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# QUEENSLAND AGRICULTURAL JOURNAL

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## *Event and Comment*

**Agriculture in National Economy.**

WHAT Napoleon said about an army marching on its stomach is more than a figure of speech; it is an accepted military maxim. It is also true that a modern army moves on wheels, for which rubber is a necessity. It is true, too, that motor spirit derived from vegetable substances—power alcohol from sugar-cane, for instance—is growing in military importance. Other raw materials, in infinite number and variety, are indispensable in making the equipment for our fighting forces. The farming industry is called upon, not only to supply many of these raw materials, but also to feed the millions of people in the cities who turn them into fighting weapons. Agriculture's part, then, in the whole business is of vital importance in national defence—and so it can be said again without any extravagant use of language that the farms of the nation are in the front line of freedom.

**Planned Agriculture.**

THERE is plenty of evidence these days of the gathering strength of the movement towards the stabilisation of our primary industries, by which the whole Commonwealth is bound to benefit. There are two fundamental principles: the first is to see that we are always in a position to send as much food as the Old Country can take from us; and the second is to keep our land industries up to a high standard of efficiency throughout the period of the war, so that when victory comes

we shall be able to increase production in double-quick time. Nothing is more certain that the biggest and most urgent need of the world after the war will be food. Our place in the whole economic life of the British Commonwealth makes the maintenance of all forms of primary production here an absolute essential; and, among other things, our job now is to test out more and more of the crops that up till now we have not thought much about and which we know we can grow without very much trouble.

So far as the primary producer is concerned, all he wants is a market and a fair price for his products; he can be depended upon to do the rest.

**Post-War Reconstruction.**

WE shall all have to make some contribution—that is, a worth-while contribution—to a well-thought-out policy of post-war rebuilding. We shall not get very far by merely talking about these things, and the days of highfalutin nebulosities are over for all of us. For our own survival and security we are now fighting and working, and those of us who are out of the actual fighting line are well and truly in the working line, and now, in Churchill's inspiring words, it's a case of "each to the task . . . . and to the toil." Pretty schemes are all right, but the thing is to see whatever schemes that are adopted, whether they are pretty or not, are workable and, if so, to get them into full working order without any delay. In all our planning we have to keep things in the proper perspective and look at facts in their proper proportions.

Farmers are thinking hard along these lines, and here is what a well-known practical producer said recently:—

> "It seems to me that the time is ripe for the setting up of advisory councils, consisting wholly of successful farmers, to plan ahead in co-operation with the Department of Agriculture for the production of the things we used to import, but which can be grown successfully here. In this way we can save exchange and provide new avenues in readiness for the time when many men of the fighting forces will return to us and want to settle on the land."

Such councils would, of course, have to be selected on a district basis. At all costs, we should avoid the mistakes made after the last war. As these councils would be made up of practical men willing to serve, no doubt voluntarily, with ample knowledge of the capacity of their districts to grow different kinds of crops, they would be in a position to save a good deal of time in any local trials and get results quickly.

Much the same idea was also expressed about the same time by a well-known Downs wheatgrower and grazier. "It is up to us," he said, "to see provision is made against any repetition of some of the conditions that arose after the last war. Organisation for this purpose should start now and not when our lads return. There are many capable men in the agricultural industry and in our Government departments able to lay out the foundations of schemes to absorb these young men when they come back. With the assistance of men in industries suitable for this purpose, much useful and necessary preparation could be started and started now . . . . Provision should be made to give every facility for the men returning to have an assured chance of re-establishing themselves in civil life in suitable occupations. It is our duty to see that we don't fall down on the job."

**Trees on the Farm for Shelter, Windbreaks, and Beauty.**

NOW is the time for us to think about putting in a few trees around the place and out in the paddocks, especially in open country in the colder parts of the State. For shelter for stock and as windbreaks, trees have a definite economic value on a farm. The same may be said of trees planted for purely garden or landscape effects, for they too, add value to a property, besides suggesting comfort and cosiness in a farm homestead, which bare, bleak surroundings will never suggest, no matter how fertile or well-cropped a farm may be.

It has been said of Australians, at least of many of us, that we were born with a "Black Kelly," a "Collie King," or a "Plumb" axe in our hands, and there is often very solid ground for the taunt, for many of us have never realised what a heritage we have in our native trees.

As for judicious tree planting on farms on the open downs country, or on farms that have been cleared of every bit of timber, there is really no excuse for our neglect to make our homes real farm homes with the right species of trees providing shelter and shade, for in Queensland we have an excellent tree service. The Government Botanist is ready to advise on tree planting in any particular district, the kind of trees to put in, whether for shade or as a fodder standby, at any time. The Sub-Department of Forestry in the Department of Public Lands can supply many species of trees at a very low price, in tubes ready to plant.

Sheep men in our western open rolling downs country have a full appreciation of the value of trees, and the man who uses an axe out there without thought or judgment usually gets short shrift.

**Our Tree Heritage.**

FORTUNATELY, we are all acquiring a real forest consciousness, and are coming to regard our native trees as a noble heritage, and where clearing or ringbarking has to be done we are using more forethought and judgment. Let us hope that no longer will our forest wealth be regarded as a vanishing asset.

No town or landscape is complete without trees, and a treeless stretch of country is often drab and uninteresting. The chief point in tree planting is to place the trees to the best advantage, choosing, of course, species best suited for the purpose and locality. Nature has generously provided us with trees that will stand up to strong winds, others for shade and avenue purposes, and others again that provide not only shade for stock but food, too, when the time of necessity arrives. Then there are the lemon-scented gums and the blue gums—who of us can forget a sightline of blue gums in his memories of our countryside!

There is a certain country town where the summers are sizzling, but where belts and avenues of white cedars have made all the difference to the people who live there. Look what could be done in every country centre with a properly ordered scheme of tree planting—trees suitable to the locality, and which would add beauty to every street, and so stimulate commendable civic pride.

# Starting the Orchard.

By Officers of the Fruit Branch.

## SELECTION OF THE SITE FOR AN ORCHARD.

THE successful production of fruit depends, firstly, on the right kinds of fruit being grown in the right soil and climate. Other points to be considered are the selection of a site for the orchard, the aspect, drainage, fertility, and accessibility.

The ideal site would be one that is well sheltered on all sides from heavy winds, but particularly those from the west and south. If the site is a sloping one, it should, for preference, be in a northerly or easterly direction. In districts where frosts are prevalent and the crop is one subject to injury, high-lying land should be chosen and care taken to see that windbreaks are present on the westerly and southerly sides. When leaving windbreaks of timber, it is important, particularly on coastal scrub lands, that these should be of at least 2-chain widths. Strips of timber of lesser width rapidly die out, leaving the orchard exposed.

Good natural drainage is most essential, and in its absence no other soil treatment can counteract the deficiency. Adventitious draining by means of agricultural pipes, stones, slabs, &c., can effect some improvement to badly drained soils, but cannot be economically applied to large orchards, and at best will not equal natural drainage. Those soils which possess a compact subsoil close to the surface through which the water cannot permeate should always be avoided.

Though fertile soils have an advantage over poorer soils in that it is easier to maintain fertility than to build it up, it is possible within certain limits to make up the deficiency in plant foods by the application of artificial fertilizers and by the ploughing-in of cover crops.

Accessibility may be considered from two aspects—firstly, the ease with which the site can be worked, remembering that level or nearly level situations are easier and less costly to work; and secondly, the facilities available for smooth and quick transport of the fruit to market. A good road to a convenient point of despatch to market is desirable.

## PREPARATION OF THE LAND.

In preparing the land stumps and roots should be run to a depth of not less than 12 inches, and preferably up to 18 inches, so that subsoiling can be effectively carried out if required. It is far better to delay planting for a season and have the land thoroughly worked up than to plant in soils which have not been properly prepared. After the first ploughing to a depth of about 3 inches the land should be left in the rough state to destroy weed growths. Two or three weeks later the land may be cross-ploughed deeper, and harrowed, followed by a third and still deeper ploughing. Subsequently, harrowing will reduce the soil to a tilth and collect coarse weed growth, small roots, and other rubbish. In most cases it is not advisable to bring the soil beyond a depth of nine to ten inches to the surface.

### Subsoiling.

Where subsoiling is practised (the deeper this is done the better), the subsoil is merely broken up without being brought to the surface. Briefly, the advantages of subsoiling are that the capacity of the soil for the retention of moisture during dry spells is increased, and that the subsoil is made more permeable to the roots, which then have a tendency to go down instead of remaining on the surface. Surface roots are undesirable, particularly in those districts experiencing a wide range of temperature.

Subsoiling may be carried out by following in the plough furrows with a strong second plough to which is attached a strong bull-tongue share. Where the subsoil is compact considerable power is required to break it up to any depth, and a tractor is often brought into use for this work. Where the land has not been cleared to a sufficient depth to permit of the use of a subsoiling plough, explosives may be used, though they are fairly costly and require extreme care in handling. The soil requires to be in a "dry" condition. Holes to a depth of about 2 ft. 6 in. should be bored with a soil augur or "jumped" with a bar. Into each is lowered a ¾-inch plug of gelignite with fuse and cap attached, and several inches of fuse allowed to protrude from the hole. The holes should be filled with dry soil or sand, no tamping being necessary, and the fuse lighted. The shattering effect of a ¾-inch plug of gelignite is approximately seven to eight feet laterally. The lighter the soil the less is the resistance, and consequent reduction in the area of shock. Grown trees in the orchard may be subsoiled in this way without damaging them in the least.

## LAYING OUT THE ORCHARD.

For laying out the orchard a supply of short stakes about 18 inches to 2 feet long is necessary to mark the positions of the trees. Planting is principally carried out on the square or the septuple system, though the former system is preferred in that it provides for easier cultivation and offers greater facilities for interculture. With the septuple system 15 per cent. more trees are planted per acre.

### The Planting Wire.

No matter which system is adopted, a planting wire will be of great assistance. It may be of any desired length up to 500 feet; No. 10 or No. 12 gauge soft wire makes a good article for the purpose. Fasten a 3 or 4-inch round ring at one end, drive a stake through this, and stretch the wire straight and taut along the ground, fastening it to a second stake at the other end. Next measure the wire carefully, starting at the end with the ring on, and place marks at the distances the trees are to be planted apart. If for instance, the trees are to be planted 20 feet apart, mark the wire every 20 feet. A piece of fine tie-wire wound round the planting wire and soldered makes a permanent mark which will not shift. When the required number of marks has been put on, fasten another ring at the last 20-feet mark.

### Planting in Squares.

When laying out the orchard with the planting wire select the longest side as the base line and stretch the planting-wire along it, driving in stakes at each mark on the wire and at both ends. Next stretch the wire along one side at right angles to the base line, and again drive in stakes at each mark on the wire.

## To Make a Right Angle.

The following method of laying out a right angle is based on the fact that a triangle with the sides in the proportion of 3, 4, and 5 is always a right-angled triangle. Referring to Plate 91, AB is the base line, and it is desired to lay off a line AD at right angles. Place a small peg in the ground at A, and with a tape measure mark off 90 links along the base line to the point B. Insert another peg at the 30-link mark C. Now bring the 90-link mark on the tape to the point C and fasten it there. Next pick up the tape at the 40-link mark, and walk backwards until the tape tightens equally from both ends, and insert another peg at this spot, which is D. A line drawn then from A to D is exactly at right-angles with the base line AB.

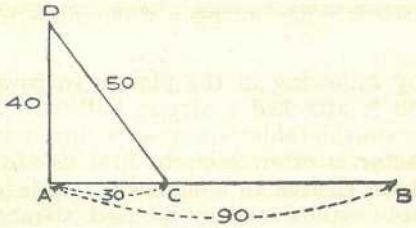


Plate 91.
TO MAKE A RIGHT ANGLE.

Having staked one side at right-angles to the base line, run a right-angle from the other end of the base line and stake as before. Next stretch the wire along the fourth side of the rectangle, and stake in a similar manner. To mark the positions of the trees in the rectangle is then only a matter of stretching the wire across the rectangle from peg to peg parallel with the base line and hammering in stakes at each mark on the wire.

## Planting on the Septuple System.

Lay-off and stake the base line as described above. Set-off the two side lines also as described, but instead of placing the stakes on the side lines at the same distance as they are on the base line, they should be only ·866 of the distance, so that if the stakes on the base line are 20 feet apart, the pegs on the side lines will be as nearly as possible 17 feet 4 inches. Next place a mark 10 feet from one end of the planting-wire and stretch it across between the stakes on the side lines and parallel to the base line.

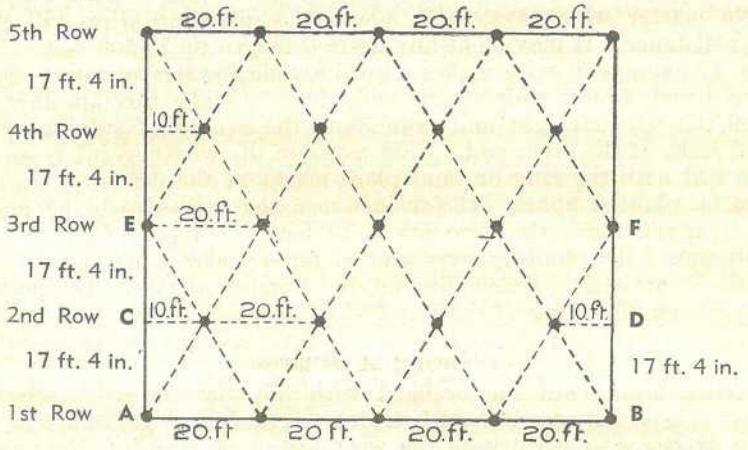


Plate 92.
PLANTING ON THE SEPTUPLE SYSTEM.

The base row has already been staked 20 feet apart; on the second row, CD, bring the 10 feet mark on the planting-wire to the point C; this will then bring each mark on the wire midway between the stakes on the base line, and stake. For the third row stretch the wire full length between E and F, with the end of the wire at E; the marks on the wire will then correspond with those on the base line. For the fourth row carry on as in the case of the second row, and so on.

## PLANTING THE TREES.

If the trees are worked trees, the buds or grafts should have made close unions with the stocks. There should be no dead wood at the point of union, and the scions should have been trained in such a manner that they are straight, clean, and well-grown. The root systems should contain sound, fibrous roots, and all straggling roots should be cut off clean. Trees one year old from the bud or graft are to be preferred as they quickly recover from the shock of transplanting, and medium-sized trees are better than unduly large ones.

### Planting Board.

To ensure that the young trees are placed in the exact spot occupied by the stakes, a planting board will be found useful and can be easily made. A piece of board about 5 feet long by 6 inches wide by 1 inch thick is a handy size. In the middle of one side cut out a "V" piece as shown at A. On the other side cut out pieces about 1 inch square from the corners as shown at B and C. When using, the stake which

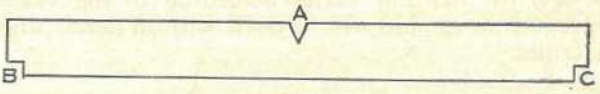


Plate 93.
PLANTING BOARD.

marks the spot where the tree is to be planted should be fitted into the "V." Two more stakes should then be driven firmly in to the ground at B and C. The board and the original peg A may then be removed, leaving the pegs at B and C; and the hole can be dug. When planting, the board should be replaced with the two pegs again fitting into the shoulders at B and C; the tree is placed in the "V" and the soil filled in.

The planting-board serves another purpose in that it ensures planting the trees at the proper depth. The correct depth at which to plant is usually the depth at which the trees were grown in the nursery; the mark can generally be distinguished on the tree. The union of the stock and scion is always a weak spot in a tree and liable to attack from fungus diseases; it should therefore be kept above the level of the soil. When using the planting-board the union, if kept level with the top of the board, will prevent the tree being planted too deeply.

In digging the holes for the trees, the surface soil should be taken out and placed on one side. The subsoil at the bottom of the holes should be broken up finely. Provided the orchard has been properly prepared there is no need to dig big holes. So long as they are large enough and deep enough to space the roots without cramping they will serve the purpose.

The roots should be spread out and spaced as evenly as possible with a downward slope of 40 to 45 degrees (Plate 94; fig. 1), the spaces being filled in with fine top soil and pressed firmly. Water should be applied before the hole is completely refilled and allowed to soak well in before the refilling is completed. Care should be exercised at all times when planting not to expose the roots to sun and dry air. Keep the trees covered with damp sacking until ready to plant.

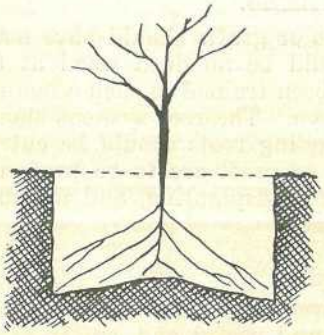

Fig 1.—The right way.

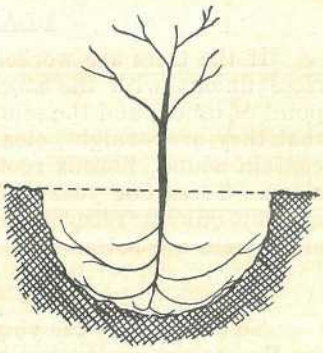

Fig. 2.—The wrong way.

Plate 94.
TREE PLANTING.

### Time of Planting.

The season of planting varies according to the variety, location, and local circumstances, and will be dealt with in detail when describing individual fruits.

## WATER MOUSE TRAP.

Here is a sketch of a device which was successfully used during former mouse plagues. The construction is easy. The requirements are a kerosene tin, a few cotton reels, a piece of stout fencing wire, a section of board two or three inches wide and sufficiently long to provide a runaway for the mice leading from the ground to the top of the trap, a small piece of thin wire, and some bait such as a lump of bread or cheese.

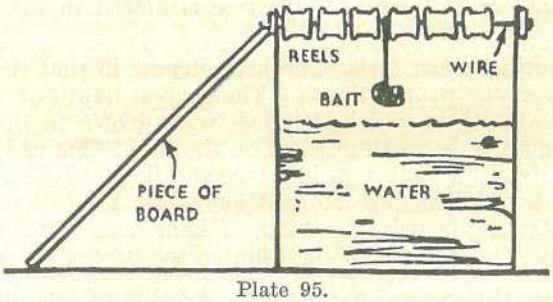


Plate 95.

Holes are punched through two opposite sides of the tin near to the top. The fencing wire is then passed through one of the holes, and threaded through half-a-dozen of the cotton reels, and out of the tin at the other side. The board is placed against one side of the tin, giving the mice access to the reel bridge. The mice, in attempting to get at the bait, slide into the water below. A little grease on the fencing wire will cause the reels to revolve more readily.

# Propagation of Fruit Trees.

By Officers of the Fruit Branch.

THOUGH a few varieties of fruit trees perpetuate their characteristics when raised from seeds, the majority cannot be relied upon to produce fruit of any required type; so, with practically all commercial sorts, adventitious means of propagation—budding, grafting, inarching, goatee, marcottage layering, growing from cuttings, or off shoots—are adopted.

Budding and grafting are the two chief operations practised in this State, and with hard wooded trees budding has almost entirely supplanted grafting excepting in the case of some deciduous types, and also in top-working trees of this nature, upon which strap grafting is successfully applied in the Stanthorpe district. By means of these operations the exact counterpart of a parent tree and its fruit may be perpetuated indefinitely and economically with a minimum of time and labour.

## THE SELECTION OF THE STOCK.

The first consideration, where either budding or grafting is resorted to, is analogy between stock and scion, not only as regards cell formation, but also in respect to size and general development. Should the stock possess an excess of vigour over and above that normally required by the scion, the result would probably mean excessive growth of the top and ultimately premature decay of the tree. On the other hand, should the stock be lacking in vigour the union would result in the stunted growth of the tree.

The selection of the stock is, therefore, confined to narrow limits and knowledge as to the most suitable for different soils or locations can only be determined by experience. No particular stock can be said to be universally adaptable.

## THE SELECTION OF THE SCION.

In selecting the scion only the best of wood should be taken from vigorous, healthy trees of proved fruiting qualities. Scions for grafting should be properly matured, and selected from the trees whilst dormant, and buried in damp soil until required in the early spring.

Wood for budding evergreen trees should also be selected whilst dormant, and if the leaves of selected wood are severed at about half the length of the petiole or leaf stalk two or three weeks before removing from the tree, the buds will tend to swell and to start into growth more quickly after budding. In the case of deciduous trees, wood may be selected whilst the trees are in growth. Deciduous trees, but more particularly apples and pears, are best if well shortened the previous year so that good, sound, young wood, practically free from flower buds, may be produced specially for the purpose, wood of one year's growth being used, the terminals in all cases being discarded.

In the case of most evergreens, notably citrus, the last growths are invariably rejected. The junction of the last growth and that preceding it is readily discernible, being indicated by what is generally referred to as a joint (Plate 97).

### Propagation by Seed.

To produce vigorous plants it is essential to see that the seeds have properly matured, and they have been properly stored until required for sowing, and that they are sown at the right time and in a manner conducive to germination. If seeds are well kept and sown in the spring, they will germinate strongly and the young plants progress as conditions become more favourable to their growth.

Where fruit tree stocks are raised from seed, the seed should be taken only from selected fruits from vigorous trees grown under conditions favourable to their normal development.

Seeds from evergreen trees seldom retain unimpaired vitality over a lengthy period, consequently they are usually sown soon after removal from the fruit. Those with a glutinous adherence should be well washed and placed in thin layers in the shade to dry prior to sowing.

Seed from stone and pip fruits should be obtained as fresh from the fruit as possible, and should not be allowed to dry out, but should be kept in slightly damp sand or soil until showing indications of breaking into growth.

Peach and other prunus seeds may be kept in a similar manner to pip fruits, but, as they are usually large enough to bud during the summer growth following their sowing, it is preferable to plant them out straight away in nursery rows at a depth of not more than 3 inches, to germinate when conditions are favourable.

Apples, pears, oranges, nuts, persimmons, and generally custard apples, are preferably raised in seed-beds under light shade and planted out into nursery rows prior to the second year's growth.

## SEED-BED PRACTICE.

Seed-beds should be of a light, friable, loamy nature, well drained, and preferably not over fertile. Such a soil will tend to good root development by the young plants. Facilities for shading are necessary, and should be made available. Friability of the soil is an essential feature, and is not always a natural condition, particularly in heavy soils, which are invariably inclined to form a crust on the surface to the detriment of the young plants. The addition of sufficient leaf mould or decomposed organic matter and sand will largely effect the necessary alteration, but as these are not always to be had in sufficient quantity a generous application of freshly slaked lime, at the rate of 4 to 5 lb. per square yard, thoroughly incorporated with the surface soil some months before sowing, will greatly assist in bringing about a fine tilth.

The addition of large quantities of stable manure is not advisable since this is often the cause of young seedlings suddenly wilting and dying off owing to attack by a fungus disease at ground level.

Shade is an important feature when starting nearly all seeds, but more particularly when it is desired to raise plants early in the season

or what is considered out of season. Whatever shade is used need not be of a permanent nature, but the closer the covering is to the ground, allowing, of course, room for watering, the less evaporation there will be from the beds, and the more even will be the moisture maintained. This latter condition is particularly desirable. A fabric covering is preferable to one of brush or small boughs, as, after the seed has germinated, it can more readily be removed to allow the young plants the benefit of the early morning sun, the time of exposure being gradually increased until, when the plants are large enough, the covering can be entirely disposed of.

## TRANSPLANTING INTO NURSERY ROWS.

Transplanting should be done only whilst the plants are dormant. After removal from the seed-bed, all badly grown and weakly plants and those with twisted or contorted main roots should be rejected. Tap roots should be shortened to within 8 inches, and other roots trimmed if required to a reasonable distance. In the case of evergreen plants, the head should also be cut back, the leaves being severed at about half their length.

Plate 96.

The usual practice in planting out in nursery rows is to open up narrow trenches about 3 feet apart and only deep enough to receive the young plants. The young trees are placed in position singly about 6 to 10 inches apart, and fine soil distributed amongst the roots and pressed down firmly, leaving about 2 inches of the top of the trench open to receive water, which, if the soil is at all dry, should be applied as soon as possible after planting, and allowed to soak completely into the ground before the remaining soil is replaced. Watering at planting is generally practised in the case of all plants, though with evergreens it is much more essential than with deciduous types. On no account should the roots be allowed to become dry as they are extremely sensitive. They should at all times during transplanting be kept covered with some moist material.

## BUDDING.

To perform the operation first see that only fully-developed mature buds are selected. Plate 96 shows the branch of a peach tree of the season's growth. The buds at the top end are not sufficiently mature, and the buds at the base are flat and more or less blind, and therefore uncertain, but the buds in the middle are well developed and fit for

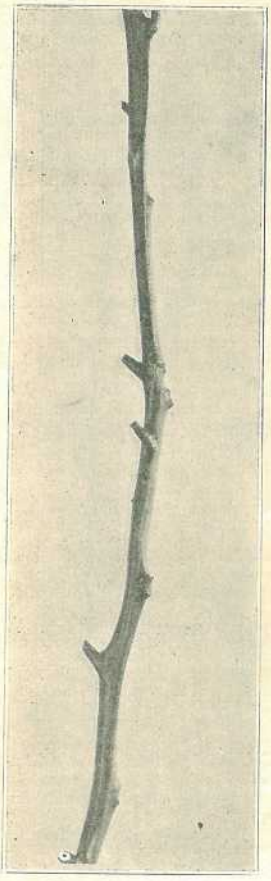

Plate 97.

Plate 98.

working. This is termed a bud stick. In the case of stone fruits, there are frequently three buds together, one central bud somewhat pointed, and the two side buds are fruit buds. Good single buds, plump and full, are always to be preferred, but when not obtainable triple buds can be used.

Plate 97 shows a branch of a citrus tree comprising two periods of growth. The joint is plainly seen, indicating where the previous growth terminated and the last growth commenced. The last growth is discarded as the buds are somewhat immature, whilst those at the base of the previous growth are flat and likely to be blind, and therefore unsuitable. Those in the middle are full and well developed and ready to use.

Plate 98 illustrates a good type of budding knife. The handle is of bone and tapered somewhat to a blunt point at the end, and is often useful in aiding the insertion of an obstinate bud.

Plate 99.

Plate 99 shows the method of holding the bud stick and of cutting the bud from the base in the case of citrus fruits; but for stone and pip fruits the buds should be cut from the top. The budding knife should be kept very keen, and the bud should be severed with one straight clean drawing cut. It should be cut very fine with as little wood as possible, and if this is done there is no need to remove any of the wood, though it is recognised that a bud with the wood taken out will start into growth more quickly than one with the wood left in. When it is intended to remove the wood the bud should be cut a little longer, and if one end of the bark is turned back slightly the wood will usually protrude and may be pulled out easily without injuring the bud. In the case of citrus, it is not always possible to remove the wood on account of the presence of wood thorns.

Plate 100; fig. 1 illustrates a well-developed bud cut and ready for insertion.

Plate 100; fig. 2 shows the method of making the T-shaped cut in the stock. The vertical cut is made first, the cut being made clean through the bark without injuring the wood underneath. The cross cut is made from left to right, the knife being held at an angle to the stock, and the cut made with a twist that will open the bark sufficiently to permit of the insertion of the bud without quilling. The bud is held between the thumb and forefinger of the left hand and inserted under the bark at the top of

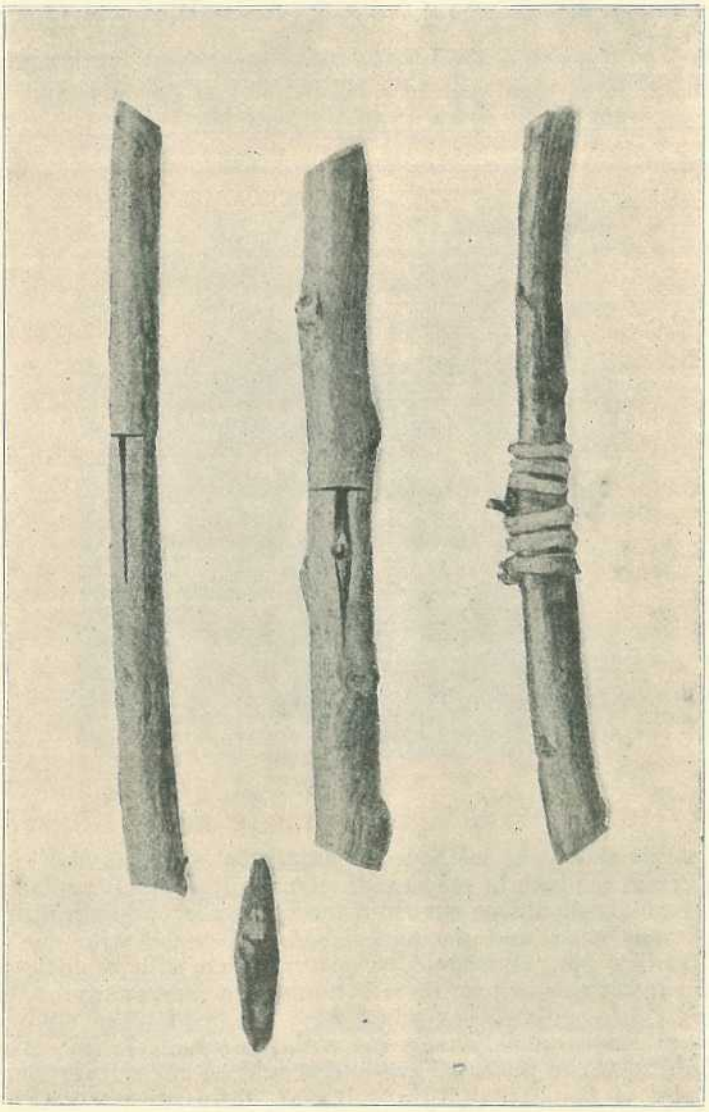

Fig 2. Fig. 1. Fig. 3. Fig. 4.

Plate 100.

the cut and gently pressed down with the thumb, when, if the bark is lifting freely, it will enter easily. The bud should be pushed down until the top end is level with the cross cut.

Plate 100; fig. 3 shows the bud in position.

