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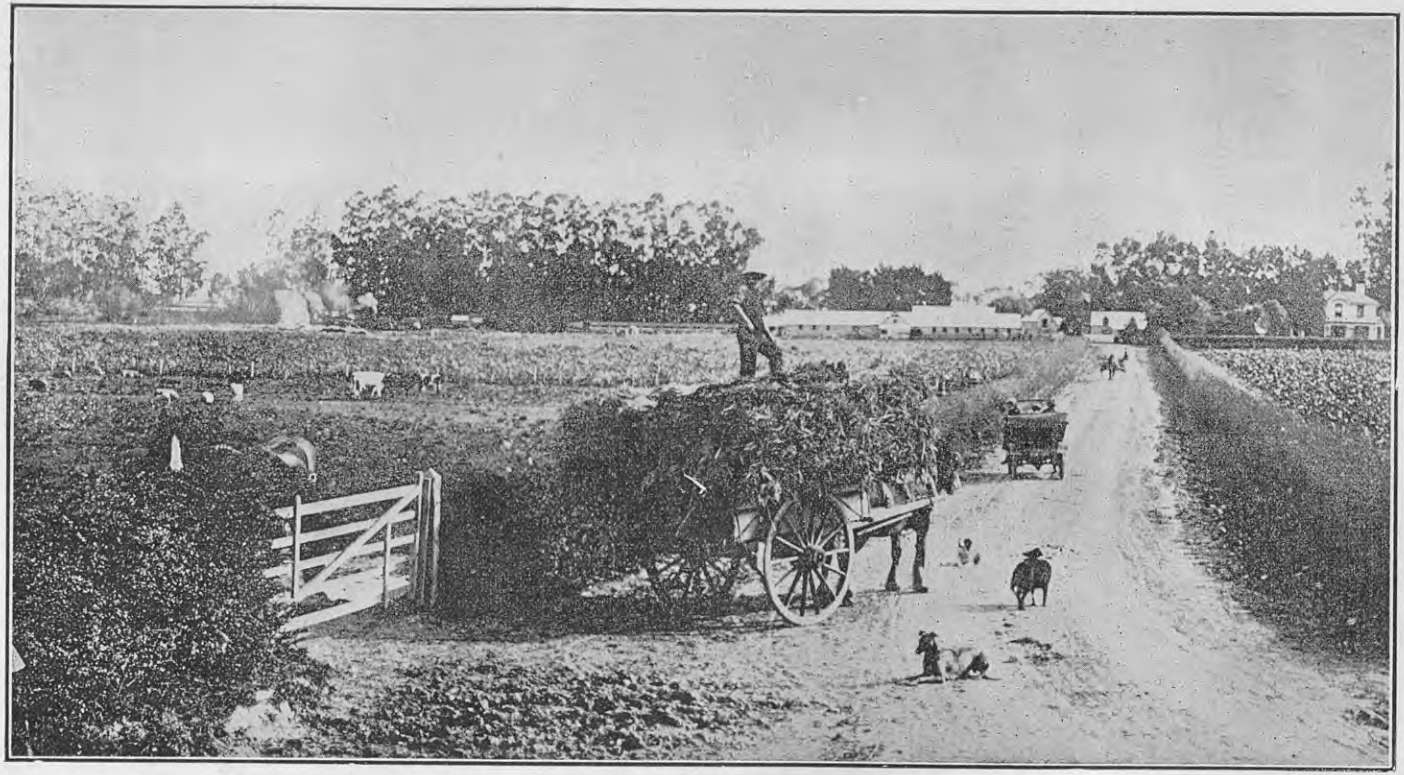


On the Taieri Plain.

The

Journal of Agriculture.

WELLINGTON, NEW ZEALAND.

20TH MARCH, 1916.

WEEDS AND THEIR IDENTIFICATION.

CONTINUED.

ESMOND ATKINSON, Biological Assistant.

THISTLES.

IF we consider their great abundance throughout the country and their powers of spreading rapidly both by seeds and roots, we must rank the various species of thistles found in New Zealand as among the most important weeds with which the farmer has to deal. In this article six of the commonest species are described and illustrated. These are:—

Spear thistle (*Carduus lanceolatus*).
Nodding thistle (*Carduus nutans*).
Winged thistle (*Carduus pycnocephalus*).
Californian thistle (*Carduus arvensis*).
Milk thistle (*Carduus Marianus*).
Woolly-headed thistle (*Carduus eriophorus*).

IDENTIFICATION.

Stems winged.

Heads large, upright, with narrow spines ..	*Carduus lanceolatus.*
Heads large, drooping, with broad spines ..	*Carduus nutans.*
Heads small, clustered	*Carduus pycnocephalus.*

Stems not winged.

Plant with creeping underground stems ..	*Carduus arvensis.*
Plants without creeping underground stems—	
Leaves very large, with white veins ..	*Carduus Marianus.*
Leaves smaller, without white veins ..	*Carduus eriophorus.*

This key is not intended to show the botanical relationships of the different thistles, but merely to provide a quick means of distinguishing them from one another. The genus *Carduus* is divided by some botanists into two genera, *Cnicus* and *Carduus* proper, the species of the former genus having feathery pappus-hairs, while those of the latter have simple pappus-hairs. By this classification two of the species, nodding thistle and winged thistle, would remain in the genus *Carduus*, the others being placed in *Cnicus*, except milk thistle, which is often separated from the rest and made to constitute the genus *Silybum*. The differences between the three genera are not important, however, and in this article all will be included under *Carduus*.

SPEAR THISTLE.

Spear thistle is a rather stout and much-branched plant, growing usually to a height of from 2 ft. to 4 ft. Being biennial, this thistle does not produce flowers till the second season, the first-year plant consisting of a stout and long, only slightly branched tap-root, bearing at its crown a rosette of spreading leaves which are strongly lobed and prickly, dark green above and whitish beneath.

The stem, which is stout at its base, though rather slender in the ultimate branches, and is everywhere hairy, is irregularly winged for most of its length. The stem leaves are unlike the radical leaves in being shorter, narrower, and more pointed, and in having fewer, narrower, and longer lobes. The heads are rather large (1 in. to 1½ in. long by about the same in diameter), erect, solitary or two or three together at the tips of the branches. The involucre is egg-shaped, and each of the numerous bracts ends in a narrow, spreading spine, those towards the base of the head being recurved. A slight cottony web is found on the involucre, but it is insignificant in comparison with that of woolly-headed thistle. The florets are purple inclining to reddish. As the achenes ripen, the involucre opens out and becomes cup-like

SPEAR THISTLE.
Rather less than half natural size.

in shape, and is filled with the whitish feathery pappus-hairs, which soon become freed from one another and from the involucre and float away as the thistle-down so common on windy days in the late summer.

It is not known accurately how far the "seeds" are carried in this way. It varies with the different species, and also depends on external conditions, such as the dampness of the weather and the strength of the wind.

Spear thistle is very commonly known in this country as "Scotch" thistle.

NODDING THISTLE.

Like spear thistle, nodding thistle is a tall and stout biennial, but it does not form as broad or as symmetrical a plant, the branches arising from higher on the stem. In this respect it is more like woolly-headed thistle, presently to be described.

The stem is cottony, grooved, and, like that of the spear thistle, is winged for most of its length, but the wings are different in appearance, being much more deeply cut, very spinous, and often interrupted, so that often they are represented only by a series of prickles with more or less expanded bases. The leaves are deeply cut into many narrow lobes pointing alternately upwards and downwards; both surfaces of the leaf are more or less clothed with short hairs, and the veins beneath are woolly. The flower-heads differ from those of spear thistle in being larger (2 in. or more in diameter) and not so elongated, and also in their being drooping and not erect, this character having given the thistle its common name. The spines of the involucral bracts are also very distinctive, being three or four times as wide. The florets are of much the same purple colour as those of spear thistle, but the pappus-hairs are simple and not feathery. The flowers of nodding thistle have a rather strong and pleasant scent, which has given it the name by which it is sometimes known, "musk thistle."

WINGED THISTLE.

This thistle is a more slender plant than the two preceding ones, and is an annual, flowering in the first season from seed. The leaves are broad in proportion to their length, cottony beneath, waved and prickly on the margin, but not so deeply cut as those of either spear or nodding thistles. In all three plants the leaves are continued down the stem as wings, but winged thistle is aptly enough named, as the wings are very much broader than in the other two plants, and are more conspicuous through their being continuous all down the stem. The flower-heads are altogether different, as they are much smaller (1 in. or less long) and grow

NODDING THISTLE.

