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SEASONABLE NOTES ON POTATO CULTURE.

During the present month and part of March potato planting will be universal in the southern portion of the State, and a few notes on the subject may prove helpful to many of our returned soldiers and others who are entering for the first time on a farming life.

CULTIVATION OF THE POTATO.

BY THE EDITOR.

Next to the cereals, the potato is probably the most important food plant grown for man. It is a native of America, and was brought to England between the years 1580 and 1585 by Sir Walter Raleigh, from Virginia. It was received, however, with great disfavour; and the Church condemned it as an unholy article of diet, seeing the race and place from which it originated. It was not until the year 1805 that, by the exertions of Dr. Buchan, it became popular. In France it was quite neglected until a certain gardener, who had grown some and found no sale for them, induced one of the kings of France to wear a potato blossom as a button-hole. This at once popularised the despised potato in that kingdom. Chemically, the potato consists of starch, gluten, and woody fibre, with, of course, water. On the authority of the late John Wilson, Professor of Agriculture, Edinburgh, an 8-ton crop of potatoes, taken from 1 acre of land, removes from the soil in which the tubers were grown—of the bases of alkaline earths, 90 lb. of potash, 8 lb. of soda, 5 lb. of lime, 7 lb. of magnesia; and of acids, 34 lb. of sulphuric acid, 20 lb. of phosphoric acid, 10 lb. of hydrochloric acid —in all, 170 lb. of inorganic matter. This was for tubers alone; and, if an equal quantity were allowed for the tops, the quantity taken from the soil would be about doubled.

MANURES.

It is, therefore, evident that, to grow potatoes to perfection, the foregoing constituent elements must be present in the soil. Professor Wilson found the best results to be obtained by preparing the soil early, and applying phosphatic and potash manures some time before planting, in the proportion of about 150 lb. to the acre. At the time of planting, nitrate of soda is sown in the drills at the rate of 1 cwt. per acre, and from ½ to ¾ cwt. at earthing-up time.

On light, poor, sandy soils, nitrogenous manures in the form of sulphate of ammonia should be supplied at the rate of from 140 lb. to 170 lb. to the acre—one-half to be used at the time of planting, and the other half at the final earthing-up.

The matter of farmyard manures in growing potatoes is a somewhat vexed question. Undoubtedly farmyard manure is good, provided that it has been properly fermented and well decomposed; but there is nothing more fatal to good results with potatoes than putting fresh manure and potato setts together, for the young plant can never force its way through the fermenting mass of decay consequent upon slow decomposition.

Some interesting experiments, made in England by Mr. E. B. Hodley, Agricultural Superintendent to the Wilts County Council, threw considerable light on the matter of the use of artificial manures. The seasons were dry ones, and therefore more favourable to farmyard manure than to artificials, the yield from its use being considerably in excess of that obtained from the heaviest dressing (12¾ cwt.) of mixed artificial manures. Where nitrogen, phosphoric acid, and potash have been applied in artificials, excellent crops have been obtained; but the heaviest crop of all was 14 tons per acre as the average of four years, grown where 8 tons of farmyard manure and 4 cwt. of sulphate of ammonia per acre were applied. The complete chemical manure was applied on different plots at the rate of 4 cwt., 8 cwt., and 12 cwt., respectively. Taking the averages for the four years, the 8-cwt. dressing proved the most economical, although the 12-cwt. dressing gave a somewhat heavier yield. When any one of the three constituents of the complete manure was omitted, there was a decrease of yield. Where the nitrate was omitted, the increase resulting from the application of kainit and superphosphate was not sufficient to pay for the cost; where superphosphate was omitted, the application of nitrate and kainit gave very little profit in excess of that obtained from the unmanured plots; and, although where kainit was omitted the yield most nearly approached that obtained from the completely manured plots, yet, even in this case, the profit was less than that obtained with a cheaper dressing of complete manure.

In conducting experiments of this nature, it should be remembered that artificial or farmyard manures will not invariably produce the same results on different soils. The rich, black soils of the Darling Downs, for instance, contain certain constituents which are wanting in lighter western or coast soils. In some there may be already a sufficiency of phosphoric acid; consequently, an application of superphosphate might prove injurious. Where cultivation grounds are deficient, as most of them are, in phosphoric acid, it becomes necessary, in order to obtain a better crop, to secure support in the form of an easily soluble phosphoric acid. Bonedust is a phosphoric acid manure which gives this result; but superphosphates produce better and quicker results.

For potatoes, a fertiliser rich in potash is essential. For general purposes a good mixed fertiliser for this crop should consist of—Available phosphoric acid, 7 per cent.; potash, 11 per cent.; nitrogen, 3 per cent; 700 lb. to the acre.

Sulphate of potash is mostly employed as a source of potash for potatoes. Muriate of potash is said to give even better results than the former.

Dried blood contains, on an average, 11 to 13 per cent. of nitrogen, but it is less soluble than sulphate of ammonia and nitrate of soda. Manures containing sulphate of ammonia should not be mixed with lime, nor applied to land which has been recently limed.

The value of kainit lies in its potash, of which it contains 12 per cent. It is the cheapest of the potash manures.

Following are the results of some experiments carried out by Mr. H. C. Quodling, Director of Agriculture, when manager of Westbrook State Farm. The manures used were—

Superphosphate, at the rate of 4 cwt. per acre.
Bonedust, at the rate of 4 cwt. per acre.
Blood, at the rate of 4 cwt. per acre.
Kainit, at the rate of 4 cwt. per acre.

One plot was unmanured, and planted with cut potatoes, and in the last plot, also unmanured, the potatoes were planted whole.

Manure.	Rate per Acre.	Weight of Seed Planted.	Cut or Uncut.	Yield per Plot.	Area of each Plot.
	cwt.	lb.		lb.	acre.
Superphosphate	4	178	Cut ..	716	¼
Bonedust	4	178	,, ..	704	¼
Blood	4	178	,, ..	712	¼
Kainit	4	178	,, ..	722	¼
Unmanured	..	178	,, ..	751	¼
Unmanured	..	178	Uncut ..	708	¼

The best manure then, for potatoes, is a mixture of farmyard manure and some artificial. For instance, 16 tons of stable manure per acre will produce a larger crop than the most remunerative dressing of artificial manure; but, employ a mixture of 8 tons of stable manure and 3 cwt. of nitrate of soda, or an equivalent quantity of sulphate of ammonia, and a far greater yield will be obtained—in fact, such a dressing gives the greatest yield and the most remunerative results of any. If stable manure is unavailable, any artificial dressing for potatoes should contain nitrogen, phosphorus, and potash. Omit one of these (as has already been shown), and the result will be a poor crop. The omission of nitrogen will cause the greatest loss, and that of potash the least.

SOILS.

Of all crops grown, the potato is the one which shows the greatest content of potash in the mineral constituents withdrawn from the soil. Hence the well-known value of soil derived from granitic detritus for potato culture. In it, we have abundance of potassium silicate, derived from the decomposing felspar and slowly set free in other forms, for the uses of the plant. Where ground has been annually cropped with potatoes for many years without a rotation, it is mainly owing to the potash having been used up that the soil is not liberal in its return of tubers.

Some of our scrub soils yield a fairly good crop of tubers, but rarely over 4 tons to the acre, and these are usually somewhat watery and bad keepers, while there is frequently an abnormal growth of tops. The best potato lands in this State are the black and red soils of the Darling Downs, notably at Allora, and, nearer the coast, at Forest Hill, Laidley, and Gatton, where an 8-ton crop is no rarity. Generally, it may be said that potatoes may be grown on any soil, but that those grown on clay soils are waxy and of bad quality; light, granitic soils produce nice, mealy potatoes; and fertile loams yield the best tubers—best both in quality and quantity.

SEED POTATOES.

When we speak of seed potatoes, we mean potato tubers which are planted, whole or cut, to produce a crop. Potato seed is a very different thing. The potato is a Solanum, which produces flowers and seed vessels. The latter appear in the form of a small green apple or tomato, which contains a quantity of small seeds, and it is by sowing many thousands of these seeds that new varieties are produced, in very limited numbers compared with the enormous numbers of seeds sown, by scientific growers, who make the production of new kinds of potatoes a business, and a very profitable business it has often proved to these experimenters. Here, however, I am dealing only with the tubers or so-called seed potatoes.

There is a good deal to be studied in the selection, care, and treatment of seed potatoes, and many farmers take far too little care of them. When the summer crop is dug, the small potatoes are hauled to the barn, and either left in bags till the next planting season comes round, or else in a large uncovered heap on the floor. Then, when planting time has arrived, it is considered time enough to overhaul the heap, bags, or pit, and pick out the rotten ones. Too often the seed is found in a matted condition, owing to the potatoes not having been turned. This necessitates the whole mass being stirred up—a process which breaks off the majority of the shoots. All this means loss—a loss which can easily be avoided by being careful to turn the seed over occasionally, say about once a fortnight, or, at any event, a fortnight before planting, by which a gain in growth may be brought about. New shoots will then form, and they will be up as early as those which were planted immediately after the last turning. An important point is to plant no potatoes except those which have sprouted. This was conclusively proved to be correct at the Queensland Agricultural College, when one plot was planted with sprouted, and another with unsprouted seed. The former came up uniformly with scarcely any misses, whilst the latter plot showed an irregular growth and wide vacant spaces. In trials which were carried out for the Irish Department, at sixty-seven centres in sixteen counties, there was an average increase of 2 tons per acre from sprouting, and in the four preceding seasons the increase due to sprouting ranged from 1 ton to 2 tons 13 cwt. No stronger testimony could be desired.

Now, concerning the size of seed tubers. Opinions differ as to whether small or large seed gives the best results. A trial was made in England to settle the question. Three rows of equal length and with an equal number of setts were planted with Northern Star potatoes as follows:—

Row No. 1: 38 setts, weighing 3 lb., produced 54 lb. of potatoes.
Row No. 2: 38 setts, weighing 4 lb., produced 64 lb. of potatoes.
Row No. 3: 38 setts, weighing 7 lb., produced 92 lb. of potatoes.

Assuming that the seed cost 1d. per lb. and the produce sold at 1d., we find that row 1 returned 4s. 3d.; row 2, 5s.; and row 3, 7s. 1d.—clearly a great gain in favour of the larger setts. All were planted on the same day, in equal ground, and all had the same amount of cultivation.

This leads to the subject of planting whole or cut tubers. Here again opinions differ. Some think it a waste to plant the setts whole, while others think the best results are got with uncut seed. Now, at the Guelph Farm, Michigan, U.S.A., experiments were made which lasted for four years, to decide the matter. These experiments are reliable, and emphatically show the advantage of planting good setts.

The experiments were made to test the effect of the number of eyes in the setts. The difference in the yield between those with one eye and those with five was found to be very considerable, amounting to about 28 bushels, the results being as follow:—

From 1 eye, 136.41 bushels per acre.
From 2 eyes, 144.70 bushels per acre.
From 3 eyes, 153.13 bushels per acre.
From 4 eyes, 162.82 bushels per acre.
From 5 eyes, 164.37 bushels per acre.

Up to four eyes in each sett, the increase in the field is, roughly, 9 bushels for each additional eye, so that, up to that extent, the increase in eyes would be well repaid in the field.

Against this experience, I place that of a Queensland potato-grower, Mr. James Pink, of Wellington Point. He says:—It has been the practice to select for propagation the refuse of the potato heap; small, ugly, ill-shaped tubers have been considered good enough for seed, and where the result has not come up to expectations, the cry is raised that the potato is degenerating. In carrying out this practice for years, was it possible to arrive at any other result? But the very art of gardening is to lift Nature above her normal state, by raising new and improved varieties of seed, and by selection.

The method of selection is peculiarly adapted to the principle of growing from single eyes. If we take an average good-shaped potato, weighing from 6 to 10 oz., we shall find that it has from 12 to 18 eyes, which, if cut into single eyes, would give as many setts, which would naturally produce a more even sample than the same number of whole tubers of different sizes. The principle of growing from single eyes has two great advantages—namely, economy of seed, and, upon suitable, well-tilled land, a larger crop of marketable potatoes.

When whole tubers are planted, two or three eyes start into growth first; these keep the lead during the entire growing season, and from their stolons the largest potatoes are produced. The weaker eyes start later into growth, and produce only small tubers of little value; but, when single eyes are planted, the whole strength of the sett is devoted to one growth; all the young tubers are formed nearly at the same time, and the plant, having no other calls on it for nutriment, these continue to grow and form large tubers. The whole tuber produces the largest number of potatoes, but the single eye will produce the most uniform sample and the heaviest crop per acre.

With a view to ascertain the relative productiveness of tubers and setts, a series of experiments was carried out in the gardens of the London Horticultural Society. A piece of ground was divided into 4-ft. squares, and in the centre of each square was planted either a whole tuber, or a single eye, or a sett containing three eyes on the whole surface of the tuber pared off so as to leave the eyes safe, but removing the centre—a practice not uncommon in Scotland. These were, in fact, potato peelings. If we consider the results of the whole sixteen experiments as being but one experiment, we shall find their proportions expressed by the following figures:—

Whole tuber	333.38, or 2	nearly
Single eyes	717.87, or 11	
Three eyes	613.94, or 5	
Parings	504.69, or 4	

In adopting the principle of the single-eye culture, it is requisite that the eye should be taken from large or averaged sized potatoes, for the smaller the potato the weaker its producing powers. The crown eye always grows the strongest, and produces the largest potatoes. The eyes taken from the middle of the potato produce the best-shaped and most uniform tubers.

There are several ways of cutting the potato into single eyes. The principal thing to aim at is, to obtain a fair share of flesh of the tuber to each eye, with the least amount of cut surface. Take any potato and hold it before you with the stem end down. You will notice that the eyes are arranged around the tuber in regular ascending rotation from the bottom to the top, similar to the thread of a corkscrew. Now, take a sharp thin-bladed knife and remove the first eye by placing the knife equally distant between it and the eye next in rotation above it, sloping it to the indenture left by the stem, removing the flesh with it.

When the first eye is removed, turn the potato in your hand till the next eye appears; remove this in the same manner, and keep on turning the potato, removing each eye as it appears. These setts should be planted as soon as cut, and a little hot lime thrown over them will absorb the moisture, prevent premature decay, and also the attacks of insects. The above method could, however, scarcely be adopted by a farmer

who plants large areas of potatoes. As an experiment, it is, of course, very interesting and instructive, and useful as being a simple means of increasing valuable new varieties of potatoes.

Some farmers utterly condemn the time-honoured practice of cutting up the potato into setts. One man says:—In all the trials which have been recorded of the potato crops produced from cut and uncut seed, I have never met with an instance of the cut tubers yielding the most or best. This fact must surely be generally known, and it is most surprising that it is not acted on. The process of cutting may increase the setts by about 30 per cent., but, if the time taken in cutting them, and the decreased yield be taken into consideration, no advantage whatever is secured, but the reverse. A man is far better off with a piece of land planted with 25 or even 30 cwt. of whole tubers than if it were planted with 1 ton cut up to cover the same space. If cutting the potato is done to save seed, that is a very poor reason.

In dealing with the cutting of potatoes, the large tubers are mostly cut into three pieces, the medium ones into two, and the small ones are let go whole. Plant the best and largest cut sett side by side with a whole tuber; it will invariably be found that the whole tuber produces the greatest number of potatoes, and certainly the largest ones. The difference in favour of the whole sett I have frequently found to be 2 lb. to one plant, and imagine what this means in the case of thousands or tens of thousands of plants. The scarcer and more expensive a variety is, the more it is cut; and, consequently, the worse for the crop, and productive of certain degeneration. It appears to the writer, from his own practical experience, that, if potatoes are cut into setts with at least three eyes, the result is equally as good as when the whole tubers are planted, and that in the latter case there will be a larger proportion of small potatoes.

Sprouting Seed Potatoes Before Planting.

This is more often practised by cultivators of gardens than on the farm, but it has some decided advantages which all potato-growers may benefit by.

Seed potatoes are often badly prepared for planting, and still more often are not prepared at all. As a rule, they are kept in heaps in the barn or in bags till they are wanted in February or in August, or in a damp shed, where it is usually found that the growths have made considerable progress. The sprouts may be 2, 3, or 4 in. in length. They grow over and amongst the tubers like a network, and the greater part of them are broken off in moving the tubers, or before they can be separated. Many have little regret in doing this. They think it is necessary, and it is; but it is also exceedingly harmful, and this ought to be remembered, as deteriorated seed is always more or less unproductive. Fancy what the result would be were we to allow our corn to sprout unduly before sowing! The excuse is that potatoes will resprout, and they will; but never so robustly as in the first instance. These long growths take a great deal out of the tuber which ought to be kept in reserve to facilitate the ordinary growth in the soil, and superfluous growth should be wholly prevented. This is easily accomplished if given timely attention, and I would urge growers that they look to their seed tubers at once.

The first treatment should consist of preventing the growths from becoming long or of a pale colour, which occurs when they are kept in the dark. Begin keeping them in the right way by turning the tubers over and removing any diseased one meets with. Do not put them in a heap again, but lay them out in a single layer on the barn floor or some other building where they will be fully exposed to the light and receive a good deal of air. This will not only check the production of long, weakly shoots, but it will green and harden the tubers, and this is a great benefit to them, as a greened tuber is much more hardy to come in contact with the soil than one that has been kept from light and air for six months or more. The growths, which will be slowly produced when laid out in a single layer and in light and air, will be short and robust and altogether different and superior to the shoots drawn up in the heap.

The Least Expensive Way.

This laying out is one way of sprouting potatoes which should be followed by every farmer who attempts potato culture. It is the least expensive way of treating them, and will always pay handsomely, as the first growth and subsequent results from prepared tubers are infinitely better than when they are taken straight from the heap and planted, which very many are, unfortunately. But there is another way of sprouting which is still better. This is to get a number of wood trays from 2 in. to 3 in. deep, and of any width and length; from 3 ft. to 4 ft. long, and 2 ft. to 3 ft. wide, are handy sizes. A little fine soil is put in the bottom, and the tubers are stood up on end as close as they can be packed in the trays. The ends with the eyes or buds on them are kept up, and the trays are placed in light, airy sheds, or such like places. Forcing them into growth is not advisable, the object being to get hardy little shoots on the tubers, which will not be checked when they come in contact with the soil in planting. The growths should not be more than 1 in. long when planted, and ½-in. is quite as useful a length. If trays cannot be provided for all of them, there is no

reason why the whole should not be laid out in sheds, or the early sorts may be sprouted in trays first, planted, and the trays again filled with late kinds. The right time to put them in trays is before growth begins, and many of the early ones will require attention at once. Sometimes there are blind tubers. When these are planted there is a blank, but in sprouting none but growing tubers should be planted. If it is seen that the growths are likely to exceed 1 in. in length before they can be planted, check them by admitting more air, but in doing this take care that a cold cutting wind does not reach them, and always be sure that they are protected from frost if that is occurring, as it still may. When the tubers are planted quite dormant it is often a long time before growth shows above ground. It might often be earlier without much chance of being injured by frost. All, too, desire their crops as early as possible if grown to meet early markets, and there is no better way of helping them on than the process of sprouting before planting, and having both tuber and growths in a sturdy, hardy condition when put in the soil. I have found this bring the crops in a fortnight or three weeks sooner at digging time than dealing with unsprouted tubers or those sprouted in the heaps, and the yield is also better from sprouted than unsprouted setts. Do not run away with the idea that there is a good deal of fiddling labour about it, and is not worth the bother, but look on it as a very important aid to successful culture and extra remunerative returns, and you will not be disappointed.