Plate 100; fig. 4 shows the method of tying. It is preferable to commence at the bottom of the cut and work up, as in this way the tendency is for any air in the wound to be squeezed out at the top and the bark will also be brought back closer to its original position. Tying should always be carefully done, a moderate pressure being maintained throughout. Various materials can be used for tying, of which narrow strips of thin calico, cotton wick, twine, waxed tape, and raffia are common. Three-ply seaming twine answers well for varieties which are slow to strike, whilst raffia serves for those which are quick to vegetate. Two or three weeks after the buds have been inserted they should be examined, and if they have taken, then the ties should be cut but not removed. If they are not cut they will injure the growth of the stock. When the buds have missed, the stocks should be rebudded on the opposite side. When the budding has been done in the autumn it is better to leave the trees as they are until the following spring, but if it has been done in the spring they may be made to start into growth at once by removing a portion of the top of the stock sufficient to cause the bud to start, or the stock may be cut half-way through a few inches above the bud on the reverse side and split up the middle and laid over on the ground above the bud. In the case of the bud which has remained dormant during the winter, early in spring before growth starts, the whole of the stock should be removed a few inches above the bud, which will then start into life and can be trained to grow upright by tying it to the portion of stock left for this purpose. This is shown in Plate 101. When the bud is strong enough to support itself the stock may be cut clean away with a sloping cut just above the bud as shown by line (*a*) in Plate 101. This cut should always be carefully and cleanly made, as the wound will then heal rapidly and the union will be practically a perfect one, whereas if the cut is carelessly made it is always a weak spot, and the tree is liable to be broken off by a heavy wind. It is advisable to stake all young trees if the nursery is at all exposed to winds, otherwise twisted trunks will result in many cases.

Plate 101.

Besides stone and citrus fruits most other varieties can be propagated by budding, the process being very similar in every respect, with the exception that the buds are rather differently cut.

Apple and pear buds are usually cut rather longer and fuller than peach buds, but the operation is otherwise the same.

With figs, walnuts, chestnuts, and other soft-wooded trees budding is much more difficult, as, though the method is practically the same, the buds require to be cut much larger and should have the greater part of their wood removed. The whole operation requires to be rapidly done, especially in the case of trees possessing a milky sap, as, if exposed to the air for any length of time, the sap sours and the union will not take place. Waxed ties are best for such varieties, as they keep the wound practically airtight.

### Plate-budding or Patch-budding.

In addition to T-budding, there are several other methods of budding, such as plate-budding, ring-budding, whistle-budding, and twig-budding, each of value for particular varieties of fruits; but for the average fruitgrower a thorough knowledge of T-budding is all that is necessary as a general rule. There is, however, one form of budding—viz., plate-budding or patch-budding (Plate 102)—that is particularly adapted to the working over of seedling mangoes with the best varieties of this fruit. This method is as described below.

Remove a piece of bark about 2 inches long by 1 inch wide or larger from a branch of the tree producing the variety it is desired to propagate, selecting a portion of the branch containing a ring of dormant buds, which always occurs at the periodical terminal growths. The bark of both budwood and stocks should be of grey colour to ensure best results, though the thickness of the bark is immaterial. The bark must be removed as carefully as possible from the bud stick and should be, if anything, rather thicker than the bark on the tree to be worked over. If the bark is running freely it is an easy matter to secure the buds, but if not, then any wood that may be attached to the bark containing the dormant buds must be carefully cut away.

The stock is prepared by removing a piece of bark of the same size as that containing the dormant buds. The latter should fit on to the stem or branch of the tree to be worked over as evenly as possible, as the inner barks of the stock and scion must be brought close together, otherwise there will be no union. Once the bud is placed in position, it should be firmly tied in place, and then waxed. No air must be allowed to gain access between the scion and the stock. If the operation is carefully carried out, a union soon takes place; and as soon as this occurs the stock should be girdled just above the bud, thus tending to force the sap into the scion and start the dormant buds. The subsequent treatment is very simple, and consists of cutting off the stock just above the bud and allowing the shoot or shoots coming from the bud to form the future branch or head of the tree. A number of plate-buds can be placed on different branches of a bearing tree, or one or two buds can be inserted into a young seedling, and the head of the tree formed from the growth arising from these buds. The bark of the stock should always run very freely, much more so than that of the scion, as no union will take place readily unless the stock is in a vigorous state of growth.

## GRAFTING.

The object of grafting is similar to that of budding—viz., to propagate any given variety of fruit true to kind, or to convert unsuitable or unprofitable varieties to suitable or profitable ones. The operation, however, differs from budding in that with budding a single bud only is taken, whereas, with grafting, a scion containing a number of buds is

used. Further, whereas budding can only be successfully performed whilst the stock is in a state of active growth, the season of grafting, with the exception of bark or rind grafting, is mainly confined to the early spring, just before or about the time of the bursting of the buds and the commencement of active growth. The principle of every method of grafting is the bringing together of the cambium layers, or growing tissues, under the bark of both stock and scion.

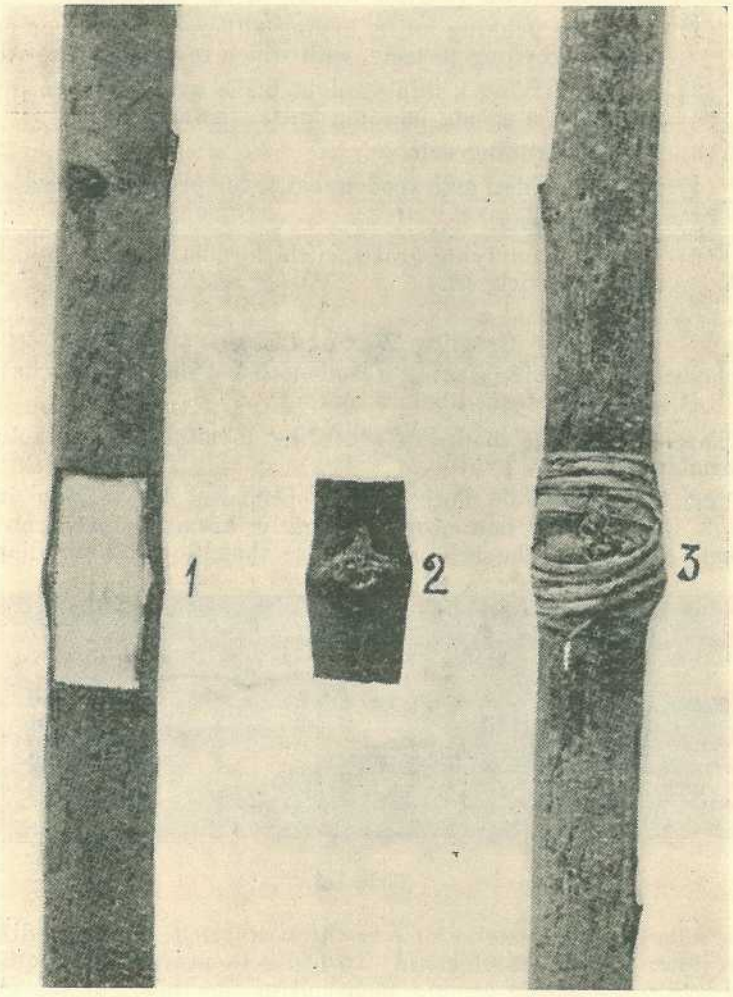


Plate 102.

PLATE-BUDDING OR PATCH-BUDDING.—(1) Section showing bud with patch removed; (2) bud with patch as removed; (3) bud with patch placed and tied on stock, a patch of bark exactly similar in size having been first removed from the latter.

Grafting is applicable to fruit trees of all kinds and sizes from nursery stock to large trees, various methods being adopted according to varieties, though the whip-tongue graft has preference. When citrus trees are grafted, which is rarely (budding being preferred) rind-grafting is preferable, whilst with custard apples the side cleft, as applicable to herbaceous plants, is used.

After grafting at or near ground level it is customary to bank the soil, which should be in a damp condition, from both sides of the row to the top of the scion, pressing it down firmly, and placing a little loose soil or mulch covering over all. When this is done there is no occasion for the use of wax or cotton ligatures—as previously stated, three-ply seaming twine answers for varieties which are slow to take, whilst raffia serves for those which are quick to make a union.

The tools required for grafting consist of the following:—

(1) A strong pruning knife, having either a straight or curved blade, according to taste, with which to prepare the stock.

(2) A knife having a thin straight blade with which to prepare the scion; a strong budding knife answers well.

(3) A good pruning saw.

(4) A strong chisel and wooden mallet for preparing large stocks.

(5) Grafting wax.

(6) Materials for tying grafts, such as raffia, waxed cloth, twine, or cotton wick, &c.

### Grafting Wax and Tape.

The best material for making waxed cloth is a cheap calico that tears easily. It should be washed before waxing.

The cloth may be made up according to either of the following two formulas:—

**First Method.**—The cloth is first prepared by tearing it into strips 9 inches wide and winding tightly around stout iron wire or upon sticks until the roll is not more than 2 inches in diameter.

Plate 103.

If the rolls are of greater diameter the wax penetrates with difficulty to the innermost layers of cloth. In order to prevent the cloth from unwinding, tie a string around each end of the rolls. If the cloth is wound upon wire the weight of the wire will sink the rolls in the mixture; if upon wood, the rolls should be kept submerged until the cloth is saturated with wax. Place 1 lb. beeswax and 1 lb. powdered resin in an iron pot and melt over a slow fire. Put the rolls of cloth in the melted wax for about fifteen minutes. Do not permit the mixture to boil or the cloth may be burned. When cold it is ready to use. Unroll the cloth as required and tear it across into strips about ¼ to ½ inch wide (see Plate 103). If twine is preferred to cloth as tying material, procure balls of soft cotton twine and place them in the melted wax as with the cloth.

**Second Method.**—This method is used when grafting trees in the Stanthorpe district.

Take 1 lb. beeswax or petroleum wax, 1 lb. resin, and ½ lb. mutton fat or tallow and heat together in a half-kerosene tin; when thoroughly melted immerse the strips of calico which will be about 9 inches wide by 4 or 5 feet long in the hot liquid. When thoroughly impregnated draw the strips through two case boards held *fairly* tightly together over the tin. The mixture is thus distributed evenly through the cloth and the excess squeezed out by the boards is returned to the tin. The strips are hung up for a few minutes to dry and can then be folded and are ready for use. If the boards used for squeezing are held too tightly there will not be sufficient mixture left on the cloth, and if too loosely there will be an excess which is wasteful.

When using either of the above mixtures as a wax paint they should be applied warm, but not hot enough to injure the bud or graft upon which they are being painted.

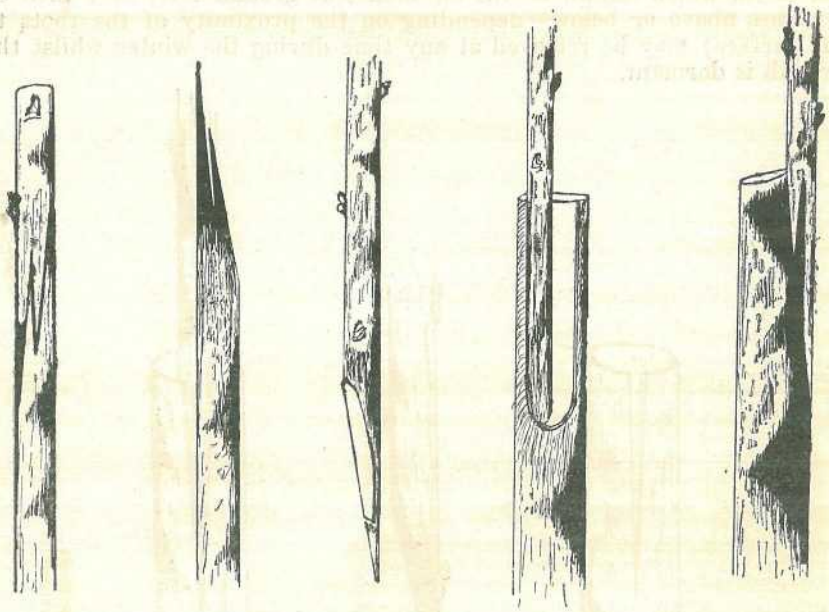

Fig. 1. Fig. 2. Fig. 3. Fig. 4. Fig. 5.

Plate 104.

WHIP OR SPLICE GRAFTING.

## Whip or Splice Grafting.

This is probably the commonest and best method of grafting nursery stocks, as it is applicable to stocks varying in thickness from that of an ordinary lead pencil to stocks of 1 inch, or even slightly more, in diameter. It is largely used on trees such as deciduous, persimmons, &c. The tongue holds the graft in place, and when the cuts are properly made the graft fits well. When the stock and scion are of equal size, the completed graft should appear as in Plate 104; fig. 1, the scion and stock being cut in a similar manner to that shown in Plate 104; figs. 2 and 3, but when the stock is larger than the scion, instead of making a sloping cut right through the stock, a sloping cut on one side of it is sufficient; a tongue is made in this cut, and the scion fitted to it, care being taken that the inner barks of the scion and stock meet on one

side (see Plate 104; figs. 4 and 5). In preparing the stock the top should be cut off with a slight slope, and the scion should always be placed on the higher side, so that the bark will grow over the wound and leave no dead wood, as would be the case were the scion put on the lower side of the slope. When the graft has been placed in position, it should be firmly tied with any suitable material or waxed calico, and the whole of the cut, including the top of the stock, should be covered with grafting-wax, so as to exclude air and moisture. Whip-grafting of nursery stocks should be done at or slightly below the level of the ground, and the grafts or scions need not contain more than two or three buds.

**Bark or Rind Grafting.**

This method can be used with trees of all kinds and of all sizes—from nursery stocks which have grown too large to bud successfully to old trees which require working over. Bark-grafting is best carried out simultaneously with the first rise of sap in spring, though the top of the stock, which should be cut off square at ground level or 1 inch or 2 inches above or below (depending on the proximity of the roots to the surface) may be removed at any time during the winter whilst the growth is dormant.

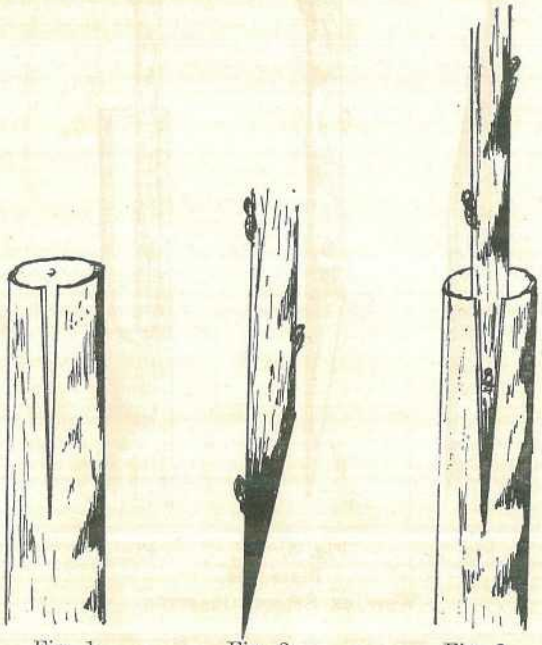

Fig. 1. Fig. 2. Fig. 3.

Plate 105.

BARK OR RIND GRAFTING.

When performing the operation a cut is made through the bark as shown in Plate 105; fig. 1, the bark on either side of the cut being carefully lifted. The scion is cut as shown in Plate 105; fig. 2, being as fine as possible, and is pushed down under the bark of the stock where the cut has been made so that it fits closely to the stock (Plate 105; fig. 3). When in position the scion should be at once tied in place and damp soil heaped up around it to the top bud and mulched with straw or other material.

In making this graft the less the inner bark of the stock is exposed the better, so that it is not advisable to lift the edges of the cut more than a little, but rather to let the scion force its own way.

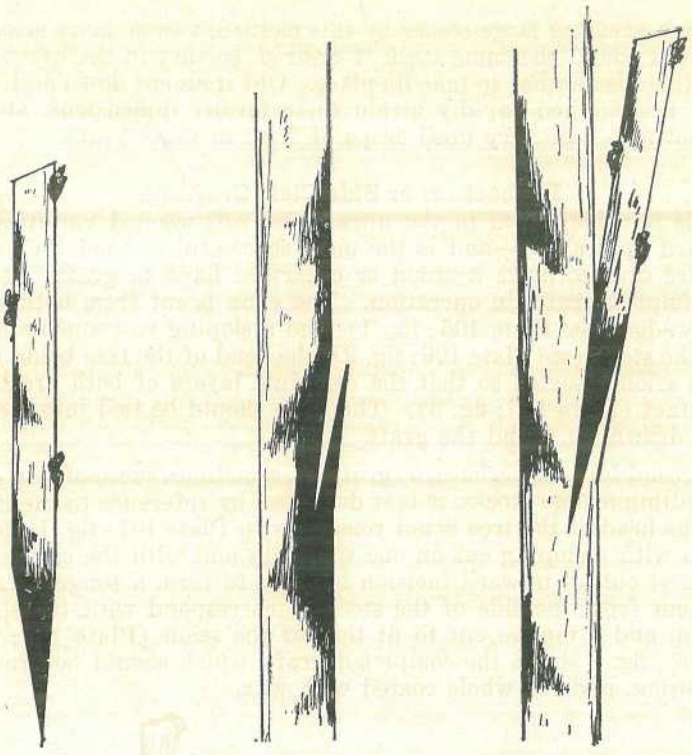

Fig. 1. Fig. 2. Fig. 3.

Plate 106.

HERBACEOUS OR SIDE CLEFT GRAFTING.

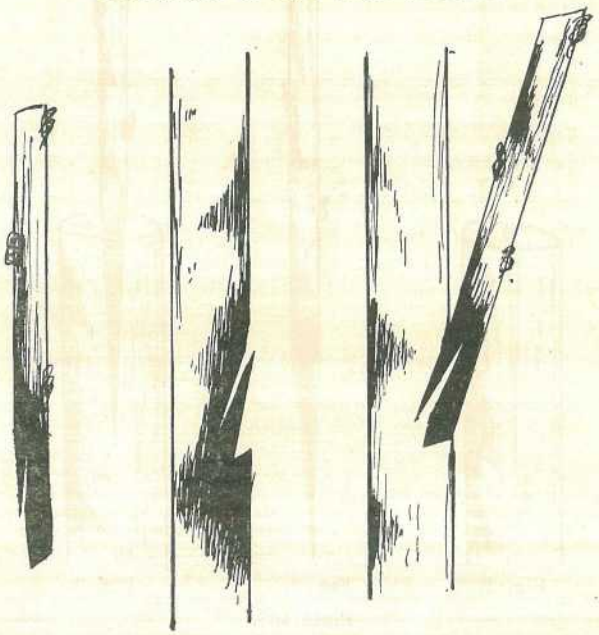

Fig. 1. Fig. 2. Fig. 3.

Plate 107.

HERBACEOUS OR SIDE CLEFT GRAFTING.

When grafting large stocks by this method, two or more scions may be inserted round the same stock if desired, so that in the event of one failing there is another to take its place. Old trees cut down and worked over by this method rapidly attain their former dimensions, and have been known to bear very good crops of fruit in three years.

### Herbaceous or Side-Cleft Grafting.

This is chiefly used in the nursery on soft-wooded varieties—such as custard apples, &c.—and is the most successful method for varieties which are slow to make a union or otherwise hard to graft. It is one of the simplest grafts in operation. The scion is cut from both sides to form a wedge (see Plate 106; fig. 1), and a sloping cut is made into the side of the stock (see Plate 106; fig. 2), the head of the tree being left on, and the scion inserted so that the cambium layers of both are brought into contact (Plate 106; fig. 3). The scion should be tied into place and the soil drawn up round the graft.

A second form of herbaceous grafting, sometimes successful in dealing with seedling mango stocks, is best described by reference to the illustration. The head of the tree is not removed. In Plate 107; fig. 1, the scion is shown with a sloping cut on one side only and with the end bevelled. In the first cut an upward incision is made to form a tongue. A piece is then cut from the side of the stock to correspond with the shape of the scion, and a tongue cut to fit that of the scion (Plate 107; fig. 2). Plate 107; fig. 3 shows the completed graft, which should be firmly tied into position, and the whole coated with wax.

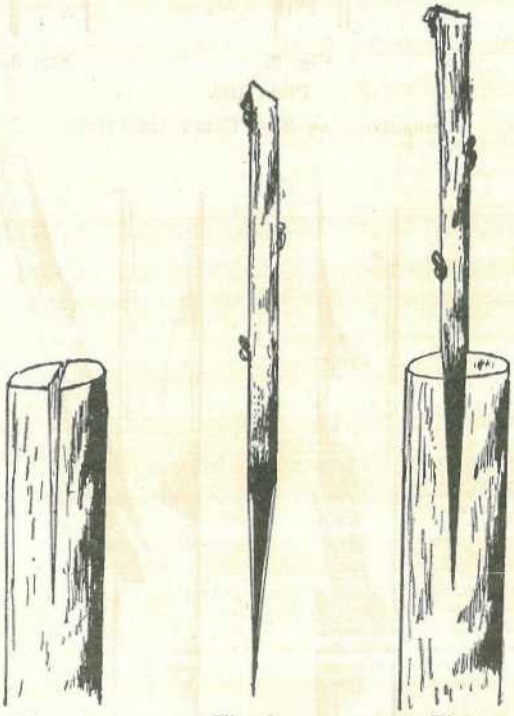

Fig. 1. Fig. 2. Fig. 3.

Plate 108.
CLEFT OR WEDGE GRAFTING.

### Cleft or Wedge Grafting.

This method of grafting is also applicable to all sizes of stocks, except very small ones; but where the whip graft can be used it is better to use it than the wedge graft, as the latter has the disadvantage of splitting, and thereby more or less injuring the stock. For large stocks, however, it is still in common use. The stock is cut off square, the edges of the cut trimmed, and then is split open with a chisel (see Plate 108; fig. 1). If the stock is large, the cut may be kept open by the insertion of a small wooden wedge to prevent the pressure from injuring the scion when inserted. The scion (see Plate 108; fig. 2) is cut in the shape of a wedge, and bevelled so that one side of the wedge is thicker than the other, and so that when inserted into the stock it fits well (see Plate 108; fig. 3), and the cambium layers join. A graft can be placed at each side of the cleft, if desired. When inserted, the scions should be tied in place and the whole should be carefully waxed, the cleft being filled with wax to keep out the rain, or the whole may be tied over with waxed cloth. This method of grafting should be done just as the sap begins to move in the stock in spring.

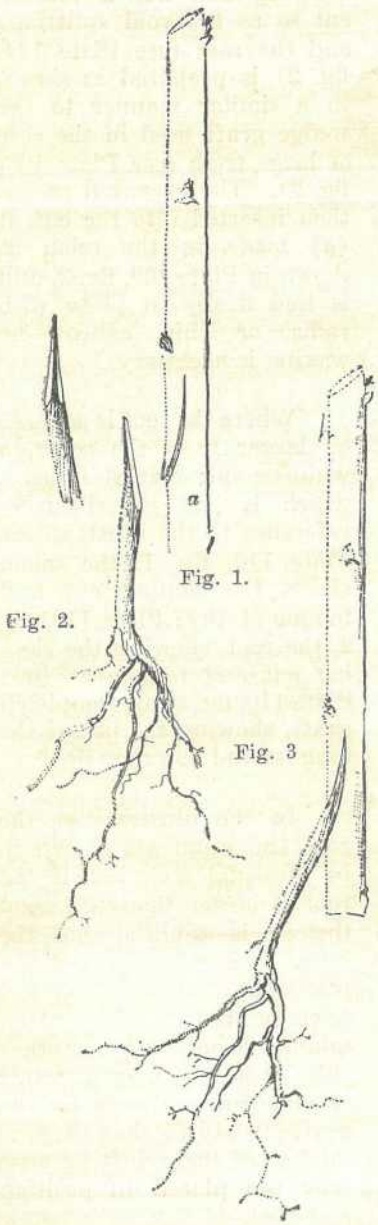

Fig. 1.

Fig. 2.

Fig. 3

Plate 109.
ROOT GRAFTING.

### Root Grafting.

There are two kinds of root grafting. In the first, a small piece of root is grafted on to a scion of the variety it is wished to propagate; and in the second, the scion is grafted on to the root stock just below the ground where the stock is standing in the nursery row, or the stocks are dug up and grafted in a shed or other suitable building, and when grafted are either heeled in temporarily in sand or are planted out in the nursery row. This is known as bench grafting, and on account of the ease and rapidity with which it can be done is often used by nurserymen. In the first case, where a small piece of root is grafted on to the scion, there are two methods employed—one where the root is smaller than the scion, and the second where the root is as large as, or larger than, the scion. These methods are chiefly used by nurserymen for the propagation of blight-resistant apple stocks,

the Northern Spy or Winter Majetin varieties being chiefly used, as both are free rooters when root grafted.

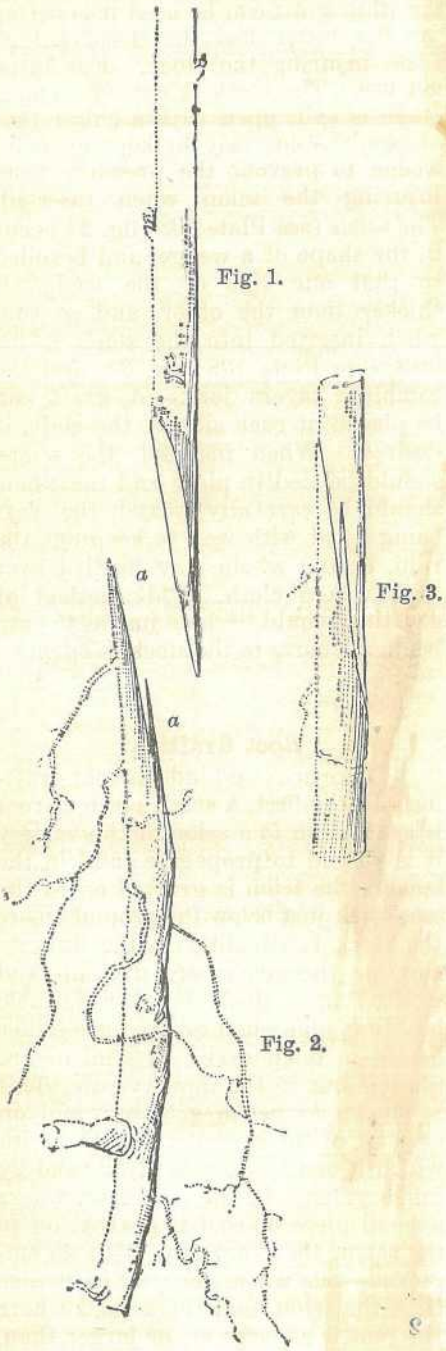


Fig. 1.

Fig. 3.

Fig. 2.

Plate 110.
ROOT GRAFTING.

When the root is smaller than the scion, a sloping cut is made into the scion as shown at (*a*) (see Plate 109, fig. 1), taking care to use a sharp knife, and making a drawing and not a forcing cut so as to avoid splitting; and the root (see Plate 109, fig. 2) is prepared as shown in a similar manner to the wedge graft used in the case of large trees (see Plate 108, fig. 2). The prepared root is then inserted into the cut at (*a*) made in the scion as shown in Plate 109, fig. 3, and is tied firmly in place with raffia or thin calico; no waxing is necessary.

Where the root is as large or larger than the scion, a whip or splice graft is used, which is best described by reference to the illustrations. Plate 110, fig. 1, the scion, shows the sloping cut and tongue at (*a*); Plate 110, fig. 2, the root, showing the sloping cut and tongue at (*a*); Plate 110, fig. 3, the completed graft, showing the use of the tongues and how they fit.

In the illustrations, the root and scion are shown to be of equal size, but if the root is larger than the scion then it is essential that the inner bark of one side of the root and of one side of the scion be brought into contact, taking no notice of the other side, as a union on one side is sufficient. Always tie the grafts firmly so that there is no fear of their shifting once they are placed in position and tied.

Root grafting, as described, can be done during the winter or early spring; the grafts when made being either kept in sand till the nursery is ready or planted out in nursery row direct.

In the second place, when the scion is grafted on to the seedling or other root stock, the method employed is that of whip grafting just described, the scion being firmly tied in place but not waxed, and the soil being then drawn round the graft till only one bud of the scion is left above the ground. If there is danger of the graft dying out, then waxed ties can be used. This method of grafting on to the root stock is often used in nurseries, especially in the case of peaches and other fruits having a soft pithy wood, and is done in spring just as the sap is beginning to move in the stock; the scion, if possible, being more backward in growth than the stock.

### Inarching.

Inarching is a form of graftage requiring a considerable amount of care and trouble. The plants are raised in pots or boxes and are ready for working when about the thickness of a lead pencil. When performing the operation the pots or boxes containing the plants require to be firmly secured on a raised platform around the tree selected to provide the scions, so that there is no likelihood of their being shifted by heavy winds. As a further precaution it is also advisable to tie the branches of the scion tree firmly to the platform.

The scions selected should be as nearly as possible of the same diameter as the stocks.

The next procedure is to remove a strip of bark from the stem of the stock so as to expose about 2 to 2½ inches of the cambium layer. The strip should be removed with one drawing cut of the knife and should be not more than 6 inches above the roots. A piece of bark of similar size is then removed from the scion and the two cut surfaces brought into exact juxtaposition and tied firmly with waxed tape.

In about three weeks the stock may be partially severed above the union and the scion below the union. A week later the top of the stock may be entirely removed, and in another two weeks the scion branch may be completely cut away below the union and the plant shifted.

Inarching is best performed when both stock and scion are growing vigorously. The stock should be kept watered, and after performing the operation if the sun is very hot it will be necessary to provide shade.

## PROPAGATION BY CUTTINGS.

Certain varieties of plants may be propagated by means of cuttings. Specially prepared beds containing a little decayed leaf mould and a large proportion of sand should be made available, and if the weather is very hot shelter must be provided.

*Root Cuttings.*—The roots of some varieties, such as citrus, plums, apples, &c., have the capacity of developing eyes which will produce shoots, and this fact is in some instances made use of to propagate these species. Roots from ½ inch to [illegible] inches in diameter may be taken as the most suitable size, and these should be cut into 8-inch or 9-inch lengths. If a saw is used to sever the cuttings it is advisable to smooth the cuts with a sharp knife. The cuttings should be placed

in a trench dug in the prepared bed, leaving about 2 inches of the thickest end above the surface. The soil needs to be well firmed after planting, and watered, and subsequently kept damp until the cuttings have grown enough to plant out.

*Stem or Branch Cuttings.*—These may be separated into hardwood and softwood cuttings, and although many varieties will root readily without special care others require more attention.

For hard-wooded kinds cuttings should be made 9 to 12 inches long from well-matured growths. The leaves at the base end should be cut off close to the cutting, whilst the top leaves should be trimmed off, leaving only about one-third of the leaf area. The butts should also be trimmed off with a sharp knife. Care must be taken at all times to avoid bruising or allowing the cuttings to wilt. Subsequent treatment should follow along the lines of the root cuttings.