Rather less than half natural size.

in compact clusters at the tips of the branches. The involucres are narrow egg-shaped or oblong, the bracts rather broad but with slender recurved spinous tips, and the florets pinkish purple or whitish. As in nodding thistle, the pappus-hairs are simple and not feathery.

CALIFORNIAN THISTLE.

This thistle is the only one of the six under consideration which is perennial in habit. It is a tall rather slender species, reaching the height of 4 ft. or more. The stems are smooth or slightly cottony, grooved and angled, and much branched, particularly towards the upper part of the plant. The leaves are deeply cut and waved, and very prickly, rather pale green above, and more or less whitish beneath.

The flower-heads, which are abundantly produced in large open leafy bunches, have a strong honey-like scent. They are of two kinds, one producing pollen (male heads), the other having abortive anthers, and hence producing no pollen (female heads). The male and female heads are produced on separate plants, and, owing to the power this thistle has of spreading by creeping underground stems, a single plant may soon give rise, without the agency of seed, to a large patch. On account of this peculiarity, a whole district may be overrun with plants bearing exclusively one or other of the two types of flower-heads.*

It is quite easy to distinguish the two kinds of flowers, the males having roundish involucres, and showy spreading florets, lilac-purple varying to white in colour; while the female involucres are longer and narrower, and the florets less showy and darker in colour. In both kinds the projecting and prickly bracts of the involucre, so characteristic of most thistles, are absent, the bracts being pointed but without spines, and instead of being reflexed the tips lie close against the involucre. Just before the achenes are ripe the feathery pappus-hairs project in a dense tuft from the slightly expanded involucre, the whole head looking rather like a paint-brush.

MILK THISTLE.

A short description of this plant should be sufficient, as it can be at once distinguished in all its stages by the conspicuous milky-white leaf-veins which give it its common name. It is the largest and tallest of all the thistles naturalized in New Zealand, reaching

* The subject of the production of seed by Californian thistle was dealt with by Mr. A. H. Cockayne, Biologist, in an article published in the *Journal* for May, 1912 page 351).

WINGED THISTLE.

Rather less than half natural size.

the height of 6 ft., and having leaves sometimes 2 ft. long, though they are often smaller. Besides being longer, the leaves are broader and less deeply lobed than those of the other thistles. The heads are large and solitary, with egg-shaped involucres armed with very long and stout spines, which spread to a diameter of 3 in. or more, and are themselves armed with prickles at their bases. The florets are purple, and the pappus-hairs of the achenes which follow them are rather short, and are not clothed with feathery hairs, but are quite simple.

WOOLLY-HEADED THISTLE.

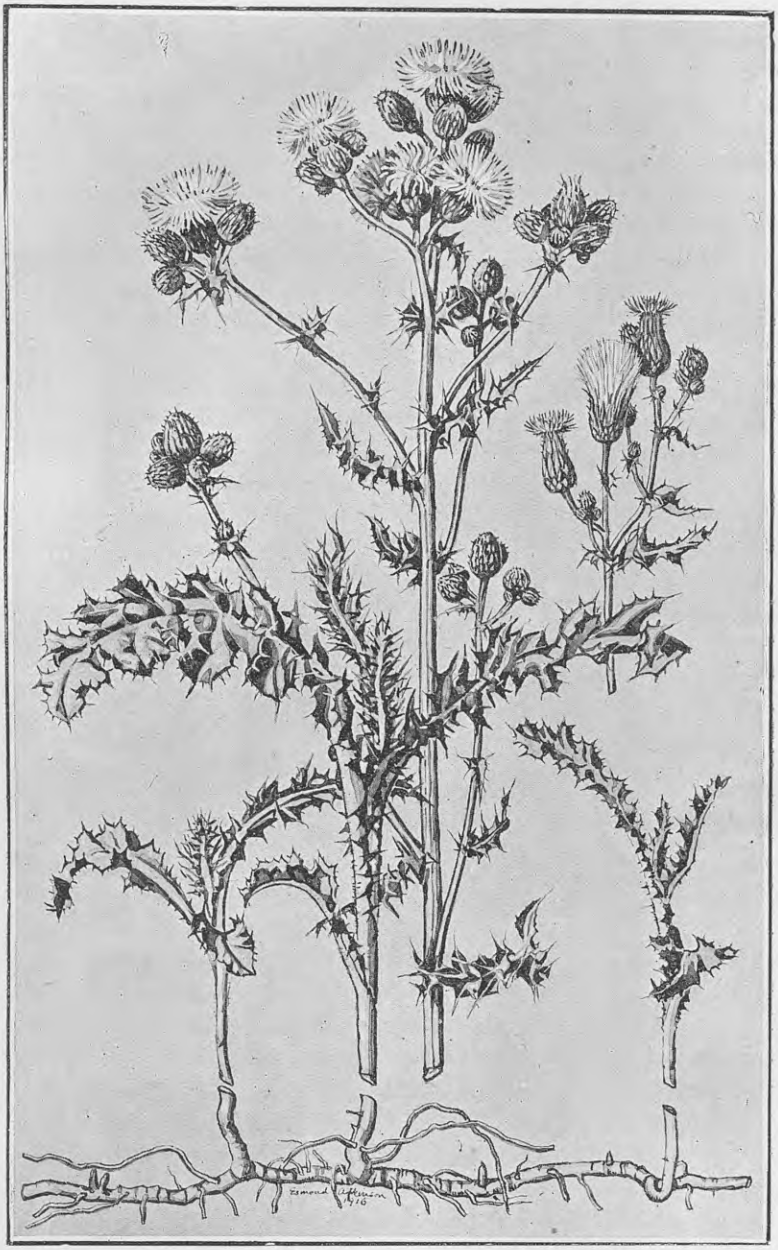
Although in the key this thistle is placed in a different section from spear thistle, owing to its not having a winged stem, it is closer to that plant in general appearance than to any other of the naturalized thistles. It may be at once separated from milk thistle, which is next to it in the artificial key, by its narrow leaves without white veins, woolly stem, and clustered cobwebby heads. From spear thistle it is distinguished by its less deeply lobed leaves, which are decidedly white beneath; by its very stout strongly corrugated stems, which are entirely without wings; and by its densely woolly heads, which look as if a spider had been spinning its web on them. When the two species are growing together woolly-headed thistle may be picked out at a distance by its more upright and less bushy and spreading habit of growth.

The heads of this species are usually described as much larger than the ones shown in the illustration, but the small-headed form is apparently the typical one in New Zealand. The pappus-hairs are feathery, and are like those of spear thistle, but have a brownish tinge.

DISTRIBUTION AND IMPORTANCE AS WEEDS.

Of the six thistles described above, three may be spoken of as widely distributed (spear, Californian, and winged thistles), one (milk thistle) as common in many places but rather local, while the two remaining plants (woolly-headed and nodding thistles) are at present confined to quite small areas.

Spear thistle is by far the most widely spread and abundant species, being found in a great variety of soils and situations throughout both Islands. It is perhaps the most characteristic constituent of the plant covering that so constantly appears a few weeks after a bush burn, and it is usually during the first few years of settlement in bush country that it is most abundant, since it does not survive more intensive cultivation. For the same reason it is not found as a crop pest, though it is one of the most



MALE PLANT AND CREEPING STEMS OF CALIFORNIAN THISTLE. AT SIDE, ON RIGHT, FEMALE HEADS.

Rather less than half natural size.

frequent occupiers of all waste ground on the farm and elsewhere. It is spread entirely through the agency of seed, but this is produced in large quantities and over a long period, besides being well adapted for dispersal by wind.

It seems probable that the achenes are capable of remaining dormant for some time, and then germinating when favourable conditions arise. The fact that spear thistle appears in enormous quantities within a few weeks of a bush burn, and also after the reploughing of old pastures, affords evidence to support this view, since the bare ground may become populated at a time when no seed-dispersal is taking place. Achenes of spear thistles as well as of woolly-headed and nodding thistles germinated strongly in a few days after being kept for four years, and this power, together with the fact that the achenes of all these thistles have seed-coats containing oil (which protects them from decay) makes it likely that they may lie dormant in the ground for a number of years.