There can be no doubt that seed potatoes are weakened by the rubbing off of the shoots when they have sprouted badly, but that a good crop may be obtained from a second sprouting has often been proved. Potatoes have even been planted when every vestige of a sprout was rubbed off and not an unsprouted eye appeared, yet they sent up vigorous shoots.

FLOWERING AND SEEDING.

Under favourable conditions the potato plant flowers freely, and produces a green berry which contains the true seed of the plant. It is from these seeds that the different new kinds of potatoes are produced. I need not here go into the matter of the production of seedling potatoes, as what is intended here is merely instruction to young farmers who have had little or no experience previously in the art of successful potato-growing. The work of raising new varieties is expensive and tedious, and is only undertaken by certain growers (as I shall presently show when I come to the cross-fertilising of potatoes), who practically devote their lives to the business, sowing hundreds of thousands of seeds, to find sometimes only one new plant worth cultivating.

The potato plant does not produce seed so freely in this State as in colder climates, and it is, perhaps, as well that it does not flower heavily, since experiments on

THE EFFECT OF FLOWERING OF POTATOES,

made by a German scientist, some years ago, to ascertain whether blossoming was detrimental to the development of potato tubers, showed that the effort of the plant to provide for its reproduction by means of seeds seemed to result in a corresponding weakness in its root growth and in the size and numbers of the tubers. The experiments were carried out on a number of plots on similar soil, every condition being exactly the same. On one plot the plants were allowed to bloom as much as they liked, but the blooms of the plants in the other plots were cut off at different times. The crop that had not been topped at all was the worst yield, and the best crop was the one that had been prevented from blooming by being topped at frequent intervals. Those that were topped at the latest stage of the plants' growth were not so satisfactory as in the case of the crop frequently topped off.

[TO BE CONTINUED.]

WHITE MUSTARD.

Two species of mustard are met with in cultivation—the *brown* or *black mustard*, with brown or dark-coloured seeds, and the *white mustard*, with yellow seeds. The former is cultivated solely for its seeds: these are ground, and the flour, after admixture with a proportion of the milder and less pungent flour of the white mustard, is used for making the well-known condiment. The latter is best known as a catch-crop for sheep feed or for ploughing in as green manure, and for the production of seedlings for salad. The crop, however, is also grown extensively in some districts for its seeds, which are used in the manufacture of mustard for domestic purposes.

Prices.—At the present time brown mustard is quoted on the London market at £7 16s. to £7 18s. per qr. (448 lb.), and white mustard at 10s. per qr. less. These prices, which are much above the average for the past few years, are attributable to a number of causes, including a lessened home production due to unfavourable weather during the early stages of the growth of the crop, the stoppage of imports from the

Baltic ports, and an increased demand from America. In normal times the market for home-grown mustard is strictly limited, and any considerable extension of the area under this crop would be attended with some risk, but so long as the present conditions continue there is likely to be a good market at home with the probable continuance of a demand from abroad.

Soil and Climate.—It would be well to confine the growing of brown mustard for seed to those areas that have proved best adapted for the purpose in the past, viz., the good fenlands and marshlands of Lincolnshire, Cambridgeshire, Huntingdonshire, and Norfolk, as this crop requires a deep, moist, well-drained fertile soil, free from acidity. There is one serious drawback to the cultivation of brown mustard. The seed, especially if the crop is over-ripe, is apt to shell out at harvest and cause trouble in subsequent crops.

White mustard is adapted to a much wider range of conditions than brown mustard, both as regards soils and weather, and causes less trouble from shed seed. It can be grown more or less successfully on all kinds of land, and is a safe crop to take on freshly-ploughed grass-land, as wireworms attack it only slightly or not at all. On heavy claylands it is often taken after dead fallows, the following crop being wheat. This system invariably proves a great success, both as regards the mustard and the wheat. On heath and light lands, white mustard is taken before barley. It is said that where turnips will grow white mustard will succeed.

FOR SEED PRODUCTION.

Generally speaking white mustard may be regarded as a fallow crop, permitting the usual summer cultivations. At the present time, when every available acre should be under a useful crop of some kind, white mustard might in many cases be grown on land normally bare-fallowed.

Seed Bed.—The ground requires thorough preparation, and a fine and fairly solid seed bed is essential.

Manuring.—If the land is in good heart the only manure needed is 3 to 4 cwt. of superphosphate per acre. In other circumstances a good dressing of farmyard manure, say 10 to 15 tons per acre, should be given, in addition to the superphosphate.

Seeding.—White mustard may be drilled at any time from the first week in April to the middle of May. If it is sown earlier it runs the risk of being cut off by frost, but if the earlier sown crop is successful it has the advantage of coming to harvest before the corn harvest begins. The seed should not be buried more than half an inch, or it will not germinate evenly; it is usually drilled on the flat in rows 12 to 18 in. apart. Some growers drill 12 in. apart and chop out the plants 9 in. in the rows or, to save labour, run the horse-hoe across the crop; on good land the plants require more room to enable them to branch. If the seed-bed is sufficiently fine, half a peck of seed, or slightly less, will be ample for 1 acre.

Harvesting.—Great care should be exercised in judging the correct time to cut: if cutting takes place too early the seed will be green and shrivelled, while if it gets too ripe there is great loss through seed shelling on the land, especially in windy weather. Old growers say they wait until the colour of the pods assumes the brownish tint of a hare's back. It is advisable to cut the crop slightly on the green side and give it plenty of "field room" to enable the plant to dry out thoroughly. White mustard is generally cut by hand with sickles, and laid on the ground in small bunches; but when there is a scarcity of labour or the men are not used to this form of cutting, the ordinary corn binder does the work well. Small sheaves should be made and not tied too tightly, and the crop should be cut as high as possible so that the high stubble may form a good resting place for the sheaves. The sheaves should be turned after two or three days, and carted when thoroughly dry. In carting care must be taken to prevent loss of seed; cloths should be put over the racks or frames fixed to the carts to catch any shed seed, and this should be distributed over the stack from time to time and not laid in heaps, or the seed will turn mouldy.

Stacking.—A good staddle is necessary. This may consist of faggots or brush-wood covered with straw or coarse grass, on the top of which should be placed a cloth or old bags to catch any shelled seed. The stacks should be relatively small, about 4 yards wide, to prevent over-heating. In some districts, stacking is obviated by threshing the crop in the field.

Threshing.—This is done with the usual tackle, the only extra parts required being four sieves of smaller size than those in normal use; such sieves can usually be supplied by the makers of the threshing machines.

Yield.—The yield varies very greatly. It may be as much as 40 bushels, but normally runs about 16 to 20 bushels, or a little more, per acre.

The chaff (pods) is used for feeding, but the straw is practically of no value for fodder, but may be used for the bottoms of stacks and cattle yards, and in some parts to form shelter walls around open cattle sheds.

FOR CATCH CROPPING.

As a catch crop for forage, mustard has many points in its favour. It grows very quickly and yields a large amount—from 10 to 14 tons per acre—of nutritious green food suitable for sheep feeding. Under favourable conditions it will often reach a height of 3 ft. or more and be ready for folding in six to eight weeks from the time of sowing. Thus it enables land to be occupied profitably even when only a short interval occurs between two ordinary rotational crops, *e.g.*, after vetches, peas, or early potatoes, and in cases where the turnip crop has failed.

When sown in *May, June, or July, from ½ peck to 1 peck of seed should be drilled in rows 12 to 18 in. apart. Drilling gives an opportunity for keeping down weeds and for stirring the land. Later in the season when weeds have not the same chance of coming to maturity, *e.g.*, after a corn crop, the seed may be sown broadcast on a lightly ploughed furrow and harrowed in; from 18 to 20 lb. of seed per acre should be sown under these conditions.

The crop should be fed off before flowering, while it is still succulent, as the plants become fibrous and hard as maturity is reached. In feeding off, it is desirable to give some other food of a drier nature at the same time, or to run the sheep on stubbles or old pasture before turning them on to a fresh "break."

FOR GREEN MANURE.

Mustard is often grown for ploughing in as green manure. This practice is specially to be commended for soils in poor condition when the supply of farmyard manure is inadequate. A ribbed roller, run over the crop prior to ploughing, facilitates covering and, by bruising the plant, helps to promote decomposition. In addition to increasing the store of organic matter and thereby improving the water-holding capacity of light soils, a mustard crop when ploughed in helps to keep strong soils open, promotes aeration and drainage, and thus improves their texture.

After ploughing in mustard on the lighter soils it is desirable to consolidate the ground by rolling.—Board of Agriculture and Fisheries, Whitehall Place, London, S.W.

THE COTTON OUTLOOK FOR 1918.

Up to the end of last year, the American and Liverpool cotton markets continued firm, and the trend of values was upward. Advices from America concerning the crop were not satisfactory, for killing frosts had been experienced in Texas, damaging the late cotton, and rains in the Eastern and Central divisions had delayed picking and the movement of the crop. Few farmers, except in Texas, were holding for higher prices. In the latter section they were holding for 30 to 40 cents (1s. 3d. to 1s. 8d.) per lb.

Whether rightly or wrongly, there is a growing belief in the American cotton districts that the most serious problem for the world will be the question of food supplies, and so pronounced will this become that even with the end of the war for one or two years small cotton crops from America will continue the rule. For delivery in January, 1918, prices closed at 21.13d. against 20.03d. a week earlier. British spinners continue to complain of the high prices they are compelled to pay for spot cotton, and assert that they have to pay, practically, any price demanded, and that conditions in the cotton trade are not much worse, is attributable to the successful work of our navy. The "Memphis Commercial Appeal" estimates the frost damage at 1,171,000 bales, and that in a single month the crop had deteriorated 5.9 per cent., and cotton was being marketed as fast as gathered and ginned.

It is significant that the American yield per acre last season was 156.6 lb.; in 1915-16, 170.3 lb.; and in 1914-15, 209.2 lb.

The average estimates indicate a total crop of 11,500,000 to 12,000,000 bales, and some planters are holding for 50 cents (2s. 1d.) per lb.

Seeing that after the war there will be a serious falling off in the cotton crops of America, owing, as stated, to the imperious demand for foodstuffs, and furthermore, considering that oversea transport will be resumed, there is every prospect that the golden era of the years from 1866 to 1873, when cotton-growing promised to become a permanent and paying industry in Queensland, will return, and that possibly cotton-growing will become as important an industry in this State as in the United States of America. The Queensland grower has happily not to contend with any terrible

* August, September, or October in Queensland.

destructive pest, like the boll weevil and cotton stainer, so ruinous to the American grower. **Neither has he to fear destructive early frosts, even in the South. His returns are also much larger per acre.** As above shown, the highest yield of ginned cotton per acre in America was a little over 209 lb. in 1914-15, while the average for three years was about 178 lb. If our growers, by good cultivation, can raise, as they have done, from 1,000 lb. to 2,000 lb. of seed cotton per acre, this, at 300 lb. of clean lint per 1,000 lb., would yield from 300 to 600 lb., or an average of 450 lb. lint as against the American average of 178 lb. Is it not worth while to once more enter in earnest on cotton-growing, and to do so in the coming season, so as to take full advantage of the inevitable high prices to come, as indicated above? The Department of Agriculture has been, and always will be, in sympathy with the cotton-growers, affording them every facility by supplying reliable seed, making advances on the crop, and taking the whole business of ginning and marketing, returning all profits to the growers. The department also distributes a pamphlet dealing exhaustively with all phases of the industry, and which is constantly kept up to date.

MARKET GARDENING.

POSSIBILITIES IN MINT.

A few years ago there was a certain amount of activity shown on the question of mint-growing being a good investment. This was taken up by a few, but, on the whole, the interest did not live for very long. Now is the time to revive it, for it provides an opportunity of attacking Germany, as before the war a great deal of the mint sold with packets of dried peas came from that country. Why not let Australia step in here? The work is simple enough. Mint grows easily in a favourable soil and multiplies rapidly. In picking it, care must be taken not to bruise the leaves, for mint bruises easily. This will not show clearly till the leaves are dried; then they turn black, and naturally must be thrown on one side as useless. To dry it, hang the mint up in sprigs from a ceiling where there is a good draught and no moisture. The simplicity of the whole operation should appeal to anyone who does not care for hard work, and yet wishes to eke out a few extra pennies.—"Town and Country."

BEES AND GRAPES.

Referring to a rumour that an ordinance prohibiting the keeping of bees within the city of Jerseyville, Illinois, U.S.A., was to be passed by the City Council, a correspondent of the "American Bee Journal," in denouncing the proposal, which, by the way, arose from a statement that bees were ruining the grape crops, made the following statements:—

1. Bees cannot sting grapes. If they did, it would poison the grapes, and they would be killed by their own devices.
2. Bees cannot puncture grapes in any way. You can test this to your own satisfaction by placing a bunch of sound grapes within a hive of bees. You will find that the grapes have been untouched. If you puncture or crush one of the berries the bees will consume the juices.
3. The damage done to grapes is done by birds at daylight, before sunrise. The bees come afterwards, and gather what would otherwise be lost, for grapes that have been picked by birds will not keep.
4. Even if bees could puncture grapes, and did so, an ordinance forbidding the keeping of them within city limits would be of no avail, for bees can fly for a mile or more, and usually fly half a mile, in search of food.

No ordinance was passed.

Pastoral.

BREEDERS OF PUREBRED STOCK IN QUEENSLAND—BEEF AND DAIRY CATTLE.

The following revised list of breeders of purebred cattle is published for the purpose of informing those who desire to improve their stock where the best cattle can be obtained in the State. The Department of Agriculture and Stock takes no responsibility in relation to the entries in the list; but, when inquiries were first made, the condition was imposed that the entries were to be only of stock that had been duly registered, or that were eligible for registration in the different herd books. The entries received were, in some cases, somewhat too confusing for proper discrimination, it has, therefore, now been decided that only such cattle as have been registered will be included. The lists previously published in the *Queensland Agricultural Journal* have now been withdrawn for revision.

Name of Owner.	Address.	Number of Males.	Number of Females.	Herd Book.
P. Young	Talgai West, Ellinthorp	2	42	Milking Shorthorn Herd Book of Queensland
L. H. Paten	"Jeyendel," Calvert, S. & W. Line	8	21	Ayrshire Herd Book of Queensland
F. C. G. Gratton ..	"Towleston," Kingsthorpe	2	14	Holstein Cattle Club Herd Book
T. Mullen	"Norwood," Chelmer	3	20	Queensland Jersey Herd Book
J. H. Paten	Yandina	6	21	Ayrshire Herd Book of Queensland
Queensland Agricultural College	Gatton	4	38	Ayrshire Herd Book of Queensland
		..	2	Ayrshire Herd Book of Scotland
		2	9	Holstein-Friesian Herd Book of Australia
		2	31	Jersey Herd Book of Queensland
J. W. Paten	Wanora, Ipswich ..	10	42	Ayrshire Herd Book of Queensland
M. W. Doyle	Moggill	4	12	Queensland Jersey Herd Book
G. A. Buss	Bundaberg	1	15	Herd Book of the Jersey Cattle Society of Queensland
W. Rudd	Christmas Creek, Beaudesert	2	10	Milking Shorthorn Herd Book of Queensland
M. F. and R. C. Ramsay	Talgai, Clifton ..	5	27	Herd Book of the Jersey Cattle Society of Queensland
George Newman ..	Wyreema	9	37	Holstein-Friesian Herd Book of Australia
R. Conochie	Brooklands, Tingoora	9	21	Queensland Jersey Herd Book

BREEDERS OF PUREBRED STOCK IN QUEENSLAND—*continued.*

Name of Owner.	Address.	Number of Males.	Number of Females.	Herd Book.
W. J. Barnes	Cedar Grove ..	10	37	Queensland Jersey Herd Book
T. B. Murray-Prior ..	Maroon, Boonah ..	2	37	Queensland Shorthorn and Australian Herd Books
W. J. Affleck	Grasmere, N. Pine ..		31	Queensland Jersey Herd Book
A. J. McConnel ..	Dugandan, Boonah	19	36	Australian Hereford Herd Book
A. Pickels . ..	Blackland's Stud Farm, Wondai	4	62	Illawarra Dairy Cattle Herd Book of Queensland
G. C. Clark	East Talgai, Ellinthorp	3	7	New Zealand Herd Book
H. D. B. Cox	Sydney (entered brother's name)	3	16	Commonwealth Standard Jersey Herd Book
J. T. Perrett and Son	Coolabunia	2	36	Illawarra Herd Book of Queensland
State Farm	Kairi ..	4	8	Ayrshire Herd Book of Queensland
		1	2	Holstein-Friesian Herd Book of Australia
E. M. Lumley Hill ..	Bellevue House, Bellevue	45	127	Australian Hereford Herd Book
W. T. Savage	Ramsay	2	22	Illawarra Herd Book of Queensland
Tindal and Son ..	Gunyan, Inglewood	50	400	Australian Hereford Herd Book
J. N. Waugh and Son	Prairie Lawn, Nobby	3	28	Queensland Jersey Herd Book
J. H. Fairfax	Marinya, Cambooya (2)	9	55	Ayrshire Herd Book of Queensland
C. E. McDougall ..	Lyndhurst Stud, Warwick (2)	25	100	Queensland Shorthorn Herd Book
J. Holmes	"Longlands," Pittsworth	6	20	Ayrshire Herd Book of Queensland
P. Biddles	Home Park, Netherby	1	20	Illawarra Dairy Cattle Association
A. Rodgers	Torran's Vale, Lanefield	1	9	Milking Shorthorn Herd Book
R. S. Alexander ..	Glenlomond Farm, Coolumboola	1	..	Holstein-Friesian Herd Book of Queensland
		2	..	Holstein-Friesian Herd Book of Australia
State Farm	Warren	3	83	Ayrshire Herd Book of Queensland
S. H. Hosking.. ..	Toogooloowah ..	2	15	Holstein Cattle Club Herd Book
W. J. H. Austin ..	Hadleigh Jersey Herd, Boonah	1	2	Queensland Jersey Herd Book
Ditto	ditto	..	6	Commonwealth Standard Herd Book
H. M. Hart	Glen Heath Stud, Yalangur	7	21	Ayrshire Herd Book of Queensland
C. Behrendorff ..	Inavale Stud Farm, Boonah	3	9	Holstein-Friesian Herd Book of Queensland
F. A. Stimpson ..	Ayrshire Stud Farm, Fairfield, South Brisbane	25	77	Ayrshire Herd Book of Queensland
M. L. Cochrane ..	Paringa Farm, near Cairns	5	21	Ayrshire Herd Book of Australia

BREEDERS OF PUREBRED STOCK IN QUEENSLAND—*continued.*

Name of Owner.	Address.	Number of Males.	Number of Females.	Herd Book.
Albert Cook	"Greenmount," Mackay	1	8	A.-A. Stud Book, New Zealand
Thomas Brown ..	"Bellgrove," Kingaroy	1	14	Do.
Higgins Bros. ..	Sandy Creek, Leslie, Q.	6	2	Do.
Calcino Bros. .. :	"Summariva," Charleville	3	4	Do.
W. M. McKelvie ..	"Undulla," Miles ..	5	4	Do.
James Connors ..	"Glen Erin," Nanango	1	2	Do.
J. A. Mackintosh ..	"Yundah," Warwick	2	8	Do.
M. J. Luff	Kaimkillenbun ..	1	1	Do.
A. Spencer	Brisbane	2	1	Do.
Beak Pastoral Co. ..	Rockhampton ..	2	10	Do.
E. Swayne, M.L.A. ..	West Plane Creek ..	1	2	Holstein-Friesian Herd Book of Queensland
Godfrey Morgan ..	"Arubial," Condamine	3	6	Queensland Shorthorn Herd Book

A NATURAL REMEDY FOR WORMS AND BLOOD DISEASES IN STOCK.