Softwood cuttings require more care since they are, as a rule, made by taking about 3 inches of the tender, immature terminal ends of the twigs, and removing about two-thirds of the leaf area. The cuttings should then be placed in a box containing 5 or 6 inches of clean sand, and kept in a well shaded place. The sand requires to be kept constantly moist, though not wet, as too much water will rot the immature growths. Rather than apply a lot of water at one time it is better to give a light spraying often.

Autumn is generally regarded as the best season for propagating from cuttings. They are then fairly plentiful and root easily.

## Layering.

Layering may be defined as the rooting of a branch whilst still attached to the tree. It is a method of propagation frequently practised with varieties difficult to strike from cuttings or "hard" to graft.

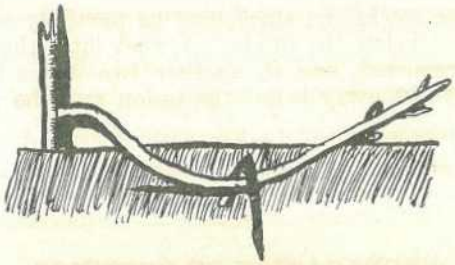

Plate 111.
LAYERED BRANCH.

The method is to bend the lowest branches of the plant downwards to the ground and peg them in shallow trenches by means of forked sticks (Plate 111). The branches are cleft with a sharp knife at the points where the roots are desired and small stones or sticks inserted to keep the cuts open. The trenches should then be filled with damp soil, leaving the ends of the branches above the surface. When sufficient roots have been developed the layers may be severed from the parent tree and dug up and planted out, removing at the same time a portion of the tops.

### Marcottage or Goatee Layering.

Marcottage is a variation of layering. It is seldom used here, other means of propagation being preferred. Briefly, a selected branch of the parent tree is "tongued" upwards and the cut kept open by the insertion of a small stick. Around the wound a pad of damp soil is tied firmly in a piece of sacking or other material. The soil requires to be kept constantly damp to induce rooting, and this is assisted by tying a tin or other suitable receptacle filled with water above the pad of soil in such a way that there will be a constant drip of water on the sacking to keep it damp. As soon as the roots penetrate to the sacking the branch may be severed at a point below the roots and planted, removing at the same time portion of the young foliage.

## WIND BREAKS FOR BANANAS.

During a cold snap, the necessity of suitable wind breaks around banana plantations soon becomes apparent by the number of frosted plants.

When falling scrub to plant fresh areas, the necessity of retaining a belt of scrub about 2 chains wide around new areas cannot be too strongly stressed. Where the locality is definitely liable to frosting, it is a good plan to make the track through the scrub or forest into the plantation on a zigzag formation. In areas not liable to frosting, a wind break will greatly assist in keeping out cold winds which chill the plants and thus retard their growth.

Where plantations are already established, growers should give attention to the planting of wind breaks, of which two types are easily made. Lady's Finger or Sugar bananas planted in close formation round the plantation will produce a thicket, and so afford protection. Several border rows of Java cane will also give some protection against frost and wind.

Growers should remember that too much hard work is put into falling scrub, burning off, logging up, and planting areas to excuse the neglect of reasonable precautions against the possible damage to bananas from frost or cold winds, for one severe frosting followed by a warm day will render their plantations worthless.

## "RUBBER BELTING ON THE FARM."
## A CORRECTION.

In the article "Rubber Belting on the Farm," in the May issue of this Journal, an error in the original typescript was overlooked, and readers are asked to note the following correction:—

In the first line of the third paragraph on page 390, the word "caused" was used instead of "cured." The sentence as printed was "Persistent slip on the pulley may be caused by bolting or riveting a piece of rubber belting to the face of the pulley." The word "caused" in the sentence altered completely its meaning. "Cured" is the word that was intended to be used and not "caused."

The corrected sentence should read: "Persistent slip on the pulley may be cured by bolting or riveting a piece of rubber belting to the face of the pulley."

# The Banana.

By Officers of the Fruit Branch.

THE banana is the fruit most largely cultivated in Queensland. It is a tropical plant, and though many years ago it was grown extensively in the North, it is now cultivated in all coastal districts experiencing sufficient rainfall, with the greatest production centred in the southern portion of the State.

## VARIETIES.

The chief variety grown is the Cavendish, whilst others of importance are Lady's Finger, Sugar, Mons Marie, and Gros Michel.

The Cavendish is most favoured because, having a dwarf-growing habit, it is less subject to serious damage on hillsides from heavy winds.

The Lady's Finger is a tall-growing robust plant. It is less subject to frost injury than the Cavendish, and thus can be grown in lower situations. The fruit is slightly angular and possesses a piquant flavour.

The Sugar is another tall-growing variety, but is usually less robust than the Lady's Finger and is particularly subject to Panama disease. On this account its cultivation is not being extended.

The Mons Marie is a sport from the Cavendish of local origin. It is reputed to have been grown first at Buderim Mountain. The plant is taller than the Cavendish, but not as tall as the Lady's Finger. The bunches and individual fruits are large and its cultivation may in a few years exceed that of the Cavendish.

The Gros Michel is the tallest grower, attaining a height in some instances of 30 feet. It luxuriates in the tropical conditions of North Queensland, but is not favoured in southern districts on account of the great height to which it grows. It is claimed that the flavour of the fruit is not equal to the Cavendish, but it carries better, and has the advantage of size. The fruit is produced on long bunches with wide inter-spaces, and is usually much less curved than the Cavendish.

Varieties of no importance are Dacca, Red Dacca, and Plantain.

## ESSENTIALS TO SUCCESS.

The *first essentials to success* in banana growing are that—

(1) Rainfall is not less than 40 inches per annum;

(2) The site is above frost level;

(3) The altitude does not exceed 1,000 feet above sea-level;

(4) The soil is fertile and well-drained;

(5) The aspect is suitable and well-sheltered.

In the southern parts of the State rainfall averages about 50 inches per annum. Hillside sites are generally selected. The soil is mostly of fertile volcanic origin and is often rough and stony, the latter feature particularly favouring vigorous growth of the plants. The land in its virgin state is usually covered with a dense growth of vine jungle. Though in some instances plantations situated at a greater altitude than 1,000 feet have produced reasonably good fruit, generally it may be accepted that bananas above this height are not commercially successful. The growth of the plants is frequently slow and stunted, and the bunches hang several months longer before reaching maturity. Also it is noted that a trouble known as Cigar End is more in evidence in such situations.

Considerable areas of good forest soils have been planted with bananas with some measure of success. The bunches produced are of good size, and the fruit is of excellent eating quality and carries better than that produced on the richer scrub soils. After burning off and planting, the whole of the forest and should be mattocked to a depth of, at least, 6 inches for best results and naturally, since the banana is a gross feeder, artificial fertilizers should be applied to maintain the life of the plantations over several years.

For a plantation site a north-easterly aspect well protected by a natural wind-break of mountains or timber on the western and southerly sides is regarded as the ideal situation. Easterly and south-easterly aspects may be used provided they also are well protected from cold winds. Too much attention cannot be given to the provision of wind-breaks. The leaves are the factories in which the plant's food is manufactured, and naturally the less they are damaged by wind or other agency the greater will be the amount of food available for the plant's use.

In the northern part of the State alluvial lands yield the best results, as growth throughout the year is even and fairly continuous.

## PREPARATION OF THE LAND.

The preliminary preparation of scrub land is confined to merely felling the timber at a suitable time—generally during winter—allowing it to dry for several months, and then burning off. Subsequently unburnt timber up to 12 inches in diameter is piled together and refired, the heavier logs being allowed to remain where they fell.

## PLANNING AND PLANTING.

In the south planting may be proceeded with from September to early March, though usually planting before the end of December is advisable in so far that the plants get a better start before the winter and fruit in a shorter time. Opinions vary as to the best month for planting to avoid having the main bunching during the period when short fruit known as "November dumps" are thrown. No definite rule can be laid down in the matter, as much depends on conditions existing in individual districts and the situation in which the plants are to be planted. Intending growers should ascertain the experiences of other growers in the district on the matter.

The land should be marked out at distances of 12 feet by 12 feet or 10 feet by 10 feet and holes about 12 inches deep and 18 to 24 inches across dug to receive the suckers. Various distances apart at which to set the plants have been advocated, but experience has proved that distances of 6 feet by 6 feet and 8 feet by 8 feet are not successful. Though 12 inches may be regarded as a safe guide to the depth of the holes at planting, the influence of the soil drainage and local conditions have an important bearing on the matter. Obviously, for instance, it would not be advisable to dig a deep hole in a soil with a heavy clay subsoil close to the surface, whilst in deep alluvial lands 18 to 20 inches would not be too great. When planting it is not necessary to completely refill the hole. The soil will gradually work in during cultivation and heavy rains. For practical purposes it is sufficient if the base of the plant is covered to a depth of 6 inches. Do not use the soil which has been dug out of the hole, but break down the surface soil from around the edges with a mattock, thus providing friable soil for the young roots to start in.

Too little attention has in past years been paid by growers to the damaging effect of soil washing in hillside plantations. It is well worth the labour expended to provide terraces as frequently as possible across the hills. These may be built of logs or stones between the rows of plants. Growers who have adopted this practice have cut larger-size bunches and have considerably extended the period of productivity of their plantations. There is no reason to doubt that the comparatively short life of Southern Queensland plantations is often due to the loss of valuable top soil by erosion. The holding of this soil on the hillside, combined with proper cultivation and fertilizing, will add several years to the present recognised profitable life of banana plantations.

Green manuring for the combined purposes of reducing soil losses during the rainy season and to provide additional humus should also be given serious consideration by growers.

## PLANTS.

Planting is carried out by means of suckers (offshoots), bits, or butts. Suckers are most generally used on account of their availablity and convenience for transport. Butts are rarely used and are not recommended, as they present a ready means of transferring beetle-borer to a new plantation. Bits are portions of old butts which have been chopped into pieces—each piece having one eye or bud from which a plant will develop. Very small suckers are not desirable. In no case should they be less than 3 inches in diameter through the corm. Care should also be taken not to obtain water suckers—i.e., those which have thrown large leaves at an early age. The best suckers are those about 18 inches ling, which taper from a well-developed base to a top of comparatively long, narrow, sword leaves. If such suckers have developed the first stages of full foliage and are desired as plants they should be cut off several inches above the corm after being dug. If used at a still later stage the stem should be cut off close to the corm and the centre gouged out to prevent further growth from that source. The butt will be found to contain several more or less developed buds or eyes distributed over its surface; these should also be gouged out and one only left to grow from around the base. Each plant should be carefully trimmed, the roots being cut close in to their bases, and where there is any suspicion that beetle-borer may be present the external covering should also be pared off.

## CULTIVATION.

Given fair conditions the young banana plant will require little attention for some time. Weed growth will sooner or later appear and should be immediately suppressed. On hillsides it is rarely possible to use horse implements, consequently hand-chipping and pulling the weeds must be resorted to. Spraying with various weedicides is practised by some growers, and with a suitable spray the practice has much to commend it provided cultivation is not altogether neglected. A plantation needs to be chipped at least twice a year to ensure good results. There is one feature growers should never overlook, and that is that it is not possible to grow bananas and weeds at the one time with any degree of success, particularly whilst the banana plants are young. It is of the utmost importance to suppress all weeds in the early stages. of the plants' growth.

## DESUCKERING.

The right time to remove unwanted suckers is when they first appear above ground. The parent plant then does not waste energy building up suckers which have later to be destroyed.

Under average conditions the usual method has been to allow only one plant to grow for the first four months. Then allow the first follower to develop, preferably at the side. After another four months allow a second sucker to develop on the opposite side of the parent, and after a similar interval allow a third sucker to develop at the side of the first. If possible, never allow suckers to grow from the down hill side of the parent, as in a year or two, unless the soil is continually banked up around the plants, they will be growing on the top of the ground. For this reason also the suckers which are retained as followers should originate well down in the ground and not at soil level. After the third sucker has been allowed to develop allow the fourth sucker to come from the side of the second, and so on. By following this method of pruning one developed bunch only is permitted to hang on each stool at one time, and as the plant is putting its energy into the bunch it will be a good one and worth more than two or three smaller bunches. Furthermore, succeeding bunches follow in fairly regular order.

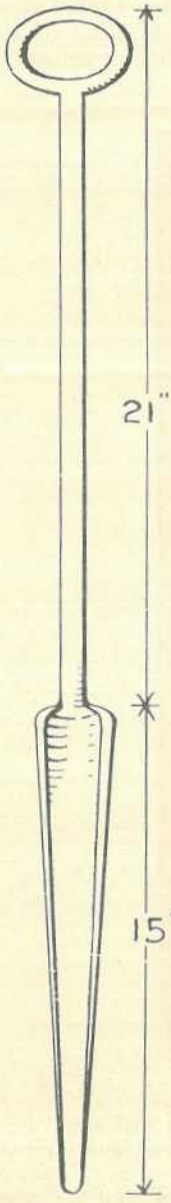


Plate 112.
BANANA DESUCKERING GOUGE.

Some growers have the idea that no suckers should be removed from the parent until it has borne a bunch. Such is an entirely erroneous idea, and probably developed from the fact that suckers *intended for replanting* should only be taken from parents which have borne a bunch. If taken before, the suckers are soft and invariably produce a very poor first bunch.

In desuckering it is advisable to avoid injury to the roots of the parent plant so far as is possible. The implement in use most favoured is the gouge (Plate 112), made from a 3-feet piece of spring steel 1½ inches by ¼-inch. About 15 inches of one end is hammered out, and the edges turned up and sharpened. This "blade" is tapered to a point of about half-an-inch across to facilitate its entry well into the corm of the sucker after the top has been severed, whilst the sharp curved edges make it easy to cut out a cone-shaped piece of plant and prevent further growth. The top of the gouge is generally fitted with a handle of ½-inch round iron for better leverage.

## THE ONE-BUNCH ONE-SUCKER SYSTEM.

The great problem facing the banana grower is the production of first-class fruit. Of recent years in many instances the sites for banana growing have shifted from the extremely fertile scrub soils to forest soils of varying fertility and aspect. The necessity of grubbing the forest soil and the use of fertilizers has considerably increased the cost of production, and unless a definite system of desuckering is carried out the production from this class of soil will not often be commercially profitable.

A system of desuckering, which has been tried and proved in the Eumundi and Yandina districts and is locally known as the one-bunch one-sucker system, has as adherents, the principal growers. Growers who have carried out the system have had as much as 200 cases to the acre for the first cut off forest soil, and by the selection of the correct follower for the second and subsequent cuts have reached an average of 500 cases per acre during the life of the plantation.


Plate 113.

"A"—also indicated by the arrow—shows the correct sucker well down which should be left to produce the follower. "B" is a "sitter" formed about ground level and should be destroyed.

"C" shows a sucker intended for planting ready to be detached from the parent corm. If the top is always severed with a sloping cut as shown, and the sucker planted with the lower point of the cut "D" facing up hill, the follower is nearly always certain to grow in the right position, shown approximately at "E."

The system really starts with the selection of the stock for planting, and in this connection well developed eyes with a portion of the corm adhering, and known as bits, are given first preference, and healthy suckers of more than 3 inches diameter are next best.

The bits or suckers are planted in a hole dug to a depth of about 12 inches. It is advisable not to cover the plant with more than 3 to 6 inches of soil at the time of planting, thus preventing the corm from forming too near the surface. The distance apart should not be less than 10 feet x 10 feet.

Plate 114.

SHOWS THE PARENT PLANT.—"A" with a matured bunch and a sucker "B" of the correct size and in the correct position at the side for the following season.

Suckers are a popular form of stock, and in placing these in the holes the followers for the second and succeeding crops can in a big percentage of cases be definitely ascertained. The side of the sucker furthest away from the parent usually produces the correct follower, and the sucker should be placed with the correct side facing the direction from which it is desired the follower should grow (see

Plate 113). On very steep slopes a follower at the side is preferred for the reason that if allowed to grow on the top side the old corm when rotting allows the young plant to sag forward, whereas if on the side the ground helps to stay it. The maiden plant must be regularly desuckered *as soon as the suckers appear above the ground,* this operation being most important, having, as it does, a direct influence on the size and quality of the expected bunch.

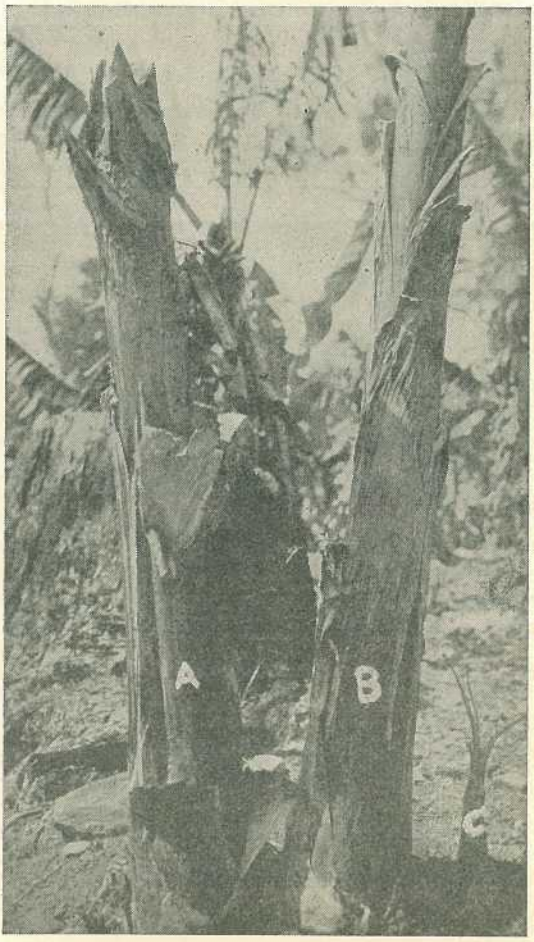


Plate 115.

SHOWS THE THIRD GENERATION OF PLANTS.—"A" is the original plant from which a bunch has been cut, "B" is the first follower ready to bunch the second season, and "C" is the follower for the third season. Note that "C" is in a direct line away from "A."

Where a grower has had experience in a certain locality, the number of months required to throw a bunch can in most cases be used as a basis in determining the time when the follower is allowed to come. From observations of quite a number of seasons and other factors in

North Coast districts, a period of approximately fourteen months is the usual time taken from planting to bunching. Using this with local data, followers can be left to insure the avoidance of fruit being thrown during November, as such fruit, having been formed in the plant in the winter, is usually unprofitable.

The most important factor governing the system is the selection of the correct first follower, and although some seasons make it somewhat hard, a careful observant grower can get at least 95 per cent. correct. On examining a banana plant with a number of suckers surrounding the butt, it will be found that the majority, and in some cases the whole, of the suckers are growing from eyes or buds that are in a circle at or near the soil level. These suckers are referred to as "sitters," and when allowed to develop into matured plants are sitting more or less on the surface with a root action that is superficial. *Such suckers are to be avoided as followers.*

Usually after the plant has made good growth and has been regularly desuckered, it forms one or perhaps more suckers that come from buds or eyes directly *below* the top layer of eyes and at least 5 inches lower in the soil: *these are the correct followers,* and if the injunction to place the suckers the correct way when planting has been carried out, by the time the bunch is thrown on the parent plant the grower will have a nice sturdy spear-leaved follower of from 2 to 4 feet in height on the top or at the side according to the contour of the plantation (see Plate 114). It is of the utmost importance that the follower is above ground *when the bunch is thrown on the parent plant.*

Once a grower has reached the stage of having his next year's follower correctly placed as regards position and time his main troubles are over, as it has been proved definitely that the third and succeeding correct followers, to the extent of 95 per cent., are true follows through, i.e., in a direct line with the original plant and the first follower (see Plate 115). The straight follow-through demands that the planter must ensure that the first follower does not grow on the down hill side or towards a fixed object such as a stump or a stone.

The objectives of this system are the same as are aimed for in every other line of fruit production where pruning is resorted to for definite results. A desuckered banana plant enjoys a maximum of sunlight, available food and moisture, and must, when these and other essential factors are present, produce a superior article. In addition, a one-bunch one-sucker plantation can be regularly and effectively baited for beetle and offers every facility for inspection for bunchy top and other diseases.

## TRASHING.

By trashing is meant the removal of dead leaves from around the stems of the plants. Carry out this work after the winter. The banana is a tropical plant and growing in Southern Queensland under semi-tropical conditions, the dead leaves provide a certain amount of warmth for the stem during the colder months.

## THE ENDLESS WIRE CARRIER.

The use of the endless wire system for transporting bunches of bananas from the plantation to the packing shed means a saving of much time and hard work for the banana-grower. The use of the system need not necessarily be confined to banana plantations; any hillside orchardist will find it a great convenience.

Briefly, the idea of the system is to despatch the fruit from a central point in the plantation on carriers which run on carrier wires to the packing shed. The carriers are attached to an endless wire running round grooved wheels at each end of the system. The carriers are fixed in such a way that as one is sent to the packing shed with its bunches the second carrier is returned uphill for its load.

The system is not difficult to instal. One of the chief things is to see that the structure is strongly built. A steep grade does not necessarily make the system impracticable, as the provision of a braking system serves to check the speed of the carriers.

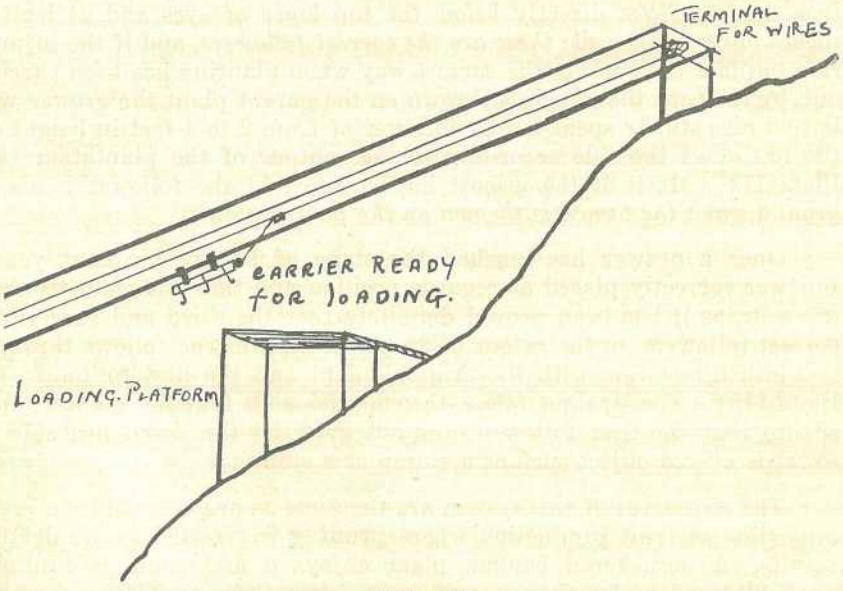


Plate 116.

First a central part of the plantation must be selected as a despatching point. This should be conveniently situated so that bunches from surrounding parts of the plantation can be easily carried to it. From this site select a position at the bottom of the plantation for a receiving station. A suitable place is usually found on the top of a small rise, as this will give the wires greater height so that the bunches will not brush against the plants whilst they are in transit. This receiving terminal should also be suitable for the building of a packing shed in order to save unnecessary handling of the fruit, and it should therefore have easy access to a roadway. Difficulty may be experienced on

some slopes in obtaining sufficient height for the wires. In such cases, a staging can be built at the despatching point and the terminal for the wires made higher up the hill, somewhat as shown (Plate 116).

### Construction of the System.

Reference to Plate 117 will explain the building of the system. The main posts marked "A" at both top and bottom terminals must be solid and about 12 feet long. They require to be firmly fixed in the ground, at least 4 feet deep and preferably 5 feet, and should be well braced. In Plate 26 the posts at the despatching end are shown anchored to a convenient stump for additional strength. The distance between the posts at each terminal may be about 6 or 8 feet.

About 6 inches from the top bore inch diameter holes through each of the posts for the carrier wires ("B"). The holes in the posts at the top end should be inclined downhill and those through the bottom posts inclined uphill so that the wires when strained will not kink at the entrance to the holes. A straight pull also makes it easier to strain the wires, which should be drawn as tightly as possible. To do this, tie the wires firmly round the posts at the sending end, and at the receiving terminal wind the slack of the wires round good strong rollers ("C"). If wooden rollers are used, they should be made of tough cross-grained timber, 4 inches in diameter, clear of sap. Straight-grained timber is liable to split and is not capable of carrying the load. Iron levers ¾ inch to 1 inch diameter ("D") passed through holes bored at right angles to one another in the ends of the rollers will give a good purchase and enable the wires to be tightly strained. For the carrier wires, heavy 10 by 12 gauge oval steel wire is sold specially for the purpose. This wire has a breaking strain of 2,140 lb. and is suitable for all ordinary distances up to approximately 600 yards. Some systems in use are a mile long, but heavier wires are required for these.

For the endless wire ("K") 12 by 14 gauge steel wire is generally used. This runs round grooved wheels fixed at each terminal.

Posts marked "E" are sunk and well braced at the receiving terminal. If a good anchorage such as a stump is not available at the despatching end, similar posts should be erected there also. Cross bearers ("F") made of 4 by 3 inch hardwood to carry the wheels are then bolted across the posts. Care is necessary in fixing the bearers, as in order to prevent the wire running off the wheels they must be tilted slightly, the wheel at the top being inclined downhill and that at the bottom uphill. In Plate 26 it will be noted that at the sending terminal the top bearer is placed across the front of the posts and the posts are checked out to allow the bottom edge of the bearer to be completely housed in the posts. The lower bearer is placed across the back of the posts, and in this case the posts are checked out so that the top edge of the bearer is completely housed. A piece of solid hardwood is next bolted to the top of the bottom bearer to form a small platform ("G"), so that when a hole for the axle of the wheel is bored through the top bearer the auger will continue on and bore a corresponding hole in the platform for the other end of the axle. The wheel, when fitted, will then be inclined towards the wheel at the bottom terminal, where a similar procedure is followed to tilt the wheel uphill. Old motor cycle or motor car wheels serve the purpose very well and may be obtained at any car wreckers for a few shillings each.

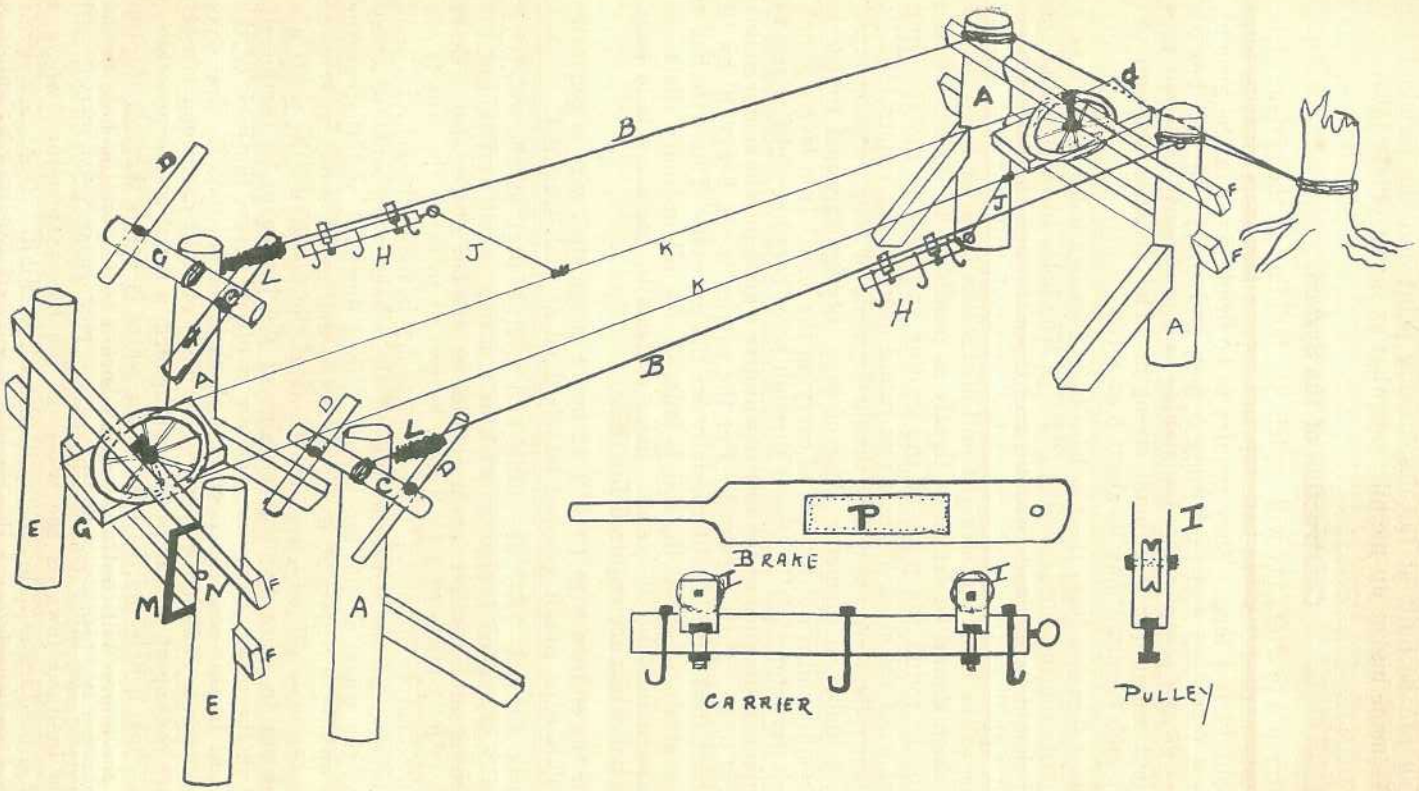


Plate 117.
PLAN OF AN ENDLESS WIRING SYSTEM FOR BANANAS.

The endless wire, when fitted, should be fairly tight, otherwise it will tend to run off the wheels. The approximate length required should be measured and run round one of the wheels whilst the latter is in position, and tied with a piece of tie wire to prevent it slipping off. The other wheel should then be lifted out of its platform and brought forward several feet. The wire should then be placed around it, and the two ends tied. The tie should be strongly made. The wheel is next drawn back to its correct position on the platform, and the axle inserted to hold it in its place. The use of a Spanish windlass made with a rope and two or three pulley blocks is an easy way of drawing the wheel back into place. If facilities for making a Spanish windlass are not available, the wheel with the endless wire tied on may be strained through a post fixed behind the terminal posts ("E") in the same manner as the carrier wires are strained. If the endless wire is not tight enough, the join will have to be broken, the wire shortened, and the work done again.