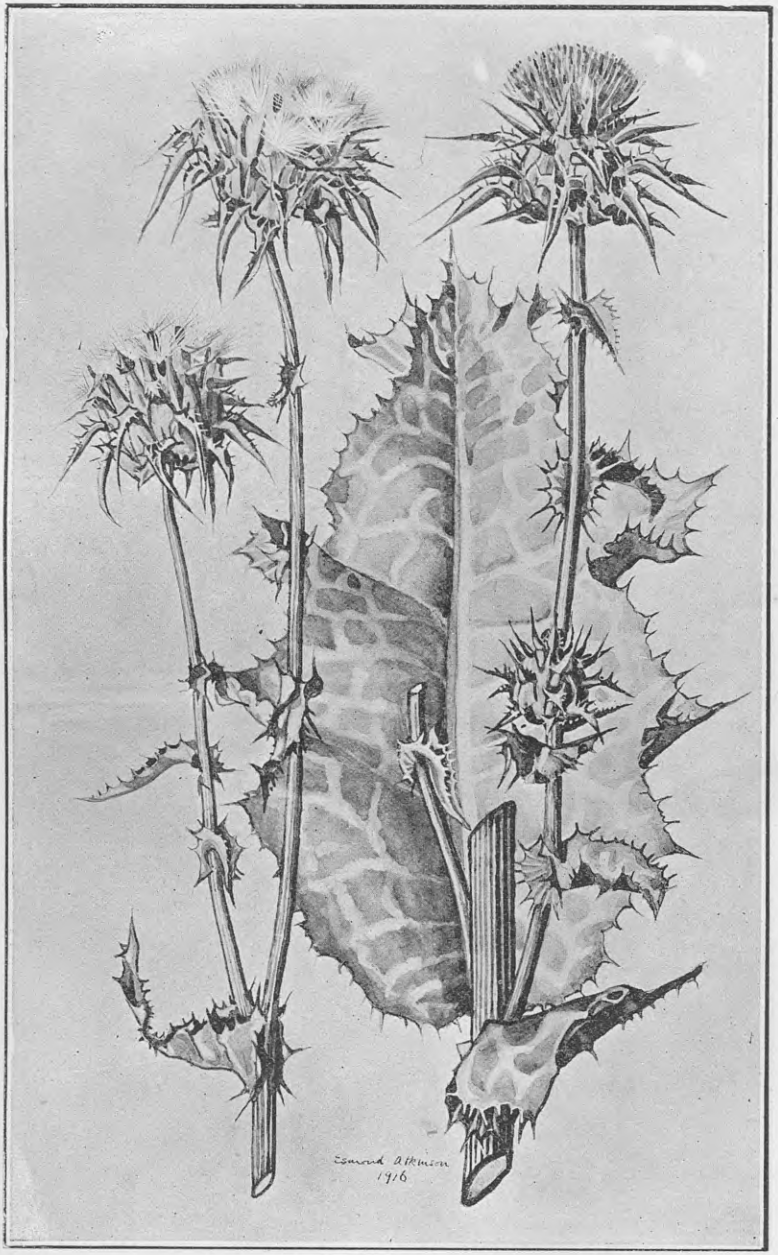
It should be mentioned that goldfinches are great destroyers of thistle "seeds," especially those of spear thistle. In many districts it is quite difficult to find whole achenes.

Little need be said here of the economic position of Californian thistle, since this subject has been fully dealt with in the *Journal* from time to time. The thistle is now widespread throughout New Zealand, and is still on the increase, though its distribution is not even. Certain districts may be called its strongholds, while it is still quite rare in others. In Marlborough lucerne has proved very effective in destroying Californian thistle, and where the former plant can be grown there is no sounder way of getting rid of the pest.

Californian-thistle rust (*Puccinia suaveolens*) has done good work this season, and the Biologist will send supplies of the fungus (as long as it is available) to any one requiring it.

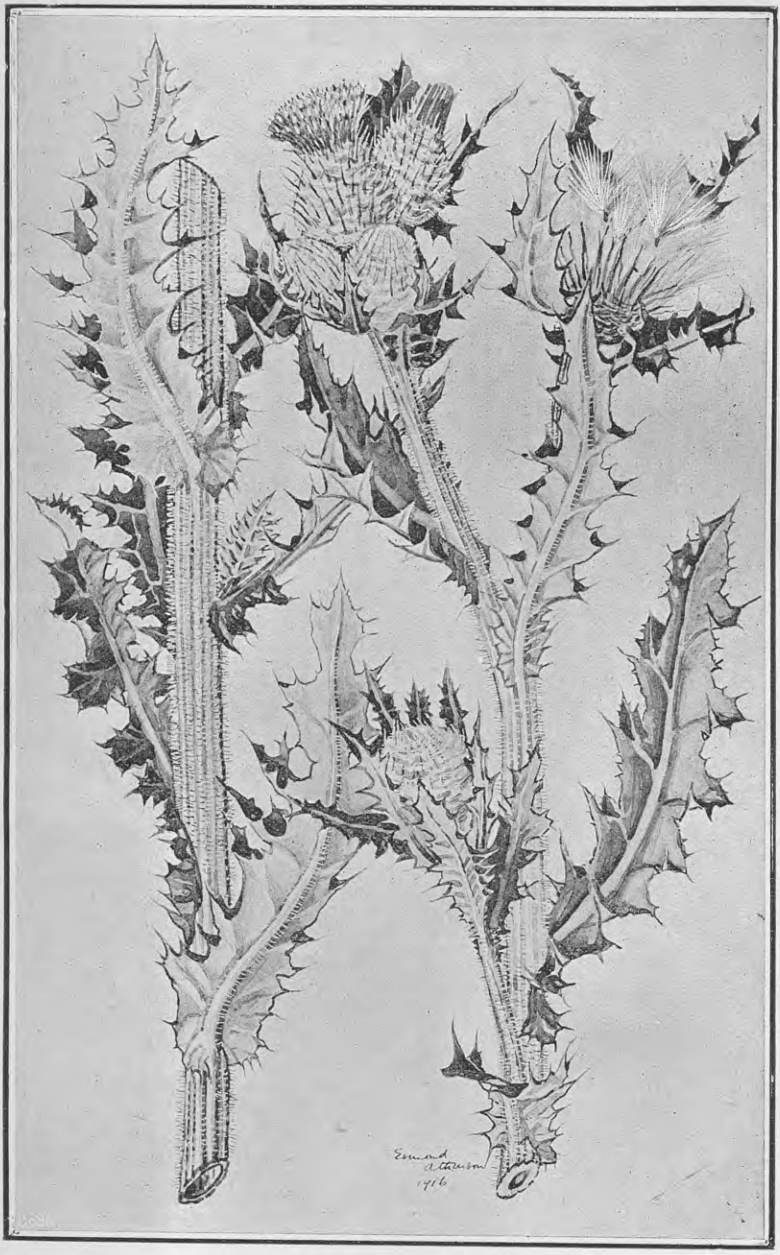
Winged thistle, though very abundant in many localities, is not nearly as generally distributed as either spear or Californian thistles. It is the most ephemeral of all the introduced thistles, ground which is covered with it in one year often being entirely free from it the next. "Seed" ripening in autumn will produce flowering plants the following spring and summer, while from spring "seed" arise plants flowering in the autumn. In many parts of the denuded areas of Central Otago it occupies a position of great economic importance, since it affords the only available winter feed for sheep.

Milk thistle is abundant in many parts of the North Island, but it is local in its distribution, and is less common in the South. It often grows in large and dense patches, smothering all other vegetation, but it never persists where thorough cultivation is carried on.



MILK THISTLE.

Rather less than half natural size.



WOOLLY-HEADED THISTLE.

Rather less than half natural size.

Both woolly-headed and nodding thistles are local plants. The former is at present confined to a part of the Wairarapa, and to the Otaki and possibly other river valleys to the west of the Tararua Range. Apparently this thistle has spread by means of "seed" carried over the range from the Wairarapa by the wind, as it is found only in the upper part of the Otaki valley—*i.e.*, in the country nearest to the original habitat. Nodding thistle is fairly common in South Canterbury, and is scattered through parts of Otago, but has been recorded from nowhere else at present.

The achenes of three of these thistles (spear, Californian, and winged) are found as impurities in various lines of agricultural seeds, both New-Zealand-grown and imported. For a full account of these impurities the reader is referred to an article by Mr. E. B. Levy in the *Journal* for June, 1915. The "seeds" of the other three have not yet been recorded as impurities, two of the plants being rather rare and local, while the third (milk thistle) has achenes of so large a size that they would dress out of most lines.