By L. G. JONES (late 2nd Lieut., 41st Battalion, A.I.F.).

The attention of stockbreeders, pastoralists, and farmers is directed to the following article under the above heading:—

Sheep eating earth at certain spots was one of the first things I noticed when I came over from Tasmania to the main land (Burrowa district, New South Wales), and everybody I spoke to in the district replied: "Oh, that is where there is a salty soakage, or where at some period or other salt has been thrown on the ground for the stock to lick, as was the custom on some stations in olden days, and has been washed into the ground by rains." Not being satisfied, I gave the subject more consideration, and further studied the positions of the lickholes (by which term they were generally known to sheep men), which brought me to the conclusion that, if they contained salt in sufficient quantity to cause sheep to lick at them, it must be a natural soakage and was not through salt being tipped there in days gone by, as the positions and localities in many instances flatly contradicted it. The next peculiarity I noticed was that these lickholes ran reef-like across country, as would a lode of silver or other mineral, and would be cut, perhaps, by a creek or come to the surface on a flat when the sheep would lick or burrow for the earth as the case might be, and in no case could I detect any saline taste in the earth. I felt convinced that the salt idea was a hypothesis and not a fact. At this stage I decided to have an analysis made, and which is now herewith attached:—

ANALYSIS OF LICKHOLE.

	Per cent.
Moisture	3.85
*A volatile and organic	4.20
Insoluble silica	80.20
Soluble silica SiO_2	.28
Ferric oxide $Fe2O_3$	7.10
Ferrous oxide FeO	trace
Alumina Al_2O_3	3.11
Lime CaO	.63
Magnesia MgO	.49
Potash K_2O	.11
Phosphoric acid P_2O_5	.37
Sulphates So_3	.17
Chlorine, equivalent to sodium chloride	.87
	101.38

*Containing: Nitrogen = .08 per cent., equivalent to ammonia = .09 per cent; alkalinity or sodium carbonate = .21 per cent.

Whilst waiting for the analysis of the lickhole I put salt into their troughs and allowed the sheep free access to it, and I observed that they partook of the salt, but it did not lessen their visits to the lickhole. This, to me, was conclusive proof that the sheep did not go to the lickholes because they wanted salt. And this conclusion was further substantiated on arrival of the analysis of the lickhole. Then, why did they eat the earth? It is an old truism that there is never effect without a cause. I maintained—and do so now—that the sheep ate it by instinct, because it was beneficial to them. I further experimented with this earth by mixing a quantity of it with salt, letting some 200 very weak and wormy and flukey sheep have free access to it in a paddock where there was no lickhole, and I concluded that the sheep did improve and the deaths decreased, and I could not attribute the improvement to any other cause than the lickhole earth. After due consideration I concluded that this was the starting point of a discovery of something that would result in a benefit to stock—particularly sheep—because the analysis proved that the sheep were eating a well-defined though weak combination of chemicals. It now occurred to me that the formulæ of the lickhole resembled an iron ore in composition; then, again, my experience contributed the fact that ironstone localities were sounder than other country, such as sandstone country. There seemed to me to be a connection here. I obtained about 10 lb. of the most likely looking ironstone I could find, powdered it as finely as possible, mixed it 1 to 4 with Liverpool salt, then selected twenty-five very wormy sheep showing bottle-jaw and other symptoms of disease, and allowed them to have free access to the mixture. They showed a very sharp improvement towards health. In about three weeks the skins and eyes were showing a good healthy colour, the bottle-jaw had left them, and they gradually improved in health. (Before treatment they could not have been in a worse condition.) Later, they got into condition fit to kill for rations. I killed one. There were still a good many worms in the stomach (small red), but the animal had wonderfully improved in blood condition. In fact, it was in a very healthy condition, and plenty of it. There was no doubt that the sheep had made a very large quantity of blood, and, considering that I had no guarantee that the ironstone used was of the best quality (no analysis was made), I was very pleased with the result,

because it showed an improvement on the ore over the lickhole earth, and a connection between the two ores or deposits was established; consequently, the paddock that I obtained this ironstone from had the reputation of being the only sound paddock in that part of the district, and the overseer told me himself that he never had sheep die in it, though he had at times put very flukey and wormy sheep in it, and they always benefited by the change. In this paddock there was an ironstone hill, and I put it under close observation in the following manner:—In the early morning sheep always move off from their camping ground in an easterly direction. Knowing this, I would frequently secrete myself on this ironstone hill and, with the aid of a pair of field-glasses, observe the habits of the sheep. Time and again I observed that the sheep licked the iron dust from the stones, and repeatedly they would turn the smaller and loose stones over with their nose apparently for no other purpose than to get any iron dust that might be there; and after a general study of this paddock I was—and am now—convinced that the run owed its good reputation to the available iron dust the rocks contained. At this stage I reluctantly left it, and have not had any further *practical* experience with it. But I fairly, squarely, and honestly believe that, if the principle is followed as far as it takes me—*i.e.*, if the following ores (iron and mispickel) are taken and finely powdered and mixed 1 to 4, and the whole mixed 1 to 4 with Liverpool salt, and the stock given free access to it in their troughs—we would have done with many diseases in sheep and cattle. I believe that animals treated with this mixture would live according to nature in the highest and finest sense. By virtue of the first-rate general tonic and building-up properties of these ores, which would keep sheep in a perfectly healthy condition, stock treated with it should certainly improve in condition and be proof against diseases that might otherwise attack them. With regard to cattle, it would give grown stock the same resisting power against tick fever that a young calf always enjoys without the diminishing degree. The reason for this degree of immunity (in the calf) is that power to manufacture fresh red blood cells is very great in young animals, and the destruction of these cells caused by the organisms of tick fever is not greater than the young animal's vital power can cope with. As regards the arsenic contained in mispickel ore, it being in chemical combination with the iron (principally) ensures its perfect distribution throughout the whole, and in the proportion in which it is present there is not the slightest danger in its administration, and being present principally as arsenate of iron it is gradually absorbed in the stomach without irritation. The value of arsenical treatment for worms in sheep needs no comment by me, being so well known.

ANALYSIS OF CRUDE IRON ORE.

	Per cent.
Ferric oxide	42.33
Manganese oxide	.95
Lime	7.44
Potash	.27
Carbon dioxide	.12
Ferrous oxide	29.92
Alumina	7.86
Magnesia	3.82
Silica	5.82
Phosphoric acid	1.86

ANALYSIS OF MISPICKEL ORE (ARSENICAL PYRITES).

	Per cent.
Arsenic	25.60
Ferrous oxide	50.27
Sulphur	15.09
Silica	7.15
Copper	traces

Poultry.

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

The past month has been characterised by continuous rain, and conditions have not been in favour of high egg production. The total number of eggs laid for the month was 8,091. In the light brood section, E. Chester's pen laid the highest monthly total of 154 eggs, and in the heavy breed section the pen of the Mars Poultry Farm lead with a total of 138. The following are the individual returns:—

Competitors.	Breed.	Dec.	Total.
LIGHT BREEDS.			
E. Chester	White Leghorns ...	154	1,240
G. Chester	Do.	115	1,082
*J. M. Manson	Do.	137	1,078
*G. H. Turner	Do.	111	1,069
F. W. Leney	Do.	125	1,067
Oaklands Poultry Farm	Do.	135	1,060
W. Becker...	Do.	122	1,058
W. R. Crust	Do.	127	1,050
Kelvin Poultry Farm	Do.	109	1,018
T. A. Pettigrove, Victoria	Do.	112	1,008
T. Taylor	Do.	124	1,008
*A. T. Coomber	Do.	127	1,001
*J. R. Wilson	Do.	130	999
Chris. Porter	Do.	87	996
*J. Zahl	Do.	113	993
Moritz Bros., S.A.	Do.	105	988
D. Fulton	Do.	128	982
Quinn's Post Poultry Farm	Do.	105	959
*Mrs. J. D. R. Munro	Do.	118	953
A. Shillig	Do.	92	944
J. G. Ritcher	Do.	110	935
*Dixie Egg Plant	Do.	116	935
A. H. Padman, S.A.	Do.	102	927
T. B. Hawkins	Do.	105	925
J. L. Newton	Do.	110	913
*T. Fanning	Do.	103	908
Mars Poultry Farm	Do.	103	903
*A. W. Bailey	Do.	110	901
F. Clayton, N.S.W.	Do.	125	900
Mrs. Bradburn, N.S.W.	Do.	122	899
C. Knoblauch	Do.	123	891
J. Holmes	Do.	125	883
Mrs. S. J. Sears	Do.	126	880
E. Cross	Do.	128	877
G. J. White	Do.	128	873
C. H. Singer	Do.	127	866
L. G. Innes	Do.	107	864
C. P. Buchanan	Do.	120	861
R. Holmes	Do.	81	857
S. C. Chapman	Brown Leghorns... ...	110	854
G. Howard	White Leghorns... ...	88	848
Geo. Williams	Do.	103	848

EGG-LAYING COMPETITION—*continued.*

Competitors.	Breed.	Dec.	Total.
	LIGHT BREEDS—*continued.*		
J. Ferguson	White Leghorns ...	119	841
*A. E. Walters	Do.	102	836
Miss M. Hintz	Do.	119	822
Mrs. J. Carruthers	Do.	113	801
*C. C. Dennis	Do.	33	785
*Dr. E. C. Jennings	Do.	108	768
	HEAVY BREEDS.		
*R. Burns	Black Orpingtons ...	132	1,159
*Mars Poultry Farm	Do.	138	1,083
W. Smith	Do.	110	1,051
E. A. Walters	Do.	119	1,036
*E. F. Dennis	Do.	114	971
W. S. Hanson, N.S.W.	Do.	98	959
F. A. Claussen	Rhode Island Reds ...	99	940
*E. A. Smith	Black Orpingtons ...	112	897
Mrs. J. H. Jobling, N.S.W.	Do.	99	896
H. Jobling, N.S.W.	Do.	110	878
D. Kenway	Do.	102	875
Cowan Bros., N.S.W.	Do.	94	865
P. C. McDonnell	Do.	85	854
King and Watson, N.S.W.	Do.	106	821
C. B. Bertelsmeier, S.A.	Do.	110	816
*Miss M. Hintz	Do.	97	815
*Oakland Poultry Farm...	Do.	94	811
R. Burns	S. L. Wyandottes ...	106	790
E. Morris	Black Orpingtons ...	106	786
J. M. Manson	Do.	115	783
*Kelvin Poultry Farm	Plymouth Rocks ...	101	742
C. C. Dennis	White Wyandottes ...	88	729
*F. W. Leney	Rhode Island Reds ...	79	653
F. Clayton, N.S.W.	Do.	58	633
Totals	...	7,914	65,797

* Indicates that the birds are engaged in single hen test.

DETAILS OF SINGLE HEN PENS.

Competitors.	A.	B.	C.	D.	E.	F.	Total.
			LIGHT BREEDS.				
J. M. Manson	180	187	157	173	179	202	1,078
G. H. Turner	149	158	194	199	170	199	1,069
A. T. Coomber	174	113	193	178	176	167	1,001
J. R. Wilson	184	165	163	179	143	165	999
J. Zahl	190	110	197	119	205	172	993
Mrs. Munro	203	151	138	150	126	185	953
Dixie Egg Plant	145	183	175	181	175	76	935
T. Fanning	126	162	173	143	129	175	908
A. W. Bailey	36	160	181	180	173	171	901
A. E. Walters	115	120	139	166	145	151	836
C. C. Dennis	156	89	77	148	153	162	785
Dr. Jennings	101	95	144	141	172	122	775

EGG-LAYING COMPETITION—*continued.*

DETAILS OF SINGLE HEN PENS—*continued.*

Competitors.	A.	B.	C.	D.	E.	F.	Total.
HEAVY BREEDS.							
R. Burns	169	148	210	158	214	260	1,159
Mars Poultry Farm	169	199	173	180	187	175	1,083
E. F. Dennis	195	176	166	206	192	36	971
E. A. Smith	151	149	112	178	156	151	897
Miss M. Hintz	141	122	119	149	149	135	815
Oaklands Poultry Farm... ...	189	121	108	103	179	111	811
Kelvin Poultry Farm	114	115	124	170	88	131	742
F. W. Leney	111	126	91	103	114	108	653

POULTRY HOUSES.

The following notes on the construction of chicken houses, with the illustrations, are taken from a very instructive circular prepared by Ross M. Sherwood, specialist in poultry husbandry and head of the Department of Poultry Husbandry during 1916-1917, Kansas (U.S.A.), State Agricultural College:—

SIZE OF THE HOUSE.

The size of the house is governed largely by the breed of fowls, the amount of protection provided outside the chicken house, and the section of the state in which

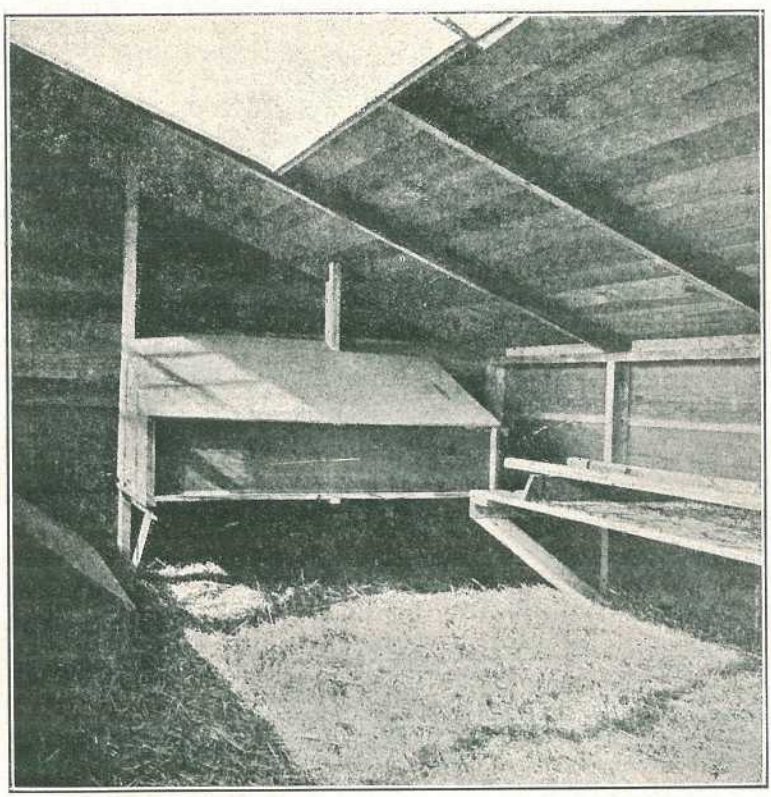


Fig. 1.—Interior of house, showing arrangement of perches above the dropping board, and nests at the end of the house.

the farm is located. The farmers of Kansas who get the most winter eggs provide a scratching room where the hens are given grain feed in a deep litter of straw or similar material. The fowls are kept in this room whenever the weather is not satisfactory for them to run at large. This scratching room should allow from three to five square feet of floor space for each hen. Heavy breeds, and fowls confined a great part of the time, require the larger space, while those which range most of the time may have the smaller floor space. Crowding of fowls does not give satisfactory results. Another room may be used for roosting, or a dropping board may be placed in the scratching room about thirty inches above the floor, and the perches placed six or eight inches above it, as shown in Fig. 1. This is an economical plan, because it eliminates the necessity of providing a separate roosting room.

VENTILATION.

There is no best method of providing ventilation. The two methods most common in Kansas are the curtain front and the open front. The open front is giving excellent results in some sections of the State, but many people find it desirable to have curtains that may be placed over most of the openings during bad weather. It has been found that a house closed on three sides and curtained tightly on the south does not provide enough fresh air. To remedy this, a narrow opening is often provided along the south side of the house just under the rafters. This causes a greater circulation of air than the curtained openings alone, yet does not allow the wind to blow on the fowls. The large curtained openings should be from thirty to thirty-six inches from the floor, so that the wind will not blow on the fowls when the curtains are raised. During the summer months other openings are necessary to make the building cool enough so that the fowls will roost there. These should be so located at the back of the house that draughts will not blow on the fowls during the night. These openings should be closed tightly during the winter months.

FLOORS.

Floors of portable houses are necessarily made of wood. For permanent houses, however, concrete and building-tile floors are coming rapidly into favour. Such floors are easily cleaned, rat proof, long lived, and practically as cheap as board floors. If properly constructed and well littered with straw, they are not cold or damp. If concrete floors are built, the moisture may be kept down by the use of a coarse rock floor foundation, as shown in Fig. 2.

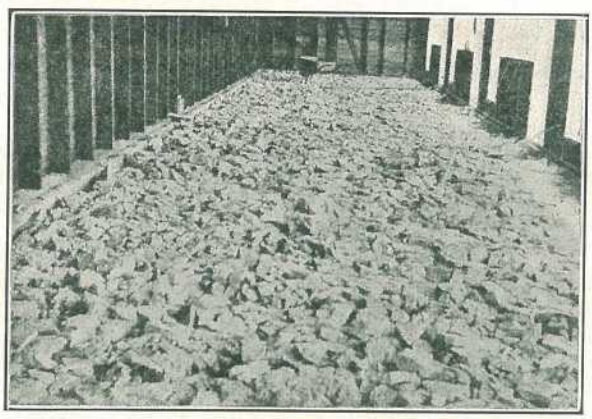


Fig. 2.—Rock foundation for cement floor. This prevents the moisture from coming up from the soil below. A floor on such a foundation should be dry.

FIXTURES.

Poultry-house fixtures should be simple, few in number, and easily removed. They usually consist of a perch, with or without a dropping board, nests, a feeding shelf, and a broody coop.

The perches should provide six to eight inches of room for each fowl, and be fourteen inches apart. Overcrowding will very likely result in an epidemic of colds or roup. All perches should be on the same level, to avoid the crowding that results from the effort of all to roost on the top perch. The most common material used for perches is 2 in. by 3 in. lumber. This may be placed on edge and the upper edges rounded to avoid bruising the feet.

If it is desired to place nests under the perches or provide more space for scratching, a dropping board should be used. This should be made of good matched material, so that there will be a minimum of cracks for harbouring mites. It should be removable, so that the ends may be easily sprayed.