### Construction of Carriers.

The frames of the carriers ("H") are constructed from pieces of hardwood measuring about 4 feet long by 3 by 1 inches. Holes are bored for the hooks, as shown, from which to hang the bunches. The pulleys ("I") can be made by a good blacksmith. The pulley frame is usually $1\frac{1}{2}$ by $\frac{1}{4}$ inches iron bent as shown. Through the bottom a $\frac{3}{8}$-inch hole is bored for a bolt to fasten the pulley to the carrier. A second $\frac{3}{8}$-inch hole is bored through the two sides for a steel bolt to serve as an axle for the pulley wheel, which can be an ordinary grooved wheel of about 2 inches diameter. The pulley wheels should be kept frequently and liberally oiled, and to facilitate this a small hole bored through the pulley wheel above the axle bolt will be found of considerable benefit. The pulley frame is partially housed in the wooden frame of the carrier, as shown, by mortising out a piece of the wood and then bolting right through. At the end of the carrier a hook to which to tie the tail rope ("J") is screwed in. The carrier is fitted on the wire ("B") by removing the axles for the pulley wheels, fitting the wire in the pulley frames, and then replacing the wheels. The tail ropes should be long enough to allow for a sag in the carrier wires when carrying a load, and they should be firmly fastened to the endless wire to prevent slipping. Also, if one tail rope is tied to the join in the endless wire, the join will not then have to run round the wheels, and the tie will therefore not cause any obstruction. It is also a good idea to fit a swivel in the tail rope, near where it is tied to the endless wire, to prevent the tail rope from twisting round it. At the bottom terminal of each of the carrier wires, a piece of wood ("L") about 2 feet long wired on will act as a stop to hold the carrier when it arrives with its bunches, and prevent the latter from bumping the posts and bruising the fruit.

### The Brake.

The brake is made from a piece of solid hardwood fashioned with a handle like an elongated cricket bat. It should be loosely fastened with a long bolt to one of the bottom posts at the point "N." For extra strength a piece of iron ("M") may be bolted through the post to form a D, through which the brake is inserted. The brake should be only loosely bolted, as it must be capable of being moved forwards and backwards, according as it is pressed against the wheel to check its speed or released to allow the wheel to spin faster. A piece of leather ("P") tacked to the face of the brake where it comes into contact with the wheel will increase its efficiency and reduce friction.

# Green Manuring the Orchard.

By Officers of the Fruit Branch.

BY green manuring, or cover cropping as it is sometimes termed, is meant the growing of suitable green crops in the orchard to be ploughed or otherwise turned under to rot down and form humus. Humus is defined as the product of the decay of organic substances and one of the most important constituents of a fertile soil. It improves the texture and assists in maintaining fertility and the retention of moisture. In tropical lands, when virgin timber is cleared, natural humus becomes rapidly depleted due to leaching by heavy rains and through exposure of the land to the direct rays of a hot sun. The orchardist, therefore, who does not appreciate the value of supplying his land continually with humus, soon finds that his trees return him poorer results each year whilst his land becomes hard, baked, and dry. The growing of green crops must therefore be regarded in the light of essential orcharding practice if the grower wishes to maintain and improve soil fertility. Farmyard manure is the ideal manner of supplying humus to a soil but, unfortunately, this is not always available in sufficient quantity. Green manures are therefore called upon to provide the deficiency, and

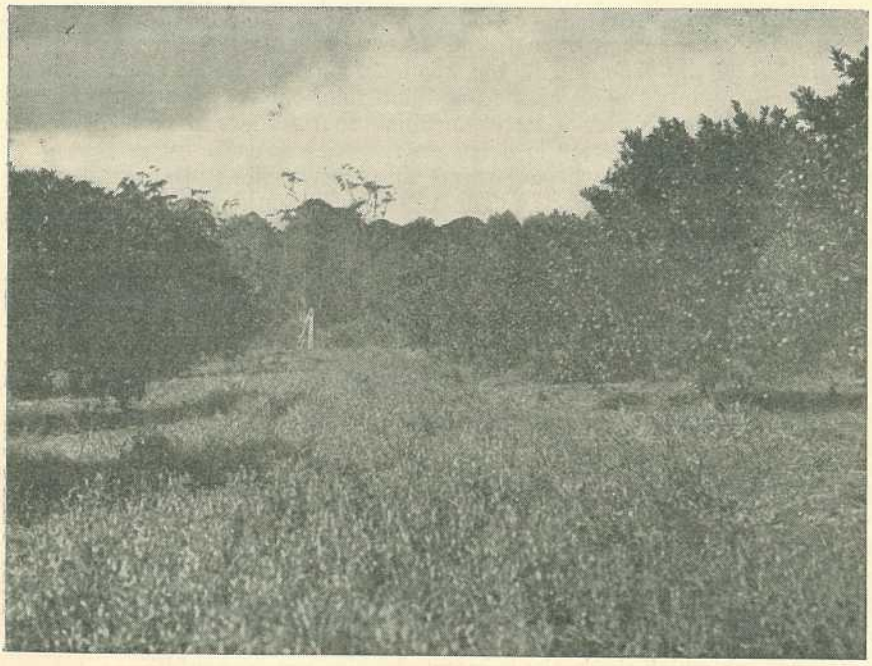

Plate 118.

A GREEN MANURE CROP OF FIELD PEAS AND BARLEY.

by their growth they also have the advantage of reducing soil erosion during the rainy season. Further, their incorporation with the soil enriches it by the addition of certain essential plant foods, such as carbon, oxygen, and hydrogen, which are absorbed from the air. The compounds that result from the crop decay increase the absorptive power of the soil and promote aeration, drainage, and granulation—conditions of importance where successful plant growth is concerned. If the crop grown is a legume, the store of nitrogen is also increased by the absorption of this element from the air.

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

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

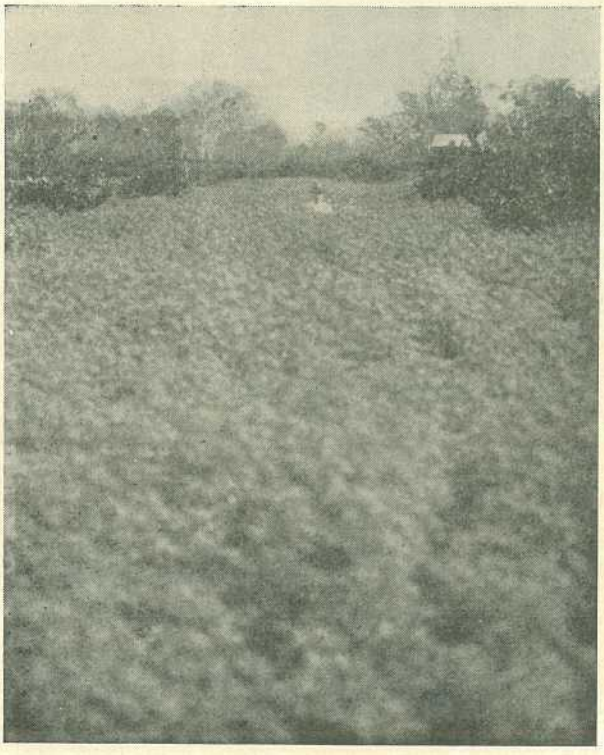

Plate 119.

A GREEN MANURE CROP OF NEW ZEALAND LUPINS.—Tops green:—36 tons to acre
Roots:—4.8 tons to acre.

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

Plate 120.
GREEN-MANURE CROP OF MAIZE READY FOR TURNING UNDER.

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

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

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

As the main essentials of a desirable green crop are rapid and succulent growth, it is of considerable benefit to apply a light dressing of fertilizer when sowing the crop. Both legumes and non-legumes will benefit considerably by the application of 1 or 2 cwt. of superphosphate, and often the addition of similar amounts of ammonium sulphate is advisable, particularly when growing non-leguminous crops.

In regard to the choice of crop to grow, Crotalaria, maize, Poona peas, and Black Cow peas grow well in coastal districts when planted during November or December, according to seasonal conditions.

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

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

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

Plate 121.
IN WELL-ESTABLISHED ORCHARDS OR PLANTATIONS GREEN CROPPING SHOULD BE CONFINED TO NARROW STRIPS DOWN THE MIDDLE OF THE ROWS.

## SORGHUM MIDGE ON THE DOWNS.

A considerable acreage of grain sorghums was planted later than usual on the Darling Downs this season, partly owing to inadequate spring rains and partly to difficulties encountered in preparing the land for planting when rain did fall. Many of these late-planted crops have suffered severely from sorghum midge, a pest which infests the heads when they are flowering and inhibits seed development.

Midges survive the winter as pupae in sorghum heads lying on the ground or in threshing debris which has not been destroyed when the previous crop was harvested. From these pupae the fragile, red-bodied adults emerge in spring and early summer. Midges are, however, comparatively few in numbers until mid-summer, when both cultivated and wild sorghums begin to flower in weather which is favourable for a rapid increase in the population. From then on during the remainder of the season the pest is extremely active. Johnson grass, Sudan grass, saccharine sorghums, and grain sorghums are all attacked, but only the injury to the grain sorghums is of economic importance.

It is difficult to assess the amount of damage to a grain sorghum crop without entering the field and examining the heads. If the infestation is very considerable, the heads will be carrying little or no grain. Under these circumstances, it would be pointless to hold the crop to maturity when the considerable amount of green feed available at present can be put to good use for stock. If allowed to remain, the forage value of the crop will be lost and the small amount of grain will not warrant harvesting. Farmers with grain sorghum crops on their holdings should, therefore, examine them as soon as possible. Nothing will be lost if the crop is good, but much will be gained if crop prospects are poor, for valuable forage can then be fed to cattle or conserved for future use as silage before it dries out and goes to waste.

# Some Values of Green Manure Crops.

By N. G. CASSIDY.*

WHILST it is desirable that all Queensland cane farmers should grow green manures as a regular practice, many do not yet take advantage of this very valuable and efficient adjunct to cane production. This paper is a contribution to the knowledge of green manures in the hope that the use of them may be forwarded thereby. The importance of leguminous crops assumes a fresh significance since both the cost and availability of nitrogenous manures, such as sulphate of ammonia, have introduced their inevitable problems.

During the past few years a number of analyses and soil investigations have been undertaken in connection with green manure cultivation in the sugar areas. The results of these studies provide many interesting phases and these will be discussed in this short paper.

## Soil Type and Conditions.

The examination of forty-one cases where the green crop was reported to be either definitely good or definitely poor, suggested that soil texture had little effect. Green manure crops succeeded on gravelly soils just as well as on heavy clay.

When the soils were tested chemically several facts were outstanding. Highly acid soils produced good green crops, and there was no apparent effect of low available potash; but the amount of available phosphate was important, and it appears that legumes are more exacting than cane in this respect.

The average available phosphate content of soils carrying good crops was 110 parts per million, while for the poor crops the value was 37. While the latter figure would, in general, be almost adequate for satisfactory cane crops, it would seem that 60 parts of available phosphate are necessary for satisfactory green crop yields. These conclusions are based on results chiefly from Poona pea crops and were drawn from widely separated cane districts. On soils notably deficient in phosphates it would be distinctly advantageous to broadcast a dressing of superphosphate with the green manure seed. Some cases did not fit in with this generalisation, but doubtless other cultural conditions exert their influence, while the efficiency of the particular root-nodule bacteria in the soils could be expected to show substantial variations.

## Weight of Crop.

From time to time sample areas of trial fields have been harvested and the weights of green and dry material determined. Analyses have also been made of the dry crop. Large variations exist from field to field, but the available data suggest that about 12 tons of green or 2½ tons of dry material is an average value for successful crops. When turned into the soil this constitutes quite an appreciable quantity of organic matter. On the basis of the weight of an acre-foot of soil it amounts to 0·2 per cent. of the weight of the soil concerned. Although the total amount of organic matter is not very materially increased, especially as

* In *The Cane Growers' Quarterly Bulletin* for April, 1941.

much of the crop residue is actually lost to the soil by the rapid decomposition which takes place, the very nature of the rotting process results in improvement of the physical properties of the soil. However, the chief benefit of the green crop is its influence on the soil nutrient supply, and in particular the nitrogen gain which a well-nodulated green crop obtains from the atmosphere. This is largely a clear gain in soil fertility. It should be stressed, however, that a crop grown in a soil rich in available nitrogen will simply live on the soil supply and so serve merely as a cover crop.

### Composition of Leguminous Crops.

The green crop also serves as a soil preserver, as it is grown during the high rainfall season. It prevents erosion from slopes due to excess run-off, and also absorbs the available phosphate, potash, and other foods, guarding them against leaching until the crop is ploughed in, when they are rapidly returned to circulation. *Dry* green manure tissues contain, on an average—

| | Per cent. | lb. per acre. |
|---|---|---|
| Nitrogen .. .. .. | 2·2 .. | 120 |
| Phosphoric acid .. .. | 0·4 .. | 22 |
| Potash .. .. .. | 2·0 .. | 110 |

Expressed in terms of common fertilizer materials, these represent—

5½ cwt. sulphate of ammonia.
1 cwt. superphosphate.
1¾ cwt. muriate of potash.

It is estimated that about two-thirds of the nitrogen represents a net gain to the soil, while the remaining plantfoods, though absorbed from the soil, are preserved against loss by leaching. For the largest nitrogen gains through the agency of root-nodule bacteria, farmers should use inoculated seed and sow it soon after the old ratoons have been ploughed out.

It is of interest to compare the weights and composition of cane trash with the above figures. The weight of *dry* trash from a 20-ton cane crop is about 6 tons, containing 0·4 per cent. nitrogen, 0·16 per cent. phosphoric acid, and 0·7 per cent. potash, which is equal in plantfood value to some 52 lb. nitrogen, 22 lb. phosphoric acid, and 90 lb. potash per acre.

## TREES ON THE FARM.

Trees serve many important purposes on farming and pastoral country.

Trees are valuable as—

1. Windbreaks and shelter belts.
2. For isolated or scattered shade and shelter.
3. A reserve supply of fodder for periods of drought.
4. Timber and fuel supplies.
5. Screens around dams and tanks to prevent silting up by dust, and undue evaporation of the water.
6. For the prevention of erosion on slopes and along the banks of creeks and rivers.
7. For ornamental plantations in improving the appearance of the home.

# Frost Prevention by Orchard Heating.

By Officers of the Fruit Branch.

IN Queensland destructive frosts are not nearly so frequent as in some other States or in other parts of the world. Nevertheless, serious losses are occasioned at times to early-fruiting varieties by late frosts, and though, generally, the expense attached to orchard-heating is too high to be economical, it would at times be well worth the expense of occasional heating in those orchards where late frosts periodically occur.

## FROST FORMATION.

With regard to the principles of frost formation, everybody knows that this phenomenon occurs when the temperature falls below 32 deg. Fahrenheit. What is known as a white frost is the accompaniment of a deposit of white ice crystals on exposed surfaces. A black frost is characterised by the absence of white crystals and is usually regarded as being the more severe in the causation of damage to plant life.

During the daytime, the heat from the sun comes to the earth in the form of waves, a method of heat transfer which is known as radiation. By the same process of radiation the earth losses heat continuously both day and night, but during daylight the amount of heat absorbed is greater than that given off into space, and the temperature of the earth becomes higher than that of the air in contact with it. As soon as this occurs, the layer in contact with the earth surface becomes warmer than the air at higher elevations. Heated air is lighter than cold air, and as soon as the air in contact with the earth's surface becomes warmer than that above or surrounding it, it is forced upward, and colder air rushes in to take its place. Circulation is thus established, in which the cool upper air is continually replacing the heated air near the ground. By sunset the air to a height of several hundred feet has been warmed. After sunset no heat is received from the sun, and the earth rapidly cools and becomes colder than the layer of air in contact with it. The surface layer of air in turn becomes colder than the air a few feet above. In this instance, however, the cooled air being heavier than the warmer air higher up, the tendency is on a calm night for the same air to remain in contact with the ground all night. Since air conducts heat very slowly, atmospheric cooling does not extend to great heights, as a result of which the temperature of the air 300 feet above the ground changes but little during the night. Thus, over a flat piece of ground on a clear calm night there is a relatively thin layer of cold air near the ground with a gradual increase of temperature up to an altitude of several hundred feet, above which the air becomes colder the higher one ascends. There is thus formed a sort of atmospheric ceiling, the existence of which is of very great importance in the prevention of frost damage to plants by the creation of artificial heat.

Certain factors influence surface cooling. For instance, wet soil is a good conductor of heat and newly irrigated soil is therefore less susceptible to frost than dry ground. Newly ploughed ground, grass, weeds, &c., are poor conductors, and so tend to increase the severity of the frost. Water has a good capacity for heat, hence the proximity of lakes and rivers will help to reduce the frost. On a slope the coldest air at ground level will tend to drift down hill and make room for warmer air higher up. A slope is therefore protected to some extent

Very small differences in level can make a big difference to frost formation. A wind will stir up the air, mixing cold and warm and thus ensure a higher temperature. The clearer the sky, the greater the likelihood of frost.

## PREVENTION OF FROST INJURY.

Various methods have been advanced from time to time as a means of preventing frost injury. The old method was the causation of dense clouds of smoke overlying the area to be protected. The method was known as smudging. The modern method is to heat the cool stratum of air immediately overlying the orchard, so that the temperature does not fall below 32 deg. Fahrenheit, the point at which frosts occur and cause damage.

With regard to the importance of the so-called atmospheric ceiling, if this ceiling did not exist and the air got colder from the ground upwards, as soon as the lower stratum of air was heated it would rise to unlimited heights, and cold air would continually rush in to take its place. With the existence, however, of a body of air above the ground in which the temperature increases up to a height of several hundred feet, the rise of the heated air is checked when it reaches a height at which the air temperature is equal to its own. Having reached this level, its tendency to rise disappears and it spreads sideways, and subsequent supplies of warm air from below will similarly be deflected sideways but at an ever decreasing height. At the same time, the cold air drawn in to replace the heated air at ground level will not be so cold but will already have been partially warmed. Thus an effective rise in temperature will be eventually obtained right down to ground level.

For the purpose of creating heat various fuels have been used, such as wood, coal, coke, kerosene, crude oil, &c. Of these methods, crude oil burned in specially constructed heaters is very efficient. Among the advantages is that in suitable burners many fires can be set going in a short space of time. Many small fires provide a better protection than a few big ones.

When there is a danger of frosts occurring several nights in succession the expense and labour are, of course, increased. In localities where wood is plentiful it is often used, and this is the method most used in Queensland up to the present time. The disadvantages of using wood, however, are the labour involved in obtaining it, as a number of fires are required per acre of orchard; the time occupied in lighting the fires, especially if the wood is wet or damp—and time is an important factor when the alarm bell indicates that there is danger of frost and the fires must be got going as quickly as possible. Coal and coke have been used, but the great drawback here, also, is the time occupied in lighting.

Oil fuel is easy to handle, easy to light, and easy to maintain at an even temperature. If the temperature is raised unnecessarily high, as indicated by the thermometer, some of the burners can be easily extinguished.

## TYPES OF HEATER USED.

In Southern States two types of heaters are mainly in use. Firstly, the coke, coal briquettes, or charcoal heaters, which are simple and cheaply constructed of heavy-gauge iron, consisting of two parts, the cylinder with grate which contains the fuel, and the top which fits on the cylinder, comprising a draught cone, stack, and damper. Each

heater is capable of holding approximately 20 lb. of fuel, which burns from four to five hours at a cost of 4½d. to 5d. per heater, varying according to the cost per ton. From forty-five to fifty heaters of this type are required per acre.

Bucket heaters of all kinds burning low-grade oils have been used with unqualified success. Useful burners may be made from 2-gallon or 4-gallon oil or paint drums, usually obtainable from hardware dealers. Dampers, which may be circular or triangular, should be made to fit over the tops of the burners, so that the flame may be regulated and the burning may not be excessive. The wick, which can be made from any old rag or cloth, may be hung on the damper. Lids should be provided so that the heaters can be extinguished at will. Lighting is accomplished by the use of torches which drip burning fuel into the heaters. Such a torch consists of a container with a spout and a wick so placed that the fuel will fall fairly freely, the lighted wick igniting the torch fuel as it flows out. If the buckets are made narrower at the bottom than

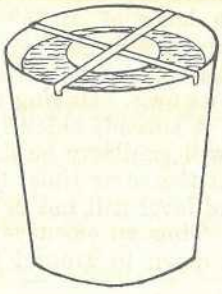

Fig. 1.
Circular Damper.

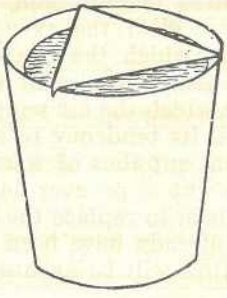

Fig. 2.
Triangular Damper.

Plate 122.

OIL BURNING BUCKET HEATERS.

at the top, they can be stacked inside one another and occupy less space when not in use. No solder joints must be used in making the buckets as the boiling point of oil is higher than the melting point of solder and the solder joints would melt and break.

## COST OF HEATING.

Some crops are more easily injured by frost than others. For instance, oranges are injured by a temperature of 30 degrees when the buds are commencing to show colour, whereas apples are not troubled until the thermometer falls to 27 degrees. Knowing the temperature at about which injury is likely to be occasioned, the grower can decide according to the probable number of frosts in a season and the value of his crop whether the cost of heating his particular orchard is justified.

It is estimated that fifty 4-gallon heaters on a 1 acre block, each burning 0·6 gallon of oil per hour, will raise the temperature to a point equal to that of the atmospheric ceiling 25 feet up. Thus, if the temperature at an altitude of 25 feet is 5 degrees higher than at ground level, the temperature of the orchard will be raised 5 degrees. In larger orchards less heaters per acre are required since it is easier to heat a large than a small area. In a 10-acre block the number of heaters may be reduced by 40 per cent.—that is, 300 for 10 acres. With crude oil obtainable at a cost of about 6d. per gallon, the cost would be 3⅗d. per

heater per hour. Heaters can be made for about 4s. each. It would on a particularly cold night probably be necessary to keep them burning for three or four hours until the danger has passed. Once the temperature of the orchard has been raised to the degree required, the dampers can be placed on the heaters and the size of the flame and the fuel consumption reduced to half. This may prove sufficient to maintain the warmer temperature until the danger of damage is over.

## SPACING OF HEATERS.

When the number of heaters required is decided upon, suitable spacing must be arranged. A row of heaters should be placed a few yards outside the orchard on the windward side if there is any wind drift, or, if there is higher land above the orchard, a row should be placed along the higher side to guard against cold air drifting in from this direction. It is advisable to place the heaters closer together round the edges of the orchard and space the remainder evenly throughout the trees themselves. If the ground is lower in some parts and consequently more susceptible to injury, the heaters should be placed closer together in such places.

## THERMOMETERS.

A thermometer should be placed in the lowest portion of the orchard or the point at which the frost is likely to be most severe. If the orchard is a very large one or the surface irregular, appreciable differences of temperature are likely to be found throughout the orchard and other thermometers should be placed at intervals. The thermometer should be carefully fixed at a height of 4 feet from the ground and midway between heaters so that the lowest temperatures are recorded. Steel-based coloured alcohol thermometers are probably the best to use. They are strong and the alcohol is coloured red so as to be easily readable at night. The cost is about 7s. 6d. each.

## ALARM THERMOMETERS.

A simple type of alarm thermometer which will warn the orchardist at his bedside that the temperature is reaching danger point is shown in Plate 123.

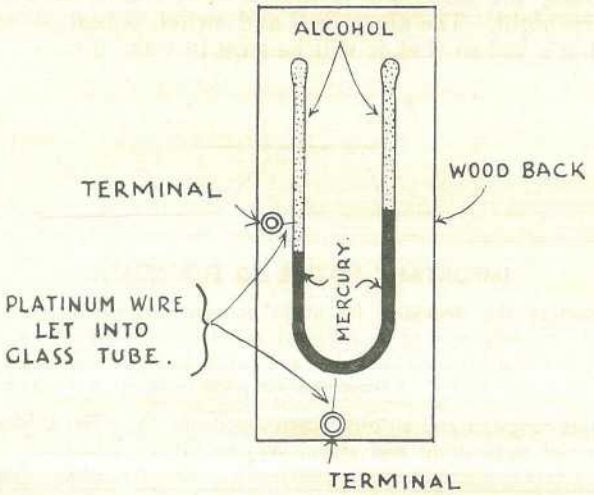


Plate 123.
ALARM THERMOMETER.

As the temperature falls, the alcohol in the left-hand bulb contracts and the mercury moves up to the left-hand side of the tube. At 34 degrees Fahrenheit, or whatever temperature the instrument is made for, the mercury touches the upper patinum wire, thus making electrical contact between the two terminals. The thermometer is connected to a bell, battery and switch, as shown in Plate 124, and at this temperature the bell rings and wakes the orchardist. The bell is stopped by shutting off a switch.

The position of the alarm thermometer is most important and it should be mounted in a manner similar to the ordinary thermometer at the coldest point of the orchard. The alarm should be tested every

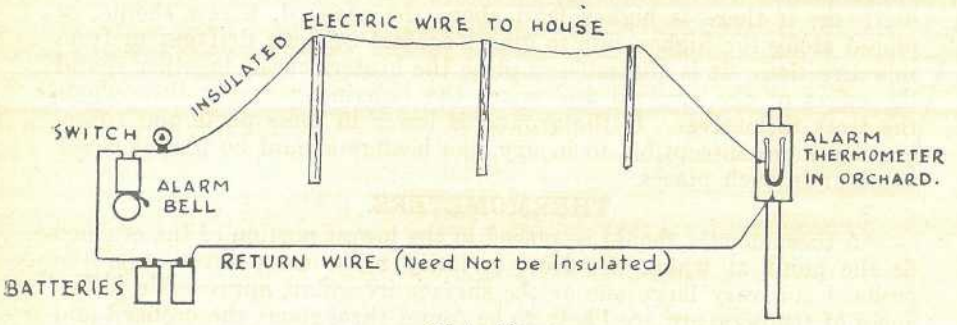


Plate 124.
WIRING OF ALARM BELL.

evening until the danger is over because a broken wire will cause the system to fail. Also if the insulation of the wiring is poor and a leakage of current takes place, the batteries will be run down and will not have enough energy left to ring the bell. If the two wires touch the bell will ring irrespective of the temperature. The system is tested by joining the two terminals of the thermometer with a piece of wire and then switching on. If everything is in order, the bell will ring. The piece of wire joining the terminals is then removed and the switch left on ready for the night. The alarm bell and switch is best placed alongside the orchardist's bed so that it will be sure to wake him.

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# Methylene Blue (Reductase) Test and Plate Count Test.

## A COMPARISON OF 2,304 PARALLEL TESTS.

O. KUDELKA, M.D., Bacteriologist of the Brisbane Milk Board.

THE Methylene Blue (Reductase) Test modified by Wilson measures the time in which 10 millilitres of the milk to be tested decolourise 1 millilitre of a standard methylene blue solution (containing about 1/300,000 part of methylene blue). By inverting the test tube in every half hour an equal distribution of butter-fat and bacteria is achieved and a distinct decision of the state of decolourisation is possible. The change of colour is effected by two main reducing systems, one in the milk itself and the other in the ferments of bacteria in milk. Wilson has pointed out that raw or pasteurised milk never reduces methylene blue under aerobic conditions when bacteria are completely absent. The test can therefore be regarded as significant for the degree of bacterial contamination of milk.

The reduction of methylene blue to the colourless methylene white depends on the number and the activity of bacteria present in the milk. A short reductase time can be caused by a large number of weakly reducing or by a small number of strongly reducing organisms. The bacterial activity and its effect on the quality of milk is, however, the main problem of milk hygiene. The methylene blue test can therefore be regarded as a very suitable and satisfactory milk test. It is simple and reliable and allows a fairly quick detection of low-quality milk However, it does not give information as to the type of organism present and cannot be used for the detection of harmful germs.

The plate count test indicates the number of colonies that develop within forty-eight hours after a suitable medium (milkagar) has been inoculated with a known amount of the milk to be tested. The count is referred to the number of colonies per 1 ml. of milk. Although this test requires the equipment of a bacteriological laboratory, its accuracy is not very great. The bacteria are not equally distributed in milk and sometimes cling together, forming clumps or clusters. Although it is supposed that every colony of the plate has originated from a single bacterium, some of the colonies may have been formed from a clump of many bacteria that were clustered together. On the other hand, some other bacteria may have failed to develop colonies at all. The conclusion from the number of developed colonies to the number of bacteria originally present in milk is therefore only exact to a limit.

Different plates of the same milk may show different counts within certain limits, and the skill and method of the person testing have a marked influence on the result of the test. However, identification of types and detection of harmful germs is easily possible, and certain conclusions as to the probable source of contamination can be made.

Since, therefore, the plate count test is based on the number only, the reductase test on number and action, any comparison of results can only be made by considering this difference.

In the following the results are reported of 2,304 milk examinations which were carried out on raw morning's milk. The milk was sampled three to five hours after milking, at the depots in Brisbane, and the samples were subjected without any delay to the plate count and reductase test simultaneously.

Table (1) shows the actual figures.

TABLE 1.