CONTROL OF THE BLACK CRICKET.

CALIFORNIAN METHODS WITH GRASSHOPPERS.

E. CLIFTON, New Zealand Commissioner, San Francisco.

IN certain northern districts of New Zealand the black cricket (*Gryllus servillei*) often commits considerable depredations during the summer. The lands that usually suffer to the greatest extent are rich fertile swamps in the process of reclamation, also parts of the hilly country where, during dry hot weather, openings in the soil permit these insects to shelter.

A very similar condition due to another insect, the grasshopper, causes very appreciable damage in the Imperial Valley of California. This grasshopper is somewhat similar in its propagation habits to that of the black cricket of New Zealand. Its eggs are laid in the soil, and in the season when the insects mature their depredations commence. The most serious harm is effected when imperfect or no cultivation at all is applied. In the Imperial Valley fields of lucerne and maize, and gardens and trees, have been more or less injured. In lucerne fields from which an ordinary yield of a ton of hay per acre would have been obtained the stems alone

remain. Something similar has been seen in those northern districts of New Zealand, where areas have been stripped almost clean of vegetation.

It is recognized that although cultivation is the means of overcoming the pest in the districts affected by the black cricket in New Zealand there are serious difficulties in the way of this method. The land may have been but recently reclaimed; considerable expense must be incurred in drainage or in the clearing of stumps before cultivation may be entered upon. Cultivation will come as these operations are completed. In the fertile Imperial Valley, wherever thorough cultivation has been applied the grasshopper pest is almost entirely avoided, for the reason that the operation has brought to the surface and exposed to the sun the eggs of the insect. Such treatment will be the ultimate cure in New Zealand.

There remains another possibility of restriction—namely, by poisoning the matured insect. This is effected in California by the distribution of a mixture consisting of 25 lb. of bran, 1 lb. arsenic and 2 quarts molasses, in 4 gallons of water. The arsenic used is usually in the form of Paris green. The latter is mixed with, say, 1 quart of water, poured into a tub, mixed with the molasses, and the bran is added slowly until the compound becomes of the consistency of mortar. It is undesirable to pour the water containing the poison on the bran; the arsenic is then not evenly distributed. The quantity specified is estimated to be sufficient for 5 acres of land—that is, assuming that the whole area was affected. In the greater part of the country affected in New Zealand, however, the pest is not distributed over the whole area. Therefore, this quantity would serve a much greater acreage if distributed on those parts that the crickets affect. The poisoning method is being used over quite a large area in California, particularly for the protection of commercial market-gardens and gardens generally.

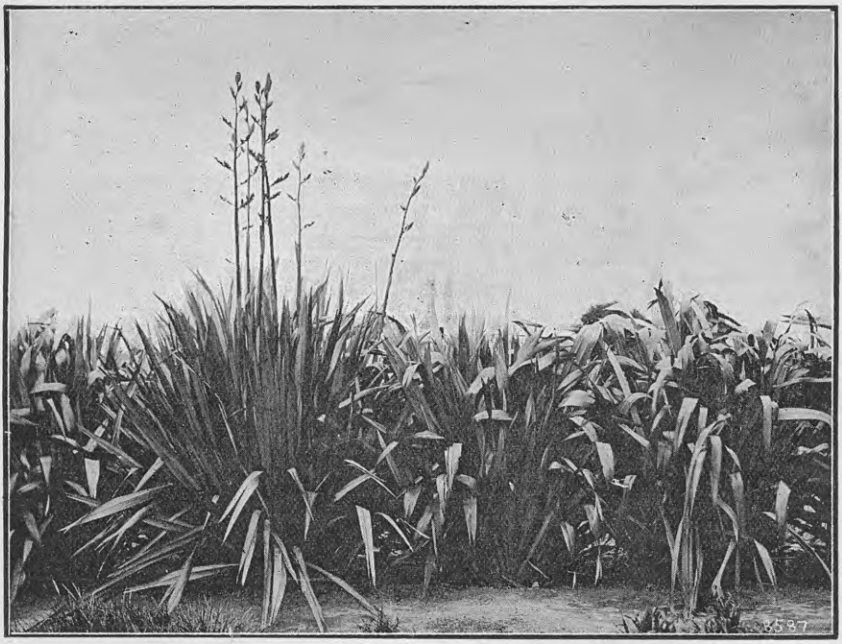
It is claimed that this compound is not attractive to stock or poultry, and therefore is not a danger to them. It may, however, be dangerous to children, and great precautions should be taken in making use of it when such condition applies.

In dealing with the grasshopper a greater difficulty is encountered than applies to the cricket. The former moves in quite large flights from place to place; the cricket has not this means of locomotion at its command. On the other hand, the grasshopper does not shelter itself in the ground as does the cricket. A grasshopper-catcher is availed of by the farmer in the form of a canvas screen covered with glutinous oil. The insects fly against the

screen and fall into a hopper below. Another means is a wide concave canvas screen of which the centre terminates in a bag net. The insects are usually caught in this and made use of for poultry-feed. This means, of course, could not be availed of in New Zealand, for on being disturbed the cricket at once seeks shelter in the ground.

It is claimed that when sheep have been pastured on land during the winter and spring but a relatively small number of grasshoppers appear. This is supposed to be due to the trampling of the ground by the stock.

The summary of recommendations for the farmer in California—and which may be applied with modifications to New Zealand—is in the first instance thorough cultivation, and in the second poisoning.



PHORMIUM VARIETIES AT WERAROA EXPERIMENTAL FARM.

A STUDY IN BREEDING.

W. M. SINGLETON, Assistant Director, Dairy Division.

Two of our most prominent certificate-of-record purebred dairy cows represent a phase of breeding which is considered by some authorities to be so much along modern lines that it has been deemed advisable to draw the attention of readers of the *Journal* to the matter. The well-known Jersey, Lady of Collingwood, which holds the highest record for the four-year-old class of that breed, and Minnie of Glenweir, the highest-producing mature Ayrshire, are the animals referred to.

It will suit the purpose best to first set out the tabulated pedigree of Minnie of Glenweir as it appears on page 59, Volume iv, of the Ayrshire Herd-book, as follows :—

Minnie of Glenweir	King Cole ..	King's Pride ..	*Ayrshire King* ..	Teviot.
				Bluebell.
			Oamaru Queen ..	Sir Robert Stout.
				Flower.
		Winnie ..	First Choice ..	Baron Oxhill (Imp.).
				Maid of the Glen.
			Queen II ..	Tahuna.
				Queen I.
	Minnie IV ..	McAllum's Pride	Victory	Bobbie Burns.
				Minerva.
			Queen Mary ..	*Ayrshire King.*
				Duchess II.
		Minnie III ..	Sir William ..	*Ayrshire King.*
				Snowdrop.
			Minnie II ..	Bruce.
				Pudge.

Attention is directed to Ayrshire King. This is one of the most noted Ayrshire bulls that have been in service in New Zealand, and that concentration of his blood indicated in the pedigree was undoubtedly most successful. A number of the earlier Ayrshire breeders have expressed the opinion that Ayrshire's King's daughters were exceptionally good producers, and the certificates of record which Messrs. Weir Bros. have received on the yields of his descendants go to substantiate these earlier experiences.

LINE BREEDING.

It will be noted that on the sire's side there are two generations between Minnie of Glenweir and Ayrshire King, while on the dam's side there are three such generations, making five "free" generations in all. In this connection a quotation is

apropos from the Research Committee on Animal Breeding in their review of the work as it is carried on at various agricultural experimental stations in the United States. They state, "It has been found, to carry the matter a step further, that most winning racehorses during the last half-century have had five 'free' generations; prior to that four 'free' generations was the rule. When there are no 'free' generations, thoroughbreds are likely to be deficient in vigour; where there are more than five 'free' generations they fail, because their speed has been swamped by outcrossing or lost by reversion." It will be seen that Minnie of Glenweir's pedigree has followed "winning" lines. It is obvious that the excellence of the individual whose transmissible factors are being concentrated is of paramount importance.

The foregoing pedigree affords a splendid example of line breeding. The distinction between line breeding and inbreeding is one of degree, line breeding being described as the mating of two individuals whose blood lines are the same from about 25 to not more than 50 per cent. If they are common to 50 per cent. or more it is termed inbreeding rather than line breeding. Inbreeding would be obtained by mating a sire with his daughter, a mother with her son, and a half-brother and sister. Lady of the South in Lady of Collingwood's pedigree would also be considered inbred, since her sire and dam have each 50 per cent. in common from K.C.B. Line breeding also suggests that the various sires used have each some of the hereditary factors of a common ancestor.