A nest should be roomy, easily cleaned and sprayed, dark, and conveniently located. For most fowls a nest fourteen inches square and six inches deep is a good size. **There should be one nest for every five hens in a farm flock of ordinary size.** Hens are quite likely to roost on the edges of the nests during the molting season,

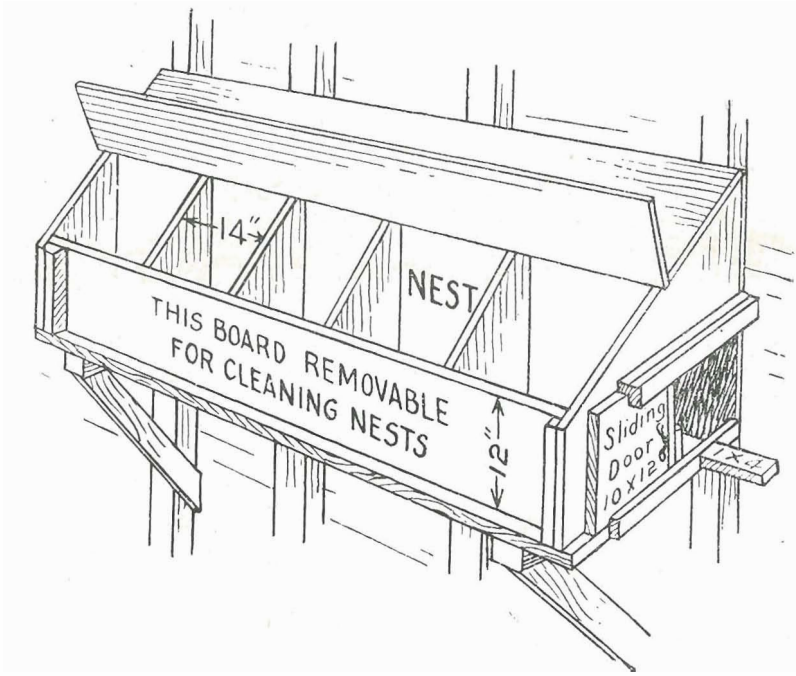


Fig. 3.—A good type of wall nest.

owing to the fact that their bodies are tender from the growing feathers and they try to escape the crowded perch. It is a great advantage to be able to close the nests at the time of the evening feeding. This may be accomplished by means of a slide door, as shown in Fig. 3.

A feeding shelf may be constructed to keep the feed hopper and water pan up out of the way of the floor litter as it is scratched about by the flock. A dry-mash

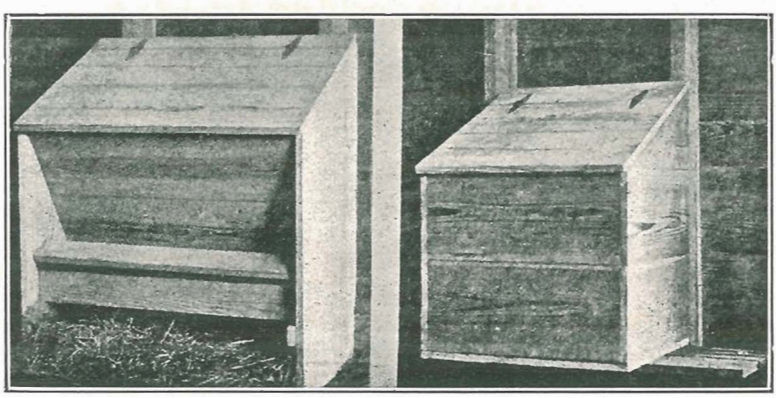


Fig. 4.—Mash hopper to left. Grain bin to right.

hopper and grain bin, as shown in Fig. 4, are very useful in the chicken house. The bin makes it possible to have a supply of grain near at hand.

A broody coop is a convenience in every chicken house for breaking up broody hens. It should be provided with a slatted bottom, so that it will be self-cleaning and there can be no accumulation of nesting material.

CARING FOR THE CHICKEN HOUSE.

The chicken house should be littered at all times with straw eight to twelve inches deep. This should be renewed whenever it becomes damp, badly broken up, or so full of droppings that grains thrown down are not quickly lost from sight.

When a dropping board is used it should be cleaned at least once a week, because disease germs and mites accumulate on it. Further, if not cleaned frequently the feet of the birds become soiled, causing a large per cent. of dirty eggs. Also, injurious gases are given off by the decaying manure.

As a matter of precaution against disease and insects, the chicken house should be thoroughly cleaned at least once a year, and soaked in every part with a 3 per cent. mixture of compound solution of cresol or a good stock dip.

The two most common poultry parasites are mites and lice. Mites are usually first noticed on the under side of the perches or in the corners of the nests where they live, rather than on the fowl's body. They stay on the body of the fowl only long enough to feed. Mites are killed by spraying. In order to get entirely rid of them it is necessary to spray two or three times to kill the mites which have hatched after the previous spraying. In warm weather the sprayings should follow each other at intervals of five to seven days. If it is cool, ten days will be sufficient.

The chicken louse spends most of its life on the fowl, and is thus not affected by cleaning or spraying. It is controlled by dust baths, dust powders, and blue ointment. A good, cheap lice powder can be made by mixing three parts of gasoline with one part of cresol, and gradually stirring in plaster of paris or building cement to take up the moisture. After drying, this mixture is ready for applying to mature fowls. It should be applied thoroughly.

Blue ointment may be purchased from a drug store and mixed with equal parts of vaseline. A piece of the mixture about the size of a pea should be thoroughly rubbed into the fluff of each fowl, close to the vent. A second application should be made eight or ten days later to kill the lice which hatch after the first application.

A whitewash is also good in keeping parasites and disease in check. A good whitewash is made as follows:—Slack one bushel of lime in a container, and add water until twelve gallons have been used. In another vessel dissolve 2 lb. salt and 1 lb. of sulphate of zinc in two gallons of water. After these are dissolved add the mixture and two gallons of sweet skimmed milk to the lime water.

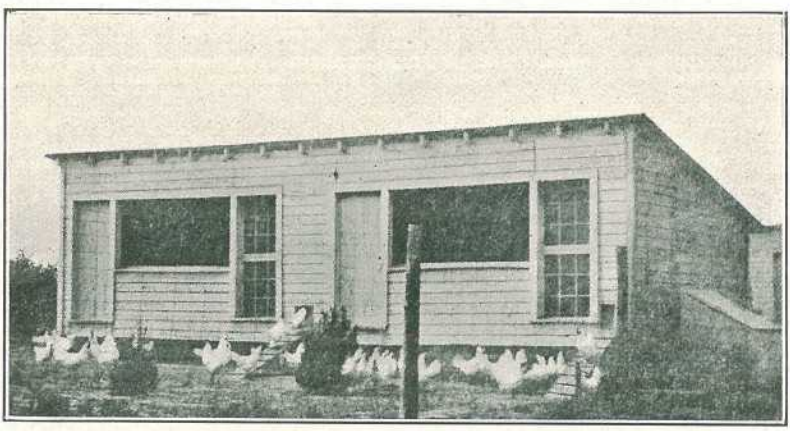


Fig. 5.—Shed-roof chicken house having good light and ventilation.

Fig. 5 shows the wall construction and front ventilation of a shed-roof chicken house. The openings in the front have muslin curtains, which may be closed in severe weather. There are openings on the back side, just below the roof, for use during the summer time. These are so arranged that draughts do not blow on the fowls. Doors are shown above the front openings. These may be used if it is found necessary.

The floor plan of this house is shown in Fig. 6. This gives the arrangement of nests, roosts over dropping board, broody coop to confine broody hens, and platform for mash hopper and water bucket.

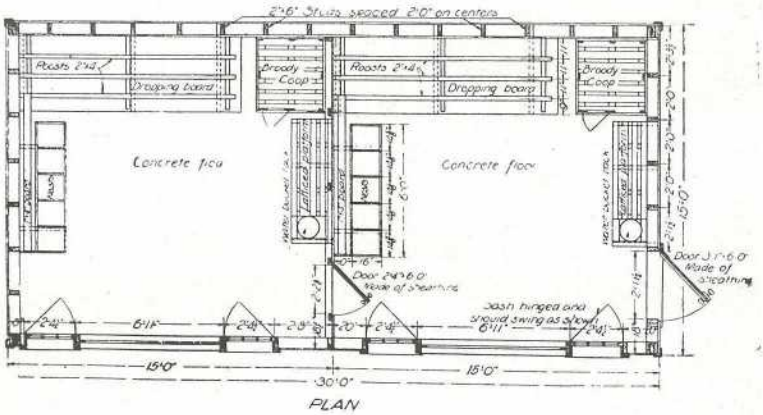


Fig. 6.—Floor plan of house shown in Fig. 5.

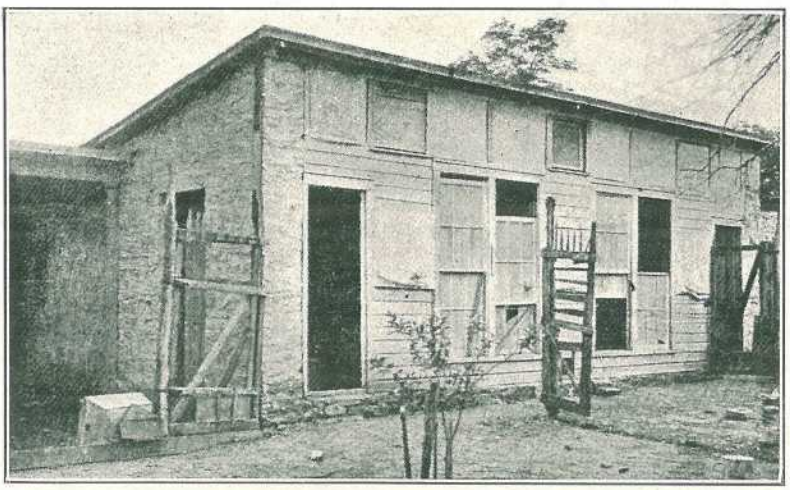


Fig. 7.—Stone chicken house which is giving good results on a Kansas farm.

The shed-roof house shown in Fig. 7 is giving good results on a farm in northern Kansas. Originally this house was much narrower, an addition being made later. Had the entire house been built at one time it probably would have been made lower. As it is, it is higher than is necessary, both in the front and in the back. This house is well ventilated, as indicated by the large number of openings. The openings in the upper part of the front form an outlet for all bad air which may accumulate near the roof.

Fig. 8 shows a Kansas farmer's well-proportioned shed-roof chicken house. The openings in the front have muslin curtains, which may be lowered whenever the weather is severe enough to make it advisable. In this house the fowls roost along the back wall over dropping boards. The nests are similar to those shown in Fig. 3, except that they are two tiers high. They are built on both ends and on the partition,

which divides the house into two similar rooms. There is a room on one end of the house for the storage of feed. Such a room is very useful because it saves a great deal of time in feeding the fowls.

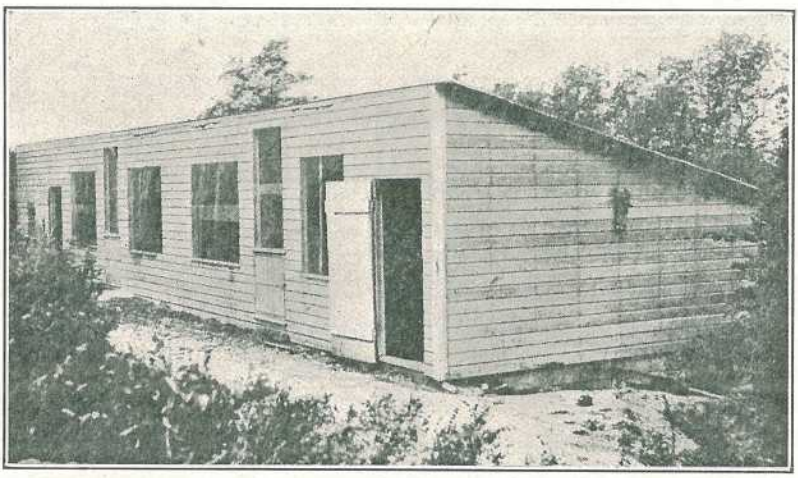


Fig. 8.—The ventilation is not overlooked in this house. The openings may be covered with curtains if weather demands.

The type of house illustrated in Fig. 9 is satisfactory when built about twenty feet wide. This house has an open front, with no curtains for protection. It has been used with good results in States farther north than Kansas for the medium-

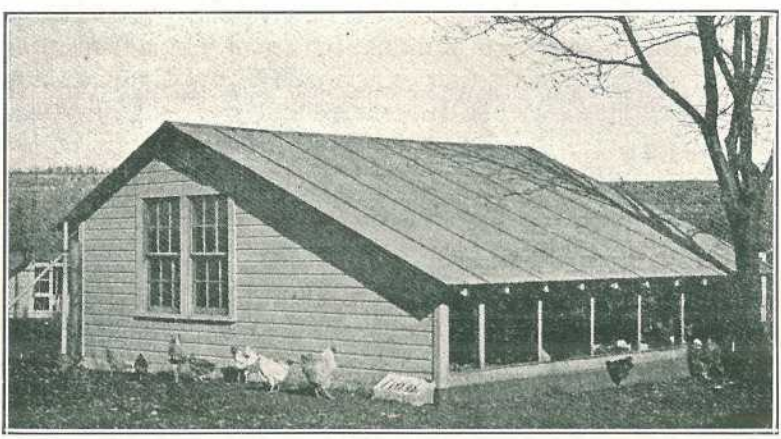


Fig. 9.—An open front hen house which is giving good results.

weight breeds. This house has windows on both the east and the west. It also has an opening along the north side, under the eaves, to provide summer ventilation.

The house shown in Fig. 10 may be used for hens or for growing chicks. It may be moved from place to place, so that the chickens may have fresh range. This is probably the cheapest type of house for a given floor space, unless it be a house with no side wall at all. The dimensions are 8 ft. by 8 ft. This type of house is often built 10 feet from front to back. The shape of roof is such that it may be moved easily between the rows of trees in an orchard.

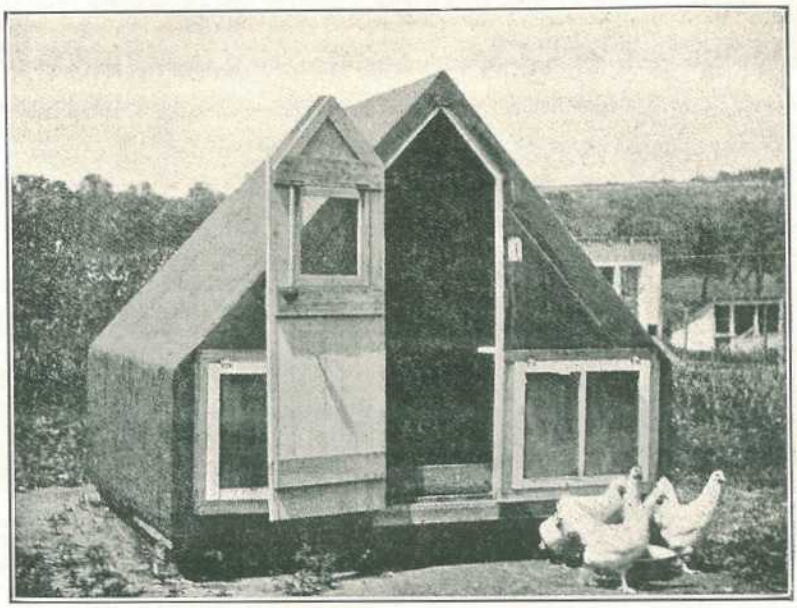


Fig. 10.—An economical house for either hens or growing chicks.

The floor plan of this house is shown in Fig. 11. The dotted lines are the joists for the floor.

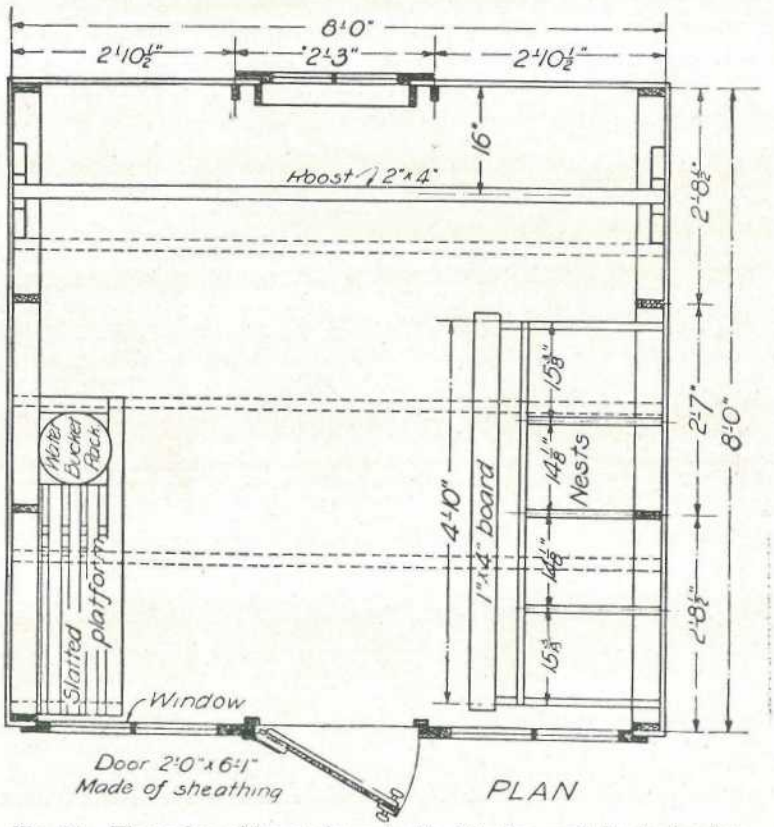


Fig. 11.—Floor plan of house shown in Fig 10 when used for laying hen .

Fig. 12 shows a house made from two piano boxes. There are enough boards in two boxes to make this entire house. The only added expense is the lower framework for the floor, roofing paper, windows, and hardware. This house may be used for growing chicks during the summer and for mature fowls during the rest of the season. It is a very practical type where piano boxes are available at a reasonable cost.

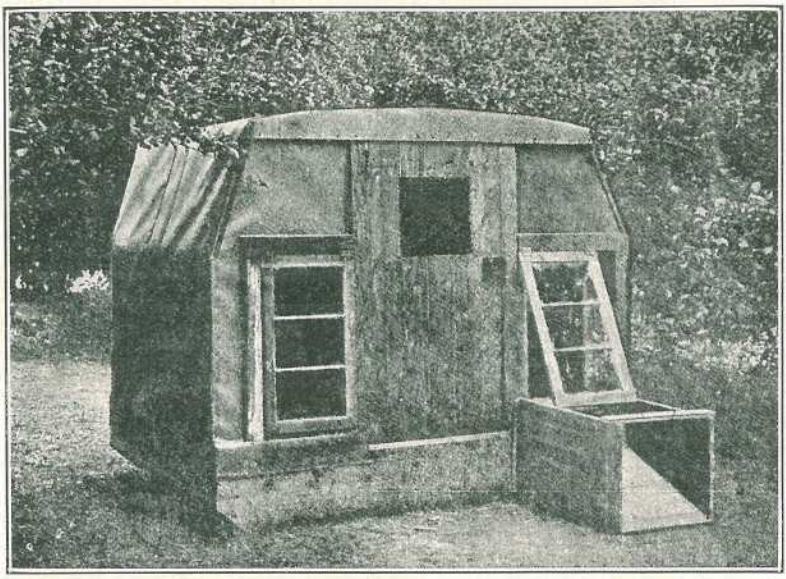


Fig. 12.—House made of two piano boxes covered with roofing paper.