ABSOLUTE FIGURES, 1939—PLATE COUNTS PER MILLILITRE.

| Time of Reduction (Decolourisation). | Under 10,000. | 10,000-50,000. | 50,000-100,000 | 100,000-250,000. | 250,000-500,000. | 500,000-750,000. | 750,000-1,000,000. | Over 1,000,000. | Number of Cases. |
|---|---|---|---|---|---|---|---|---|---|
| More than 5½ hours | 124 | 123 | 15 | 8 | 1 | .. | .. | .. | 271 |
| Less than 5½ hours .. | 28 | 66 | 12 | 4 | 3 | .. | .. | .. | 113 |
| Less than 5 hours .. | 12 | 48 | 21 | 8 | 3 | .. | .. | .. | 92 |
| Less than 4½ hours .. | 4 | 34 | 21 | 24 | 7 | .. | .. | .. | 90 |
| Less than 4 hours .. | 2 | 26 | 23 | 17 | 12 | .. | .. | .. | 80 |
| Less than 3½ hours .. | 2 | 19 | 13 | 28 | 9 | 2 | 1 | 2 | 76 |
| Less than 3 hours .. | 1 | 14 | 11 | 23 | 19 | 5 | 2 | 4 | 79 |
| Less than 2½ hours .. | .. | 6 | 5 | 25 | 17 | 9 | 2 | 9 | 73 |
| Less than 2 hours .. | 2 | 5 | 3 | 9 | 8 | 12 | 1 | 20 | 60 |
| Less than 1½ hours .. | .. | 1 | 1 | 1 | 6 | 1 | 3 | 26 | 39 |
| Less than 1 hour .. | .. | 2 | 1 | 2 | .. | .. | 2 | 18 | 25 |
| Less than 30 minutes | .. | .. | .. | .. | .. | .. | .. | 13 | 13 |
| Number of cases .. | 175 | 344 | 126 | 149 | 85 | 29 | 11 | 92 | 1,011 |

1940.

| Time of Reduction (Decolourisation). | Under 10,000. | 10,000-50,000. | 50,000-100,000. | 100,000-250,000. | 250,000-500,000. | 500,000-750,000. | 750,000-1,000,000. | Over 1,000,000. | Number of Cases. |
|---|---|---|---|---|---|---|---|---|---|
| More than 5½ hours .. | 242 | 154 | 15 | 6 | 4 | .. | .. | .. | 421 |
| Less than 5½ hours .. | 38 | 78 | 8 | 6 | .. | 1 | .. | .. | 131 |
| Less than 5 hours .. | 31 | 76 | 10 | 6 | 1 | .. | .. | .. | 124 |
| Less than 4½ hours .. | 10 | 71 | 30 | 11 | 3 | .. | 1 | .. | 126 |
| Less than 4 hours .. | 9 | 48 | 37 | 20 | 7 | 2 | .. | .. | 123 |
| Less than 3½ hours .. | 15 | 24 | 23 | 19 | .. | .. | .. | 1 | 82 |
| Less than 3 hours .. | .. | 6 | 6 | 28 | 22 | 7 | 2 | 2 | 73 |
| Less than 2½ hours .. | .. | 4 | 4 | 12 | 27 | 6 | 3 | 12 | 68 |
| Less than 2 hours .. | 1 | 1 | .. | 9 | 19 | 3 | 7 | 22 | 62 |
| Less than 1½ hours .. | .. | 2 | .. | 1 | 8 | 2 | 8 | 18 | 39 |
| Less than 1 hour .. | .. | .. | .. | 1 | 3 | .. | 5 | 28 | 37 |
| Less than 30 minutes | .. | .. | .. | .. | .. | .. | .. | 27 | 27 |
| Number of cases .. | 346 | 464 | 133 | 119 | 94 | 21 | 26 | 100 | 1,313 |

To facilitate the comparison the percentage of distribution was worked out by taking as a basis (*a*) the reductase time (Table 2), and (*b*) the plate count (Table 3).

TABLE 2.

1939—PLATE COUNTS PER MILLILITRE.

| Reduction Time. | Number of Cases. | Under 10,000. | 10,000-50,000. | 50,000-100,000. | 100,000-250,000. | 250,000-500,000. | 500,000-750,000. | 750,000-1,000,000. | Over 1,000,000 | |
|---|---|---|---|---|---|---|---|---|---|---|
| More than 5½ hours | 271 | **45.7** | 45·3 | 5·5 | 2·9 | 0·4 | .. | .. | .. | 100 |
| Less than 5½ hours | 113 | 24·8 | **58.4** | 10·6 | 3·5 | 2·7 | .. | .. | .. | 100 |
| Less than 5 hours | 92 | 13·0 | **52.2** | 22·8 | 8·7 | 3·3 | .. | .. | .. | 100 |
| Less than 4½ hours | 90 | 4·4 | **37.8** | 23·3 | 26·7 | 7·8 | .. | .. | .. | 100 |
| Less than 4 hours | 80 | 2·5 | **32.5** | 28·7 | 21·3 | 15·0 | .. | .. | .. | 100 |
| Less than 3½ hours | 76 | 2·6 | 25·0 | 17·2 | **36·8** | 11·9 | 2·6 | 1·3 | 2·6 | 100 |
| Less than 3 hours | 79 | 1·3 | 17·7 | 13·9 | **29.1** | 24·1 | 6·3 | 2·5 | 5·1 | 100 |
| Less than 2½ hours | 73 | .. | 8·3 | 6·8 | **34.3** | 23·3 | 12·3 | 2·7 | 12·3 | 100 |
| Less than 2 hours | 60 | 3·4 | 8·6 | 5·2 | 12·1 | 13·8 | 20·7 | 1·7 | **34.5** | 100 |
| Less than 1½ hours | 39 | .. | 2·6 | 2·6 | 2·6 | 15·4 | 2·6 | 7·7 | **66.6** | 100 |
| Less than 1 hour | 25 | .. | 8·0 | 4·0 | 8·0 | .. | .. | 8·0 | **72** | 100 |
| Less than 30 min. | 13 | .. | .. | .. | .. | .. | .. | .. | **100** | 100 |
| | 1,011 | .. | .. | .. | .. | .. | .. | .. | .. | .. |

1940.

| Reduction Time. | Number of Cases. | Under 10,000. | 10,000-50,000. | 50,000-100,000. | 100,000-250,000. | 250,000-500,000. | 500,000-750,000. | 750,000-1,000,000. | Over 1,000,000 | |
|---|---|---|---|---|---|---|---|---|---|---|
| More than 5½ hours | 421 | **57.5** | 36·6 | 3·6 | 1·4 | 0·95 | .. | .. | .. | 100 |
| Less than 5½ hours | 131 | 29·0 | **59·5** | 6·1 | 4·6 | .. | 0·8 | .. | .. | 100 |
| Less than 5 hours | 124 | 25·5 | **61·3** | 8·1 | 4·8 | 0·8 | .. | .. | .. | 100 |
| Less than 4½ hours | 126 | 7·9 | **56.6** | 23·8 | 8·7 | 2·3 | .. | 0·7 | .. | 100 |
| Less than 4 hours | 123 | 7·3 | **39.0** | 30·1 | 16·3 | 5·7 | 1·6 | .. | .. | 100 |
| Less than 3½ hours | 82 | 18·3 | **29.3** | 28·0 | 23·2 | .. | .. | .. | 1·2 | 100 |
| Less than 3 hours | 73 | .. | 8·2 | 8·2 | **38.4** | 30·2 | 9·6 | 2·7 | 2·7 | 100 |
| Less than 2½ hours | 68 | .. | 5·9 | 5·9 | 17·6 | **39.7** | 8·8 | 14·4 | 17·7 | 100 |
| Less than 2 hours | 62 | 1·6 | 1·6 | .. | 14·5 | 30.7 | 4·8 | 11·3 | **35.5** | 100 |
| Less than 1½ hours | 39 | .. | 5·1 | .. | 2·6 | 20·5 | 5·1 | 20·5 | **46.2** | 100 |
| Less than 1 hour | 37 | .. | .. | .. | 2·7 | 8·1 | .. | 13·5 | **75.7** | 100 |
| Less than 30 min. | 27 | .. | .. | .. | .. | .. | .. | .. | **100** | 100 |
| | 1,313 | .. | .. | .. | .. | .. | .. | .. | .. | .. |

TABLE 3.

1939.

| Plate Counts. | Number of Cases. | More than 5½ Hours. | Less than 5½ Hours. | Less than 5 Hours. | Less than 4½ Hours. | Less than 4 Hours. | Less than 3½ Hours. | Less than 3 Hours. | Less. than 2½ Hours. | Less than 2 Hours. | Less than 1½ Hours. | Less than 1 Hour. | Less than 30 Min. | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Under 10,000 .. | 175 | **70.9** | 16·0 | 6·8 | 2·1 | 1·2 | 1·2 | 0·6 | .. | 1·2 | .. | .. | .. | 100 |
| 10,000-50,000 .. | 344 | **35.8** | 19·2 | 14·0 | 9·9 | 7·5 | 5·5 | 4·0 | 1·7 | 1·4 | 0·3 | 0·6 | .. | 100 |
| 50,000-100,000 .. | 126 | 11·9 | 9·5 | 16·7 | 16·7 | **18.3** | 10.2 | 8·7 | 4·0 | 2·4 | 0·8 | 0·8 | .. | 100 |
| 100,000-250,000 .. | 149 | 5·4 | 2·7 | 5·4 | 16·1 | 11·4 | **18.8** | 15·4 | 16·8 | 6·0 | 0·7 | 1·4 | .. | 100 |
| 250,000-500,000 .. | 85 | 1·1 | 3·5 | 3·5 | 8·0 | 14·1 | 10·6 | 22·4 | **20·0** | 9·4 | 7·1 | .. | .. | 100 |
| 500,000-750,000 .. | 29 | .. | .. | .. | .. | .. | 6·9 | 17·2 | 31·0 | **41.4** | 3·4 | .. | .. | 100 |
| 750,000-1,000,000 .. | 11 | .. | .. | .. | .. | .. | 9·1 | 18·2 | 18·2 | 9·1 | **27.3** | 9·1 | .. | 100 |
| More than 1,000,000 | 92 | .. | .. | .. | .. | .. | 2·2 | 4·4 | 9·8 | 22·0 | **28.3** | 19·6 | 14·1 | 100 |
| | 1,011 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | |

1940.

| Plate Counts. | Number of Cases. | More than 5½ Hours. | Less than 5½ Hours. | Less than 5 Hours. | Less. than 4½ Hours. | Less than 4 Hours. | Less than 3½ Hours. | Less than 3 Hours. | Less than 2½ Hours. | Less than 2 Hours. | Less than 1½ Hours. | Less than 1 Hour. | Less than 30 Min. | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Under 10,000 .. | 346 | **69.9** | 11·0 | 9·0 | 2·9 | 2·6 | 4·3 | .. | .. | 0·3 | .. | .. | .. | 100 |
| 10,000-50,000 .. | 464 | **33.2** | 16·8 | 16·4 | 15·3 | 10·3 | 5·2 | 1·3 | 0·9 | 0·2 | 0·4 | .. | .. | 100 |
| 50,000-100,000 .. | 133 | 11·3 | 6·0 | 8·0 | 22·5 | **27.8** | 17·3 | 4·5 | 3·0 | .. | .. | .. | .. | 100 |
| 100,000-250,000 .. | 119 | 5·0 | 5·0 | 5·0 | 9·2 | 16·8 | 16·0 | **23.5** | 10·0 | 7·6 | 0·8 | 0·8 | .. | 100 |
| 250,000-500,000 .. | 94 | 4·3 | .. | 1·1 | 3·3 | 7·7 | .. | 23·4 | **29.0** | 20·7 | 8·7 | 3·3 | .. | 100 |
| 500,000-750,000 .. | 21 | .. | 4·8 | .. | .. | 9·5 | .. | **33.3** | 28·6 | 14·3 | 9·5 | .. | .. | 100 |
| 750,000-1,000,000 .. | 26 | .. | .. | .. | 3·8 | .. | .. | 7·7 | 11·5 | 26·9 | **30.8** | 19·2 | .. | 100 |
| More than 1,000,000 | 110 | .. | .. | .. | .. | .. | 0·9 | 1·8 | 10.9 | 20·0 | 16·4 | **25.5** | 24·5 | 100 |
| | 1,313 | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | |

In general, there is a good agreement of both tests.

Milk with a good plate count has also a long reductase time and vice versa. The latter seems to give more uniform results than the former, but it has to be remembered that too many subgroups in milk tests provide only pseudo-accuracy.

For practical purposes the distinction of very good, fairly good, not satisfactory, and very unsatisfactory milk is sufficient. It can be seen that both tests correspond exactly in regard to very good and very bad milk. Those with more than five and a-half hours of reductase time have in more than 90 per cent. counts below 50,000 per ml. 100 per cent. of all milks with the extremely low reductase time of less than thirty minutes show counts over 1,000,000 per ml.

The middle groups of both tests have but a common tendency. It seems impossible to co-ordinate exactly a certain reductase time to a certain plate count.

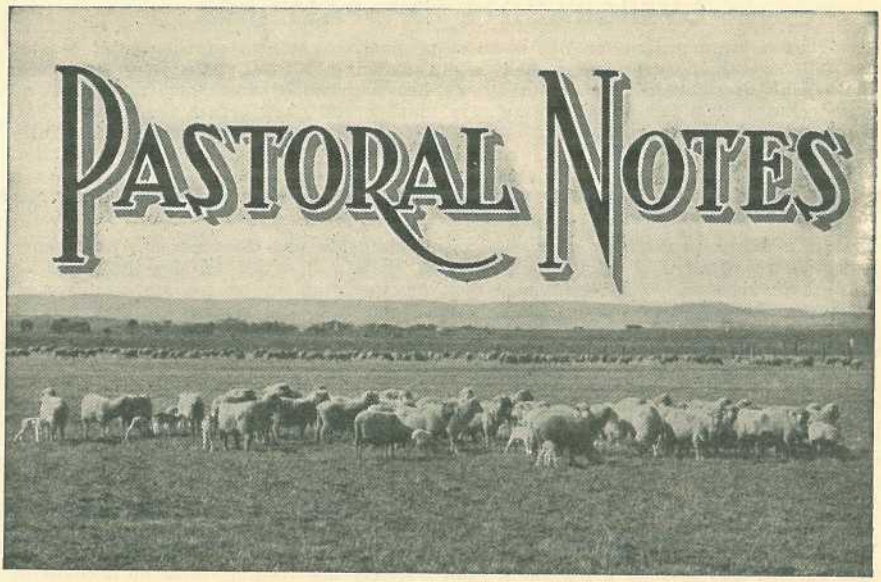
The different activity of the various bacterial types will always cause a variation of the reductase time, which is independent from the variation caused by different numbers.

For grading milk either of both tests can be used satisfactorily. Being simpler and shorter the methylene blue test seems preferable for the most practical purposes.

Plate 125.

NEARLY FIFTY YEARS AGO.—The Staff of the Department of Agriculture and Stock, 1895.

*Left to right.*—R. Wilson (afterwards Under Secretary), S. S. Hooper (who became Chief Accountant), E. Scriven (afterwards Under Secretary), Peter McLean (Under Secretary), Henry Tryon (formerly Chief Entomologist), A. H. Jones (afterwards O/C Commercial Section), T. Voltemann, John Liverseed (afterwards Manager of Hermitage State Farm, Warwick).




# Fat Lamb Sires.

MANY sheep owners realise both the advantage to be gained by improving their stock and the influence exerted by the sires on the progeny. Much more consideration should, however, be given to these important factors in the management of the flock. Poor quality sheep require just as much time and attention as those producing a greater quantity of better quality wool. On a holding where sheep can be bred successfully, 1,000 average breeding ewes may cut approximately 7 lb. per head. Assuming that 20 cheap merino rams cutting 12 lb. per head are used and that wool prices are 15d. per lb. for ewe wool and 12d. per lb. for ram wool, the income from the sale of wool will be £449 10s.

If better quality rams are used, they should cut 18 lb. each. The returns from them and the 1,000 ewes would be £455 10s., if the ram's wool is valued on the same basis as that of the low producers.

The influence of the better rams should increase the wool production of the progeny in four years to an average of 10 lb. per head, and the quality of the wool would be improved and bring higher returns, say, 16d. per lb. The yearly income would then be approximately £685.

Thus the additional expenditure on high-class rams is more than compensated for by an increased return to the grazier. The standard of the whole flock has been raised considerably and improvement can similarly be continued until stud standard is reached.

The influence of breed and type in fat lamb production is equally important. In fat lamb production, the lambs must develop quickly and combine plumpness with a symmetrical form at an early age. Feeding on suitable pastures or crops is essential no matter what breed is used; but carcass quality is largely dependent on the use of the right type of sires. A group of lambs which are the progeny of a pure bred shapely ram capable of transmitting the early maturing plumpness to the lamb can usually be sold at an age of from eleven to twelve weeks. The progeny of an inferior sire of the same breed may take three or four weeks longer to develop into prime condition, and, even when fat, they cannot be classed as prime sucker lambs for they are too old to carry the sucker bloom. The additional expense and trouble of having to feed and care for the slow maturing lambs for the three or four extra weeks is a further disadvantage.

Consumers at the present time are enquiring for small plump joints of lamb and the first step in meeting this demand should be the introduction of purebred rams.

## OVERGRAZING OF PASTURES.

That a large proportion of the most productive pastures of the State, coastal as well as inland, are overstocked is an undeniable fact. Unfortunately, too, the recent drought in the coastal areas has emphasised the harmful results of overstocking. The farms which were very much overstocked before the drought had the heaviest losses through its incidence. Many farmers and pastoralists are fully conscious of the bad effects of overstocking on pastures, and a large proportion of them insist on a moderate and judicious stocking of their holdings. As a consequence they are frequently very successful in good seasons and are the last to be affected by adverse seasons.

In a large proportion of cases, overstocking is due to economic conditions. Landholders often feel compelled to stock their properties to the limit during favourable seasons. Any general attack on the problem of overstocking would, therefore, inevitably involve financial considerations. It is, however, invariably advantageous, even from the economic viewpoint, not to overtax the productive capacity of the pastures.

Pastures which are not heavily stocked usually make rapid growth in the late summer and autumn, when the rainfall is sufficient. This is notably the case in some of the best paspalum pastures on the coast. This excess growth of grass is not eaten by stock, and when dry serves to protect the younger growth of grass from frost during the winter. With the approach of spring the younger growth of grass makes rapid headway, and forms a luscious pasture for stock. The general fertility of the soil of a pasture maintained in this way deteriorates much less rapidly than that of an overstocked pasture. The excess grass as it lodges and rots is added to the soil, and augments its organic constituents. Although this surplus late summer grass has a comparatively low feeding value on account of its low protein content, it has a high manurial value. It is composed very largely of organic matter which after decomposition has a marked reducing effect on essential soil minerals such as iron. It is due to this reducing effect of these organic constituents that the iron in the upper layers of the soil becomes soluble and available to pasture plants, fruit trees, and other economic crops.

## MEATWORKS BY-PRODUCTS.

Meatworks by-products are all of organic origin, and vary in composition with the part or parts of the animal used in their preparation.

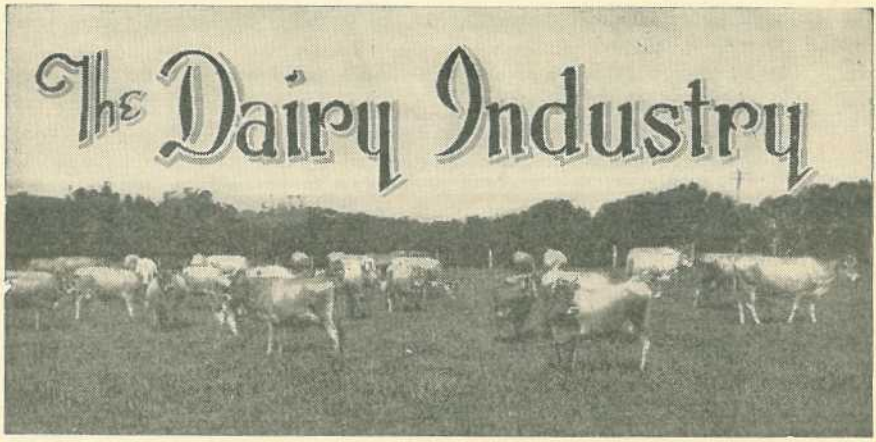
*Blood* is used either as a foodstuff (blood meal) or as a fertilizer (dried blood), depending on the quality of the manufactured product. Blood meal is not available on the Queensland market and requires no discussion here. Dried blood contains 81 per cent. crude protein (nitrogen 13 per cent.) and other organic matter, plus moisture 19 per cent. It is a widely-used nitrogenous fertilizer, comparable in many respects with sulphate of ammonia in the rapidity with which the nitrogen is available to the plant.

*Bone* is finely ground in the preparation of bone flour, bone meal, and bone dust. An average quality bone dust contains crude protein 22 per cent. (3½ per cent. of nitrogen), tricalcic phosphate 50 per cent. (23 per cent. phosphoric acid), and other organic matter plus moisture, 28 per cent. Bone dust is a slow-acting phosphatic manure. The more highly-refined products find an outlet as a constituent in many stock licks, which are valuable for stock grazing on phosphate deficient soils.

*Waste flesh* is the basis of meat meal, the dried residues being finely ground. It invariably contains a certain amount of bone. Meat meal (crude protein 63 per cent.), like blood meal, is an excellent protein concentrate for stock and the available supplies are readily absorbed on the Queensland market. It also contains fat. When used for fertilizer purposes, the fat is first extracted during preparation.

*Meatworks manure* is a mixed product containing blood, bone, and waste flesh. It contains approximately 3 to 6 per cent. nitrogen and 14 to 23 per cent. phosphoric acid, and is widely used in the State. It should be noted that as the nitrogen increases the phosphoric acid decreases, and *vice versa*.

All bone flour, bone meal, and meat meal products used for feeding animals must be subjected to a steam heat at a temperature of not less than 250 deg. F., equal to an indicated steam pressure of 30 lb. per square inch, for at least two hours during the manufacturing process. They must be prepared only from animals slaughtered for human consumption.




# Steam Sterilization in the Dairy.

RESEARCH in many countries has demonstrated that the most prolific source of contamination of milk and cream is the utensils used in the dairy.

Thousands of tests carried out in Queensland in the course of the past few years have revealed that under sub-tropical dairying conditions with the extensive use of the milking machine—always difficult to maintain in a sanitary condition—utensils are of even greater import than in countries with more temperate climate. Because of this special problem, steam sterilization of mechanical milking plants is now compulsory under "*The Dairy Produce Act.*" Because of the diversity of opinion as to the merits of different cleansing and sterilizing procedures, extensive investigations were made and only after the results had clearly shown the inferiority of milk and cream produced on farms equipped with milking machines was the installation of a steam sterilizer made compulsory. It is sometimes suggested that "scalding" is as effective as steam for sterilizing. Certainly the small dairyman may achieve consistently good results by the use of boiling water, but "scalding" temperatures have been found, in the course of investigations, to vary from 130 degrees Fahr. (little better than luke warm) to actual boiling point. Under everyday conditions, however, "scalding"—i.e., pouring hot water from vessel to vessel—even in the hands of a careful supplier cannot be regarded as an effective substitute for steam. To be really effective, utensils should be completely immersed in boiling water—an almost impracticable requirement for milking machine parts.

Remarkable bacteriological results have been obtained with machine-produced milk on farms applying steam sterilization in combination with other approved practices. The efficiency of the procedure was convincingly demonstrated in a field investigation on the Darling Downs some months ago. This survey, covering 72 farms, of which about one-third were equipped with sterilizers, showed that the quality of the milk produced, in accordance with the production methods classed as follows, varied in this order:—

(1) Milk produced with the use of milking machines and equipped with steam sterilizers, 21 farms—of the 198 samples examined, 65.7 per cent. were of satisfactory quality.

(2) Milk produced by hand-milking (steam sterilization not compulsory), 27 farms—of the 253 samples examined, 42 per cent. were of satisfactory quality.

(3) Milk produced with the use of milking machines and not equipped with steam sterilizers (ordinary 12-gallon coppers were used), 24 farms—only 25.7 per cent. of the 363 samples examined were of satisfactory quality.

It should be emphasised that although steam sterilization alone cannot be expected to solve all the problems associated with the production of a choice quality

cream, it will almost certainly be successful if combined with methods of minimising the contamination from other sources besides the utensils. The salient points which must receive attention are:—

(1) Keeping buildings and equipment clean and free from dust.

(2) Rejection of foremilk.

(3) Washing of udders and milkers' hands.

(4) Thorough cleansing, immediately after milking of all utensils in the approved way, and washing of milking machines according to recommended procedures (sterilization is only complementary to thorough washing).

(5) Storage of washed and sterilized utensils away from a contaminating atmosphere.

(6) Keeping milk or cream as cool as possible and away from dusty yards, and other sources of contamination.

Finally, there is the important economic aspect of steam sterilization. As a practice of the greatest importance in the production of choice quality cream, not only does it increase the producer's pay cheque, but contributes materially to the raising of the quality of the State's butter output.

## OILING THE SEPARATOR.

Before the separator is used it should be seen that the sight feed lubricator is working satisfactorily. It is absolutely necessary for the machine to receive the correct flow of oil from the lubricator before the separation process begins, otherwise the spindle—one of the most expensive parts of the machine—will show signs of wear long before it is due. Ten drops of oil a minute is a satisfactory adjustment to make on the lubricator. Any increase in this number of drops will not help in the lubrication, although the oil will not go to waste, for it drops into the reservoir at the bottom of the machine.

As soon as separating is finished, the lubricator should be shut off to prevent any more oil from dropping into the machine.

It is advisable to form a habit of cleaning the working parts—the parts that have to be oiled—at the beginning of every month. Take the back cover off the machine, drain out the oil, put in a cup of kerosene or petrol and give the machine a good turn, so that all the moving parts will be thoroughly cleansed. Drain off the kerosene or petrol in the same way as the oil, then replace it with clean, fresh oil, turn the machine again, so as to distribute the oil over the parts, then stop the machine and drain again. This will leave the separator in a thoroughly clean condition, ready to receive fresh oil that will give 100 per cent. lubrication.

Another important point to remember about separator lubrication is that the particular type of oil used must be suitable for high-speed lubrication. Cheap, thick oil should not be used as it may reduce very considerably the efficiency of the separator.

The whole of the cleaning-out and renewing of the oil can be done well within half an hour, and the time spent will be more than repaid.

## THE DAIRY FARM.

Large paddocks on a dairy farm are not economical. If practicable, the farm should be subdivided into a number of small paddocks which allows for each to be grazed in turn, and then spelled for a period to enable the paddock to recover. Large paddocks often mean fodder wastage, as cattle roam all over the area, eating out the choice grasses and fouling the remainder, making them unfit for food.

A lot of waste results from faulty management of good pastures by stocking too heavily, which means, of course, that good grasses are eaten up quickly. If the paddock is spelled for a reasonable period, the pasture gets a chance to recover and the grasses have time to seed.

Unwise feeding methods constitute a prolific source of waste. It is necessary to balance the ration, so that there shall be no waste or loss in production through feeding an excess of one food constituent at the expense of another.


| Name and Address. | Name of Hatchery. | Breeds Kept. |
|---|---|---|
| **F. J. Akers,** Eight Mile Plains .. | Elmsdale .. | Australorps |
| **W. Brown,** Waterworks road, The Gap, Ashgrove | Strathleven .. | White Leghorns |
| **W. T. Burden,** 44 Drayton road, Toowoomba | Harristown .. | White Leghorns, Australorps, and Rhode Island Reds |
| **J. Cameron,** Oxley Central .. | Cameron's .. | Australorps and White Leghorns |
| **M. H. Campbell,** Albany Creek, Aspley | Mahaca.. .. | White Leghorns and Australorps |
| **J. L. Carrick and Son,** Manly road, Tingalpa | Craigard .. | White Leghorns and Australorps |
| **J. E. Caspaney,** Kalamia Estate, Ayr | Evlinton .. | White Leghorns |
| **W. Chataway,** Cleveland .. | Wilona .. | White Leghorns and Australorps |
| **N. Cooper,** Zillmere road, Zillmere | Graceville .. | White Leghorns |
| **R. B. Corbett,** Woombye .. | Labrena .. | White Leghorns and Australorps |
| **Mrs. M. M. Cousner,** The Gap, Ashgrove | Progressive Poultry Farm | Australorps and White Leghorns |
| **Dr. W. Crosse,** Musgrave road, Sunnybank | Brundholme .. | White Leghorns, Australorps, Rhode Island Reds and Whites |
| **O. M. Dart,** Brookfield .. .. | Woodville .. | White Leghorns, Australorps, Langshans, and Rhode Island Reds |
| **Dixon Bros.,** Wondecla .. .. | Dixon Bros. .. | White Leghorns |
| **T. Duval,** Home Hill .. .. | Athalie .. | White Leghorns and Rhode Island Reds |
| **E. Eckert,** Head street, Laidley | Laidley .. | Australorps, Langshans, and White Leghorns |
| **Elks and Sudlow,** Beerwah .. | Woodlands .. | White Leghorns and Australorps |
| **F. G. Ellis,** Old Stanthorpe road, Warwick | Sunny Corner .. | Australorps |
| **B. E. W. Frederich,** Oxley road, Corinda | Glenalbyn .. | Australorps |
| **W. H. Gibson,** Manly road, Tingalpa | Gibson's .. | White Leghorns and Australorps |
| **Gisler Bros.,** Wynnum .. .. | Gisler Bros. .. | White Leghorns |
| **J. W. Grice,** Loch Lomond, via Warwick | Quarrington .. | White Leghorns |
| **C. and C. E. Gustafson,** Tannymorel | Bellevue .. | White Leghorns, Australorps, and Rhode Island Reds |
| **F. E. Hills,** Sims road, Bundaberg | Littlemore Poultry Farm | White Leghorns, Australorps, Rhode Island Reds, and White Wyandottes |
| **C. Hodges,** Kuraby .. .. | Kuraby .. | White Leghorns and Anconas |

| Name and Address. | Name of Hatchery. | Breeds Kept. |
|---|---|---|
| **A. E. Hoopert,** 24 Greenwattle street, Toowoomba | Kensington .. | Australorps and Rhode Island Reds |
| **H. Hufschmid,** Ellison road, Geebung | Meadowbank .. | White Leghorns, Brown Leghorns, Minorcas, Australorps, and Rhode Island Reds |
| **S. W. Kay,** Cemetery road, Mackay | Kay's Poultry Stud | White Wyandottes, Light Sussex, Rhode Island Reds, Australorps, White and Brown Leghorns |
| **W. A. Lehfeldt,** Kalapa .. | Lehfeldt's .. | Australorps |
| **F. W. R. Longwill,** Birkdale .. | Nuventure .. | Australorps, White Leghorns, and Light Sussex |
| **J. McCulloch,** Whites road, Manly | Hinde's Stud Poultry Farm | White and Brown Leghorns and Australorps |
| **W. S. McDonald,** Babinda .. | Redbird .. | Rhode Island Reds and Anconas |
| **F. W. McNamara,** Vogel road, Brassall, Ipswich | Franmara .. | White Leghorns and Australorps |
| **A. Malvine, Junr.,** Waterworks road, The Gap, Ashgrove | Alva .. .. | Australorps and White Leghorns |
| **H. L. Marshall,** Kenmore .. | Stonehenge .. | White Leghorns and Australorps |
| **W. J. Martin,** Pullenvale .. | Pennington .. | Australorps, White and Black Leghorns |
| **A. E. Mengel,** 181 Campbell street West Toowoomba | Glenmore .. | White Leghorns, Black Leghorns, Brown Leghorns, Anconas, Australorps and Rhode Island Reds |
| **C. Mengel,** New Lindum road, Wynnum West | Mengel's .. | Australorps |
| **J. A. Miller,** Charters Towers .. | Hillview .. | White Leghorns |
| **F. S. Morrison,** Kenmore .. | Dunglass .. | White and Brown Leghorns and Australorps |
| **Mrs. H. I. Mottram,** Ibis avenue, Deagon | Kenwood Electric | White Leghorns |
| **J. W. Moule,** Kureen .. .. | Kureen .. | Australorps and White Leghorns |
| **D. J. Murphy,** Marmor .. .. | Ferndale .. | White and Brown Leghorns, Australorps, Silver Campines, and Light Sussex |
| **S. V. Norup,** Beaudesert Road, Coopers Plains | Norups .. .. | White Leghorns and Australorps |
| **A. C. Pearce,** Marlborough .. | Marlborough .. | Australorps, Rhode Island Reds, Light Sussex, White Wyandottes, and Langshans |
| **E. K. Pennefather,** Douglas street, Oxley Central | Pennefather's .. | Australorps and White Leghorns |
| **G. Pitt,** Box 132, Bundaberg .. | Pitt's Poultry Breeding Farms | White Wyandottes, White Leghorns, Brown Leghorns, Australorps, Rhode Island Reds, Langshans, and Light Sussex |
| **G. R. Rawson,** Upper Mount Gravatt | Rawson's .. | Australorps |
| **J. Richards,** P.O., Atherton .. | Mountain View | Leghorns and Australorps |
| **W. G. Robertson,** Bilsen road, Nundah | Ellerslie .. | Australorps, Light Sussex, and Plymouth Rocks |
| **C. L. Schlencker,** Handford road, Zillmere | Windyridge .. | White Leghorns |
| **S. E. Searle,** New Cleveland road, Tingalpa | Tingalpa Stud Poultry Farm | White Leghorns and Australorps |
| **W. B. Slawson,** Camp Mountain | Kupidabin .. | White Leghorns, Australorps, and Light Sussex |
| **Mrs. A. Smith,** Beerwah .. .. | Endcliffe .. | Australorps and White Leghorns |
| **A. T. Smith,** Waterworks road, Ashgrove | Smith's .. | Australorps and White Leghorns |
| **T. Smith,** Isis Junction .. .. | Fairview .. | White Leghorns and Australorps |
| **H. A. Springall,** Progress street, Tingalpa | Springfield .. | White Leghorns |
| **A. G. Teitzel,** West street, Aitkenvale, Townsville | Teitzel's .. | White Leghorns and Australorps |
| **W. J. B. Tonkin,** Parkhurst, North Rockhampton | Tonkin's .. | White Leghorns, Australorps, and Rhode Island Reds |

| Name and Address. | Name of Hatchery. | Breeds Kept. |
|---|---|---|
| **P. and K. Walsh,** Pinklands, via Cleveland | Pinklands .. | White Leghorns |
| **W. A. Watson,** Box 365 P.O., Cairns | Hillview .. | White Leghorns |
| **G. A. C. Weaver,** Herberton road, Atherton | Weaver's .. | Australorps, White and Brown Leghorns, Anconas, Minorcas, Rhode Island Reds, Indian Game, and Bantams |
| **H. M. Witty,** Boundary road, Kuraby | Witty's .. | White Leghorns and Anconas |
| **P. A. Wright,** Laidley .. .. | Chillowdeane .. | White Leghorns, Brown Leghorns, and Australorps |

## GREEN FEED FOR FOWLS.

If fowls are deprived of green feed the most serious deficiency which is likely to occur is that of vitamin A. This vitamin is one of the "fat soluble" group; that is, it is present in high concentration in animal fats. But it may be, and customarily is, supplied by the feeding of greenstuff in which is a substance named carotine. This substance is transformed into the true vitamin A by the liver of the animal body and is stored there in relatively large quantities.