INBREEDING.

The pedigree of Lady of Collingwood is even more striking, so far as the appearance of common ancestors is concerned. In tabulated form it appears thus:—

Lady of Collingwood	Bilberry's Member	M.L.C...	..	*K.C.B.* (Imp.)	..	..
						..
				Sunflower V	..	Monologue.
						Sunflower III.
		Bilberry III	..	Monologue	..	Monopoly II.
						Victoria II.
				Bilberry I	..	Monopoly II.
						Mulberry IV.
	Lady of the South	Sungod's Member		Sungod ..	..	*K.C.B.* (Imp.).
						Sunflower II.
				Bluebell IV	..	*K.C.B.* (Imp.).
						Bluebell II.
		Roses Sweet	..	Knight Commander		*K.C.B.* (Imp.).
						Victoria III.
				Sweetbrier VII	..	*K.C.B.* (Imp.).
						Sweetbrier II.

The outstanding feature of this pedigree is the frequent appearance of K.C.B. — a Jersey bull with eleven certificate-of-record daughters. To use a breeder's parlance, Lady of the South had

50 per cent. of her blood from K.C.B. With her was mated a grandson of K.C.B., the offspring being Lady of Collingwood. Not only was there concentration of the hereditary factors from K.C.B., but were this pedigree extended three generations further it would be found that other ancestors appear more than once. Some of these are Monologue, Monopoly II, Dry Monopole, Monopoly (Imp.), Victoria, Sunflower, Mulberry IV, &c. In the sixth generation behind Lady of Collingwood, of sixty-four ancestors, the writer has counted forty-two which appear twice or in the earlier generations. In the next generation 70 per cent. of the ancestors appear twice or elsewhere, making this cow at least 70 per cent. inbred.

CONSTITUTIONAL EFFECTS.

Neither her inbreeding nor her three consecutive years of high butter-fat production seem to have had any deleterious effect on Lady of Collingwood's constitution. It is generally held that inbreeding impairs constitution. It cannot be maintained that this is invariably the case where proper judgment is exercised. Line breeding appears to be coming more into practice with the most progressive breeders, but the uninitiated must remember that such matings are likely to accentuate any unfavourable factors as well as the desirable. No important transmissible defects should form a part of the animal whose blood is being concentrated by line breeding or inbreeding.

THRESHING LUCERNE-SEED ON THE PAKOWHAI ESTATE, POVERTY BAY.

COMBINED SPRAYING.

A CHEMICAL GUIDE CHART FOR FRUITGROWERS.

THE introduction of time- and labour-saving devices is, generally speaking, a sound policy, but it only remains sound as long as it can be accomplished without unduly interfering with efficiency.

The fruitgrower has usually more than sufficient work on hand to keep him fully occupied, and is naturally only too anxious to cut out as much labour as he possibly can, and to otherwise lessen the cost of running his orchard. The principal time-saving innovations adopted by the orchardist, particularly during the last few years, may be stated as follows: Power-spraying outfits; improved implements for cultivating the soil; the disposal of the product of the orchard in bulk to properly established trading and packing firms, thereby avoiding all the labour entailed in grading, packing, and marketing fruit; and the utilization of suitable ready-made spraying-compounds with a view to controlling two or more diseases of a different class with the labour of one application. By these means, in general, orchard work can be more readily and effectively carried out than it could be at any time in the past. In regard to spray mixtures, however, a great amount of care has still to be exercised. The temptation to use a prepared spray mixture rather than go to the trouble of procuring and mixing the separate ingredients in the orchard is such that many are apt to adopt this course regardless of the effect it may have on the disease it is intended to control.

Again, in the combining of two or more spraying-compounds—a matter with which these notes are mainly concerned—the same temptation to save labour exists. Certain spraying-compounds are held to be improved by combination, while others remain unaffected; on the other hand, a great many of the ingredients and mixtures used for spraying purposes are very materially affected when unwisely combined. It is therefore undesirable to apply the method of combining spray mixtures for the purpose of controlling diseases of a different class without having some previous knowledge of the result.

The average fruitgrower has little or no knowledge of chemistry or of the chemical action likely to take place when the constituents

A CHEMICAL GUIDE CHART FOR FRUITGROWERS.

DIAGRAM SHOWING THE EFFECT OF MIXING VARIOUS SPRAYING-COMPOUNDS, BASED UPON A COMPATABILITY TABLE BY G. F. GRAY, CALIFORNIA, IN "BETTER FRUIT," AND INVESTIGATIONS BY W. C. MORRIS, HASTINGS, NEW ZEALAND.

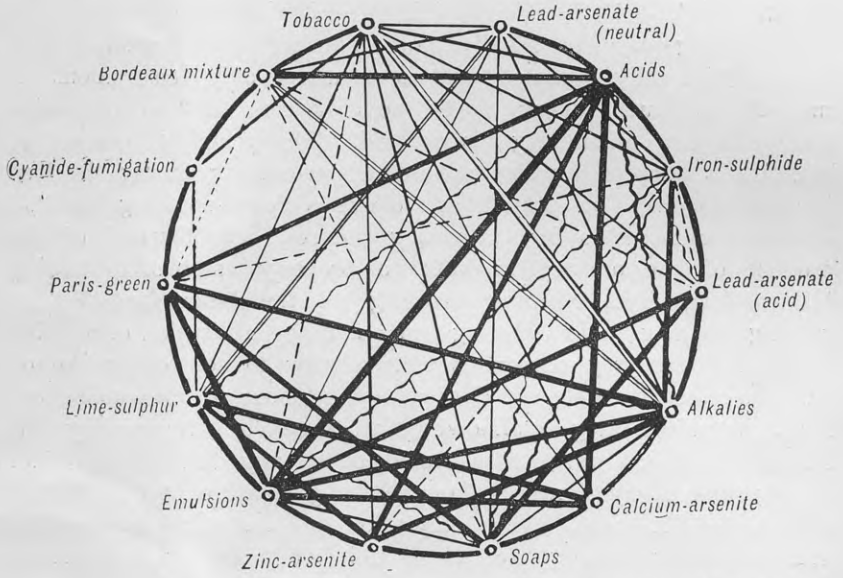


Diagram arranged by W. C. Morris.

KEY.

Any two compounds joined by thick lines ▬▬ are dangerous as combined sprays.

Any two compounds joined by thin lines ——— are good mixtures—properties not interfered with.

Any two compounds joined by dash lines - - - - are excellent mixtures—mixing improves them.

Any two compounds joined by two thin lines ═══ are efficient and non-injurious—mixing does not improve them.

Any two compounds joined by wavy lines ~~~~ are inefficient and non-injurious—of no use mixed.

of two separate spraying-compounds are combined. While it is generally recognized in regard to fruit-tree spraying that the practical demonstration on the tree is the final test, and is altogether more reliable than that of the laboratory, there are certain chemical laws some knowledge of which would no doubt act as a sufficient warning against combining unsuitable ingredients.

In order to lessen the need of this knowledge of chemistry in respect to the ordinary ingredients and compounds used for spraying purposes, and to present the facts in a handy form, Mr. W. C. Morris, Agricultural Instructor to the Hawke's Bay Education Board, has drawn up the chart here reproduced. Mr. Morris wishes it to be clearly understood that the chart is submitted merely as a guide, and is based on an article which appeared in the August, 1914, issue of "Better Fruit," a United States publication; also that the decisions arrived at, although based on laboratory tests, are generally supported by practical experience.

A careful study of this chart would no doubt prove of value to any one contemplating the combination of spraying-compounds the effect of which they have had no previous experience of. The spraying-compounds and terms used in connection with the chart refer only to those in common use for spraying purposes. "Emulsions" means any class of oil emulsion, soaps, fish-oil, whale-oil, or other soaps used in spraying. "Acids" and "alkalies" mean any ingredient showing an acid or alkaline litmus-paper test respectively.