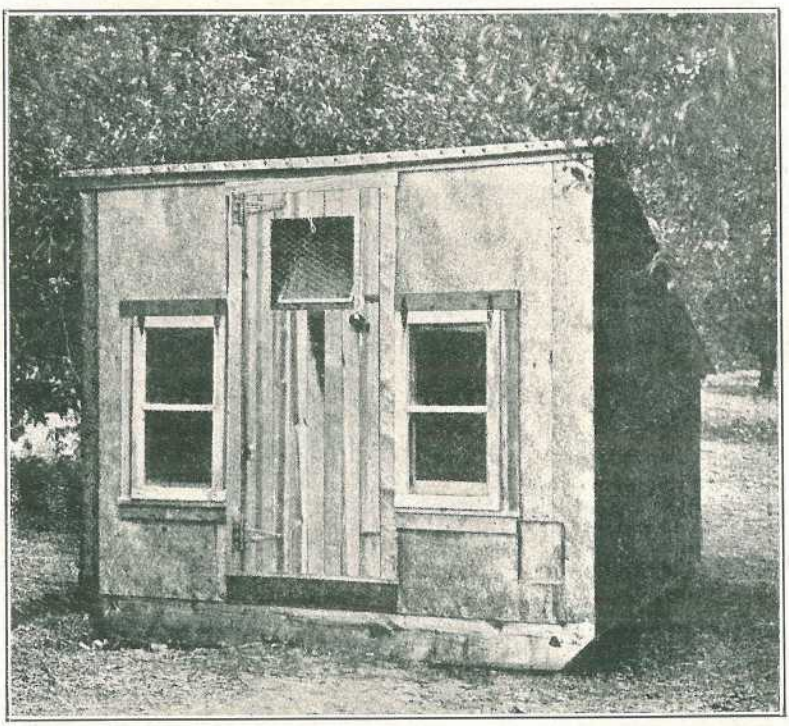


Fig. 13.—Shed-roof colony house for chicks or mature fowls.

For those who wish a shed-roof movable house for hens or growing chicks the house shown in Fig. 13 is suggested. It is necessary to provide more ventilation than is specified if it is used for mature fowls.

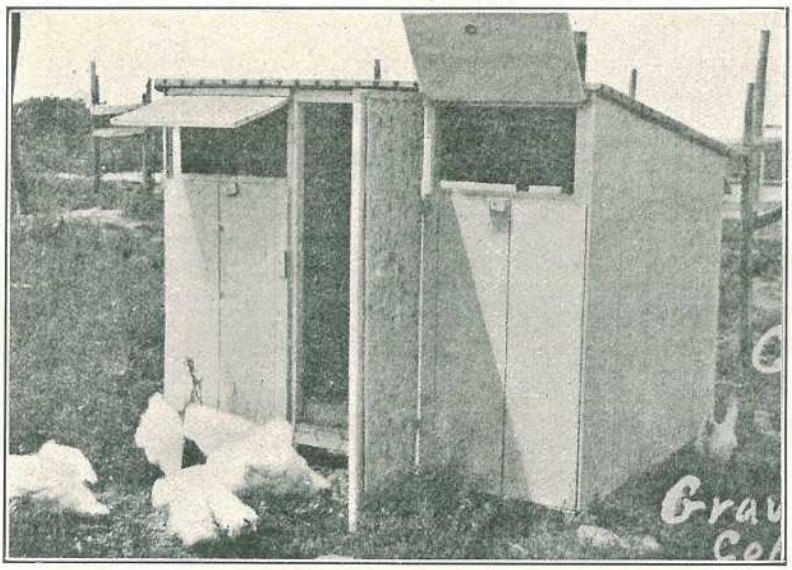


Fig. 14.—Economical coop for growing chicks. It is especially well ventilated.

A farmer in Southern Kansas has solved the problem of housing for a small flock of growing chicks by constructing the small house shown in Fig. 14. The building is sided with ship-lap on a light frame of 2 in. by 2 in. material. It is covered with prepared roofing. Ventilation is well provided for. There is a long, narrow door under the eaves on the back side as well as the two doors on the south side. By properly operating the doors the house may be kept comfortable for the chicks.

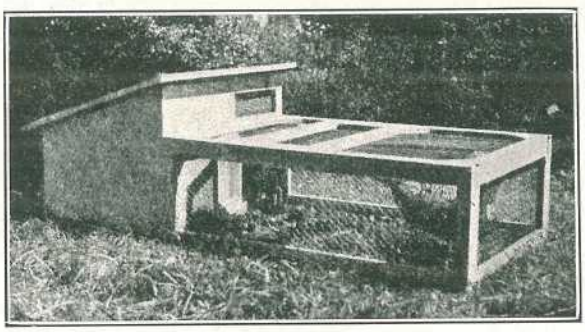


Fig. 15.—Coop and yard for hen and chicks. Chicks are protected from their enemies in such a coop.

The broody coop shown in Fig. 15 is very useful for a hen and chicks, or for a sitting hen. Such a coop should be provided with a tight floor. It will then protect chicks from surface water and rats. The yard makes it possible to confine the chicks while the grass is wet. If hens are confined in such coops until the chicks are several weeks old, the loss of chicks will be much smaller than is often the case.

Fig. 16 shows a very useful and economical broody coop. This is made from a large, tight box with prepared roofing paper fastened over the top for a roof. The door at the front is covered with ½ in. mesh hardware cloth to protect the chicks from enemies without depriving them of proper ventilation. This coop may also be used for sitting hens.

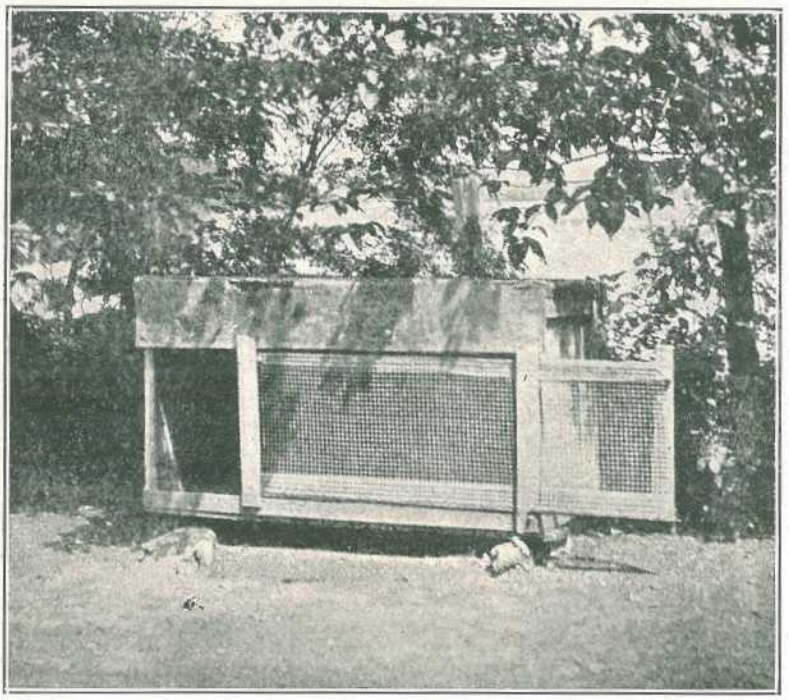


Fig. 16.—Excellent broody coop made from large tight box covered with roofing paper.

SOLAR OVENS.

In view of the scarcity of coal or wood in many subtropical regions, such as Egypt, the Punjab, and the Karoo of South Africa, it is interesting to note the report recently made by Sir F. Nicholson, describing valuable experiments in the employment of solar ovens. These consist of stout teakwood boxes, blackened inside and fitted with a double glass top. They are suitably insulated, and with this simple apparatus a temperature of from 240 degrees to 275 degrees Fahr. is easily obtained during the middle of the day from 11 a.m. to 3 p.m., and 290 degrees with the aid of a single glass mirror. The oven once constructed, the "Journal of the Royal Society of Arts" for 11th May, 1917, points out, costs nothing, and for all mere baking or cooking purposes it is a very efficient and cheap utilisation of sun-heat, suitable for many applications. The disadvantage attached to the process—namely, the hours possible for hot meals being reduced to those in the hottest period of the day—must not be overlooked.—"Agricultural News of Barbados."

Dairying.

THE DAIRY HERD, QUEENSLAND AGRICULTURAL COLLEGE, GATTON.

MILKING RETURNS OF COWS FROM 27TH NOVEMBER TO 26TH DECEMBER, 1917.

Name of Cow.	Breed.	Date of Calving.	Total Milk.	Test.	Commercial Butter.	Remarks.
			Lb.	%	Lb.	
Sweet Meadows ...	Jersey ...	8 Aug., 1917	610	6·8	49·23	
Miss Edition ...	,, ...	12 Nov. ,,	874	4·2	34·14	Slipped calf.
Iron Plate	,, ...	14 Oct. ,,	850	4·2	41·96	
Hedge's Dutchmaid	Holstein ...	9 Sept. ,,	817	4·3	41·27	
Auntie's Lass ...	Ayrshire ...	5 July ,,	898	3·7	38·97	
Violette's Peer's Girl	Jersey ...	26 Oct. ,,	646	5·0	38·13	
Nina	Shorthorn...	6 Sept. ,,	835	3·9	38·02	
Thornton Fairetta	Jersey ...	30 June ,,	476	6·7	37·83	
Miss Bell	,, ...	27 June ,,	587	5·4	37·46	
Princess Kate ...	Ayrshire ...	28 June ,,	603	5·0	35·58	
College Bluebell ...	Jersey ...	28 June ,,	720	4·2	35·54	
College Damsel ...	Holstein ...	12 July ,,	817	3·7	35·41	
Netherton Belle ...	Ayrshire ...	17 July ,,	689	4·3	34·85	
Netherhall Queen Kate	,, ...	30 June ,,	771	3·8	34·34	
Lady Annette ...	,, ...	19 Oct. ,,	687	4·2	33·91	
La Hurette Hope	Jersey ...	22 Aug. ,,	544	5·1	32·76	
Buttercup	Shorthorn...	2 June ,,	753	3·7	32·64	
Lady Dorset ...	Ayrshire ...	14 Aug. ,,	721	3·8	32·13	
Lady Melba ...	Holstein ...	12 July ,,	661	4·1	31·82	
Lady Loch II. ...	Ayrshire ...	3 June ,,	668	4·0	31·36	
Burlesque	Jersey ...	8 Oct. ,,	483	5·3	31·25	
Glow VI.	Guernsey ...	9 Nov. ,,	714	3·7	30·95	
Skylark	Ayrshire ...	24 May ,,	584	4·3	29·54	
Miss Betty ...	Jersey ...	27 Mar. ,,	529	4·7	29·31	
College St. Margaret	,, ...	9 Nov. ,,	561	4·4	29·05	
Songstress	Ayrshire ...	1 Oct. ,,	632	3·9	28·92	
Rosine	,, ...	21 June ,,	627	3·8	27·93	
College Ma Petite	Jersey ...	10 Nov. ,,	594	4·0	27·89	
Lilia	Ayrshire ...	11 July ,,	650	3·6	27·41	
Glade	Shorthorn...	29 Mar. ,,	466	4·8	26·36	
Confidence ...	Ayrshire ...	25 June ,,	588	3·8	26·19	
Miss Security ...	,, ...	27 Mar. ,,	530	4·2	26·17	
Hedge's Madge ...	Holstein ...	22 Mar. ,,	491	4·4	25·43	
College Mermaid ...	Jersey ...	21 Aug. ,,	458	4·7	25·31	
Prim	Holstein ...	3 Aug. ,,	759	2·8	24·67	
Leonie	Ayrshire ...	4 Sept. ,,	587	3·5	24·03	
Windyhill Davidina	,, ...	2 July ,,	496	4·1	23·88	
Lady Mitchell ...	Holstein ...	26 Sept. ,,	613	3·2	22·88	
Lerida II.	Ayrshire ...	2 June ,,	463	4·2	22·84	

The Orchard.

EXPERIMENTS IN CONNECTION WITH THE DESTRUCTION OF INSECT PESTS OF THE TOMATO.

In May last, the Director of Fruit Culture, Mr. A. H. Benson, with the view of assisting tomato-growers and others to prevent the serious losses of these crops due to the ravages of the tomato moth, by destroying the larvæ, arranged with the Committee of the Wynnum Fruitgrowers' Association to carry out a series of experiments to test the efficacy of certain sprays and various forms of lantern traps. The experiments were carried out on the properties of Mr. Randall, of Wynnum South, and Mr. Hargreaves, Manly, under the direction of Mr. Inspector Leslie. Mr. Randall reported that on the plots sprayed with arsenate of lead the best results were obtained, as the percentage of waste was very light.

Other insecticides were not as efficacious as arsenate of lead. In the control plots the percentage of loss was very much greater both with disease and grubby fruit, and the foliage withered before that of the sections treated.

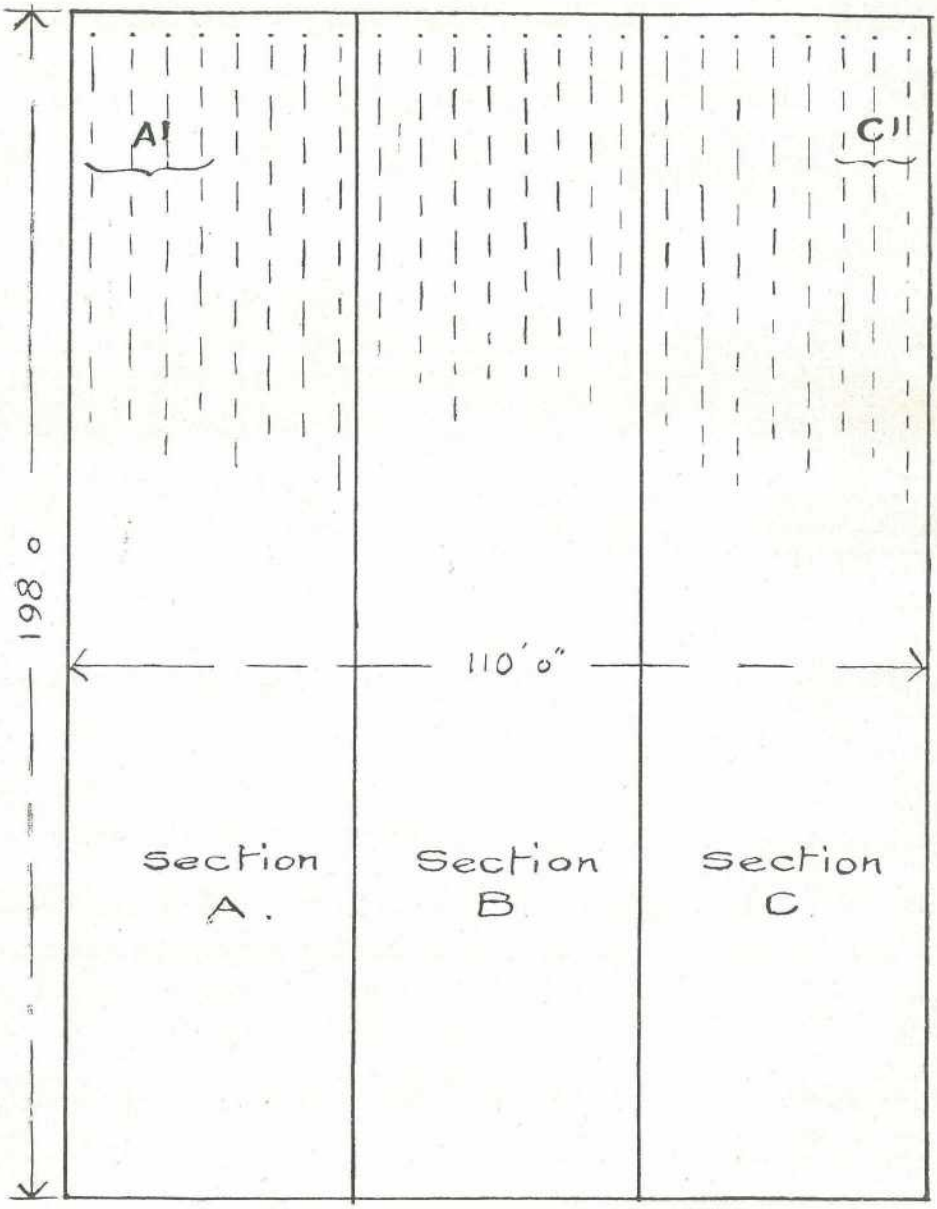
Mr. Hargreaves also states that the general quality of the fruit was superior in the treated sections, and that the spraying had a marked effect in reducing the waste.

Mr. Leslie summarises the result of the experiments as follows:—

1. Arsenate of lead proved the most satisfactory insecticide for the purpose.
2. The ordinary kerosine hurricane lamp, fixed as described and illustrated by him, proved most satisfactory as a trap lantern.
3. That the method of staking adopted was unsatisfactory.

The conditions under which the experiments were undertaken were:—

1. The Director of Fruit Culture undertook to
   - (*a*) Lay down a plot or series of plots in a certain district.
   - (*b*) To accept for consideration offers of suitable areas for the purpose.
   - (*c*) To supply materials, apparatus, and supervision necessary for carrying out of special work or experiments.
2. The grower whose offer was accepted would agree—
   - (*a*) To carry out the ordinary work of cleaning and cultivation.
   - (*b*) To reap and market the crop.
   - (*c*) To keep account of all work done, materials used, the crop, and its value.
   - (*d*) To allow access to plots and records by the Director and his officers, or anyone genuinely interested.



HARGREAVE'S PLOT.

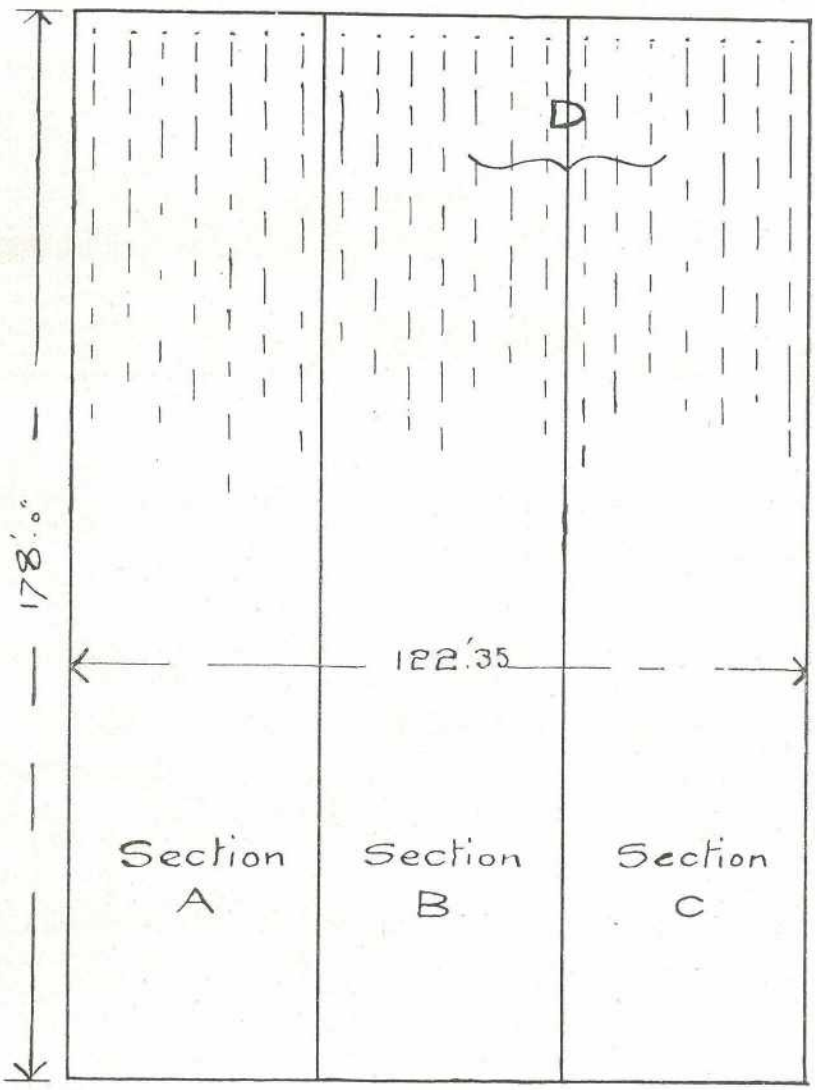
3. It would be understood that the whole proceeds of the crop would belong to the grower.