The absence of vitamin A is liable to produce very serious effects on poultry, because when supplies of this substance are inadequate the birds are more liable to bacterial infection. Consequently, a conjunctivitis—that is, an inflammatory condition of the eye—first appears and progresses until the eye has the appearance of an abscess. Further, there is usually a moderate mortality, and on post-mortem examination characteristic abnormalities are seen. Most marked is the presence in the mouth and throat of pustules and ulcers, which can be seen when these parts are opened up carefully. Another characteristic alteration, which is more difficult to detect, occurs in the kidney. Fine white lines may be noticed running through the tissue of that organ. This change is brought about by the deposition of substances called urates, which are excreted from the body by the kidneys.

The occurrence of this disease may be prevented by the feeding of adequate greenstuff, but it is realised that this may be difficult and expensive at the present time.

Additional foods rich in vitamin A are milk and milk by-products, yellow maize, and cod liver oil.

A cheap and convenient method of supplying vitamin A is to feed a goodly proportion of maize or maize meal to poultry.

## MILK IN THE POULTRY PEN.

Skim milk is an excellent poultry food, and if fowls are given all the skim milk they can drink, and even if fed on nothing else but grain, they will continue to lay well.

Farmers generally appreciate the necessity of efficient feeding and, to give their fowls the necessary amount of protein, use one or other of the prepared mashes. These mashes are usually fed with grain, the birds being given an equal quantity of each. In these circumstances a sufficient amount of protein is made available to the birds.

The farmer who has skim milk to give his birds may therefore depart somewhat from his ordinary practice for skim milk is a protein-rich food; but how far he may do so depends on the quantity of skim milk available. If the birds are given only say half the skim milk they will consume half the quantity of mash that is usually fed should be supplied and the grain increased by about 50 per cent.

It will generally be found a sound policy when milk mash and grain are being fed to the flock to give the birds all the grain that they will consume and not force them to eat given quantities of mash. This policy will largely enable the birds to balance their own ration.


## Don'ts for Cotton Growers.

DON'T grow cotton by methods that are not suitable for the production of a satisfactory yield under the wide range of conditions which may be experienced in most of the cotton-growing districts. The following recommendations are offered for growing cotton under only rainfall conditions and are based on the results which have been obtained in this State both in investigations conducted over a series of years, and in a large number of commercial crops grown each season.

1. Don't grow cotton on old cultivations if it can be avoided. If it is necessary to use old cultivations, the cotton should follow some fodder crop that has matured in time to allow of the ploughing for the cotton crop to be done prior to the occurrence of the winter rainfall.

2. Don't grow cotton following either lucerne or cowpea. These crops may build up the supply of nitrogen in the soil sufficiently to cause rank development of the cotton plant with a resultant partial crop failure, particularly when planting is delayed. The results obtained over several seasons have generally indicated that the best yields may be expected where cotton is grown on land in the first, second or third season following the ploughing of either native grassland or sown areas of Rhodes grass.

3. Don't grow cotton following cotton, except on land in the second and third season after the breaking up of grassland. A cotton crop will exhaust most of the subsoil moisture during a dry autumn, thus handicapping the growth of a following cotton crop if on an old cultivation, unless very efficient and timely rainfall is experienced throughout the growing period of the latter crop. Land in the second or third season after the breaking up of grassland is usually of sufficiently open structure to trap efficiently the rainfall experienced in the early winter prior to the ploughing out of that season's cotton crop. Such ploughing operations should be completed, however, by mid-July to ensure of the fullest efficiency being obtained in the trapping of the late winter and spring rains. The rainfall during the growing period of the following

cotton crop will also be trapped sufficiently in most seasons to promote satisfactory crop development on such cultivations if the winter rainfall has provided ample subsoil moisture.

4. Don't cross plough land on which cotton is to follow cotton, if a satisfactory turn under of all grass, weed, and trash present is obtained with the first ploughing. Where a suitable first ploughing is obtained the final preparation of the seed bed can be carried out efficiently in most seasons by the use of either a disc harrow or a weighted spike tooth harrow. When a sufficiently wet period is experienced in late winter to compact the soils, it may be necessary to cross plough early in the spring to warm up the soils and to bring the surface to a suitable tilth, in which case only a shallow ploughing is advisable.

5. Don't delay ploughing grassland until late in the winter. The best results may be expected where the ploughing is done in April or May to prevent the grass using the moisture stored in the subsoils as a result of the late summer rains. The early ploughing will also leave the surface soil in an open condition that will efficiently trap the winter rains experienced.

6. Don't delay the cross ploughing of ploughed grassland, if this operation is necessary, until late in the spring. Much loss of moisture in the ploughed soil will result if ploughing is done then in an ordinary season, whereas, if the cross ploughing is done not later than mid-July, there is definite possibility in most districts of sufficient rainfall being experienced to moisten the ploughed soils thoroughly to the subsoil prior to the occurrence of the planting rains. On most soils with ample subsoil moisture, a stand of cotton plants may be obtained and maintained on surprisingly light rainfall during the late spring months. An early start of the cotton crop may thus be accomplished in some seasons in which the conditions would be unfavourable for planting on late ploughed areas.

7. Don't under estimate the value of obtaining early a stand of well established cotton plants in most of the districts suitable for cotton growing. Over a series of years it has been shown that crops resulting from plantings in late September to the end of October in the Central District, and from mid-October to mid-November in the southern districts, may be expected to produce better yields than later planted crops. In the areas around Mackay and in the districts north of there, planting towards the end of the wet season appears to produce better yields of cotton of good quality than do plantings made prior to the occurrence of the wet season.

8. Don't plough up and down a slope or even in a straight line across it. Investigations have shown that ploughing on the level contour across the slope of newly-broken grassland prevents run off of all rain amounting up to 1 inch per fall.

9. Don't plough deeper than 6 inches when preparing a seed bed for a cotton crop. No apparent advantages have been gained where deeper ploughings have been tried. If cotton is to follow cotton, ploughings made deeper than 6 inches may prevent obtaining an early stand in the following cotton crop when insufficient rainfall is experienced to wet the deeply-ploughed seed bed thoroughly to the subsoil.

10. Don't make the surface of the seed bed so fine that early storm rains will compact it to such an extent that much of the subsequent

rainfall will be lost through run off. Such run off on slopes may cause a severe loss of surface soil which will result in a further reduction in the absorption of the rainfall experienced that season.

11. Don't grow cotton on deep sandy soils. The red scrub soils, particularly on old cultivations, also frequently fail to produce satisfactory yields of cotton. The general experiences indicate that the loams and clay loams overlying a clay subsoil at a depth of 12 to 36 inches are the most suitable for obtaining satisfactory yields of cotton under a range of climatic conditions.

12. Don't change to another variety because a poor yield is obtained, particularly if the variety grown has produced satisfactorily on the same soil type in previous seasons. Contact the district field officer of the Department of Agriculture and Stock, or the head office of the Department at Brisbane, regarding the suitability of the variety for the soil type on which it has been grown. Also advise regarding the cultural methods being used. Changing to another variety because a poor yield has been produced may prevent faulty cultural methods being detected.

13. Don't reduce the planting rate per acre below that recommended, i.e., 20 lb. of fuzzy seed and 15 lb. delinted seed for cultivations, and 10 lb. delinted seed for the new burns of scrub areas. A poor stand seriously handicaps obtaining good yields.

14. Don't plant deeper than 2½ inches, or shallower than 1½ inches.

15. Don't plant in the dry soil if it can be avoided. It is advisable to have sufficient equipment to enable planting to be completed promptly after the planting rain. When this is not practicable, as in the case of large acreages, plant in the dry only the acreage that cannot be planted within three days after the occurrence of the planting rain.

Plate 126.

DON'T DELAY THE FIRST CULTIVATION, WHICH SHOULD BE MADE WHEN THE COTTON SEEDLINGS ARE 2 TO 3 INCHES TALL.

16. Don't plant delinted seed in the dry soil prior to the occurrence of a planting rain. A light rain may be experienced after the planting which will be just sufficient to start germination of the seed, and in the event of further rain not being experienced soon afterwards, rotting of the seed will result. Generally, if sufficient rain occurs to germinate fuzzy seed planted in dry soil, there will be enough moisture in the soil to maintain the resultant seedlings if there has been ample storage of subsoil moisture prior to the planting period. Using delinted seed after a satisfactory planting rain has occurred is definitely advisable, however, for more even distribution of the seed is obtained in the planting operations and a quicker stand of seedlings results than where fuzzy seed is planted.

17. Don't space the rows wider apart than 4½ feet or narrower than 3½ feet. Use 4½ feet spaces on the fertile soils capable of producing rank growth of plant. Reduce the row spacings to 3½ feet, proportionately to the height of plant that may be generally expected, on the soils which do not produce rank growths.

18. Don't neglect early cultivation of the cotton crop. An efficient cultivation made when the cotton plants are 2 to 3 inches tall removes any grass and weed seedlings present more thoroughly than when the first cultivation is delayed until the cotton plants are 5 to 6 inches tall, and all grass and weed growths are well established. Undoubtedly an early cultivation not only reduces the amount of hand labour and cultivation required later in the season, but the early eradication of weed growth also prevents the cotton plants being robbed of considerable supplies of moisture, which would be of marked value during a dry period in the late spring and early summer. This is a very important point that is overlooked by many cotton growers. An additional benefit obtained by the early destruction of weed growth is the reduction effected in the number of insect pests which begin their attacks in the cotton fields on certain weeds when they are present.

19. Don't eliminate the thinning operations. Undoubtedly serious loss of yield and reduction in the quality of the cotton produced, results where the plants are not sufficiently spaced out. Generally speaking, a spacing from 12 to 18 inches appears to be the most suitable in the main cotton-growing districts for soils producing plants of an open habit of growth, while 18 to 24 inches are more satisfactory for either where tall rank growth may be expected or the districts of lighter rainfall where the wider spacings may provide more moisture for the plant during conditions of stress.

20. Don't delay the thinning operations until the plants are too tall to allow of efficient and economical thinning being done. The best height at which to thin is when the plants range from 6 to 8 inches tall. Better yields result from this height of thinning as compared to thinnings done when the plants are either shorter or taller than these heights.

21. Don't allow the crop to become weedy after the thinning operations are performed. A cultivation should be given right after thinning to establish a mulch and to work soil to the cotton plants. With each later cultivation more soil should be worked to the plants to smother weed seedlings germinating in the row and also to brace the bottom of the plants to prevent their being blown over when the soil is wet.

22. Don't neglect to examine the cotton crop frequently during the early period of its growth. The timely discovery of an attack by some of the insect pests which destroy cotton seedlings, and the immediate application of recommended methods of combating such pests will prevent the considerable loss of stand that may otherwise occur in some seasons.

23. Don't start the picking operations before there is ample cotton open to allow of good picking "tallies" being obtained.

24. Don't pick cotton that is either damp from rainfall or is "green," as cotton is called that has not been thoroughly dried out following the opening of the boll. The fibres of cotton in either condition are cut and twisted badly in the ginning operations, thereby seriously reducing their value.

25. Don't leave the cotton exposed to the weather long enough to affect its quality. Cotton that is left unpicked for several weeks loses the bright colour that is required in the upper grades of lint cotton.

26. Don't include weed seeds or an appreciable amount of leaf and trash when picking cotton. When cotton containing foreign matter of this nature is packed into a container, the leaf, &c., is pressed into the fibres so tightly that it is difficult to extract, especially if the cotton is even slightly damp when packed.

27. Don't harvest good cotton by the snapping method. Snapping, as the process of removing together the open burr and seed cotton is called, is of definite value in harvesting cotton of low grade at the end of the season. The snapping of cotton of good quality, however, markedly lowers its value owing to the excessive admixture of burr and trash with the seed cotton, much of which cannot be removed in the ginning operations.

Plate 127.

DON'T NEGLECT THE LATE CULTIVATION OF A COTTON CROP.—Cultivation should be continued until the passage of the team and machine causes serious breakage of the plants.

28. Don't pack several grades of seed cotton in the one container. The cotton is graded on the basis of the lowest grade contained in the wool pack or chaff bag.

29. Don't delay until late in the winter, where cotton is to follow cotton, the cutting and burning of the cotton stalks in the endeavour to harvest all of the top bolls. The gain obtained in the following cotton brought about by ploughing out the previous plants not later than mid-July, will generally considerably exceed the value of the low-grade cotton harvested from the last of the top bolls of the former crop.

30. Don't leave the old cotton plants standing in the field where the land is not to be planted to cotton again. Standover cotton is frequently a breeding centre for numerous insect pests which may seriously damage the next season's cotton crop. As soon as harvesting is completed, graze the old cotton crop with cattle to remove any unpicked bolls. The remaining plants should then be cut and burned, following on which the land should be ploughed to destroy any insect life or weed and grass growth present.

Cotton is a war-time commodity that is required in appreciably greater quantity than is now being produced in Australia. Every farmer who has soil suitable for producing a satisfactory crop of cotton should therefore grow as much acreage of cotton as he can take care of properly. In order to achieve efficient and economical production of the crop, it is strongly recommended that the above suggestions be carefully followed.

## QUEENSLAND SHOW DATES FOR 1941.

### June.

| | |
|---|---|
| Wowan Bushman's Carnival | 6th |
| Maryborough | Postponed |
| Lowood | 6th and 7th |
| Childers Patriotic Carnival | 9th and 10th |
| Boonah | 11th and 12th |
| Bundaberg | 12th to 14th |
| Gin Gin Horse Show and Carnival | 16th and 17th |
| Gladstone | 18th and 19th |
| Rockhampton | 24th to 28th |
| Toogoolawah | 27th and 28th |

### July.

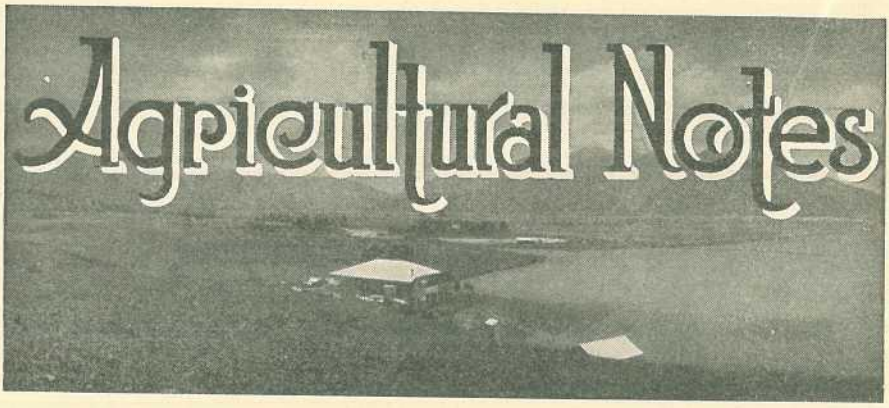
| | |
|---|---|
| Mackay | 1st to 3rd |
| Proserpine | 4th and 5th |
| Bowen | 9th and 10th |
| Charters Towers | 10th to 12th |
| Nambour | 10th to 12th |
| Ayr | 11th and 12th |
| Townsville | 15th to 17th |
| Laidley | 16th and 17th |
| Rosewood | 18th and 19th |
| Ingham | 18th and 19th |
| Cleveland | 18th and 19th |
| Cairns | 22nd to 24th |
| Gatton | 23rd and 24th |
| Innisfail | 25th and 26th |
| Atherton | 29th and 30th |
| Crow's Nest | 30th and 31st |

### August.

| | |
|---|---|
| Pine Rivers | 1st and 2nd |
| Home Hill | 1st and 2nd |
| Royal National, Brisbane | 11th to 16th |

### September.

| | |
|---|---|
| Imbil | 5th and 6th |
| Canungra | 6th |
| Pomona | 12th and 13th |
| Rocklea | 13th |
| Beenleigh | 19th and 20th |




# Winter Preparation of Land for Maize.

TO get the best results maize requires a good soil, in which a plentiful supply of plant food is available, a condition which can only be brought about by an early and thorough preparation of the land before planting, attention to the cultivation of the crop itself, and to the eradication of young weeds during its early growth.

The land should be ploughed to a depth of at least 9 inches during the winter and allowed to lie in the rough until the early spring. The action of the frost and the rain will improve the texture of the soil and will leave it in a mellow condition. In the early spring the land should receive a second ploughing, which, if possible, should be a cross ploughing. This should not be so deep as the first ploughing, and should be immediately followed by a harrowing and cross harrowing to work the surface soil into a fine tilth.

If a crop of weeds is turned under during the second ploughing, planting should not be carried out for at least a few weeks to allow decomposition to take place. On land which is not too heavy and moist, rolling is desirable, as it consolidates the soil and helps to make a good firm seedbed. Rolling should always be followed by a light harrowing.

*Preparation of Seedbeds.*—The preparation of the seedbed is one of the most important points in the production of maize, and no amount of after cultivation will undo the damage that has been caused by planting in a badly prepared piece of land.

One has only to see the difference, not only in the growth but in the colour of the foliage also, between a crop grown on thoroughly prepared and another on hastily prepared land, to realise how great the effect is.

Give the young crop a chance to become well established in a well prepared seedbed—in which the young plants will not have to battle with a host of weeds—and the increased return will more than compensate for the extra time and labour spent.

*Time to Plant.*—The best time to plant will naturally vary in different districts. In districts which have a long growing season and a comparatively regular rainfall, planting can be carried out whenever weather conditions are suitable, from August to late December.

Two very important points are—firstly, to choose a variety which is suitable for the district; and, secondly, to try and have the crops tasselling during periods in which rain can usually be expected. Maize must have moist conditions during tasselling, and if hot, dry winds occur during this period, the pollen is shed too early and fertilization cannot take place.

Seed should be sown in drills spaced 3 ft. 6 in. to 4 ft. apart. The wider spacing is essential for the tall-growing, late-maturing varieties. As a general rule single spacing in the rows gives the best results, the grains being dropped singly, with a distance of approximately 12 in. between the grains for the quick maturing varieties, and from 15 to 18 in. for the late-maturing varieties.

From 9 lb. to 12 lb. of seed is sufficient to plant an acre when sown in this manner.

The seed drill is the most satisfactory implement for sowing maize, as it ensures a good even spacing, and no loss of moisture occurs during planting, as is often the case where furrows have to be opened up for hand planting.

## GET SOUND SORGHUM SEED.

The growing interest in sorghums for green fodder, grain and silage is apparent to a marked degree in the present stage of development of the Western Downs and Maranoa. In view of the large acreage which will probably be sown in those districts during the forthcoming season, the attention of all intending growers is called to the absolute necessity for ensuring that their seed is sound in respect of germination capacity.

It will be readily understood that if at the next sowing period there is faulty germination of the seed, the resultant dislocation of planting may well be fatal to success, and the delay caused by the necessity for replanting may result in the crop missing the most favourable conditions for growth. For these reasons, all growers are strongly urged to insure against loss by adopting the following suggestions:—

(1) If planting has to be done late in the season, all crops intended for seed should be sown before those to be used for other purposes.

(2) When purchasing, insist on getting seed which has been tested for germination capacity by the Department of Agriculture and Stock, or send samples for testing direct to the Department.

Samples should be 4 oz. in weight and addressed—

The Officer in Charge,
Seed Testing Station,
Department of Agriculture and Stock, Brisbane.

Directions for sampling issued by the seed testing station are—

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

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

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

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

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

(5) In the seed testing station great pains are taken to ensure absolute accuracy of work. It follows, therefore, that all this care is wasted, unless the person sending samples for examination takes the trouble to ensure that the samples drawn truly represent the bulks from which they are obtained.


# Green Manure for Stanthorpe Orchards.

THE supplying of organic matter to Stanthorpe soils is fundamentally important for the maintenance of soil fertility, and the ploughing under annually of bulky green crops is the most effective means of building up the soil content of this material. Leguminous crops are particularly valuable because, in addition to organic matter, they supply nitrogen in a cheap form, and thus make possible a saving in artificial nitrogenous fertilizers.

Based on tests of a large number of potential winter-growing varieties of green crops, and on extensive fertilizer trials, the following recommendations are made for the guidance of orchardists in the Stanthorpe district.

### 1. Varieties for Winter Growth.

*Legumes.*—New Zealand blue lupins and golden tares are outstanding in their ability to resist both severe frosts and soil dryness. When grown for the first time, inoculation of the seed with proper strains of root nodule bacteria is advisable. Bacterial cultures for the inoculation of these crops are available from the Department of Agriculture and Stock, Brisbane. Other legumes tested, but not found to fulfil local requirements are tick bean, purple vetch, dun field pea, and clover.

*Cereals.*—Black winter rye corn is recommended because of its ability to grow successfully under Stanthorpe conditions. Florence wheat and Sunrise oats are suitable under most conditions, but the latter will not survive severe frosts. Cape barley has been the least satisfactory of all cereals tried.

### 2. Sowing.

Before sowing, the land should receive preparatory cultivation, preferably a ploughing, and then the seed should be broadcast and buried by cultivator or harrows. Recommended rates of sowing are:—

For New Zealand blue lupins or golden tares: 1 bushel per planted acre for the first one or two years; thereafter, ¾ bushel may suffice.

For cereals: 1 bushel per planted acre.

### 3. Time to Sow.

Cultural preparations should be made in March, so that both soil and crop will benefit from autumn rains. Early sowing is preferable to late sowing, as the crops should be well established before winter.

4. FERTILIZER TREATMENT.

Fertilizing is indispensable if the crop is to have an opportunity of making adequate growth. Preferably, fertilizer should be broadcast and ploughed under in the course of preparation of the seed bed, rather than applied at the time of sowing. Germination may be impaired when fertilizer is close to the seed. Rates of application are:—

For legumes: 1½ cwt. sulphate of ammonia and 1 cwt. superphosphate per acre.

For cereals: 1½ cwt. sulphate of ammonia per acre.

5. TIME TO TURN UNDER.

To secure the maximum benefit from a green crop it should be turned under in time to allow its decomposition before the spring growth of the fruit tree commences. This is essential if the trees are to receive the supply of nitrogen in the spring from the ploughed-in material. Generally speaking, non-leguminous crops, such as cereals, should be ploughed in at least six weeks, and legumes at least three weeks, before the end of the dormant period of the fruit plants they are intended to benefit.

## GROWING FRENCH BEANS FOR SEED.

The most important point to consider in the production of French bean seed is the origin of the seed to be planted in the first place. It is essential that the latter be obtained from a crop which is known to be free from disease. Anthracnose and halo blight, the two most serious diseases of the French bean, are transmitted through the seed and a few affected plants are the main source of general infection in the crop later in the season. The inclusion of a few infected seeds may, therefore, be the ruination of a crop specifically sown for seed purposes.

If it is not possible to ascertain both the origin and purity of the seed, a small stud plot should be established. This plot should be isolated from other beans and the plants regularly inspected, diseased or off-type plants being immediately removed and burnt. Provided the crop in the stud plot is kept free from disease, the seed can be used to plant up a larger area for seed production in the following season.

It should be made a strict rule never to cultivate, or even walk through the plot, when the beans are wet from rain, or even dew, as a man's boots or trousers may spread diseases from plant to plant. During the growing period no one who has worked in a diseased crop should be allowed into a seed bean plot. Visitors should also be excluded.

Before sowing beans for seed, the planter should be thoroughly cleaned out and sprayed, or carefully wiped over with a 5 per cent. solution of formalin. Care should be taken to see that implements are quite free from dirt before moving them to the clean crop.

# THE FRUIT MARKET.

JAS. H. GREGORY, Instructor in Fruit Packing.

THE public demand for fruit is now tending to slow up. This should be a serious consideration for growers now marketing fruits. With cool conditions prevailing, fruit ripens slowly; fruit should be allowed, therefore, to become further advanced in ripening before sending to market. This is particularly applicable to Southern consignments.

Tomatoes, papaws, and pineapples should now be picked showing good colour indications. Green fruit is not wanted in the South. A perusal of prices will show the difference that prevails in market price levels between green and coloured fruit.

The demand for Queensland citrus fruits on Southern markets has been somewhat reduced because of much unsuitable quality fruit being sent South. Some Queensland growers who continue to make this error should realize the importance of sending only first quality fruit to Southern markets. A close study of marketing conditions in the capital cities brings a realization that our main trouble on the market is not over-production, but over-marketing of low-grade fruit. Prices at the end of May were—

## TROPICAL FRUITS.

### Bananas.

*Brisbane.*—Cavendish: Smalls, 6s. to 9s.; Sixes, 5s. to 11s. 6d.; Sevens, 7s. to 12s. 6d.; Eights, 11s. to 13s. 6d.; Nines, 11s. to 14s. 6d.; Bunch, per dozen, 1½d. to 5d.

*Sydney.*—Cavendish: Sixes, 6s. to 10s.; Sevens, 8s. to 13s.; Eights and Nines, 12s. to 18s.

*Newcastle.*—Cavendish: Sixes, 15s. to 16s.; Sevens, 15s. to 18s.; Eights and Nines, 17s. to 19s.

*Melbourne.*—Cavendish: Sixes, 12s. to 14s.; Sevens, 13s. to 16s.; Eights and Nines, 16s. to 18s.

*Adelaide.*—Cavendish, 14s. to 18s. per case.

*Brisbane.*—Lady Fingers, Bunch, 1d. to 8d. dozen.

*Brisbane.*—Sugars, 3¾d. to 5d. dozen.

### Pineapples.

*Brisbane.*—Smoothleaf, 3s. to 7s. case; loose, 1s. 6d. to 5s. dozen.

*Sydney.*—Smoothleaf, 6s. to 12s.

*Newcastle.*—Smoothleaf, 8s. to 11s.

*Melbourne.*—Smoothleaf, 8s. to 13s.

*Adelaide.*—Smoothleaf, 12s. to 16s. case.

*Brisbane.*—Ripleys, 4s. to 6s. case; 1s. to 3s. per dozen.

### Papaws.

*Brisbane.*—Yarwun, 6s. to 8s. tropical case; locals, 3s. to 5s. bushel; Gunalda, 5s. to 7s. bushel.

*Sydney.*—10s. to 14s. tropical case.

*Melbourne.*—15s. to 18s.

### Custard Apples.

*Brisbane.*—2s. to 4s. half bushel.

*Sydney.*—3s. to 6s. half bushel.

*Newcastle.*—5s. to 6s. half bushel.

*Melbourne.*—5s. to 7s. half bushel.

## ROSELLAS.

*Brisbane.*—2s. to 2s. 6d. bag.

## AVOCADOS.

*Brisbane.*—7s. to 8s. half bushel. Specials higher.

*Sydney.*—10s. to 12s. half bushel.

### Passion Fruit.

*Brisbane.*—First Grade, 9s. to 13s. half bushel; seconds, 4s. to 7s. half bushel.

## CITRUS FRUITS.

### Oranges.

*Brisbane.*—Navel Oranges, 5s. to 9s. bushel; commons, 4s. to 8s. bushel.

*Sydney.*—6s. to 12s.

**Mandarins.**

*Brisbane.*—Fewtrells, 5s. to 7s. bushel; Emperors, 5s. to 9s. bushel; Scarlets, 6s. to 9s. bushel; Glens, 8s. to 14s. bushel.

