of them are the plants of the pea and bean family—sweetpeas, peas, beans, lupins, and the like. These are too good to be thrown on the rubbish heap and burnt. Scraps from the kitchen should be systematically buried, and any fallen leaves make a good mulch when spread under plants to help retain moisture in the soil. These materials in the course of their decay not only release their own plant foods, but help to make available what is already present in the soil by encouraging bacterial activity. Too often such material is thrown away or burnt. Generally speaking, the only vegetable rubbish from the kitchen or the garden that should not be turned into the soil is that which is diseased or contaminated with troublesome weeds. This can be burnt and the ash used as a soil dressing.

Now that potash is not available for the home garden, ash from the rubbish heap and other fires should never be wasted. It has quite a useful potash content, and is specially useful for roses and such plants in helping them to resist mildew. Bones should be burnt and they can then be broken down to a powder with the back of a spade and used as bonedust. The finer the powder, the more effective it is as a plant food. Ashes and powdered bones provide two of the three standard substances used as fertilizers—namely, potash and phosphate. The third, nitrogen, is deficient, but it may be supplied by animal manure or urine, the latter being diluted with about four times its volume of water.

Where it is inconvenient to adopt a regular programme of burying rubbish, a compost heap may be built. Vegetable trash is piled in a pit or an old tank, or even in a heap in some corner, and sprinkled liberally with lime. Successive layers are built up, each sprinkled in turn with lime and kept moist but not wet. The heap rots down to a valuable compost for the garden beds, especially if it is turned over with the fork from time to time. Where there are shrubs in the garden, grass clippings, fallen leaves, and the less troublesome types of weed can usefully be piled under them to form a heavy mulch to conserve moisture. In the course of time they will rot down and perform the further service of providing food material for the plants. Such a practice often produces unexpectedly good growth in the mulched plants.

There are certain materials which may find their way into household rubbish and which should not be put on the garden. Boracic acid and borax are very injurious. Borax is often used for controlling cockroaches, and if it is swept up and dumped on a garden bed will produce a barren patch. The same is true for most antiseptics and disinfectants though the effect may only be temporary. Salt solutions are injurious, though salt washes out of the soil readily and does not produce lasting ill-effects. Such solutions (corn beef water for example) may be poured on weed clumps to kill them.

PASTEURISATION.

The object of pasteurisation is, firstly, to make milk and milk products safe by destroying any disease germs that may be present; and, secondly, to improve the keeping quality of butter and cheese made from milk and cream so treated. Pasteurisation, however, has its limitations. It cannot perform miracles—such as improving the grade of cream from second to choice, or eliminating strong weed taints.

Most dairy farmers are aware of this, and know that the production of choice quality cream depends on the care and attention given on the farm, and that the pasteurisation process is beneficial in that a butter of choice quality can be manufactured to withstand long periods of cold storage.

THE ANSWER TO VIRGINIA.

Nearly forty years ago, the Editor of the New York "Sun" received a letter from little Virginia O'Hanlon—

"Dear Editor,

"I am eight years old. Some of my little friends say there is no Santa Claus. Please tell me the truth. . . ."

The answer to Virginia published in the "Sun" next day caused such nation-wide interest that the "Sun" has reprinted it every Christmas for nearly forty years—and this is the answer to Virginia:—

"Virginia, your little friends are wrong. They have been affected by the scepticism of a sceptical age. They do not believe except they see. They think that nothing can be which is not comprehensible by their little minds. All minds, Virginia, whether they be men's or children's, are little. In this great universe of ours man is a mere insect in intellect, as compared with the boundless world about him, as measured by the intelligence capable of grasping the whole of truth.

"Yes, Virginia, there is a Santa Claus. He exists as certainly as love and generosity and devotion exist, and you know that they abound and give to life its highest beauty and joy. Alas! How dreary would be the world if there were no Santa Claus! It would be as dreary as if there were no Virginias. There would be no childlike faith then, no poetry, no romance to make tolerable this existence. We should have no enjoyment, except in sense and sight. The eternal light with which childhood fills the world would be extinguished.

"Not to believe in Santa Claus! You might as well not believe in fairies! You might get your Papa to hire men to watch all the chimneys on Christmas Eve to catch Santa Claus, but even if they did not see Santa Claus coming down, what would that prove? Nobody sees Santa Claus, but that is no sign that there is no Santa Claus. The most real things in the world are those that neither children nor men can see. You tear apart a baby's rattle and see what makes the noise inside, but there is a veil covering the unseen world which not the strongest men, nor even the united strength of all the strongest men that ever lived, could tear apart. Only faith, fancy, poetry, love, romance can push aside that curtain and view the supernal beauty beyond. Is it real? Ah, Virginia, in all this world there is nothing else real and abiding.