The danger of cyanide both as a poison and as a destroyer of foliage when improperly used in the fumigation of plants is generally well known. It is not intended to convey the impression by the chart that cyanide can be safely used in conjunction with other ingredients for spraying purposes, but rather that the danger to plants is greater when fumigation is carried out immediately after spraying with Bordeaux mixture or Paris green, and that the contrary is the case in regard to tobacco-wash or lime-sulphur.—*J. A. Campbell, Assistant Director, Horticulture Division.*

Californian-thistle Rust. — Fields Inspector Webb, Masterton, writes: "Californian-thistle rust has made rapid strides in this district, the settlers assisting by spreading it as suggested by the Biologist. I have sent several affected plants to non-affected areas. All have taken this season, and have done an immense amount of good in the direction of controlling the weed."

RYE-CORN STRAW FOR THATCHING.

A. W. GREEN, Manager, Ruakura Farm of Instruction.

MUCH difficulty is often experienced by farmers in obtaining thatching-material for stacks and other purposes. Rushes have been the chief stand-by, but with the steady spread of cultivation and land-clearing generally this material is becoming scarce in many

RYE-CORN AT RUAKURA CUT GREEN FOR THATCHING.

localities. Even where they abound considerable labour is required to cut sufficient rushes to thatch a few small stacks.

Fortunately, a first-class thatching-material can be grown on any arable farm. Cut at the right stage, there is no better material for this purpose than rye-corn straw. Farmers will find it a good practice when putting in cereal crops to sow a small proportion of the field with rye-corn, thus anticipating requirements for stacks after the harvest. Half an acre of rye will provide enough thatch for 20 acres of crop of average bulk.

Rye-corn may be either sown in autumn and fed off, or in early spring for continuous growth. The usual seeding is 2 bushels

per acre, and a very suitable manure is basic superphosphate at the rate of 3 cwt. per acre.

The proper time to cut rye-corn for thatch is when the head is in the flowering stage, a tough straw being then obtained. If the rye is allowed to mature further the straw becomes brittle, and is not nearly so suitable for thatching. Moreover, mature heads may germinate on the stack in moist weather. The rye for thatching can be cut green with the reaper-and-binder before the harvest rush is on, and by the time the grain crops are ready for stacking the rye will be dry enough to use for immediate thatching.

STACK OF MEADOW HAY AT RUAKURA THATCHED WITH RYE-CORN STRAW.

A useful feature of rye-corn is that it can be successfully grown in sour swamp soils, where both wheat and barley would fail. On such soils sorrel is usually abundant. Few crops will kill out sorrel to such an extent as a heavy growth of rye-corn.

At Ruakura this season an area of 12 acres of rye-corn was grown. The crop was sown on the 3rd September and made splendid growth, attaining a height of over 6 ft. Early in December 6 acres were cut in the flowering stage, giving about $3\frac{1}{2}$ tons per acre of thatching-material—an exceptionally good yield. The accompanying photograph shows this part of the crop drying in stook, with the maturing portion of the rye to the left.

Twenty-two large stacks of cereals, lucerne hay, and meadow hay, at Ruakura, have been thatched with this rye-corn. A quantity has also been reserved for thatching the pig-shelters. In addition, a fair bulk has been sold to neighbouring farmers, while more inquiries have been received for the material than could be satisfied.

The field in which the rye-corn was grown was reclaimed from swamp a few years ago, and is still sour and sorrely. Barley grown next the rye-corn was almost a failure. On the part occupied by the rye-corn the sorrel has been pretty well smothered out.

TOMATO-FRUIT DISEASES.

CURRENT INVESTIGATIONS.

R. WATERS, Biological Assistant.

TOMATO-FRUIT in the vicinity of Carterton, Wairarapa, has been affected this season by several diseases, one of which appears to have been not recorded so far in New Zealand. As this disease was suspected of causing diarrhœa and similar illness to the consumers of affected fruit, a rapid investigation was undertaken, and the following notes are presented for the information of growers generally. The crops dealt with were growing out-of-doors.

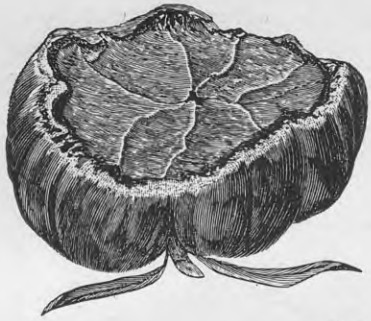
The root, stem, and leaves of the tomato-plants examined were practically free from disease. On the fruit, however, three apparently separate affections were found—namely, (1) Tomato black-rot (*Macrosporium tomato*), (2) circular white patch, and (3) premature softening.

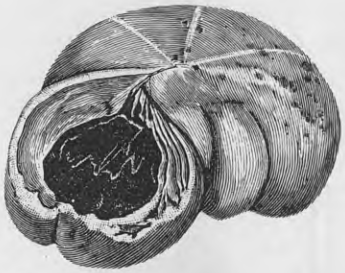
TOMATO BLACK-ROT (*Macrosporium tomato*).

Attention has previously been drawn in the publications of the Department to this very destructive disease, which doubtless is now well known to many growers. The disease on the present occasion was found prevalent particularly amongst the more wrinkled varieties, which often seemed to expose internal tissues through unequal growth tearing the flesh about the blossom end. Dark spots appear, especially toward this end, and these spots enlarge until more than half the fruit may be flat or sunken (Figs. 1 and 2). On such injured surfaces black or greenish-black velvety

mould occurs, bearing enormous numbers of minute olive-green spores (Fig. 3). By the latter appearance the disease may be detected.

Though formerly tomato black-rot was regarded as distinct from potato leaf-curl (*Macrosporium solani*), more recent observers are inclined to believe that the two are identical; growers would





TOMATO BLACK-ROT.

Fig. 1 (on left).—Typical appearance of a badly affected fruit. Fig. 2 (on right).—Fruit attacked at the side.

therefore be well advised at least to treat them as such. When the fungus is established upon a ripening crop, as in this case, the collection and the destruction by burning or by burying deeply all affected fruit is the best treatment that can be advised. Simultaneous Bordeaux spraying limits the infection of unaffected fruit. As soon as the crops are harvested it is necessary to destroy similarly all diseased tomato or potato material. The following season the crop should advisedly be grown on land not previously occupied for some years by either tomatoes or potatoes. Damp or badly drained land and badly ventilated glasshouses encourage black-rot, and it spreads rapidly in plants only partly supported or altogether growing over the ground. Fresh stable manure should not be used. Early and thereafter regular applications of Bordeaux mixture next season would do much to prevent a recurrence of an attack.

TOMATO BLACK-ROT.

Fig. 3.—Spores of the Attacking Fungus. Highly magnified.

CIRCULAR WHITE PATCH.

Treating of this affection, there were observed to be common on the upper surfaces of the fruit directly exposed to the midday sun large patches, first appearing as light-yellowish areas in the skin and the firmer thick fleshy tissue just beneath, which latter together form the casing holding the pulp and give the shape to the fruit. Outside of these areas the fruit was reddening as usual. Later the tissues of the bleached patches collapsed into sunken, flat, somewhat circular, finely wrinkled white patches, sometimes over an inch in diameter. The firm tissue under the skin by this time had dried, adhering closely to the under-side of the skin, with which it then formed a thin casing expanding to normal

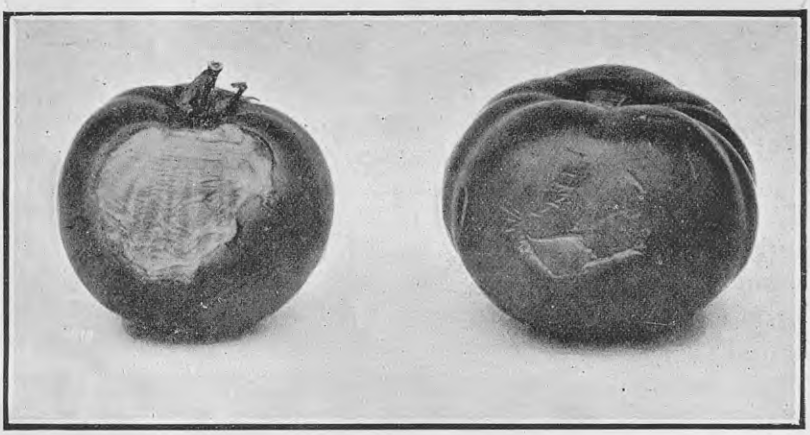


FIG. 4.—TOMATOES AFFECTED WITH CIRCULAR WHITE PATCH.

thickness only at the periphery of the circle. Under these patches the pulp surrounding the seeds was moist and sometimes milky white. This was seen under the microscope to be due to the accumulation in the pulp-cells of enormous numbers of starch granules, which also were abundant in the cells of the dried skin and adjacent tissue.