*Sydney.*—Emperors, 10s. to 12s.; Glens, 11s. to 13s.

*Melbourne.*—Fewtrells, 10s. to 12s.; Glens, 14s. to 18s.; Emperors, 12s. to 14s.

**Grape Fruit.**

*Brisbane.*—5s. to 8s. bushel.

*Sydney.*—8s. to 14s. bushel.

*Melbourne.*—10s. to 14s. bushel.

**Lemons.**

*Brisbane.*—6s. to 13s. bushel.

*Sydney.*—10s. to 15s.

*Melbourne.*—10s. to 13s.

## DECIDUOUS FRUITS.

**Apples.**

*Brisbane.*—Stanthorpe, Granny Smith, 5s. to 7s. bushel; imported apples, 6s. to 9s. bushel.

**Pears.**

*Brisbane.*—Imported, 6s. to 12s. 6d.

**Tomatoes.**

*Brisbane.*—Coloured, 2s. to 5s. half bushel; ripe, 2s. to 3s. 6d.; green, 2s. to 4s.

*Sydney.*—Coloured, 8s. to 10s.; green, 5s. to 8s.

*Newcastle.*—Green, 4s. to 5s.; coloured, 7s. to 8s.

*Melbourne.*—Queensland, 7s. to 8s.

*South Australian Celery.*—12s. to 20s. per crate; local, 1s. 6d. to 2s. bundle.

## VEGETABLES. (Brisbane, unless otherwise stated.)

*Beans.*—First quality, 4s. to 7s.; second grade, 2s. to 4s. bag. Sydney: 3s. to 7s. bushel. Melbourne: 7d. to 8d. lb.

*Peas.*—8s. to 13s. sugar bag; poor quality lower.

*Cabbage.*—Small, 9d. to 1s. 6d.; prime, 2s. to 4s. bag.

*Cauliflowers.*—Locals: Small, 3s. to 5s.; prime, 6s. to 12s. bag. Stanthorpe, 8s. to 13s. chaff bag.

*Carrots.*—3d. to 1s. 3d. bundle.

*Beetroot.*—4d. to 1s. bundle.

*Rhubarb.*—6d. to 1s. 6d. bundle.

*Cucumbers.*—7s. to 9s. bushel.

*Marrows.*—1s. to 3s. dozen.

*Lettuce.*—6d. to 2s. dozen.

*Pumpkins.*—3s. to 4s. bag.

*Chokos.*—1d. to 3d. dozen.

*English Potatoes.*—2s. 6d. to 4s. sugar bag.

*Sweet Potatoes.*—2s. to 3s. sugar 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 Aryshire Cattle Society, production charts for which were compiled during the month of April, 1941 (273 days unless otherwise stated).

| Name of Cow. | Owner. | Milk Production. | Butter Fat. | Sire. |
|---|---|---|---|---|
| | | Lb. | Lb. | |
| **AUSTRALIAN ILLAWARRA SHORTHORNS.** | | | | |
| **Mature Cow (Standard, 350 lb.).** | | | | |
| Newlands Empress 2nd | J. F. Evans, Malanda | 14,660·4 | 565·109 | Greyleigh Sunbeam |
| Rhodesview Biddy 14th (365 days) | W. Gierke and Sons, Helidon | 11,710·35 | 543·264 | Blacklands Prospector |
| Sunnyside Empress 33rd (365 days) | P. Moore, Sunnyside, Wooroolin | 14,912·38 | 536·245 | Bruce of Avonel |
| Sunnyside Daisy 22nd | P. Moore, Sunnyside, Wooroolin | 13,739·8 | 490·016 | Patrol of Cosey Camp |
| Corunna Dainty | J. H. Anderson, Fairvale, Southbrook | 12,752·62 | 476·737 | Gambol of Wilga Vale |
| **Senior, 4 Years (Standard, 330 lb.).** | | | | |
| Fairvale Jean | J. H. Anderson, Fairvale, Southbrook | 10,500·38 | 428·671 | Blacklands Czar |
| **Junior, 4 Years (Standard 310 lb.).** | | | | |
| Cedargrove Pearl | P. D. Fiechtner, junr., Pilton View, *via* East Greenmount | 8,467·5 | 341·223 | Cedargrove Umpire |
| **Junior, 3 Years (Standard, 270 lb.).** | | | | |
| Blacklands Sultan's Fairy | Estate P. Doherty, Box 31, Gympie | 8,684·3 | 389·975 | Sultan 2nd of Blackland |
| Balcarres Dot 5th (258 days) | W. H. Reeve, Balgowan, Muldu | 7,099·3 | 285·354 | Morden Signal |
| **Senior, 2 Years (Standard, 250 lb.).** | | | | |
| Sunnyside Marvelette 2nd (365 days) | P. Moore, Sunnyside, Wooroolin | 9,769·55 | 346·914 | Cosey Camp Rupert |
| Chelmer Olive | E. O. Jeynes, Newhaven, Raceview, Ipswich | 7,829·4 | 334·595 | Daphne's Elect of Hillview |
| Bileena Dulcie | A. T. Paull, Bowenville | 5,342·1 | 271·751 | Murray Bridge De Valera |
| Trevor Hill Spangle | Geo. Gwynne, Umbiram | 7,355·14 | 267·291 | Corunna Supreme |
| **Junior, 2 Years (Standard, 230 lb.).** | | | | |
| Faversham Dewdrop 2nd | R. J. Couchman, Warra | 8,226·77 | 311·331 | Faversham Rex |
| Trevor Hill Mermaid 2nd | Geo. Gwynne, Umbiram | 7,854·72 | 286·965 | Corunna Supreme |
| Blacklands Melba 13th | T. Ryan, Kital, Allora | 6,596·6 | 266·078 | Blacklands Treasurer |
| Bileena Myrtle 2nd | A. T. Paull, Bowenville | 5,719·75 | 263·169 | Murray Bridge De Valera |
| Cedar Grove Tuckumbil 23rd | T. Ryan, Kital, Allora | 6,924·1 | 261·452 | Cedar Grove Trump |
| Trevor Hill Lola | Geo. Gwynne, Umbiram | 6,063·62 | 245·439 | Corunna Supreme |

## JERSEY.

### MATURE COW (STANDARD, 350 LB.).

| | | | | | |
|---|---|---|---|---|---|
| Kathleigh Brown May (365 days) | F. W. Kath, Moffat, *via* Dalby | 14,852·7 | 808·296 | Retford Royal Atavist |
| Lermont Silver Bell (Twin) | J. Schull, Lermont, Oakey | 9,356·3 | 494·668 | Woodside Golden Volunteer |
| Langside Quip | S. H. Caldwell, Walkers Creek, Bell | 6,460·13 | 404·846 | Masterpiece Yerribee of Bruce Vale |
| Sweetheart of Palm Ridges | J. Sigley, Millaa Millaa | 6,101·25 | 369·7 | Oceanview Merriamber Wait-a-While |

### SENIOR, 4 YEARS (STANDARD, 330 LB.).

| | | | | |
|---|---|---|---|---|
| Kathleigh Royal Mayflower | F. W. Kath, Moffat, *via* Dalby | 10,115·03 | 589·529 | Retford Royal Atavist |

### JUNIOR, 4 YEARS (STANDARD, 310 LB.).

| | | | | |
|---|---|---|---|---|
| Rush Princess (imp.) | J. Sinnamon and Sons, Moggill | 8,866·13 | 476·045 | Rush Fern's Oxford Junior |

### SENIOR, 3 YEARS (STANDARD, 290 LB.).

| | | | | |
|---|---|---|---|---|
| Lermont Kitty | J. Schull, Lermont, Oakey | 9,669·9 | 466·789 | Woodside Golden Volunteer |
| Palm Ridges Fanny | J. Sigley, Millaa Millaa | 6,635·2 | 315·209 | Oxford Jocular Lad |

### JUNIOR, 3 YEARS (STANDARD, 270 LB.).

| | | | | |
|---|---|---|---|---|
| Wyreene Gentle | C. W. Barlow, Irvingdale road, Dalby | 6,618·24 | 361·438 | Lyndhurst Majesty |
| Floss 55th of Grasmere | T. W. McMiken, Southbrook | 5,394·72 | 274·592 | Grasmere Floss 21st Duke |

### SENIOR, 2 YEARS (STANDARD, 250 LB.).

| | | | | |
|---|---|---|---|---|
| Oxford Jezebel | E. Burton and Sons, Wanora | 8,443·0 | 475·323 | Oxford Daffodils King |
| Lermont Golden Kate | J. Schull, Lermont, Oakey | 7,987·4 | 388·090 | Woodside Golden Volunteer |
| Neurums Elvinas Victorina | P. J. McCauley, Neurum | 5,539·95 | 295·119 | Oxford Brown Victory |

### JUNIOR, 2 YEARS (STANDARD, 230 LB.).

| | | | | |
|---|---|---|---|---|
| Pride of Linwood | C. W. Barlow, Irvingdale road, Dalby | 7,201·7 | 404·101 | Listowel Royal Heir |
| Lermont Posy | J. Schull, Lermont, Oakey | 7,337·35 | 383·840 | Woodside Golden Volunteer |
| Lermont Lady | J. Schull, Lermont, Oakey | 7,285·0 | 354·456 | Belgonia Lady's Duke |
| Oxford Silver Maid | E. Burton and Sons, Wanora | 6,193·9 | 311·427 | Retford May's Victor |
| Oxford Elaine | E. Burton and Sons, Wanora | 5,878·75 | 305·569 | Oxford Jovial Lad |
| Trinity Cute Duchess | J. Sinnamon and Sons, Moggill | 5,824·12 | 293·275 | Cute Prince 3rd (imp.) |
| Trinity Lily's Queen | J. Sinnamon and Sons, Moggill | 5,110·73 | 286·026 | Cute Prince 23rd (imp.) |
| Trinity Royal Gleam | J. Sinnamon and Sons, Moggill | 5,781·62 | 268·969 | Trinity Royal Sovereign |
| Trinity Cute Violet | J. Sinnamon and Sons, Moggill | 4,613·91 | 255·857 | Cute Prince 3rd (imp.) |
| Oxford Dainty May | E. Burton and Sons, Wanora | 5,030·0 | 252·005 | Retford May's Victor |
| Trinity Handsome Belle (253 days) | J. Sinnamon and Sons, Moggill | 4,711·53 | 230·75 | Cute Prince 3rd (imp.) |

## AYRSHIRE.

### SENIOR, 3 YEARS (STANDARD, 290 LB.).

| | | | | |
|---|---|---|---|---|
| Myola Jollity 2nd | R. M. Anderson, Southbrook | 10,591·87 | 412·318 | Benbecula Bonnie Willie |

### JUNIOR, 3 YEARS (STANDARD, 270 LB.).

| | | | | |
|---|---|---|---|---|
| Myola Jaunty | R. M. Anderson, Southbrook | 7,247·9 | 275·111 | Benbecula Bonnie Willie |

# General Notes

**Staff Changes and Appointments.**

The following transfers of officers of the Department of Agriculture and Stock have been approved:—

Dr. L. G. Miles, B.Sc.Agr., Ph.D., from South Johnstone to Biloela;
Mr. T. G. Graham, Instructor in Agriculture, from Ayr to South Johnstone;
Mr. C. H. P. Defries, Instructor in Agriculture, from Roma to Ayr; and
Mr. W. R. Straughan, Instructor in Agriculture, from Gympie to Chinchilla.

The Officer in Charge of Police, Silkwood, has been appointed also an acting inspector of stock.

Messrs. W. W. Chapman (Hambledon) and H. E. Moody (Cairns) have been appointed honorary protectors of fauna.

Mr. H. Barfield, Cattle Creek Co-Operative Sugar Milling Association, has been appointed millowners' representative on the Cattle Creek Local Sugar Cane Prices Board.

Mr. D. S. Robertson, inspector under *The Stock, Slaughtering, and Dairy Produce Acts,* Monto, has been appointed also an inspector under *The Brands Acts.*

Mr. N. H. Piket, Morningside, has been appointed an inspector under *The Diseases in Stock Acts, The Slaughtering Act,* and *The Dairy Produce Acts,* Department of Agriculture and Stock.

Messrs. F. C. Jorss (East Brisbane), R. J. Rollston (Greenslopes), and H. Lambert (Sunnybank) have been appointed inspecting cane testers for the forthcoming sugar season, with headquarters at Cairns, Mackay, and Maryborough, respectively.

Messrs. H. W. McLean (Keppel Sands, Rockhampton) and W. Sievers (Strathalbyn, near Collinsville) have been appointed honorary protectors of fauna.

Constable D. E. W. Sprenger (Biggenden) has been appointed also an inspector under *The Slaughtering Act.*

Messrs. W. Grimes (chairman of the Bundaberg Cane Disease Control Board) and S. C. Shearer (Pioneer Sugar Mills (Pty.) Ltd., Pioneer, via Townsville) have been appointed honorary inspectors under *The Sugar Experiment Stations Acts.*

The appointments of Messrs. W. G. Batchler (West Bundaberg) and C. S. Wynter (Townsville) as honorary inspectors under *The Sugar Experiment Stations Acts* have been cancelled.

Mr. H. Bell, Inspector under *The Stock, Slaughtering, and Dairy Produce Acts,* has been transferred from Doboy to Chinchilla.

Mr. T. H. Sewell, Lang street, Dutton Park, has been appointed an honorary protector of fauna and an honorary ranger under *The Native Plants Protection Act.*

Constable J. J. Mooney, Rosedale, has been appointed also an inspector under *The Slaughtering Act.*

**Qualischefski Dip.**

In announcing the result of the recent test conducted by the Department of Agriculture and Stock of the claims made by Mr. A. Qualischefski for an improved dip against cattle tick, the Minister for Agriculture and Stock (Hon. F. W. Bulcock) pointed out that the test had been a thoroughly comprehensive one. It had been carried out under the supervision not only of departmental experts, but of representatives of the United Graziers' Association and of the Selectors' Association.

Mr. Qualischefski had claimed that—

(*a*) the dip killed all ticks on a beast;

(*b*) following two dippings at an interval of four weeks, cattle remained free from three to four months;

(*c*) female ticks from dipped cattle would not breed.

The Committee had furnished Mr. Bulcock with a unanimous report, finding that none of these claims had been substantiated.

**Plywood and Veneer Boards.**

Orders in Council (two) have been approved for the extension of operations of the Plywood and Veneer Board and the Northern Plywood and Veneer Board for the period from 3rd May, 1942, to 2nd May, 1947.

**Veterinary Registration Fee.**

An amendment of Regulations under *The Veterinary Surgeons Act* provides that a fee of £1 1s. may be charged for the restoration to the register of veterinary surgeons of the name of any veterinary surgeon previously removed therefrom.

**Tomato Maturity and Grade Standards.**

*The Fruit and Vegetable Grading and Packing Regulations of* 1928 *issued* under *"The Fruit and Vegetables Acts,* 1927 *to* 1939," have been amended to provide new maturity and grade standards for tomatoes.

"Mature" in the case of tomatoes means that the tomato has reached its maximum growth and has reached or passed the stage of its maturity when the skin has changed from a dull green to a bright green colour, and its flesh surrounding the seed has changed from a light green colour to a deep amber or to a deep amber tinged with pink.

A and B grade standards are provided, and all tomatoes must be graded into the following seven sizes, viz.:—"Small," 2 inches, 2¼ inches, 2½ inches, 2¾ inches, 3 inches and "Large."

**Wild Life Preservation.**

An Order in Council has been issued under *"The Fauna Protection Act of* 1937," declaring parts of Stones Creek and Sandalwood Holdings (Strathalbyn Homestead, near Collinsville) to be a sanctuary under and for the purposes of the abovementioned Act.

**Cane Levy.**

An Order in Council has been issued under *The Regulation of Sugar Cane Prices Acts,* providing that the assessment which the Minister may make and levy on every ton of sugar-cane received at any mill in Queensland, with the exception of Moreton, Kalamia, and Invicta mills, shall be one penny farthing (1¼d.) per ton. The assessments on sugar-cane received at the Moreton, Kalamia, and Invicta mills have been fixed at 5¼d., 2d., and 6¼d. per ton, respectively. The increased levies at these mills have been made to meet the cost of surveys. The assessment is borne by the canegrower and the owner of the mill in equal proportions, and all sums raised thereby are paid into the Sugar Cane Prices Fund.

**Hail Insurance.**

A regulation issued under *The Primary Producers' Organisation and Marketing Acts* provides that the Canary Seed Board hail insurance regulations shall not apply to and shall have no force or effect in respect of canary seed planted during the year 1941.

# Answers to Correspondents

## BOTANY.

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

### Two Weeds.

W.H.E. (Colusseum)—

1. *Herpestis chamaedryoides.* This small plant is a native of tropical America, now naturalised in most tropical countries. It is quite common in North Queensland, where it has been established for the past twenty years or more. Though small, it is rather an aggressive weed. Where digging out is impracticable, it would probably succumb to weak arsenical sprays, or if these cannot be used because of the presence of stock, sodium chlorate sprays could be used. A weak solution of this latter would suffice, say 1 lb., or even less, to 10 gallons of water. Probably more than one spraying would be necessary. We have not heard a common name applied to this weed.
2. *Acanthospermum hispidum,* Star Burr. This is one of the commonest weeds in North Queensland. It is, however, not particularly difficult to eradicate in farming areas, or in comparatively confined places. In the larger areas, such as some of the pastoral holdings in the Gulf country, it is very difficult to keep under.

### Trees and Shrubs for the Dalby District.

A.G. (Dalby)—

We are doubtful whether Laburnum or the Hawthorn would succeed around Dalby. We would hesitate to plant a whole hedge. A couple of individual plants, of course, would be different. Probably the best hedge for a garden at Dalby would be the privet: the large-leaved variety for a tall hedge or windbreak and the small-leaved variety for smaller hedges. The variety known as Golden Privet is excellent for general garden purposes.

Bottle Trees do excellently around Dalby. There are many about the town, and you could easily obtain seed, or if you prefer it, you could have them transplanted from the district scrubs. They can be transplanted as quite large specimens, say 8 feet or higher.

Kurrajong: Seeds could probably be obtained from Toowoomba nurserymen. They may also be transplanted when quite large.

White Cedar: One of the best of the native trees for Western Queensland. The common pepperina is one of the hardiest.

Two trees of some importance are the Portuguese Elm (the leaves of which are a valuable fodder for stock), and the Carob Bean (the pods of which also are valuable feed for stock). A packet of Portuguese Elm and Carob Bean seed has been posted to you.

If you have a property outside Dalby, the Forestry Sub-Department, Executive Buildings, Brisbane, send trees out to farmers at low rates. From its list, the following would suit you:—Hoop Pine, Bunya Pine, Crow's Ash, Loblolly Pine, Mexican Cypress, Blue Cypress.

### Blue Panic—Stink Grass.

L.A. (Millmerran)—

1. Blue Panic (*Panicum antidotale*), now grown fairly extensively in many parts of Queensland. Like Guinea Grass, we think that this is an excellent species to have a small area for periodical cutting or feeding-off. The stems become rather caney, but send out tufts of leaves from the nodes, and these are readily eaten by stock.
2. Stink Grass (*Eragrostis cilianensis*), a native of southern Europe, now established in parts of Queensland as a very common farm weed. Stock will sometimes eat it, but on the whole it is unpalatable, and should be regarded as only a weedy species.

**A Small Blue Grass.**

Inquirer (Winton)—

The specimen is *Dichanthium humilius*, a small Blue Grass which we were very interested to see. We had received only a couple of fragments before from different parts of Queensland, and it has always been looked on as extremely rare. This year, many grasses which had previously been regarded as rare or little known have suddenly covered large areas, because, no doubt, of the extraordinary season. The ordinary Blue Grass is *Dichanthium sericeum*, and the present species was looked on as a variety of this, but is now regarded as a distinct species. It occurs in South Australia and Central Australia. It has not yet been found in New South Wales.

If you have any other grasses that seem new to you at the present season, we would be very pleased to receive specimens.

**Red Natal Grass.**

W. (Brisbane)—

Red Natal Grass (*Rhynchelytrum repens*) was originally introduced as a fodder by the Queesnland Acclimatization Society many years ago, and is now very widely spread over the State. It is of indifferent value as a fodder. In its green state, it has a very slight hold of the ground, and is easily pulled up by grazing animals. Towards the winter, it becomes dry and unpalatable. Although widely spread, in Queensland it is mostly found in old cultivation lands and along railway enclosures. In many of the fruit-growing areas, it is a common weed of cultivation, and is frequently used as a "chop-chop" for working horses, and is quite good for the purpose, especially when mixed with better-class fodders.

**"Mullumbimby Couch."**

C.S.A. (Toowong)—

The specimen represents the Mullumbimby Couch (*Kyllinga brevifolia*), a very common weed in blue couch lawns about Brisbane. It is especially abundant on lawns badly drained or shaded by trees, but is not confined to such situations, and sometimes infests lawns on better ground. The only method of keeping the plant in check that we know of is to feed the blue couch grass, either by top-dressing or by a light dressing of fertilizer, especially meatworks fertilizer, and keep regularly cut. If this is done, it should choke out the Mullumbimby Couch.

**"Monkey Vine."**

H.McB. (Millmerran)—

The vine specimen is *Lyonsia eucalyptifolia*. The only local name we have heard applied to this plant is Monkey Vine. It is fairly common in parts of Western Queensland, but, according to most pastoralists, not common enough, as they regard it as an excellent fodder. It belongs to a dangerous family (*Apocynaceae*), however, and has at times been suspected of poisoning stock, but we do not think this suspicion has rested on sufficient evidence.

**"Farmers' Lice."**

A.M. (Beenleigh)—

Your specimen is *Siegesbeckia orientalis*, sometimes called Farmers' Lice, because the seeds stick to clothing, feet of animals, or anything else they come in contact with. The plant is a very common weed in coastal Queensland, and during the past season has spread as far west as Mitchell. It is a very common farm weed, but generally not very difficult to eradicate. It is not known to possess any poisonous or harmful properties, and is readily eaten by stock.

**"Prickly Pine."**

R.C.W. (Townsville)—

The tree in flower is *Bursaria incana*. It is very widely spread in Queensland, and belongs to the *Pittosporaceae*. It is commonly called Prickly Pine, and the leaves are regarded as excellent fodder for stock.

# Rural Topics

### What are the Costs of Production?

A lot is heard nowadays about costs of production. Many farmers claim that prices should be high enough to enable them to cover cost of production plus a reasonable profit. That is fair enough, and it is a claim with which everyone will agree. It is no more than the farmer is entitled to, but—and this is a point which strikes right home after a moment's thought—on whose cost of production should prices be based? It is well known how remarkably costs vary on different farms. Take dairying, for instance—the biggest factor in costs of production is the yield per cow or per acre. The farmer who obtains low yields invariably has high cost figures.

Records like these, of course, serve to stress the importance of sound farm management. Unless seasonal conditions are exceptionally bad—such as drought or excessive rainfall—cost of production must be based on yields that can be reasonably expected under intelligent systems of farming. To get such yields it must be admitted that more attention should be given to herd testing for milk production and also to the very important matter of soil fertility.

### Digging for Victory—and Prosperity.

The penalty of neglecting agriculture has been incurred by many people during this war. That is evident from the viewpoint expressed in this news item from England:—

> "No citizen is more responsive to the call for national service than the farmer. The country has been forced by hard facts to recognise the primary importance of British agriculture to the defence of the nation, the economic welfare of its people, and the support of public finance. When the war is ended we must dig for prosperity as we are now digging for victory."

### The British Commonwealth and Food Production.

In view of the present export situation, a statement from a source of authority in Great Britain is very interesting to Queensland producers. Here is the statement:—

> "It has become evident that in an emergency we must depend more and more on the British Commonwealth. We have found that supplies from friendly nations may, through no fault of their own, suddenly dry up.
>
> "Accordingly for the present essential confidence there should, apart from preservation of the home industry, be the guarantee that the countries of the Empire will in due course be brought together to hammer out a scheme of Empire security by the production of food."

### Good News for the Cook.

Cabbages which have lost their characteristic odour, but retain all their other properties, have been produced by research workers at the Cornell University (U.S.A.). It took six years of effort and 4,000 cabbages before the smell was eliminated.

### A New Breed of Sheep.

From the United States comes news that another new breed of sheep has been developed by an American sheep specialist who claims for his breed—which he has named the Southdale—that it produces an ideal dual-purpose animal specially adapted for the small farm.

The new breed has been developed by crossing the Southdown and the Corriedale breeds. As the Corriedale itself is a comparatively new breed, it may be found that some years must elapse before the type of breed can be said to have become definitely fixed.

The producer of the Southdale says that the Southdown is noted for its mutton qualities, but produces a light weight, short staple fleece, which is, however, of a high wool quality. The Corriedale he regards as not so good a mutton breed as the Southdown, but produces a high-quality heavy, long staple fleece. In the new breed the wool yield is said to be heavier than that of the Southdown, and the mutton is of better quality than that of the Corriedale.

At least one Argentine sheep breeder is, it is reported, breeding, and is actually offering for sale, rams which he describes as cross-bred Southdown Corriedales.

### A New Way of Drying Foods.

Evaporation of moisture, plus semi-refrigeration of foodstuffs, is being tested in Britain with a small plant designed to dry products at low temperatures. This plant has been in operation for a year or more. Many different foods have been treated, including meat, fruit, and vegetables, and it is claimed that the products are, in general, much better than those obtained by other methods of drying.

### Oranges for the Nose Bag.

Some race horse owners in California are finding, we are told, that their horses feel better and run faster when citrus fruits are added to their daily diet. Well, why not? Science has proved the value of oranges in human diet, so they ought to be good for beast as well as man.

### Beans for the Tin.

Talking of the possibilities of starting new lines of production, here is what a farmer in the New England district, not very far below the Queensland border, has done. When he realised that the supply of beans for canning was likely to be cut off, he decided to put in a large area of the Little Navy variety of bean. It is a small white bean and pretty well just what the canners want . He went ahead and to-day is harvesting an excellent crop which the canners have agreed to take. He put about 20 acres under crop, and from this area he got 15 tons of beans and 600 bales of bean hay, which he is now storing for winter feed for his stock. He is quite satisfied that the growing of beans for canning and the making of bean hay from the bean plants is a profitable sideline where soil and other conditions are suitable.

### A "Mixed" Farm.

How is this for farming variety? A large farm, not far south of the border, runs crossbred sheep, pigs, and beef cattle. In addition, it grows lucerne, maize, oats, wheat, root crops, and tobacco. Winner in the district open fodder competition, among its fodder reserves is a pit of wheaten and oaten hay put down twelve years ago. This farm is just under 1,800 acres and this is what was got off it last year:—Five cuts of lucerne, 20 tons of tobacco, 120 fat vealers, and 500 fat lambs. It is now carrying 1,000 sheep, 300 head of cattle, 60 pigs, and 10 horses. Its feed reserves are made up of lucerne hay, wheaten and oaten hay, mixed lucerne and grasses, pitted silage and a heavy tonnage of pumpkins—enough feed it is reckoned to tide between 3,000 and 4,000 sheep over a dry time.

### Who Shall Inherit the Earth—Man or Bug?

Insect pests are the producers' worst enemies. Ask any sheep man what he thinks about blowflies, for instance; and that is why we have to be keenly alert in war time, and especially so when we remember that with modern speed in transport—particularly air transport—much of our immunity from insect invasion has gone. When long voyages were the rule, the very length of a voyage constituted an effective period of quarantine so far as we in Australia were concerned. In the United States there is a real fear that this war may increase the worry of those concerned with insect pest control. In a publication received in the American mail recently, the United States Bureau of Entomology and Plant Quarantine had this to say:—

> If history is allowed to repeat, the war may add to the insect pests that have invaded new territory because of armed conflict among men. The Hessian fly (there is a familiar ring about that—the Hess-ian fly!) which each year destroys wheat with an estimated value of many millions, came with the German troops in the days of the War of Independence.
>
> Then the bedbug, cockroach, and housefly found the trip to North America easy and the new world congenial, with the codling moth, the Japanese beetle, and the pink bollworm confirming this subsequently.

Evidently those pests did not trouble much about the Monroe Doctrine!

On the other hand, the dreaded Colorado beetle, which does so much damage to potato crops, crossed the Atlantic to Europe in 1917 with the American army and settled in France, and afterwards spread to Germany, where it is now one of the worst farm pests. That suggests that the Germans will receive something even more deadly and disturbing from America this time.

Well, it is estimated that there are over 400 million kinds of insects in the world, and all of them are of significance to the human race. All are our competitors for the world's food supply. As to who shall inherit the earth—man or bug—will depend in the final analysis on which creature is most efficient in fighting for his daily ration.

# Farm Notes

## JULY.

EARLY-MATURING wheat varieties such as Florence, Novo, and Seaspray are very suitable for late sowing, while the popular medium-early varieties Flora, Three Seas, and Pusa may also be sown with every chance of success.

Stock should be removed from early-sown wheat subjected to grazing by the end of the month if a satisfactory yield of grain is desired.

Canary seed, which has proved suitable for the black basaltic Downs soils, may be sown during July, drilling in approximately 15 lb. sound seed per acre. Although usually harvested for seed, the crop will make excellent hay or provide useful grazing.

Potato planting will be commencing on lands east of the Main Range where late frosts are not a deterrent. Cut sets may be used, dusting the cut surfaces with wood ashes or slaked lime shortly after cutting, but whole seed not less than 2 oz. in weight is to be preferred. Seed-borne disease can be prevented by treating with either hot formalin or with corrosive sublimate, as advised in a leaflet issued by this Department. Old potato lands deficient in humus can be made more productive by ploughing in green manure crops, and the application of suitable fertilizers when planting.

After the harvesting of late maize, old stalks should be ploughed in and allowed to rot. All headlands will be improved by clearing up weeds and rubbish, preferably with a good fire.

Mangolds, swede turnips, and similar root crops which are making satisfactory growth should be thinned out to suitable distances apart in order to encourage full development, while the necessary inter-row cultivation should not be overlooked. The root system of autumn-sown lucerne should now be well established, and will be strengthened by an early mowing if fair top growth has been made.

Any infestation of weeds during the spring can be kept in check by frequent mowing without regard to the quantity of hay secured. When fully established, cuttings can be regulated to coincide with the commencement of flowering.

## PASTEURISATION.

Although the term pasteurisation is very commonly used nowadays, there perhaps, are many who do not know its origin and meaning. Actually it dates back to 1860-1864 when Louis Pasteur, the famous French scientist, conducted experiments on "diseases" in wine and beer, and found that heating for a short period at a temperature of 140 deg. F. was sufficient to prevent abnormal fermentations and the souring of these beverages. This process of heating liquids to check the growth of undesirable microbes was extended to other industries, and was given the name pasteurisation in honour of Pasteur, who had first employed it.