No Santa Claus? Thank God! He lives and lives forever. A thousand years from now, Virginia, nay ten times ten thousand years from now, he will continue to make glad the heart of childhood."

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF OCTOBER IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALL DURING 1941 AND 1940, FOR COMPARISON.

Divisions and Stations.	Average Rainfall.		Total Rainfall.		Divisions and Stations.	Average Rainfall.		Total Rainfall	
	Oct.	No. of years' records.	Oct., 1941.	Oct., 1940.		Oct.	No. of years' records	Oct., 1941.	Oct., 1940
North Coast.	In.		In.	In.	*South Coast—contd.*	In.		In.	In.
Atherton	0·93	40	0·08	0·22	Gatton College ..	2·02	42	0·68	0·58
Cairns	2·11	59	0·05	1·68	Gayndah	2·38	70	1·23	0·08
Cardwell ..	1·99	69	0·04	0·30	Gympie	2·69	71	0·44	0·29
Cooktown ..	1·02	65	Nil	0·83	Kilkivan	2·69	60	0·70	1·30
Herberton ..	0·95	55	Nil	0·08	Maryborough ..	2·74	70	0·98	0·62
Ingham	1·82	49	0·15	0·28	Nambour ..	3·18	45	0·84	0·95
Innisfail	3·19	60	0·04	1·83	Nanango	2·22	59	0·40	0·93
Mossman Mill ..	2·95	28		0·89	Rockhampton ..	1·79	70	0·11	0·16
Townsville ..	1·21	24	Nil	0·18	Woodford ..	2·60	54	0.42	1·15
Central Coast.					*Central Highlands.*				
Ayr	0·89	54	0·16	Nil	Clermont ..	1·29	70	0·59	Nil
Bowen	0·98	70	Nil	0·24	Gindie	1·33	42	..	0·19
Charters Towers ..	0·72	59	0·91	Nil	Springsure ..	1·62	72	1·76	0·02
Mackay P.O. ..	1·70	70	0·08	0·04	*Darling Downs.*				
Mackay Sugar Experiment Station	1·44	44	..	0·16	Dalby	2·02	71	0·77	0·50
Proserpine ..	1·58	38	0·21	0·92	Emu Vale ..	2·15	45	0·50	0·90
St. Lawrence ..	1·77	70	0·48	0·06	Hermitage ..	1·95	36	..	0·71
South Coast.					Jimbour	1·89	62	0·60	0·13
					Miles	2·01	56	0·62	0·96
					Stanthorpe ..	2·48	68	1·32	1·17
Biggenden ..	2·48	42	1·73	0·28	Toowoomba ..	2·53	69	1·19	0·75
Bundaberg ..	2·10	58	1·43	0·50	Warwick ..	2·30	76	0·64	0·94
Brisbane ..	2·55	89	0·61	1·97	*Maranoa.*				
Caboolture ..	2·73	65	1·00	3·25					
Childers	2·74	46	1·89	0·92					
Crohamhurst ..	3·36	48	0·59	1·71	Bungeworgorai ..	1·35	27	0·66	Nil
Esk	2·62	54	0·65	1·43	Roma	1·71	67	0.76	0·24

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CLIMATOLOGICAL TABLE—OCTOBER, 1941.

COMPILED FROM TELEGRAPHIC REPORTS.

Districts and Stations.	Mean Atmospheric Pressure, at 9 a.m.	Shade Temperature.						Rainfall.	
		Means.		Extremes.				Total	Wet Days.
		Max.	Min.	Max.	Date.	Min.	Date.		
Coastal.	In.	Deg.	Deg.	Deg.		Deg.		Points.	
Cooktown	..	82	70	85	31	63	25, 26	Nil	..
Herberton	..	83	54	92	30, 31	38	2	Nil	..
Rockhampton	30·04	87	65	97	30, 31	55	2	11	5
Brisbane	30·05	79	61	89	30	52	3	61	7
Darling Downs.									
Dalby	..	84	56	99	21	38	3, 4	77	4
Stanthorpe	..	76	47	91	7, 21	30	3	132	7
Toowoomba	..	77	55	94	21	42	2	119	7
Mid-Interior.									
Georgetown	29·98	97	66	103	31	52	2	6	1
Longreach	29·97	95	63	106	22	39	2	45	3
Mitchell	30·00	86	56	100	21	34	2, 3	124	5
Western.									
Burketown	..	92	68	100	31	55	2, 3	Nil	..
Boulia	29·93	93	65	106	21, 22	44	3	29	3
Thargomindah ..	29·99	86	59	100	17	43	3	45	4