The general appearance of this affection is so distinctive that it should readily be correlated with any previous description had it been recorded. So far, however, I have been unable to find any mention of such injury, nor could any traces of a causative fungus be found. The conversion of soluble reserve food into starch, which accumulates in granules, takes place under ordinary

circumstances as the fruit develops. These granules are later reduced to a sugar or similar soluble form, in which some of it may then pass on to the seeds or other growing parts requiring nourishment. The assemblage of granules in such enormous numbers as in the cases noted, however, is quite extraordinary, and somewhat discounts the likelihood of the trouble being due to an organism which was drawing upon and reducing the reserve material. I am inclined to regard the disease as a physiological one brought on by some unfavourable weather-conditions, of which the heat of the sun acting upon the previously damaged portions caused the final dried and bleached appearance. Nevertheless specimens will be kept under observation. Should any grower have had experience with this trouble the Biology Section of the Department would be glad to co-operate with him in arriving at its origin.

PREMATURE SOFTENING.

This trouble seems indistinguishable from the ordinary softening of overripe fruit, and but for its occurrence upon specimens just turning colour one would have thought it was nothing but the natural ripening process. Affected fruit appear to soften in patches that exhibit an almost imperceptible change in colour and in the transparency of the skin. To this condition were attributed certain qualities in the fruit injurious to the consumers. This, in fact, was the only aspect of the matter immediately important to the grower in the present instance, who was withholding the sale practically of his entire crop—valued at £200—on account of several cases of illness reported to be due to his fruit. Experiments with typically affected fruit indicated that there was little fear of such disorders arising from the tomatoes as he marketed them. He was consequently advised by telegram to proceed at once with the sale of the fruit.

The softening in patches of ripening fruit may be merely the incipient stages of the circular-white-patch condition, which was found much more abundant throughout the crop. Further observations in this direction will be made.

Cultivation given to the lucerne at Ruakura during the latter part of January had a wonderful effect on the succeeding crop. Rye-grass, Yorkshire fog, catsear, and sorrel, which had constituted the principal weeds in the lucerne, were almost absent from this growth. The cultivating operation was carried out under ideal weather-conditions, a hot sun rapidly withering up the weeds after they had been dragged out by the cultivator and harrows.

LUCERNE - CULTIVATION.

A. McTAGGART, M.S.A., Agriculturist.

THE experience of Australia and of other parts of the world in the growing of lucerne emphasizes the importance of systematic cultivation. The best growers regard good cultivation as essential to success with this greatest of forage crops. The lucerne-plant penetrates deeply into the soil in a perpendicular manner, hence

RENOVATING A LUCERNE-FIELD IN AUSTRALIA WITH THE SUNSHINE RIGID-TINE CULTIVATOR.

repeated and deep cultivation with the proper implement cannot injure the crop, but rather, on the contrary, it greatly improves it. Such tillage, while creating ideal conditions for the thriving of the lucerne-plant, effectively removes weeds and all other growths of a shallow-rooting nature. Clean fields ensure an unchecked growth of every stalk, while the unrestricted penetration of light and sunshine naturally promotes a vigorous development of succulent leaf. The stirring of the soil by use of the cultivator admits air, and this bestirs to renewed activity the minute beneficial bacteria, which are of primary importance to fertility.

Knowing the importance of the cultivation of lucerne, the irrigation authorities of the State of Victoria conducted at Tongala a competition with a view to ascertaining which implement gave the best practical results. The Sunshine rigid-tine cultivator was awarded first place. The points most considered by the judges who made the award were lightness of draught, thoroughness of soil-cultivation, destruction of weeds, simplicity of structure, and least injury to crop. The twelve-tine size cultivator of this make that was used in the trials was easily drawn by three medium draughts; it cut out practically all trefoil, grass, and weeds without unduly damaging the lucerne; and it stirred the soil throughly to a fine tilth.

During a visit paid recently to Australia by the writer he inspected the Central Research Farm at Werribee, near Melbourne. While there his attention was drawn to this useful implement, which gave excellent results in the renovating of lucerne, particularly in soils inclined to bake — soils characteristic of the Werribee Farm.

The Sunshine rigid-tine cultivator is manufactured at Sunshine, Melbourne, by the firm of H. G. Mackay, maker of the famous Sunshine harvester. The cultivator is made in various sizes, or in such a manner that it can be extended, thus meeting the needs of all farmers, large and small. Built mainly of steel, it possesses great structural strength without being heavy or awkward. The main beam, which ensures the accurate working of all the other parts, is of stout section steel. To this the reversible stub axles are bolted, and also the front frame of angle steel, which bears the pull of the tines. So strong is the principle of construction employed that there is no possibility of important details twisting or sagging whilst at work. Since the tines serve such an important function in the cultivator, they are made of spring steel, wrought to a hollow shape, and tempered, enabling them to withstand both direct and side strains to an exceptional degree. The tines used for renovating lucerne can readily be removed, and replaced by duck-foot points for the effective cultivation of fallow.

The following are the prices asked in Australia for the implement in its various sizes: Sixteen tines, 6 ft. 3 in. wide, £22 10s.; twelve tines, 5 ft. wide, £19 10s.; ten tines, 3 ft. 10 in. wide, £13 10s.; eight tines, 3 ft. 4 in. wide, £12.

As lucerne is a crop which bids fair to play an important part in the agricultural economy of New Zealand, and as the keeping of the crop clean is perhaps the chief problem connected with its establishment in this country, the advent of a specially effective

cultivator (judging from the extensive trials to which the implement has been subjected in various parts of Australia) must be viewed with satisfaction. For autumn cultivation of lucerne, to provide a growth to carry it through the winter well; and again for early spring cultivation, to pulverize the soil and to destroy weeds, the introduction of such an implement at this season of the year would be timely.

FORAGE-CROPPING ON THE HAURAKI PLAINS.

THE crop of rye-corn and tares shown in the accompanying photograph was grown during the past season on Mr. Buchanan's farm at Pipiroa. The paddock of about 12 acres was sown in June, and the crop made marvellous growth during the winter months,

THE CROP OF RYE-CORN AND TARES.

attaining a height of fully 6 ft. In November the crop was cut and made into stack ensilage (on Mr. Dibble's advice), being estimated to have produced from 80 to 100 tons of that fodder. Five years ago this part of the Hauraki Plains was considered useless, and grew little except saltweed. Systematic draining—open and mole—has transformed the home of the wild duck into rich pastures, which even now are hardly to be beaten in the Province of Auckland, and in a few years will be second to none in the Dominion.—*C. E. McPhee, Fields Inspector, Thames.*

THE FRUIT INDUSTRY.

VARIETIES FOR EXPORT AND LOCAL MARKETS.

J. A. CAMPBELL, Assistant Director, Horticulture Division.

FOR a number of years past substantial areas planted in fruit-trees have been annually added to those already existing in the Dominion, but a special impetus was given to orchard planting about the year 1909, when a large area of comparatively cheap land in the Nelson District was made available for orcharding purposes. Subsequently other districts adopted a similar scheme to that introduced in the Nelson District for the control and management of new orchard properties, with the result that from 2,000 to 3,000 acres of new orchards have been planted yearly.

Present indications are that this rate of increase is likely to continue for some time, and some idea of the annual increase in the fruit-production of the Dominion as a result can be gathered from the following: 3,000 acres of land planted in fruit-trees at the rate of 150 trees per acre equals 450,000 trees. Calculating the yield when the trees are in full bearing at the modest estimate of two 1-bushel cases per tree, gives a total increase of 900,000 cases of fruit annually. Now, allowing for failures, which are more or less sure to take place in this as well as any other industry of the kind, by halving this total we still have 450,000 additional cases of fruit to be dealt with every year. Multiply this by 7, and we have a total of 3,150,000 cases, the trees for the production of which have been planted during the last seven years.

We shall not, of course, feel the effect of this increase for several years to come, but the trees planted in 1909 are now coming into bearing, and should in a year or two be producing fruit at the rate mentioned. From that time onward an annual increase equal to the above can be expected so long as the area is being extended at the present rate.