To-day it is best known through its application to the dairying industry. The pasteurisation of milk simply means that the milk is heated to a temperature of 145 deg. F. for thirty minutes and then cooled as quickly as possible to 50 deg. F. or lower. Cream in the butter factories is heated to 185 deg. F. for a few seconds, and then cooled rapidly to 40 deg. F.

Pasteurisation aims, firstly, at making milk and milk products safe, by destroying any disease germs that may be present; and, secondly, at improving the keeping quality of butter and cheese made from milk and cream so treated. It, 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 now aware of this and know that the production of choice quality cream depends on the care and attention given at 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.

# Orchard Notes

## JULY.

### THE COASTAL DISTRICTS.

CITRUS fruits, with the exception of the late-ripening varieties, will have been harvested by now, and cultural operations should be receiving attention.

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

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

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

**For Brown Spot.**

Home-made cuprous oxide mixture (3-40)—

(1) At ½ to ¾ petal fall (i.e., as soon as the majority of the fruit has set).

(2) Two months later.

(3) In late February.

**For Black Spot.**

Home-made cuprous oxide mixture (3-40)—

(1) At ½ to ¾ petal fall.

(2) Two months later.

**For Melanose and/or Scab.**

Home-made cuprous oxide mixture (3-40)—

(1) At ½ to ¾ petal fall.

Certain applications of these copper sprays may be combined with various insecticides and mixtures to correct mineral deficiencies, such as zinc. Information regarding these mixtures can be obtained from this Department.

Where for any reason healthy trees of vigorous constitution are unprofitable, they may be headed back—in fact, have the whole of the top removed—leaving a few selected arms. All other branches should be cut away at their source of origin. The three or four remaining arms, of which lengths will vary from 2 to 4 feet, will form the future framework of the tree. Care must be taken to cover the whole of the exposed bark with a suitable coating of whitewash to prevent sunburn. The numerous shoots which will grow from main arms should be suitably reduced, leaving from two to four on each arm. Under favourable conditions, these will be in a fit condition to receive selected buds from desirable trees by the following autumn. It is desirable that when shoots intended for budding have attained a length of from 6 to 9 inches, their terminals should be nipped off in order to stiffen their growth and guard against the possibility of damage by strong winds.

Fertilizing should be finished as early as possible, the mixture for the spring application being high in readily available nitrogen. Ploughing should then be completed, the depth being regulated by local conditions and the nature of the original preparation of the land. After the ploughing, the land should be worked down to a fine state of tilth. On hillside orchards, attention should be given to the

control of possible storm waters. Cultivation should be so arranged as to form shallow drains or banks along the tree rows and across the heaviest slope, leading into suitable side drains which may be grassed to prevent erosion.

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

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

## THE GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

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

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

The usual winter working of the land is essential for the retention of moisture and aeration of the soil, but in shallow soils in which many orchards are planted, deep working is most detrimental.

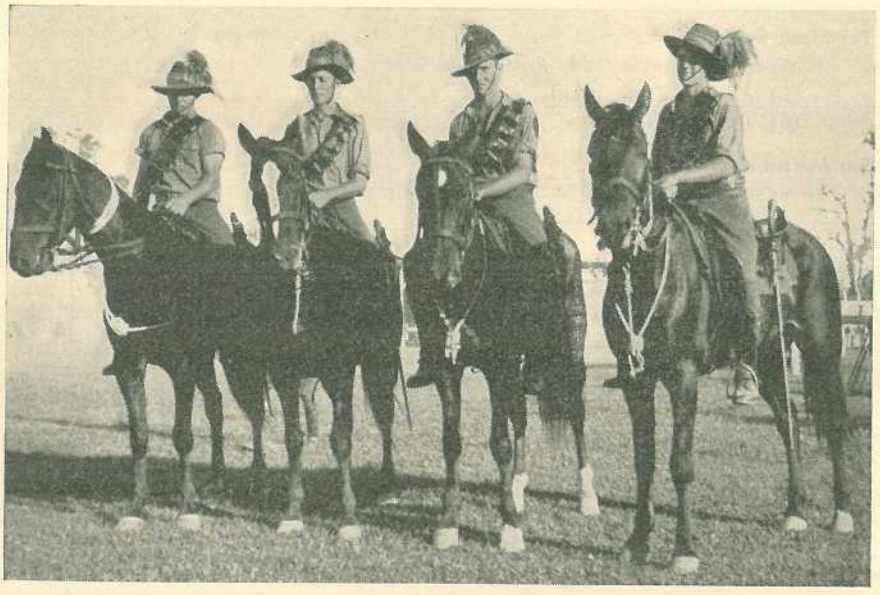


Plate 128.
A WELL-MOUNTED AUSTRALIAN LIGHT HORSE TROOP (MILITIA).


# 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.*

## BABY'S HEALTH: NATION'S WEALTH.

### SOME DEFECTS OF FEET AND LEGS IN EARLY CHILDHOOD.

#### The Structure of the Normal Foot.

IN our article last month we talked to mothers and fathers—and to all who have any part in the supervision or education of children—about the care of the feet in infancy and childhood. We noted the beauty and suppleness and strength of the normal baby foot and asked that parents should appreciate the value of Nature's gift to children and do all they can not to spoil it. We emphasised the different ways those beautiful baby feet can be disfigured and deformed by ordinary footwear. This month we are going to talk about certain weaknesses and sometimes deformities of the feet and legs which baby may be born with or which may show themselves early in his life. To help those who did not see our last month's article to a better understanding of these deformities we will explain again that the sole of the foot is arranged in the form of two arches, a long one stretching from the heel to the toes and a short one stretching from the inside to the outside of the foot. This arrangement may be compared to a dome. Normally, the weight of the body is borne by the strong bone at the top of the arch and is passed on through the other bones of the foot to the heel and toes, most of the weight being taken by the outer part of the foot. The bones of the feet, like all the other bones in baby's body, begin to form long before birth, and normally they grow in a symmetrical manner and according to a very definite plan, so that baby is born with the beautifully shaped feet we have described. It must be remembered that it has taken centuries of evolution to develop the feet of human beings into structures which are capable of bearing the weight of a child or adult and keeping him quite steady when standing or walking upright. This stability is brought about by a beautiful balance in the building up of the foot. This balance depends not only upon the arrangement of the bones but also of the muscles and ligaments which are attached to them.

### Types of Deformity.

It will be readily understood then that any condition which interferes with the harmonious development of all these parts in the period before baby is born or even afterwards may cause the foot to grow unequally so that one side is not as well developed as the other. This condition would be made worse by the pull of the muscles on the strong side of the foot and later when baby begins to stand on his wrongly balanced foot the deformity would increase. This is because the bones and muscles as they grow tend to adjust themselves to the wrong position. After baby walks extra strain is placed upon the parts and the deformity becomes gradually worse. It is in such a way as this that talipes or club foot is brought about. In this condition the growth of the outer side of the foot outstripes the growth of the inner side which becomes drawn inwards by the muscles. A deformity which usually escapes notice until baby begins to stand is that which results from a falling of the arch of the foot accompanied by bulging on its inner side.

Bow legs and knock knees are not actually foot deformities, but they may cause turning in of the toes and this is often the first thing to be observed in these conditions. Many babies are born with a slight degree of bow legs, but if the condition is very well marked in early infancy or has not improved by the time baby is six months old, advice should be sought at once. Knock knee is usually noticed only after baby has commenced walking. A baby may be born with dislocation of one or both hips, and where he is under trained observation the condition may be recognised before he walks. Otherwise it is often overlooked until he is noticed to be walking in a clumsy waddling manner.

### Necessity for Early Treatment.

It will be realised from what has been said that it is of the greatest importance that deformities should be recognised early and particularly before baby has learnt to walk in order that they may be corrected and prevented from becoming worse. Deformities which in early life may be corrected by the simple method of moulding the parts into the correct position and keeping them in that position for a time may require surgical operation if left until later. Mothers are often anxious to know whether it is necessary to have less serious deformities treated. The answer is "yes," for not only may the deformity be unsightly, but it may result in serious disability later. It may cause a handicap by interfering with the proper use of the child's limbs and by affecting the general posture and carriage of the body. Every mother wishes to see her boy or girl able to take part in sports and other such activities when he or she goes to school. Not only is a child's inability to play games like his fellows a handicap to his physical health, but it may affect his mental development also, by giving him a feeling of inferiority. A mother, who neglects to obtain advice regarding any suspected deformity on the plea that she thinks her child will grow out of it, may be condemning that child to a handicap which will affect him all his life. In any case, by seeking advice early, she may save him from a surgical operation. There are so many places where mothers can obtain advice as to procedure in these cases—their own doctors, the Maternal and Child Welfare Centres (Baby Clinics), the out-patients' departments of hospitals, &c. One or other of these services is within the reach of most mothers.

### How Mothers can Help.

Remember that Nature is endeavouring always to produce the perfect specimen. When we consider the thousands of beautiful babies that are born in Australia every year, and the relatively few defects which occur, we realise that she nearly always succeeds. Mothers can assist Nature's handiwork by taking special care to eat the right foods both before and after baby comes along, so that baby will have all the necessary building materials for making strong bones and muscles. In a previous talk we mentioned what these foods were. As well as eating the correct foods mothers should have lots of fresh air and sunshine, plenty of rest and sleep, and practise moderation in all things. If, in spite of this care, the structure of baby's body has a small flaw, or through illness or other mischance one occurs later, mothers of to-day should appreciate the fact that owing to the advance in medical science something can be done to correct it.

You can obtain further advice on this or any other matter relating to the feeding and management of children up to school age by writing to "Baby Clinic, Brisbane." Such letters need not be stamped.

Our article next month will be on the care of the premature baby in the home.

# IN THE FARM KITCHEN.

## SEASONABLE SOUPS.

### Haricot Bean Soup.

Soak 4 oz. haricot beans overnight, then place them in a casserole dish with enough stock or water to cover. Cover with a tight-fitting lid and cook until tender. Turn into a saucepan with 1 lb. sliced tomatoes, 2 minced onions, 3 or 4 stalks of chopped celery. Add more stock to more than cover vegetables and simmer until vegetables are tender. Rub through a sieve and keep hot. Melt 1 dessertspoon butter in a saucepan, add 1 dessertspoon flour; cook a little, add puree, and stir until it thickens, then add hot milk to the required thickness. Season with pepper, salt, a little grated nutmeg, and serve with fried croutons.

### Mulligatawny Soup.

Place 1½ quarts stock (chicken for preference) in a saucepan with 1 cup chopped apple, 3 tablespoons chopped carrot, 1 cup minced onion, 2 cups water, and if liked 1 or 2 cloves and a bay-leaf or a tiny sprig of fresh thyme. Simmer for about 45 minutes, then rub through a sieve. In the meantime melt 2 tablespoons butter or bacon fat in a saucepan, add 2 tablespoons flour, 2 level teaspoons curry powder, cook a little, stirring all the time; then add stock and stir until boiling point. Simmer for another 10 minutes, then add the juice of a small lemon (about ¼ cup). Serve with a little well-boiled rice.

### Onion Broth.

Mince 6 large onions and fry them in 2 oz. butter for five or six minutes. Add 3 cups white stock and simmer for 45 minutes. Put through a sieve and keep hot. Melt 1 tablespoon butter in a saucepan, add 2 tablespoons flour, cook a little, then add 2 cups hot milk and stir until mixture thickens. Simmer for five minutes, then add onion mixture. Beat 2 egg yolks well with ¼ cup milk, add to soup and season with salt and pepper, and, if liked, a little cayenne. Do not allow soup to boil after yolks are added, but turn into individual earthenware pots. Sprinkle with a little grated cheese and place in hot oven or under griller to melt cheese. Serve at once.

### Cream of Spinach.

Cook 1 bunch spinach in the usual way and rub through a fine sieve. Melt 2 level tablespoons butter in a saucepan, add 2 level tablespoons plain flour and cook a little, add 2 cups stock and bring to boil and then simmer for 5 minutes. Now add 2 cups hot milk and spinach, salt and pepper, and if liked a little grated nutmeg. A little cream may be added just before serving.

### Cottage Broth.

Remove fat from 1 lb. scrag end of mutton and cut meat into small dice. Cut the following into dice also: 1 carrot, 2 onions, 1 swede turnip, 2 sticks celery, 1 parsnip, and 1 small potato. Melt 1 tablespoon good dripping in a saucepan, add meat and bones, and fry until brown, add 4 oz. well-washed rice and fry a few minutes longer. Add vegetables, salt and pepper, and 1 teaspoon sugar, and fry for a few more minutes. Add 5 pints stock or water and bring to boil slowly. Simmer for 2½ hours; remove bones and skim off fat, add 2 teaspoons finely-chopped parsley, and serve piping hot.

### Mutton Broth.

Cut meat off bones from 1 lb. scrag end of mutton, remove fat and cut meat into dice, then cut up bones. Put them into a large saucepan with 3 quarts water and 4 oz. well-washed barley. Bring to boil and simmer for 1 hour, skimming it well during the cooking. Now add 2 carrots, 2 sticks celery, 2 turnips, cut into dice. Simmer for 1 hour longer, then remove bones. Remove fat, add a little finely-chopped parsley, pepper and salt to taste. Serve piping hot. It is a good idea to cook 3 or 4 mutton shanks in the soup, and these can be served separately with onion, caper or parsley sauce.

### Potato and Cheese Soup.

Take 1½ lb. potatoes, 2 oz. grated cheese, 1 small onion, 1 oz. butter, 1 quart vegetable stock, ½ pint milk, 1 carrot, seasoning. Peel the vegetables and cut into small pieces. Fry the onion and carrot for a minute or two in the butter, taking care not to let them colour. Add the potatoes, seasoning, and the stock. Bring to the boil and allow to simmer with a lid on until the vegetables are soft. Whisk up the soup until smooth or put through a wire sieve. Add the milk and, if necessary, some more stock or water. Heat up the soup—do not reboil. Put into a hot tureen or individual cups and sprinkle the grated cheese on top.

# ASTRONOMICAL DATA FOR QUEENSLAND

## JULY, 1941.

By A. K. CHAPMAN, F.R.A.S.

### SUN AND MOON. AT WARWICK.

| July. | SUN. | | MOON. | |
|---|---|---|---|---|
| | Rises. | Sets. | Rises. | Sets. |
| | a.m. | p.m. | a.m. | p.m. |
| 1 | 6.44 | 5.8 | 11.1 | 11.20 |
| 2 | 6.44 | 5.8 | 11.42 | nil |
| 3 | 6.43 | 5.8 | 12.24 | 12.21 |
| | | | p.m. | a.m. |
| 4 | 6.43 | 5.9 | 1.9 | 1.23 |
| 5 | 6.43 | 5.9 | 1.56 | 2.27 |
| 6 | 6.43 | 5.9 | 2.49 | 3.31 |
| 7 | 6.43 | 5.10 | 3.45 | 4.34 |
| 8 | 6.43 | 5.11 | 4.44 | 5.36 |
| 9 | 6.43 | 5.11 | 5.45 | 6.33 |
| 10 | 6.42 | 5.12 | 6.46 | 7.26 |
| 11 | 6.42 | 5.12 | 7.45 | 8.12 |
| 12 | 6.42 | 5.13 | 8.42 | 8.54 |
| 13 | 6.42 | 5.14 | 9.38 | 9.34 |
| 14 | 6.41 | 5.14 | 10.31 | 10.12 |
| 15 | 6.41 | 5.14 | 11.23 | 10.48 |
| 16 | 6.41 | 5.14 | nil | 11.23 |
| 17 | 6.40 | 5.15 | 12.15 | 11.58 |
| | | | a.m. | p.m. |
| 18 | 6.40 | 5.15 | 1.6 | 12.35 |
| 19 | 6.40 | 5.16 | 1.57 | 1.15 |
| 20 | 6.40 | 5.16 | 2.48 | 1.57 |
| 21 | 6.40 | 5.17 | 3.39 | 2.42 |
| 22 | 6.39 | 5.18 | 4.30 | 3.31 |
| 23 | 6.39 | 5.18 | 5.19 | 4.24 |
| 24 | 6.39 | 5.19 | 6.7 | 5.19 |
| 25 | 6.38 | 5.20 | 6.54 | 6.16 |
| 26 | 6.37 | 5.20 | 7.38 | 7.15 |
| 27 | 6.37 | 5.21 | 8.21 | 8.15 |
| 28 | 6.36 | 5.21 | 9.4 | 9.15 |
| 29 | 6.35 | 5.22 | 9.43 | 10.15 |
| 30 | 6.34 | 5.22 | 10.24 | 11.16 |
| 31 | 6.34 | 5.23 | 11.7 | nil |

### Phases of the Moon.

2 July, First Quarter, 2.24 p.m.
9 „ Full Moon, 6.17 a.m.
16 „ Last Quarter, 6.7 p.m.
24 „ New Moon, 5.39 p.m.
31 „ First Quarter, 7.19 p.m.

### FARTHEST FROM THE SUN.

EARLY last month we saw the illusive little planet, Mercury, for an hour or so after dark. As it continued its way round the luminary it gradually passed down into the brightness between us and the sun and disappeared. On 2nd July Mercury will be passing almost between us and the sun, after which it will become a morning star, but too near the sun to be seen until about the middle of the month. On 24th July the planet will be 20 degrees west of the sun, rising 82 minutes before him, a little north of east.

The Evening Star, Venus, is still low in the twilight. On 26th July, the slender crescent moon, about two and a-half days old, will be low in the west. If the crescent can be seen, Venus may be located a little north of it.

The next, in order of distance from the sun, is planet earth. This planet moves round the sun in an almost circular orbit, but the sun is a little out of the centre so that every year, about 3rd July, the earth reaches a point in its orbit which is its farthest from the sun.

### EARTH OUT IN THE COLD.

This year, on 3rd July, we shall be 94,500,000 miles away from the great luminary upon whose vivifying rays the earth depends for its life. In January the distance was only 91,300,000 miles. It is not altogether this greater distance which causes the cold of winter, for England is just as far from the sun as we are and it is sometimes quite hot there at this time of the year. The cold of winter is caused by the nights being longer than the days and the sun's rays being more slanting than in the summer. The distance from the sun plays its part, for it is estimated that the earth, as a whole, receives hourly almost 6 per cent. less heat from the sun in July than it does in January. For that reason the southern winter which occurs in July is colder than the northern winter and the southern summer is hotter.

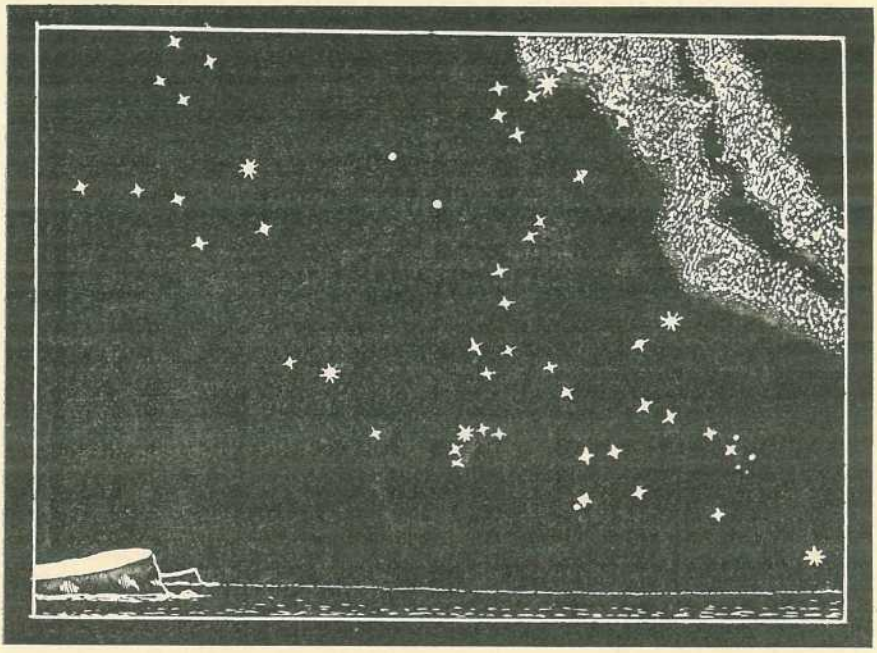
Mars is the only planet which is well seen at the present time. It rises, now, soon after 11 p.m., and is well up a few hours later. The planet may be found not far from the waning moon on 15th July. The Great Square of Pegasus shows well north of Mars. A line through the two stars marking its eastern side and continued up as far again will reach the Red Planet. It is interesting to note that Mars is now quite near the First Point in Aries, the place where the sun is at the southern autumn equinox.

The two great planets, Jupiter and Saturn, which we watched passing and repassing each other last summer, passed beyond the sun in May. They are now appearing before dawn, as morning stars. They are both near the clusters of the Pleiades and Hyades, Saturn having passed between them, and Jupiter is about to follow. Saturn rises about 3.20 a.m. and Jupiter about an hour later. They are both moving eastward. It will be noted how far Jupiter has outstripped the slower moving Saturn.

### MAN IN THE MOON.

We have almost forgotten about the Man in the Moon, but those who came from the Old Country will remember seeing him in the full moon. He was a somewhat dim, bent figure with a huge bundle of sticks on his back. We cannot see him here so well, as the moon, like the constellational figures, is upside down. With a telescope the surface of the moon can be seen very clearly, as there is no atmosphere or cloud to blot out the moonscape. The dark portions which form the Man are seen to be extensive plains. According to recent spectroscopic analysis, the light which comes from them is similar to that which comes from volcanic ash. This seems to substantiate the theory that the craters, which so thickly pit extensive regions of the moon, are really volcanic craters, akin to those upon the earth.

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



LOOKING NORTH ABOUT 9 O'CLOCK.

Corvus, the Crow, has been already mentioned. He is represented by the four stars near the top west corner. The short side of the figure points to Spica in the Virgin. There are five smaller stars shown belonging to this constellation which are arranged something like the stars of Canis Major, the Great Dog, for which they are sometimes mistaken. A line through Corvus and Spica and continued as far again passes near the large reddish star Arcturus, in Bootes, the Herdsman. Arcturus, Watcher of the Bear, may be known by the two smaller stars which, when in the meridian, appear like the hands of a clock pointing to 10.30 o'clock.

In 1933 the second Chicago World's Fair was opened by no less a dignitary than the Bear Watcher. Arcturus is forty light years distant, and as the first Chicago World's Fair was held just forty years before the second it was suggested that light rays which left Arcturus at the time of the first fair would arrive here just in time for the opening of the second fair, after winging their way through space 186,000 miles every second. The light rays from Arcturus passed through one of America's giant telescopes and was changed into electric impulses, which in due course operated a switch which lit thousands of electric lights, thus opening the fair by Arcturus, the Watcher of the Bear.

Near the top of the Milky Way, the reddest star in the heavens, Antaries, is shown with a smaller star on either side. The three stars at right angles to them form the head of the Scorpion, the starry curves of which are well known. A few years ago Antaries was thought to be the largest star known, but as there is a doubt about its distance, its diameter cannot be accurately measured. Between Scorpio and Virgo are two stars which mark the Scales.

According to old star maps the giant Ophiuchus, the Serpent Holder, stands upon the Scorpion; his head is marked by a bright star near a bulge in the Milky Way. He is holding down a huge writhing serpent, which appears to be striving to reach a crown. Below the Scorpion there is a curved line of stars ending in three forming a triangle; the starry curve forms the snake and the triangle the head. Corona Borealis, the Northern Crown, is just below, a very pleasing crescent of small sparkling stars. Within this circlet of stars a bright nova suddenly appeared in 1866; after shining brightly for some weeks it gradually faded.

HERCULES, THE HERO.

East of Corona and the Serpent is the large constellation of Hercules. Quite near the star, marking the head of the Serpent Holder, is a smaller star of reddish hue, Alpha Herculis, which marks the head of Hercules. The famous hero is on one knee which would be resting near the northern horizon. In his left hand, which is shown by a number of small stars towards the east, he holds two snakes, while with his uplifted right hand he wields a huge club. The four stars below, forming a four-sided figure, represents his loin cloth, while below his left hand a star marks his knee. They are all rather faint but can be easily picked out on clear, moonless nights.

Alpha Herculis, although appearing as a small star, is the largest star yet measured. This mighty sun is no fewer than 346 million miles in diameter. This means that if our sun was placed at its centre, all the planets as far as Mars, which is 145½ million miles from the sun, could still perform their revolutions round the sun, within the confines of this giant star. In fact, there would be 27½ million miles beyond Mars before the surface of this gigantic globe was reached.

The brilliant white star in the lower eastern corner is Vega.

# RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF APRIL 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. | |
|---|---|---|---|---|---|---|---|---|---|
| | April | No. of years' records | April, 1941. | April, 1940. | | April | No. of years' records | April, 1941. | April, 1940. |
| *North Coast.* | In. | | In. | In. | *South Coast—contd.* | In. | | In. | In. |
| Atherton .. .. | 4·13 | 40 | 13·28 | 3·45 | Gatton College .. | 1·87 | 42 | 0·78 | 0·51 |
| Cairns .. .. | 11·04 | 59 | 21·91 | 9·00 | Gayndah .. .. | 1·48 | 70 | 0·57 | 0·41 |
| Cardwell .. | 8·53 | 69 | 25·43 | 3·79 | Gympie .. .. | 3·41 | 71 | 2·17 | 1·69 |
| Cooktown .. | 8·69 | 65 | 11·91 | 4·07 | Kilkivan .. .. | 2·23 | 60 | 0·56 | 0·93 |
| Herberton .. | 3·67 | 55 | 6·72 | 2·28 | Maryborough .. | 3·81 | 70 | 1·83 | 1·69 |
| Ingham .. .. | 7·44 | 49 | 13·49 | 4·63 | Nambour .. | 6·09 | 45 | 6·91 | 3·78 |
| Innisfail .. .. | 19·64 | 60 | 46·17 | 15·40 | Nanango .. .. | 1·94 | 59 | 0·60 | 0·91 |
| Mossman Mill .. | 8·02 | 28 | 18·18 | 7·51 | Rockhampton .. | 2·53 | 70 | 3·41 | 1·97 |
| Townsville .. | 2·56 | 24 | 6·85 | 2·93 | Woodford .. | 4·57 | 54 | 1·79 | 2·98 |
| *Central Coast.* | | | | | *Central Highlands.* | | | | |
| Ayr .. .. | 2·71 | 54 | 7·41 | 20·62 | Clermont .. | 1·58 | 70 | 5·13 | 1·74 |
| Bowen .. .. | 2·84 | 70 | 9·21 | 17·55 | Gindie .. .. | 1·11 | 42 | .. | 0·06 |
| Charters Towers .. | 1·47 | 59 | 5·55 | 1·47 | Springsure .. | 1·51 | 72 | 4·12 | 0·80 |
| Mackay P.O. .. | 6·14 | 70 | 26·13 | 10·67 | *Darling Downs.* | | | | |
| Mackay Sugar Experiment Station | 4·76 | 44 | 21·38 | 10·10 | Dalby .. .. | 1·39 | 71 | 0·37 | 0·31 |
| Proserpine .. | 5·99 | 38 | 11·51 | 17·93 | Emu Vale .. | 1·36 | 45 | 0·33 | 0·26 |
| St. Lawrence .. | 1·53 | 70 | 3·61 | 1·32 | Hermitage .. | 1·38 | 35 | .. | .. |
| *South Coast.* | | | | | Jimbour .. .. | 1·43 | 62 | 0·38 | 0·91 |
| | | | | | Miles .. .. | 1·46 | 56 | 0·25 | 0·35 |
| | | | | | Stanthorpe .. | 1·74 | 68 | 0·37 | 0·20 |
| Biggenden .. | 2·15 | 42 | 1·51 | 1·10 | Toowoomba .. | 2·59 | 69 | 1·13 | 0·81 |
| Bundaberg .. | 3·23 | 58 | 2·25 | 1·48 | Warwick .. | 1·63 | 76 | 0·33 | 0·07 |
| Brisbane .. | 3·72 | 89 | 2·07 | 0·50 | | | | | |
| Caboolture .. | 4·48 | 65 | 1·79 | 2·86 | *Maranoa.* | | | | |
| Childers .. .. | 2·84 | 46 | 3·16 | 1·26 | | | | | |
| Crohamhurst .. | 6·62 | 48 | 6·45 | 5·55 | Bungeworgorai .. | 1·04 | 27 | .. | .. |
| Esk .. .. | 2·94 | 54 | 1·00 | 0·34 | Roma .. .. | 1·28 | 67 | 0·46 | 0·77 |

A. S. RICHARDS, Divisional Meteorologist.

# CLIMATOLOGICAL TABLE—APRIL, 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 .. .. | .. | 83 | 73 | 88 | 3 | 69 | 3, 4 | 1,191 | 25 |
| Herberton .. .. | .. | 72 | 61 | 82 | 4, 5 | 51 | 28 | 672 | 25 |
| Rockhampton .. .. | 30·12 | 81 | 65 | 85 | 6, 8, 28 | 50 | 30 | 341 | 15 |
| Brisbane .. .. | 30·23 | 76 | 61 | 85 | 6 | 52 | 29 | 207 | 16 |
| *Darling Downs.* | | | | | | | | | |
| Dalby .. .. .. | .. | 78 | 53 | 83 | 3, 6 | 34 | 29 | 37 | 2 |
| Stanthorpe .. .. | .. | 70 | 48 | 78 | 2, 3, 6 | 25·6 | 29 | 37 | 5 |
| Toowoomba .. .. | .. | 70 | 54 | 79 | (grass 6 | min. 45 | 18·2) 29 | 113 | 112 |
| *Mid-Interior.* | | | | | | | | | |
| Georgetown .. .. | 29·97 | 87 | 65 | 91 | 7 | 53 | 30 | 106 | 5 |
| Longreach .. .. | 30·11 | 84 | 60 | 92 | 11 | * | * | 210 | 3 |
| Mitchell .. .. | 30·19 | 78 | 51 | 84 | 7 | 32 | 29 | 64 | 3 |
| *Western.* | | | | | | | | | |
| Burketown .. .. | .. | 89 | 69 | 92 | 7, 12 | 57 | 30 | 44 | 2 |
| Boulia .. .. .. | 30·09 | 85 | 63 | 88 | 8, 15 | 48 | 30 | 12 | 2 |
| Thargomindah .. | 30.15 | 83 | 60 | 89 | 22,23,26 25 | 41 | 30 | .. | .. |

* Incomplete.