4. At Wynnum the Director would supply stakes for the tomatoes, insecticides, and materials for trapping moths.

Mr. Inspector Leslie inspected two blocks, and chose those we have mentioned, as one was "new," the other "old" land, and the difference between results on new *versus* old land would thus be ascertainable.

We need not go into the cost of the experiments, which was really trivial, considering the results.

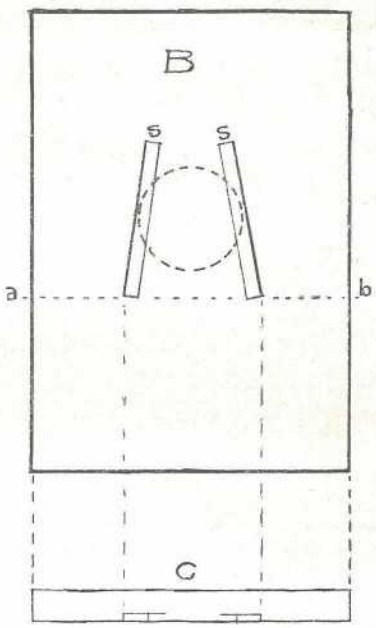
Mr. Leslie's report and diary describing the action of the trap-lamps are very informative, but the exigencies of space preclude our

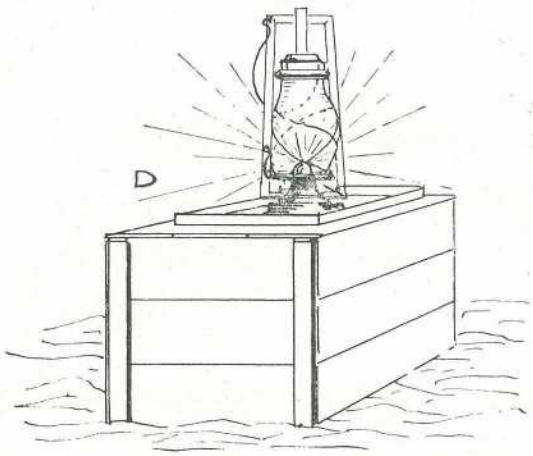


RANDALL'S PLOT.

including them in these notes; but all information on the work done may be obtained on application to the Director of Fruit Culture.

As already stated, staking the plants proved conclusively that staking and tying were not satisfactory.





REFERENCE TO PHOTOS.

I. Hargreaves' Plot, 198 ft. by 110 ft., giving 21 rows of tomatoes, 3 sections.

II. Randall's Plot, 178 ft. by 122.35 ft.

III. Hurricane Lamp—

A.—Showing how to cut the tin, making two trays.

B.—Tray-plan, showing position of tin strips (s.s.) soldered to bottom along outside edge only (heavy lines). Dotted circle shows position for base of lamp.

C.—Section of tray at *a b*—Elevation.

D.—Lamp set in tray on empty fruit-case as used on plantation.

Viticulture.

HINTS TO GRAPEGROWERS.

BY C. A. GATTINO.

(Continued from January, 1918.)

WINTER PRUNING.

Having brought the vines to their third year of growth, in accordance with my previous notes, we have to apply a practical method of pruning. The yearly pruning is a difficult subject to describe, and requires, to get the full value, practical lessons on the vines, because each country and district generally adopts a different and special system of pruning.

It is hard to say which of these special methods of pruning is best, as that can only be proved by comparative experiments in the same vineyards.

The climate, the soil, and the method of training the vines, all have great influence on the yearly pruning.

Speaking of vineyard culture, especially in these dry climates, I consider that, for slow growers and very hardy vines planted on rich soil, or strong growers planted on arid soil, the most suitable method would be the "back" or "stool" method. By this system the vine is made to form its head about 1 ft. above the ground. From this head the branches are allowed to start. At the next pruning, keep only the branches destined to be fruit-bearing, and cut them back from two to four eyes according to the vigour of the wood.

The vine will in time appear as a little tree, the fruit-bearing branches of which should be reasonably checked, thus preventing the overstraining of the energy of the vine, which, of course, would reduce the strength of the plant and future returns of fruit.

This method of pruning and training is the best and cheapest for vineyard culture of which I know; it does away with costly supports, trellises, &c., and makes the cultivation of the land, the pruning and spraying of the vines, and the gathering of the grapes easier and cheaper.

The method described is also the best adapted for dry climates, as the sap has not to travel so far or climb so high for the nourishment of the plant, and enables the vine to resist droughts, as the branches and wood are fed with a minimum supply of sap.

Dry pruning may be done at any time in the winter or in the fall, as soon as the leaves have dropped; but where there is danger of frosts, prune only towards the end of winter.

[TO BE CONTINUED.]

Tropical Industries.

INDIA'S SHARE IN THE RICE TRADE OF THE WORLD.

Intending ricegrowers in Queensland would do well to read the following position of the world's rice industry, published in the current number of the "Bulletin of the Imperial Institute," just issued (London: John Murray), which contains an article of seventy pages on the production and uses of rice. Practically all the rice-producing countries of the world are considered separately, in respect both of their rice crops and of their trade in rice, and an attempt is made to arrive at some idea of the world's production of this important foodstuff. It is calculated that the output of cleaned rice in 1916-17, in all countries except China, amounted to about 60,000,000 tons. Of this the British Empire produced about 36,000,000 tons, mostly in India, where the crop (including an allowance of 1,000,000 tons for native States) was no less than 35,000,000 tons. Of the foreign production of 24,000,000 tons, over 20,000,000 tons was grown in five countries—Japan, Netherlands East Indies (chiefly Java), French Indo-China, Siam, and Korea. Estimates of production in China are largely guesswork, but the Imperial Institute, adopting the view that the output in China is not likely to be much inferior to the Indian crop and may exceed it, concludes that 40 per cent., or a little less, would be a fair allowance for India's proportion of the world's annual production of rice.

No less important is the position which India occupies in the world's rice trade as a source of supply for other countries. That is not a necessary consequence of its importance as a rice producer. Some of the countries of largest production—China, Japan, Netherlands East Indies—do not grow enough to supply their own needs, though in the case of Japan the large increase in the rice crops in the last three years has changed a heavy import balance into an export balance, so far as the trade with foreign countries (*i.e.*, excluding Korea and Formosa) is concerned.

The world's export trade in rice is practically under the control of three countries—India, French Indo-China, and Siam. It has been calculated that the quantity of rice which entered into international trade, as shown by the export returns of different countries, amounted in 1913 to about 6,400,000 tons. This includes exports from European countries of rice which has been milled in those countries, which came originally from India, Siam, or Indo-China, and which unduly swells the total by being counted twice over. Even so, the original exports of rice from India amounted to 40 per cent. of the total, while those from Indo-China were 20 per cent., and those from Siam 18 per cent.; in other words, these three countries provided nearly four-fifths of the total.

India's export trade in rice is really dependent on Burma. Not only does Burma provide about three-fourths of the exports of rice from India as a whole (1,835,000 tons out of 2,420,000 tons in 1913-14), but Burma usually sends to other provinces of India more rice than those other provinces export. Without Burma, India would not be self-supporting in rice. As it is, India's exports of rice in the year before the war were equal to the gross requirements of the rest of the Empire, though actually only 42·6 per cent. of the exports went to British countries, and 57·4 per cent. to foreign countries.

The exports direct to the United Kingdom were only between 6 and 7 per cent. of the total. On the other hand, the United Kingdom imported considerable quantities of rice from Holland and Germany which had been first exported from India to those countries, and after being milled and polished there had been re-exported to the United Kingdom.

Ricemilling, at one time a flourishing industry in the United Kingdom, had declined before the war owing to severe competition from the Dutch and German mills, with the result that not only was the British home market partly supplied by foreign-milled rice, but what was at one time the considerable British export trade in fully-milled rice had been reduced in many directions. Since the war both the home and export trade in milled rice have been largely recovered by the British ricemillers, and it is hoped that this industry and trade may be retained after the war. The possibilities of the development of the complete milling of rice in India before export are also a matter for consideration.

The second part of the article deals with the uses of rice both as an article of food and for industrial purposes; the value of rice meal as a feeding stuff for livestock is also discussed. The milling processes are described, and the different grades of rice and the by-products which are obtained are shown in diagrammatic form. Numerous composition tables are given, and comparisons are afforded in this respect between rice and its by-products and other foodstuffs.

In connection with this subject, it may be pointed out that the Indian Committee of the Imperial Institute is now conducting, at the request of the Secretary of State for India, an inquiry into the possibility of increasing the use of Indian raw materials and foodstuffs within the Empire. The inquiry naturally involves an investigation of the extent to which other countries, and especially enemy countries before the war, had secured a predominant share in Indian trade, and the causes which led to this condition.

A Special Committee has investigated the trade in rice, and it is understood has now almost completed its work. The need for such an inquiry is clear from the facts mentioned above regarding the dominant position taken in the rice trade by Germany and Holland, before the war, as compared with the United Kingdom.

Botany.

ALGAROBA, CAROB, OR LOCUST BEANS.

A considerable amount of interest has been aroused recently in regard to the trees which produce these beans. A number of letters from correspondents, and articles appearing in print, show conflicting ideas and a general want of accurate knowledge as to what the trees really are. In order to remove all doubt on the subject, the Director of the Horticulture Division wrote to the Director of Kew Gardens, asking for information. Below is a verbatim copy of the reply:—

"Algaroba," "Carob," "Locust," and "St. John's Bread" are common names, all of which are applied to *Ceratonia siliqua*, a tree 15 ft. to 20 ft. high; native of Southern Europe and the Mediterranean region. It is wild and cultivated in North Africa; naturalised in certain parts of India; cultivated in the West Indies, &c. The beans are sold in England as "locusts," and they are an important food for stock.

"Algaroba" is also applied to *Prosopis juliflora* DC., a tree up to 50 ft. in height; native of the West Indies and Central America. It is also known as "honey-locust," "honey-pod," "Mesquit bean," and "cashaw." The pods are a good food for cattle, horses, and pigs, though death has resulted on occasion after eating damp or undried pods, owing, it has been suggested, to the germination or swelling of the seed in the stomach. They are also an important article of food with the Indians and Mexicans, who grind them into flour for baking purposes.

Parkia biglobosa Benth. and *Parkia filicoides* Benth. are known in West Africa as "locust-bean"; they are both trees, the pods of which are edible.

Gleditschia triacanthos Linn., of the Eastern United States, is known as "honey-locust"; *Robinia pseudacacia* Linn., of the Eastern United States, as "locust-tree"; and *Hymenaea Courbaril* Linn. as "West Indian locust"; but the pods of these trees are not regarded as being edible.

Enterolobium Saman Prain (*Pithecolobium Saman* Benth.), the "guano" or "rain-tree," a large tree native of tropical America, is grown for the sake of the pods as good fodder for stock in the West Indies, India, &c.—"Journal of Agriculture" of New Zealand.

DESTROYING COCKROACHES.

The West India "Committee Circular" of June, 1917, reproduces useful methods for the destruction of cockroaches recommended by the "Lancet." For actual, quick destruction, stoving with bromine or sulphur dioxide is apparently best; but for domestic application powdered sodium fluoride, which has the effect of effectually driving away the cockroach, and which at the same time keeps indefinitely, is recommended.

Entomology.

CANE GRUB INVESTIGATION.

The General Superintendent of the Bureau of Sugar Experiment Stations has received the following report on Cane Grub Investigation from Dr. J. F. Illingworth and Mr. E. Jarvis, Entomologists to the Bureau:—

The primary emergence of greyback beetles took place earlier than usual this season, about the end of October, and specimens placed in the insectary on 9th November deposited eggs from which grubs hatched out during the first week in December.

Another emergence of this beetle occurred about 3rd December, and, owing to the prolonged showery weather, egg-laden female specimens are still much in evidence (14th December).

Unless we have a considerable emergence later on, this year's flight will be far below the average. Though emergence has been spread over a period longer than usual, comparatively few beetles have been on the trees at any one time.

EMERGENCE OF *LEPIDIOTA FRENCHI* AND *ROTHI*.

In the region immediately around Meringa, both *frenchi* and *rothi* are much more in evidence than the regular cane beetle, *L. albohirta*. These two smaller species began to emerge about the 1st December, and (14th December) they are still abundant on the feeding trees and low shrubs, fences, grass, &c., where they are mating. These beetles emerge earlier in the evening than the greybacks, and they are easier to collect, because they mate on lower objects and can easily be picked off by hand. Often half a dozen pairs are clustered near together, so that they can all be taken in one hand.

Although the usual biennial occurrence of *frenchi* does not take place until next year, small local emergences are generally noticed each season. At present the grubs of *frenchi* are nearly full grown, and doing great damage in places to both ratoon and young plant cane in the region about Gordonvale. This damage results in a peculiar spotted appearance of the field, for here and there, a chain or so in extent, the cane is yellow and often dead, while the surrounding cane is dark-green and thrifty. In one field of plant cane at Meringa, fully one-third of the crop is damaged in this way. The land had not been in cane for some time, and was covered with a heavy growth of burr and grass. The soil was thoroughly worked previous to planting cane; and though many small grubs were noticed, when ploughing, last May, no attention was given to destroying them. These grubs were evidently the younger stages of *frenchi*, which now in their third stage are able to do such serious damage to the roots.

By giving attention to the advice tendered by this office in the monthly report for last May ("Australian Sugar Journal," IX., p. 221), growers will probably be relieved of considerable future damage from these pests.

On 5th November several specimens of *Anomala australasiæ*, a small dark-green rutellid beetle, were confined in cages at the insectary, and when examined a week later a number of eggs were found that hatched on the 22nd of the same month. We intend working out the life history of this insect, and of other species affecting cane not hitherto recorded.

PARASITISM.

With reference to investigations now in progress regarding certain indigenous parasites of root-eating cane beetles, it may be mentioned that male wasps of *Campsomeris radula* are now emerging from pupæ derived from eggs laid by this species on grubs of *Lepidiota frenchi* at our insectary.

It is interesting to note that the male sex of *C. radula* resembles in general appearance that of the better known digger-wasp, *Dielis formosus*, with which, apparently, it has often been confused by entomologists.

The latter species was described by Tryon in 1902 in an able and instructive treatise entitled "A Parasite of Sugar Cane Beetle Grubs" ("Queensland Agricultural Journal," X., No. 2).

So remarkable, indeed, is the similarity in form and colouration of the adult males of *formosus* and *radula* that specific are confined principally to the presence of a few additional yellow markings on the latter species that are barely visible to the naked eye.

LIGHT TRAPS.

It is our desire in present experiments with light traps, to so simplify them that they may come into common use in canegrowing regions.

A very successful type is simply a large pan, about a yard square, with sides about 4 in. high, the light being furnished by an ordinary acetylene lamp. A sheet of glass, 9 in. by 2 ft., attached to the stem of the lamp with a string, is found to give excellent results in heading off the beetles which circle about the flame, landing them in the tray of kerosene-coated water.

It is found best to have the pan placed on the ground, for if elevated the circling beetles often land beneath it, and in many cases never find their way into the trap.

It is interesting to learn that, though the light appears to have little attraction for the greybacks or the *frenchi* beetles after they have reached their feeding trees, *L. rothi* continues to enter the trap throughout the night. This latter species, though usually rather uncommon, is very abundant this season at Meringa, breeding in an old abandoned field of volunteer cane. These beetles begin dropping from the feeding trees about 9 p.m., and from that time there is a continuous hum as they come to the lamps.

From what is said above, it is evident that the time to catch both the greybacks and *frenchi* in light traps is just at dark in the region of infestation, before the beetles reach the feeding trees. Few results are obtained by exposing the lights for more than an hour. The value of this treatment is, however, in that the female beetles are destroyed before they can lay their eggs.

WHEN THE CLOCK STOPS.

Referring to a suggestion published in the issue of this journal for August, 1917, as to what to do when a clock persists in stopping, Mr. R. B. Stephens, Mellum Mountain, Landsborough, has kindly sent us the following method of proceeding when no professional horologist is available. Many of our country readers will doubtless be glad of the information:—

I notice in the August number of your valuable journal a paragraph on "When the Clock Stops." Knowing how inconvenient it is in the bush to have one's clock troubled with the stops, I would like to give my way of keeping them going. First of all, procure a bottle of 3 in 1 oil, a piece of thin wire (the same that is used for wiring down beer-bottle corks), a pair of pliers, a small screwdriver, and an egg-cup. These constitute all the necessary tools that are required to make a first-class bush clock cleaner.

Now take hold of your clock, examine it carefully for ten minutes, and you should then see how the works are kept in position. If your clock is of the usual twenty-four-hour American, round type, the works will either be held in by the legs upon which it stands, or by several small screws. Remove these, and you can then draw out the whole of the internal works.

If your clock is of the pendulum type, remove the pendulum, and also carefully remove the face and hands, being careful to notice how and in what position the hands are placed so as to replace them in exactly the same way. Now take out the screws that hold the works to the case, and lift them out. Turn your egg-cup upside down; pour on to it a few drops of the oil, and with a piece of the wire, about 4 in. long, lift a small bead or drop of oil on the end of the wire by lifting the wire from the oil in a horizontal position. Then, having taken the works in the hand, deposit a bead of oil on every place where the spindle ends go through, or into the brass frame; also touch lightly with oil the escapement (the part that causes the tick). Now, replace everything as you first found them, after first winding the clock, and in ninety-nine cases out of a hundred your clock will cause you no further trouble for quite a long time. When it does then repeat the dose. With a pendulum clock, after it has been returned to its shelf, listen if it ticks regularly. If not, lift first one side or the other till this is accomplished, and pack it up to that with strips of cardboard or a book, and your clock should then go for years. But *be sure* that it ticks *regularly*. One of my clocks, which cost, new, 15s., has been going for twenty-six years under the above treatment, and will probably be going long after I have stopped. There is a book under one side of it about ¾ in. thick, and it keeps going year in and year out. The above will be found to give entire satisfaction if carefully done, and I am sure will be almost as easy as the kerosene method.

General Notes.

AGRICULTURAL, HORTICULTURAL, AND PASTORAL SOCIETIES IN QUEENSLAND.

SHOW DATES FOR 1918.

Allora.—Central Downs Agricultural and Horticultural Association. Show dates: 20th and 21st February, 1918. J. C. Marshall, secretary.

Atherton.—Atherton Agricultural, Pastoral, and Industrial Society. W. C. Abbott, secretary.

Beaudesert.—Logan and Albert Agricultural and Pastoral Society. A. Winship, secretary.

Beenleigh.—Agricultural and Pastoral Society of South Queensland. Show dates: 19th and 20th September, 1918. R. Newburn, secretary.

Biggenden.—Biggenden Agricultural and Pastoral Society. Show dates: 27th and 28th June, 1918. C. J. Stephensen, secretary.

Boonah.—Fassifern Agricultural and Pastoral Association. Show dates: 15th and 16th May, 1918. G. E. Bell, secretary.

Belmont.—Belmont Agricultural, Horticultural, and Industrial Society. Show date: 24th August, 1918. J. A. Walker, secretary.

Brisbane.—National Agricultural and Industrial Association. Show dates: 12th to 17th August, 1918. J. Bain, secretary.

Bundaberg.—Bundaberg Agricultural, Pastoral, and Industrial Society. Show dates: 29th to 31st May, 1918. Redmond Bros., secretaries.

Caboolture.—Caboolture Pastoral, Agricultural, and Industrial Society. A. Toms, secretary.

Cairns.—Cairns Agricultural, Pastoral, and Mining Association. Nevitt and Boden, secretaries.

Caves, *viâ* Rockhampton.—Central Barmoyea Farmers' Progress Association. B. P. F. Smith, secretary.

Charleville.—Central Warrego Pastoral and Agricultural Association. A. Cahill, secretary.

Childers.—Childers Pastoral, Agricultural, and Industrial Society. W. J. Thompson, secretary.

Chinchilla.—Chinchilla Agricultural and Pastoral Association. Show dates: 9th and 10th April, 1918. W. L. Archer, secretary.

Clifton.—Darling Downs Pastoral, Agricultural, and Industrial Association. Show dates: 20th and 21st March, 1918. P. G. A. Murphy, secretary.

Crow's Nest.—Crow's Nest Agricultural, Horticultural, and Industrial Society. Show dates: 2nd and 3rd April, 1918. W. B. Carlile, secretary.

Emerald.—Emerald Pastoral and Agricultural Society. Show dates: 30th and 31st May, 1918. J. Esmond, secretary.

Esk.—Toogoolawah Pastoral, Agricultural, and Industrial Association. Show dates: 1st and 2nd May, 1918, at Toogoolawah. T. C. Pryde, secretary.

Gin Gin.—Gin Gin Agricultural, Pastoral, and Industrial Society. Show dates: 5th and 6th June, 1918. C. M. Morris, secretary.

Gladstone.—Port Curtis Agricultural, Pastoral, and Mining Association. Show dates: 4th to 6th June, 1918. J. T. W. Brown, secretary.

Goombungee.—Goombungee Agricultural, Horticultural, and Pastoral Society. Show date: 27th March, 1918. E. J. Moore, secretary.

Goondiwindi.—Macintyre Pastoral and Agricultural Society. Show dates: 23rd and 24th April, 1918. J. A. Hall, secretary.

Gympie.—Gympie Agricultural, Mining, and Pastoral Society. Show dates: 28th and 29th August, 1918. F. W. Shepherd, secretary.

Ipswich.—The Queensland Pastoral and Agricultural Society. Show dates: 22nd and 23rd May, 1918. G. W. Allen, secretary.

Kilcoy.—Kilcoy Pastoral, Agricultural, and Industrial Society. Show dates: 4th and 5th July, 1918. A. R. Hooper, secretary.

Kilkivan.—Kilkivan Pastoral, Agricultural, and Industrial Association. Show dates: 29th and 30th May, 1918. M. O. Aronsten, secretary.

Killarney.—Killarney Agricultural Society. Show dates: 27th and 28th February, 1918. W. D. McGilvray, secretary.

Kingaroy.—Agricultural, Pastoral, and Industrial Society. Show dates: 24th and 25th April, 1918. R. A. Pearse, secretary.

Lockyer.—Lockyer Agricultural and Industrial Society. R. Thomas, secretary.

Longreach.—Longreach Pastoral and Agricultural Society. J. Forrest, secretary.

Lowood.—Lowood and Tarampa Pastoral and Agricultural Association. Show dates: 7th and 8th May, 1918. W. E. Michel, secretary.

Marburg.—Marburg and District Agricultural and Industrial Association. Show dates: 1st and 3rd June, 1918. F. H. Bielefeld, secretary.

Maryborough.—Wide Bay and Burnett Pastoral and Agricultural Society. Show dates: 11th to 13th June, 1918. H. A. Jones, secretary.

Nambour.—Maroochy Pastoral, Agricultural, Horticultural, and Industrial Society. Show dates: 24th and 25th July, 1918. J. J. Wilkinson, secretary.

Nanango.—Nanango Agricultural, Pastoral, and Mining Society. Show dates: 6th and 7th March, 1918. S. Cavaye, secretary.

North Pine.—The Pine Rivers Agricultural, Horticultural, and Industrial Association. Show dates: 21st and 22nd June, 1918. G. Armstrong, secretary.

Pittsworth.—Pittsworth Pastoral, Agricultural, and Horticultural Association. Show date: 23rd January, 1918. L. G. Sims, secretary.

Pomona.—Noosa Agricultural, Horticultural, and Industrial Society. Show dates: 15th and 16th May, 1918. H. Robinson, secretary.

Rockhampton.—Rockhampton Agricultural Society. Show dates: 20th to 22nd June, 1918. H. Hill, secretary.

Roma.—Western Pastoral and Agricultural Association of Queensland. F. W. Mills, secretary.

Rosewood.—Rosewood Agricultural and Horticultural Association. Show dates: 24th and 25th July, 1918. A. J. Loveday, secretary.

Southport Agricultural, Horticultural, and Industrial Society. S. H. Earle, secretary.

Stanthorpe.—Stanthorpe Agricultural Society. Show dates: 7th and 8th February, 1918. A. E. Bateman, secretary.

Toowoomba.—Royal Agricultural Society of Queensland. Show dates: 16th to 18th April, 1918. G. Noble, secretary.

Toombul Agricultural, Horticultural, and Industrial Association. F. Shaw, secretary.

Warwick.—Eastern Downs Horticultural and Agricultural Association. Show dates: 12th to 14th February, 1918. H. Sterne, secretary.

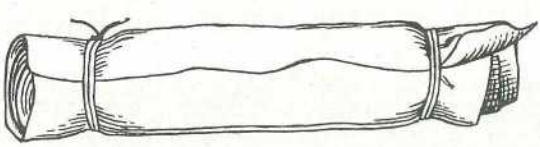
Wondai.—Wondai Agricultural, Pastoral, and Industrial Society. Show dates: 22nd and 23rd May, 1918. H. J. Compagnoni, secretary.

Woodford.—Woodford Agricultural, Pastoral, and Industrial Society. Show dates: 18th and 19th July, 1918. G. H. Osmond, secretary.

Zillmere.—Zillmere Agricultural, Horticultural, and Industrial Society. Show date: 21st September, 1918. A. B. Marquis, secretary.

TO CLEAN RUSTED HORSE-SHOE NAILS.

During the rainy season in the tropics, horse-shoe nails, even though covered, frequently get so rusty as to be quite unusable. Mr. J. F. Keane, Mareeba, says:—"To clean them, take a few (twenty-four is a convenient number) and pack them heads to point in equal numbers on a strip of canvas or sacking long enough to wrap about three times round them. Roll them up tightly, and tie two strings, also tightly,

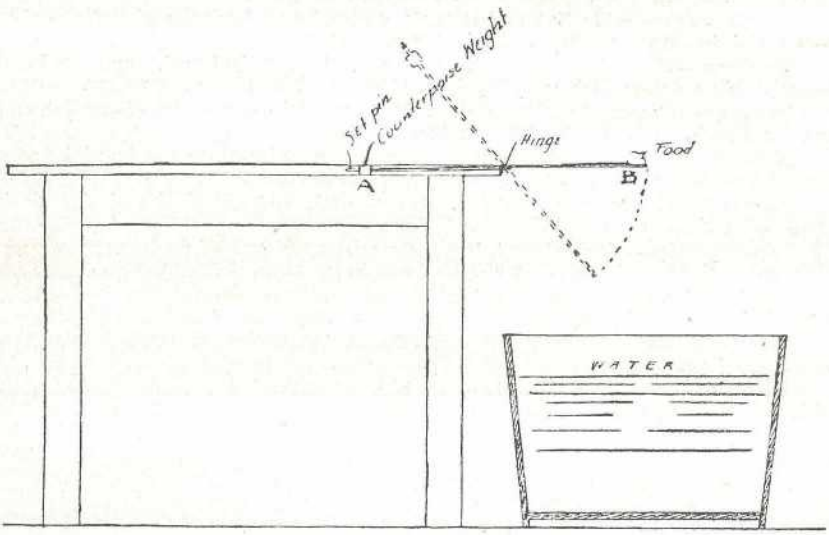


round the parcel, close to the heads of the nails, as shown in the illustration, which is half natural size. Roll the parcel backwards and forwards between the palms for three or four minutes. Then cut the string, blow the rust or dust off the nails, and they will be found as bright as new pins, ready for use.

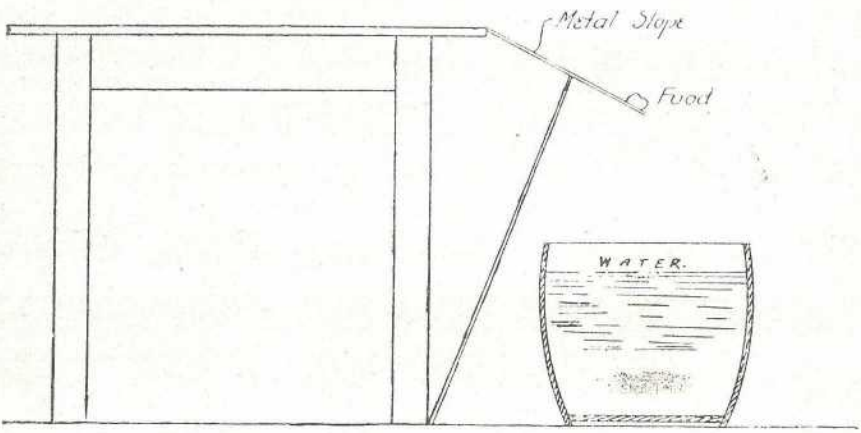
"Rusty needles may also be burnished in this way, if there are enough to make a roller, using a piece of strong, light rag."

NOTES ON SIMPLE RAT TRAPS.

The "Journal of the Board of Trade," England, devotes several pages to a description of various devices for entrapping the wary rat, two of which we select as likely to be of use to readers who are troubled with rats in the house. No. 1 is the Table or Shelf Trap, No. 2 the Table Slope Trap, here illustrated.



No. 1.—The Table or Shelf Trap.



No. 2.—The Table Slope Trap.

Answers to Correspondents.

THE BRITISH ARMY.

IGNORAMUS—

There are many who put to us the questions as to the constitution of the British Army. This information can be obtained correctly by an application to headquarters. So far, however, as we can help you to an idea of the numbers constituting regiments, battalions, brigades, army corps, divisions, &c., take the following:—

"The unit of cavalry is a regiment, and of infantry a battalion. Each British cavalry regiment in war consists of about 553 officers and men, each regiment containing three squadrons of 164 men (besides the machine-gun section, ambulance, &c.). Three cavalry regiments make a cavalry brigade (about 1,700 officers and men), and four cavalry brigades make a cavalry division, which, including four batteries of horse artillery (24 guns) and other troops attached to it, numbers about 10,000 officers and men. An infantry battalion numbers about 1,020 all told. Four battalions go to an infantry brigade (about 4,150). A division (of infantry) consists of three infantry brigades (about 12,400), with 70 guns, engineers, ambulances—in all, amounting to just under 20,000 men. Two divisions make an army corps (40,000). Any number of army corps—but usually from two to five or six—may be clubbed together as an army. An army corps (which was a unit invented by Napoleon) is in most countries increased from 40,000 to nearer 50,000 when all the reserves have had time to join."

COTTON BONUS.

COTTON-GROWER—

No. The Commonwealth bonus of 10 per cent. on cotton produced in Queensland was only in force from 1st July, 1907, to 13th June, 1916, when it lapsed. It affected the grower in that the purchaser of the seed cotton, who ginned it, by obtaining the bonus, was enabled to give the grower a higher price for his product delivered at the ginnery. The Department of Agriculture and Stock for the coming season and two subsequent seasons will make an advance to cotton-growers of 2d. per lb. on all good, clean cotton delivered at the Department's ginnery, William street. Any profit accruing after the cotton has been ginned and sold will be divided amongst suppliers according to the quantity sent in to be dealt with.

The Markets.

PRICES OF FARM PRODUCE IN THE BRISBANE MARKETS FOR JANUARY, 1918.

Article.		JANUARY. Prices.
Bacon	lb.	9½d. to 10d.
Barley	bush.	2s. 6d. to 3s.
Bran	ton	£5 15s.
Broom Millet	„	£30 to £50
Butter	cwt.	149s. 4d.
Chaff, Mixed	ton	£3 10s. to £4
Chaff, Oaten	„	£6 10s.
Chaff, Lucerne	„	£3 to £5
Chaff, Wheaten	„	£4 5s. to £4 15s.
Cheese	lb.	9½d. to 10d.
Flour	ton	£12
Hams	lb.	1s. 3d. to 1s. 10d.
Hay, Oaten	ton	£7 10s.
Hay, Lucerne	„	£2 5s. to £2 15s.
Hay, Wheaten	„	£4 5s.
Honey	lb.	2½d. to 3d.
Maize	bush.	4s. 6d. to 5s.
Oats	„	1s. 6d. to 2s. 6d.
Onions	ton	£8 to £10
Peanuts	lb.	4d. to 6d.
Pollard	ton	£6 12s. 6d. to £7
Potatoes	„	£2 10s. to £7 5s.
Potatoes (Sweet)	sug. bag	1s. 9d. to 2s.
Pumpkins (Cattle)	ton	£2 10s. to £6
Eggs	doz.	9d. to 1s. 2d.
Fowls	per pair	4s. to 5s.
Ducks, English	„	4s. 6d. to 5s.
Ducks, Muscovy	„	7s. to 8s. 6d.
Geese	„	10s. to 11s.
Turkeys (Hens)	„	12s. to 14s.
Turkeys (Gobblers)	„	18s. to 26s.
Wheat	bush.	4s. 2d. to 4s. 3d.

VEGETABLES—TURBOT STREET MARKETS.

Asparagus, per dozen bundles	6s. to 12s.
Cabbages, per sack	2s. 6d. to 6s.
Cauliflowers, per dozen	...
Chocos, per dozen	1s. 6d. to 2s.
Beans, per sugar bag	3s. 6d. to 6s.
Peas, per sugar bag	4s. to 7s.
Carrots, per dozen bunches	4d. to 1s.
Beetroot, per dozen bunches	6d. to 9d.
Lettuce, per dozen	1s. to 1s. 6d.
Parsnips, per dozen bundles	6d. to 1s.
Sweet Potatoes, per sugar bag	1s. 6d. to 2s.
Table Pumpkins, per dozen	1s. to 2s. 6d.
Marrows, per dozen	6d. to 1s. 6d.
Tomatoes, per case	2s. 6d. to 4s.
Cucumbers, per dozen	1s. to 1s. 6d.

SOUTHERN FRUIT MARKETS.

Article.	JANUARY. Prices.
Bananas (Queensland), per crate	9s. to 12s.
Bananas (Tweed River), per crate	4s. to 6s.
Bananas (Fiji), per bunch...	5s. to 6s. 6d.
Bananas (G.M.), per crate	18s. to 21s.
Mangoes, per case	4s. to 5s.
Oranges (Navel), per case	10s. to 14s.
Oranges (Seville), per bushel case	...
Oranges (other), per case	7s. to 10s.
Papaw Apples, per half-bushel case	6s. to 7s.
Passion Fruit, per half case	4s. to 7s.
Pineapples (Queens), per double case	10s. to 14s.
Pineapples (Ripleys), per double case	7s. to 9s.
Pineapples (Common), per double case	7s. to 9s.
Tomatoes (Queensland), per half-bushel case	1s. 6d. to 3s.
Cucumbers, per bushel case	6s. to 8s.
Strawberries, per lb.	...

PRICES OF FRUIT—TURBOT STREET MARKETS.

Article.	JANUARY. Prices.
Apples, Eating, per bushel case	15s. to 22s.
Apples, Cooking, per bushel case	3s. to 5s. 6d.
Apricots, per case	4s. to 6s.
Bananas (Cavendish), per dozen	1½d. to 4½d.
Bananas (Sugar), per dozen	4d. to 4½d.
Cape Gooseberries, per quart	9d.
Cherries, per box	7s. to 11s.
Citrons, per hundredweight	10s.
Cocoanuts, per sack	12s. to 15s.
Cumquats, per quarter-case	...
Grapes, per lb.	1½d. to 4d.
Lemons (Lisbon), per case	6s. to 8s.
Mandarins, per case	10s. to 15s.
Mangoes, per case	3s. to 6s.
Oranges (Navel), per case	17s. 6d.
Oranges (Seville), per hundredweight	3s. 6d. to 10s.
Oranges (other), per case	6s. to 12s.
Papaw Apples, per quarter-case	1s. to 1s. 6d.
Passion Fruit, per quarter-case	2s. to 3s.
Peaches, per quarter-case	3s. to 6s. 6d
Pears, per quarter-case	12s. 6d. to 18s. 6d.
Peanuts, per lb.	4d. to 6d.
Pineapples (Ripleys), per dozen	6s. 6d to 7s. 6d.
Pineapples (Rough), per dozen	2s. to 5s.
Pineapples (Smooth), per dozen	3s. to 5s.
Plums, per half-bushel case	4s. to 5s. 6d.
Plums, per quarter case	2s. to 3s.
Rockmelons, per dozen	1s. to 2s.
Strawberries, per dozen boxes	2s. to 3s. 6d.
Tomatoes, per case	3s. to 5s. 6d.
Watermelons, per dozen	2s. to 7s.

TOP PRICES, ENOGGERA YARDS, DECEMBER, 1917.

Animal.	DECEMBER. Prices.
Bullocks	£24 5s. to £28 2s. 6d.
Cows	£16 12s. 6d. to £20 2s. 6d.
Cows (Single)	...
Merino Wethers	46s. 6d.
Crossbred Wethers	50s.
Merino Ewes	30s.
Crossbred Ewes	44s. 9d.
Lambs	37s. 3d.
Pigs (Backfatters)	£5
Pigs (Baconers)	69s.
Pigs (Porkers)	58s.
Pigs (Slips)	13s. 6d.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

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

Divisions and Stations.	Average Rainfall.		Total Rainfall.		Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	Dec.	No. of Years' Records.	Dec., 1917.	Dec., 1916.		Dec.	No. of Years' Records.	Dec., 1917.	Dec., 1916.
North Coast.	In.		In.	In.	*South Coast*—continued:	In.		In.	In.
Atherton	7·10	15	9·81	17·74	Nambour	6·03	20	7·74	13·80
Cairns	8·99	34	13·14	25·14	Nanango	3·64	24	4·54	3 39
Cardwell	8·14	44	12·27	24·15	Rockhampton ...	4·33	29	3·09	9·44
Cooktown	6·67	40	21·68	16·63	Woodford	5·25	29	5·56	11·02
Herberton	5·35	29	7·39	13·81					
Ingham	6·28	24	18·26	24·98	*Darling Downs.*				
Innisfail	11·91	35	25·33	29·99					
Mossman	16·20	5	15·37	26·43	Dalby	3·14	46	4·07	1·64
Townsville	5·44	45	11·03	17·99	Emu Vale	3·49	20	5·05	2·51
					Jimbour	3·22	28	3·26	1·04
Central Coast.					Miles	2·57	31	1·96	2·07
					Stanthorpe ...	3·45	43	5·99	2·59
Ayr	3·56	29	8·22	8·31	Toowoomba ...	4·19	44	6·10	3·72
Bowen	4·13	45	16·05	11·04	Warwick	3·46	29	4·95	2·26
Charters Towers ...	3·50	34	3·09	10·69					
Mackay	6·76	45	13·19	17·56					
Proserpine	7·79	13	19·30	24·54	*Maranoa.*				
St. Lawrence ...	4·28	45	8·32	8·45					
					Roma	2·32	42	2·34	3·38
South Coast.									
					State Farms, &c.				
Biggenden	4·74	17	3·28	2·66					
Bundaberg	4·45	33	3·02	6·63					
Brisbane	5·02	66	5·19	5·10	Bungeworgorai ...	2·83	5	3·10	5·69
Childers	5·23	21	2·64	6·29	Gatton College ...	3·32	17	7·14	2·63
Crohamhurst ...	6·57	23	7·38	12·33	Gindie	2·58	17	2·23	9·82
Esk	4·35	29	6·17	2·93	Hermitage ...	2·64	10	4·38	2·82
Gayndah	3·86	45	2·91	3·38	Kairi	9·79	5	10·55	18·89
Gympie	5·89	46	6·91	5·31	Kamerunga ...	6·30	26	13·91	23·58
Glasshouse M'tains	6·64	8	...	14·24	Sugar Experiment Station, Mackay	7·99	...	13·04	24·44
Kilkivan	4·28	37	4·39	3·98	Warren	4·34	5	3·28	7·93
Maryborough ...	4·49	45	5·21	5·59					

NOTE.—The averages have been compiled from official data during the periods indicated; but the totals for December, 1917, and for the same period of 1916, having been compiled from telegraphic reports, are subject to revision.

GEORGE G. BOND, Divisional Officer.

Farm and Garden Notes for March.

FIELD.—Take every opportunity of turning up the ground in readiness for sowing and planting winter crops. The main crop of potatoes should at once be planted. As the growth of weeds will now be slackening off, lucerne may be sown on deeply cultivated soil. The latter should be rich and friable, with a porous subsoil. The land should be thoroughly pulverised. Do not waste time and money in trying to grow lucerne on land with a stiff clay subsoil. Prepare the land a couple of months before sowing, care being taken to cross plough and harrow before the weeds have gone to seed. This ensures a clean field. Sow either broadcast or in drills. In the former case, 20 lb. of seed will be required; in the latter, 10 lb. A good stand of lucerne has been obtained with less quantities. Should weeds make their appearance before the plants have sent down their tap roots, mow the field. Before they can again make headway enough to do any damage, the lucerne will be strong enough to hold its own against them. Harrow and roll the land after mowing. Gather all ripe corn. It is now too late to sow maize, even 90-Day, with any certainty of harvesting a crop of grain. Rye grass, prairie grass, oats, barley (in some districts, wheat), sorghum, vetches, carrots, mangolds, and Swede turnips may be sown. In Northern Queensland, sow tobacco seed, cowpea, carob beans, sweet potatoes, opium poppy, &c. Sow anatto, jack fruit, and plant kola-nut cuttings. Some temperate-zone vegetables may be planted, such as egg plant, potatoes, &c. Coffee-planting may be continued. Harvest kafir corn and paddy. Cotton picking will now be in full swing. Pick cleanly, and expose to the sun for a few hours before storing or baling. Pick none but fully ripe bolls.

FLOWER GARDEN.—Now is the time to plant out bulbs. A complete garden could be furnished with these charming plants, which are to be had in every colour and variety. Amongst the many are—Amaryllis, anemone, arum, babiana, crinum, crocus, freesia, ranunculus, jonquils, iris, ixias, gladiolus, narcissus, Jacobean, lilies, tigridia, tritonia.

All bulbs like well-drained, somewhat sandy soil, with a plentiful admixture of leaf mould. Herbaceous plants and annuals which it is intended to raise from seed should be sown this month. Such are antirrhinums (snapdragon), asters, cornflowers, dianthus, larkspurs, daisies, cosmea, candytuft, lupins, gaillardias, godetia, mignonette, poppies, pansies, phlox, sweet peas. Cannas now planted will require plenty of food in the shape of liquid manure. Put in cuttings of carnations. Chrysanthemums require attention in the way of disbudding, staking, watering with liquid manure, &c. Growers for exhibition will thin out to a few buds and protect the flowers from rain and sun. Dahlias should be looking well. To secure fine blooms, disbudding should be done.

Now, as to climbers which may now be planted. These are—*Allamanda Schotii* (beautiful yellow), *Antigonon leptopus*, a charming cerise-coloured climber; *Aristolochia elegans*, handsome as an orchid, and easily grown; *Aristolochia ornithocephala* (Dutchman's Pipe), very curious, large, always attracts attention; *Asparagus plumosa* grows in any shady place; *Beaumontia grandiflora*, splendid white flower, grand for a fence, will grow 50 ft. high; Bignonias of several kinds; Bougainvilleas, with their splendid leafy pink and purple flowers, rapidly clothe a fence or unsightly shed with a blaze of blossom; *Quisqualis indica*, a fine creeper, flowers pink, changing to white; Wistaria, purple and white. Most beautiful is the *Bauhinia scandens*, rarely seen about Brisbane. We grew a plant of this climber at Nundah, and it soon closed in the front of the veranda for a distance of over 80 ft. The leaves are very small, and in the flowering season it presents almost a solid mass of beautiful round bunches of blossoms, something like the hawthorn bloom—pink and white. It seeds freely, but the seeds are difficult to germinate, and when they have produced a plant it is still more difficult to rear it. A rooted sucker from the main stem will in all probability grow.

KITCHEN GARDEN.—During this month a very large variety of vegetable seeds may be sown in readiness for planting out where necessary in the autumn, which begins on the 20th of March. All unoccupied land should be roughly dug, and, where required, add well-decomposed manure. Transplant cabbage, cauliflower, celery, &c. Sow French and Broad beans, beet, carrot, turnips, radish, cabbage, cauliflower, cress, peas, onions, mustard, &c. Former sowings should be thinned out and kept clear of weeds. Mulch round melon and cucumber beds with a good dressing of long stable manure, as it assists in keeping the fruit clean and free from damp. Cucumbers, melons, French beans, and tomatoes should be looked for every day and gathered, whether required or not, for, if left on the vines to perfect their seeds, the plants will soon cease to be productive, or will form inferior, ill-shaped, and hence unsaleable fruit.

Orchard Notes for March.

THE SOUTHERN COAST DISTRICTS.

The marketing of the main crop of pineapples will continue to occupy the attention of growers; and as it is probable that the plantations have been allowed to get somewhat dirty during the previous month, they should be cleaned up as soon as ever the crop has been got off. The fruit of the new crop of citrus fruit will be showing signs of ripening towards the end of the month; and, as the fruit during this period of its growth is very liable to the attack of insect pests of various kinds, it is important that steps should be taken to prevent loss arising from this cause as far as possible.

Large sucking moths of several kinds attack the fruit as soon as it shows signs of ripening; and, as they always select the first fruit that shows signs of colouring, it is a good plan to gather a few forward fruit and to ripen them up quickly by placing them on a barn floor, and covering them up with bags or straw. They will turn colour in a few days, and develop the characteristic scent of the ripening fruit. The fruit so treated should be hung up in conspicuous places in the orchard as trap-fruit, as not only will it attract the moths, but also the fruit-flies. The moths will be found clustered round the trap-fruits in large numbers, and can then be easily caught and destroyed. Fruit-fly will also puncture such fruit; and if the fruit is destroyed before the larvæ reach maturity, a later crop of these insects is prevented from hatching out. Fruit-flies may also be caught in large numbers by means of such artificially ripened fruits. The fruits are smeared with tanglefoot, and hung about the orchard. The fly, attracted by the colour, settles on the fruit, and is caught in a similar manner to house-flies on specially prepared sticky paper. These simple remedies, if carefully carried out, will result in the destruction of large numbers of sucking moths and fruit-flies.

The yellow peach-moth that does such damage to peaches in spring, and that attacks corn, sorghum, cotton bolls, custard apples, and many other plants and fruits, often does a lot of damage to citrus fruits. It acts in a very similar manner to the second and later generations of the codling moth of pomaceous fruits, in that it lays its eggs where two fruits touch, under the shelter of a leaf on the fruit, at the stem end of the fruit, and, in the case of navel oranges, in the navel itself; in fact, anywhere that there is a likelihood of the egg not being disturbed. The egg hatches out into a small spotted caterpillar, which eats its way into the fruit, causing it to ripen prematurely, and fall off. Where two fruits touch, it often eats into and destroys both, and it frequently leaves one fruit to go and destroy a second. It is a very difficult insect to deal with, owing to the number of fruits and plants on which it lives; but, as far as citrus fruits are concerned, the best remedy is undoubtedly to spray the fruit with a remedy that will destroy the young insect when it starts to eat the skin of the fruit. Bordeaux mixture has been found efficacious, but I am of opinion that spraying with Paris green and lime, Kedzie's mixture, or arsenite of lead will also have good results. The latter poison is, in my opinion, well worth giving a thorough test, as it sticks to the fruit and leaves for a long time. Bordeaux mixture, either alone or in conjunction with Paris green or Kedzie's mixture, is, however, a good remedy, as not only will it destroy the larvæ or prevent the moth from attacking the tree, but it is also the best remedy for black brand or melanose, as well as tending to keep all other fungus pests in check. Fight fruit-fly systematically—both by means of the sticky fruit already recommended and by gathering all fly-infested fruit, such as guavas, late mangoes, kumquats, &c., as well as any oranges or mandarins that may have been infested, as if kept in check now there will be little loss throughout the season. A little fruit will be marketed towards the end of the month. See that it is gathered and sweated for seven days before marketing, and don't gather it too immature. Beauty of Glen Retreat mandarins are often gathered and marketed as soon as they show signs of colouring. They are then as sour as a lemon, and anyone who is unlucky enough to buy them will steer off mandarins for some time to come. This variety should not be gathered till thoroughly ripe, as when marketed in an immature state it spoils the market, as it puts people off eating citrus fruit.

Clean up the orchard after the summer rains, and have everything ready for the marketing of the crop. See that there is a good supply of clean, dry case timber on hand, as one of the greatest sources of loss in shipment is packing fruit in green cases.

Strawberry planting can be done throughout the month. Plant such berries as Federation on the lowest ground, and Aurie, Anetta, Trollop's Victoria, and Glenfield Beauty on warm, well-drained soils. Prepare the land thoroughly, so that it is in perfect tilth, and in a fit state to retain moisture well; as on this, as much as anything, the success of the crop depends. Where new orchards are to be planted, get the land ready—not the clearing, which should have been done months ago, but the working of the land, as it is advisable to get it thoroughly sweetened before putting the trees in.

THE TROPICAL COAST DISTRICTS.

The Notes for February apply equally to March. See that bananas are netted—keep down weed growth, and market any sound citrus fruits. Clean up the orchards as well as possible, and keep pines clean. Get land ready where new orchards are to be set out, as tree-planting can be done during April and May. Pines and bananas can still be planted, as they will become well established before winter.

THE SOUTHERN AND CENTRAL TABLELANDS.

Finish the gathering of the later varieties of deciduous fruits, as well as grapes. Clean up the orchard, and get ready for winter. Get new land ready for planting; and where there are old, dead, or useless trees to be removed, dig them out and leave the ground to sweeten, so that when a new tree is planted to replace them the ground will be in good order.

In the drier parts, where citrus trees are grown, keep the land well worked, and water where necessary.

GUNFIRE AND RAINFALL.

There used to exist, and it exists even to the present day, a popular belief that the explosion of guns induces rainfall, and special guns were constructed with the object of bringing down falls of rain during dry seasons. Several experiments to test this theory were made some years ago in Queensland by means of kites and guns, but all resulted in failure.

In an article in the London "Times" of 21st December, 1914, we find the following notes on the subject:—

"An impression has arisen in some quarters that the heavy and persistent rains recently experienced in this country (Great Britain) are attributable to abnormal atmospheric disturbances produced by heavy gun-firing at the seat of war. The idea is by no means novel, and, like other meteorological myths (such, for instance, as the belief in thunderbolts and the supposed influence of the moon upon our weather), it seems to possess a bullet-proof hide and takes any amount of killing. About four years ago the First Lord of the Admiralty was asked in the House of Commons whether he would instruct the Fleet to carry out their heavy gun practice at some period of the year other than in the middle of harvest time, 'when the resultant heavy rain may cause serious loss to the farming community.' A similar suggestion was made at the instance of a member of the Highland and Agricultural Society of Scotland who, at a meeting of that body, moved that 'the Admiralty be petitioned to discontinue heavy gun-fire round the coasts in August and September, when clouds were about' (*sic*), the speaker adding that 'firing was apt to bring down rain, and at that time of the year fine weather was desirable.' It may be said at once that the idea is absolutely without foundation. Experiments made some years ago in America and on the Continent showed that in droughty weather no amount of concussion in the air artificially produced had the slightest effect in the production of rain.

"At the present time there is one fact which should (one scarcely likes to believe that it will) at once dispose of the cherished theory. In spite of occasional displays of unwonted activity, there are no reasons for thinking that gun-firing at the front is more violent than it was in the earlier stages of the war. The spell of unsettled weather should, therefore, have commenced shortly after the outbreak of hostilities. As a matter of fact, nothing of the kind took place. In August and September the rainfall in the south-east of England was, on the contrary, much below the average, and in October there was again a considerable though less marked deficiency.

"As an instance of the unreliability of the notion respecting the effect of detonation upon rainfall, a correspondent of 'Symons's Meteorological Magazine' drew attention some little time ago to the fact that at Shoeburyness, where at certain seasons of the year big guns are being fired almost daily, the average annual rainfall is smaller than in any other part of the United Kingdom."

ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY D. EGLINTON, F.R.A.S.

TIMES OF SUNRISE AND SUNSET AT BRISBANE.

1918.	JANUARY.		FEBRUARY.		MARCH.		APRIL.	
Date.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.
1	4·57	6·46	5·21	6·41	5·41	6·19	5·58	5·46
2	4·58	6·46	5·22	6·41	5·41	6·18	5·59	5·45
3	4 59	6·46	5·23	6·40	5·42	6·17	5·59	5·44
4	4 59	6·46	5·24	6·40	5·43	6·16	6·0	5·43
5	5·0	6·46	5·25	6 39	5·44	6·15	6·0	5·42
6	5·1	6·47	5·25	6·39	5·45	6·14	6·1	5·41
7	5·2	6·47	5·26	6·38	5·45	6·13	6·1	5·39
8	5·3	6·47	5·27	6·37	5·46	6·12	6·2	5·38
9	5·3	6·47	5·28	6 36	5·46	6·11	6·2	5·37
10	5·4	6·48	5·29	6·35	5·47	6·10	6·3	5·36
11	5·5	6·48	5·29	6·35	5·47	6·9	6·3	5·35
12	5·6	6·47	5·30	6·34	5·48	6·8	6·4	5·34
13	5·6	6·47	5·31	6·33	5·48	6·7	6·4	5·33
14	5·7	6·47	5·32	6·32	5·49	6·6	6·5	5·32
15	5·8	6·47	5.32	6 32	5·49	6·5	6·5	5·31
16	5 9	6·47	5·33	6·31	5·50	6·3	6·6	5·30
17	5·9	6·47	5·34	6·30	5·50	6 2	6·6	5·29
18	5·10	6·47	5·35	6·29	5·51	6·1	6·7	5·28
19	5·11	6·47	5·35	6·28	5·51	6·0	6·7	5·27
20	5·12	6·46	5.36	6·28	5 52	5·59	6·8	5·26
21	5·13	6·46	5·37	6·27	5·52	5·58	6·8	5 25
22	5·13	6·46	5·37	6 26	5·53	5·57	6·8	5·24
23	5·14	6·45	5·38	6·25	5·53	5·56	6 9	5·23
24	5·15	6 45	5·38	6·24	5 54	5·55	6·9	5·23
25	5·16	6·45	5·39	6·23	5·54	5·54	6·10	5·22
26	5 16	6·44	5·39	6·22	5·55	5·52	6·10	5·21
27	5·17	6·44	5·40	6·21	5·55	5·51	6·11	5·20
28	5·18	6·43	5·40	6·20	5·56	5·50	6·11	5·19
29	5·19	6·43	...	...	5·57	5·49	6·12	5·18
30	5·19	6·42	...	..	5·57	5·48	6·12	5·18
31	5·20	6·42	...	...	5·58	5·47	...	...

PHASES OF THE MOON.

The Phases of the Moon commence at the times stated in Queensland, New South Wales, Victoria, and Tasmania.

			H.	M.	
5 Jan.	☽	Last Quarter	9	49	p.m.
13 ,,	●	New Moon	8	36	a.m.
20 ,,	☾	First Quarter	12	38	,,
27 ,,	○	Full Moon	1	14	p.m.

The Moon will be at Perigee on 15th, Apogee on 3rd and 31st.

4 Feb.	☽	Last Quarter	5	52	p.m.
11 ,,	●	New Moon	8	5	,,
18 ,,	☾	First Quarter	10	57	a.m.
26 ,,	○	Full Moon	7	35	p.m.

The Moon will be at Perigee on 12th, Apogee on 28th.

6 Mar.	☽	Last Quarter	10	44	a.m.
13 ,,	●	New Moon	5	52	p.m.
19 ,,	☾	First Quarter	11	30	,,
28 ,,	○	Full Moon	1	33	,,

The Moon will be at Perigee on 13th, Apogee on 27th.

4 April	☽	Last Quarter	11	33	p.m.
11 ,,	●	New Moon	2	34	,,
18 ,,	☾	First Quarter	2	8	,,
26 ,,	○	Full Moon	6	5	,,

The Moon will be at Perigee on 10th, Apogee on 23rd.

For places west of Brisbane, but nearly on the same parallel of latitude—27½ degrees S.—add 4 minutes for each degree of longitude. For example, at Toowoomba the sun would rise and set about 4 minutes later than at Brisbane if its elevation (1,900 feet) did not counteract the difference in longitude. In this case the times of sunrise and sunset are nearly the same as those for Brisbane.

At St. George, Cunnamulla, Thargomindah, and Oontoo the times of sunrise and sunset will be about 18 m., 30 m., 38 m., and 49 minutes, respectively, later than at Brisbane.

At Roma the times of sunrise and sunset may be roughly arrived at by adding 17 minutes to those given above for Brisbane.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhere about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

For the sunrise and sunset at Rockhampton, Townsville, Cairns, and other places in Queensland, readers may be referred to the "Queenslander" to which newspaper monthly astronomical notes will be supplied.—D.E.