An industry making such rapid strides as this is worthy of and must require, very careful management from a Dominion point of view. The problems that necessarily have to be faced should be taken in hand and dealt with as early as possible, and the business thoroughly well organized and placed on a sound footing in ample time to cope with the increased trade. Such problems no doubt will be found to be many and varied; but one

which appears to be of the utmost importance at the present time is the appointment of a New Zealand representative to visit and report upon the various markets of the world likely to be of value to the fruit industry of New Zealand, such report to cover the means and cost of transit, season of the year when fruit is required, and the capacity of the market at a price which will allow a profitable margin over and above the cost of production. This is not only necessary in order to provide for a reliable outlet for our fruit in the future, but also to ascertain approximately to what extent the present rate of orchard-extension can be continued with safety.

One very important step has been made in the direction of more efficient organization of the industry in the form of a joint conference of representatives of fruitgrowers, nurserymen, and officers of the Department, held in Wellington during the latter end of last month, for the purpose of considering the best varieties of the different classes of fruits to recommend for extensive planting to serve the possible markets of the future.

Up to the present our most extensive market has been that of New Zealand itself. During the last few seasons this market has been greatly assisted and regulated by a limited export trade carried on with South America, but judging by the figures previously mentioned it is quite obvious that this cannot long continue. In a few years neither our local market nor the South American market, even though much more fully exploited than at present, will be able to absorb the amount of fruit then available. No doubt when this time arrives we shall be compelled to look to the Northern Hemisphere to provide the markets required. This means that past and present conditions will possibly be affected. Varieties considered suitable for the markets available in the past may not profitably serve the markets of the future.

This aspect of the fruit industry has for some considerable time exercised the minds of the officers of the Department, many of whom have been advising against the overplanting of varieties unsuited for the European markets. It was recently considered that something more definite in the way of a warning and guidance should be issued, and a conference of Orchard Instructors representing the various districts of the Dominion was held last September, with a view to adopting lists of varieties of apples and pears to recommend for future planting. The lists recommended by the Conference, covering apples and pears for export to the markets of the Northern Hemisphere, South America, and for local purposes, were duly issued.

The matter was again brought up at the recent Nurserymen's Conference as a result of a paper read by Mr. D. Hay, of Auck-

land, on the subject of the elimination of unnecessary varieties from general nursery stock. During the discussion which followed the reading of this valuable paper the work of the Orchard Instructors' Conference was mentioned, and the lists of varieties discussed, and practically approved. In order to strengthen the hands of the Department, however, and in recognition of the importance of the question not only to the fruitgrower but to the nurseryman, it was ultimately arranged that a joint conference should be held to further consider the question. The Conference was held at Wellington at the end of February, the following representatives being present:—

Fruitgrowers: Mr. J. Longton (Secretary, New Zealand Fruitgrowers' Federation, Christchurch), Mr. J. G. Kay (Auckland), Mr. A. Moore (Hastings), Mr. A. P. Allport (Nelson), Mr. S. I. Fitch (Christchurch).

Nurserymen: Mr. G. A. Green (Secretary, New Zealand Federation of Nurserymen, Auckland), Mr. R. T. Morrison (Auckland), Mr. Thomas Horton (Hastings), Mr. T. Waugh (Lower Hutt), and Mr. C. F. Ivory (Rangiora).

Departmental Officers: Mr. T. W. Kirk (Director of the Horticulture Division), Mr. J. A. Campbell (Assistant Director of the Horticulture Division), Mr. J. W. Collard (Orchard Instructor, Whangarei), Mr. A. B. Mansfield (Orchard Instructor, Auckland), Mr. W. J. Courtier (Orchard Instructor, Canterbury), and Mr. W. T. Goodwin (Orchard Instructor, Otago).

During the deliberations much useful work was accomplished. The various aspects of the fruitgrowing industry and the markets relating thereto were fully considered, also the suitability of the various varieties of fruits recommended for future planting.

The Conference wishes to point out to all intending planters of fruit-trees the great change that must necessarily take place in regard to the marketing of New Zealand fruit long before any trees planted from now onward come into bearing. By the time such trees come into bearing there is no doubt that the markets of the Northern Hemisphere will be providing our principal outlet. Any person intending to plant fruit-trees extensively, particularly apples, would therefore be well advised to take this factor into consideration and plant accordingly.

As a guide to planters it should be generally known that the months of March, April, May, and the early part of June cover the period which offers the best opportunities for the satisfactory disposal of New Zealand fruit on the markets of the Northern Hemisphere; also that it takes seven weeks from the date of

shipment to land New Zealand fruit on the English markets. Considering these matters it is inadvisable to plant too extensively for the English markets any variety coming to maturity later than the middle of April. On this account the Conference is desirous of issuing a warning against very extensive planting of the Sturmer Pippin. In regard to this apple, its many excellent qualities influenced the Conference in retaining it on the export lists, but the majority of delegates were clearly of the opinion that it comes in rather on the late side to warrant its extensive cultivation for the European markets.

Again, the Conference wishes to point out that the early and mid-season varieties should be more largely planted than in the past, as such fruit can be landed when the markets of the Northern Hemisphere are practically bare of apples, thus affording better opportunities of a ready sale.

The aim of the conference was to keep the lists of varieties recommended for future planting as low as practicable, at the same time selecting those varieties most suited for general planting throughout the Dominion; but slight allowance had necessarily to be made to suit the conditions of the various districts.

The following subjects were dealt with, and varieties recommended to suit:—

(1.) Apples and pears for the Northern Hemisphere markets.
(2.) Apples for South American markets.
(3.) Apples, pears, peaches, nectarines, plums, prunes, and apricots for local markets.

The varieties recommended are as follows:—

NORTHERN HEMISPHERE.

DOMINION LIST OF APPLES.

Gravenstein.
Golden Pippin.
Scarlet Pearmain.
Worcester Pearmain.
Cox's Orange Pippin.
Jonathan.
Delicious.
Dunn's (Monroe's) Favourite.
Cleopatra.
Rome Beauty.
Statesman.
Sturmer.

The representatives of the various districts selected from the Dominion list of varieties recommended for the markets of the Northern Hemisphere those varieties best suited for their particular districts, as follows:—

Auckland District.

Gravenstein.
Golden Pippin.
Scarlet Pearmain.
Cox's Orange Pippin.
Jonathan.
Delicious.
Dunn's (Monroe's) Favourite.
Rome Beauty.
Sturmer.

Hawke's Bay District.

Worcester Pearmain.
Cox's Orange Pippin.
Jonathan.
Delicious.
Dunn's (Monroe's) Favourite.
Sturmer.

Wairarapa and Wellington District.

Worcester Pearmain.
Cox's Orange Pippin.
Jonathan.
Delicious.
Dunn's (Monroe's) Favourite.
Sturmer.

Canterbury District.

Worcester Pearmain.
Cox's Orange Pippin.
Jonathan.
Delicious.
Dunn's (Monroe's) Favourite.
Rome Beauty.
Sturmer.

Nelson District.

Worcester Pearmain.
Cox's Orange Pippin.
Jonathan.
Delicious.
Dunn's (Monroe's) Favourite.
Sturmer.

Otago District.

Gravenstein.
Worcester Pearmain.
Cox's Orange Pippin.
Jonathan.
Cleopatra.
Rome Beauty.
Statesman.
Sturmer.

It is gratifying to note that the twelve varieties of apples selected by the Conference were included in the fourteen varieties previously selected by the Orchard Instructors' Conference.

DOMINION LIST OF PEARS.

Beurre Bosc.
Beurre Capiaumont.
Beurre Clairgeau.
Beurre d'Anjou.
Beurre Diel.
Doyenne du Comice.
Directeur Hardy.
Durondeau.
Giblin's Nelis.
Glou Morceau.
Josephine de Malines.
Marie Louise.
P. Barry.
Twyford's Monarch.
Winter Cole.
Winter Nelis.

SOUTH AMERICA.

DOMINION LIST OF APPLES.

Cox's Orange Pippin.
Jonathan.
Delicious.
Dunn's (Monroe's) Favourite.
London Pippin (Five-crown).
Lord Wolseley.
Cleopatra.
Yellow Newtown Pippin.
Rome Beauty.
Statesman.
Sturmer.
Dougherty.

LOCAL MARKETS.

DOMINION LIST OF APPLES.

Beauty of Bath.
Red Astrakhan.
Lord Suffield.
Gravenstein.
Golden Pippin.
Scarlet Pearmain.
Worcester Pearmain.
Cox's Orange Pippin.
Alfriston.
Jonathan.
Reinette du Canada.
Delicious.
Dunn's (Monroe's) Favourite.
London Pippin.
Lord Wolseley.
Cleopatra.
Yellow Newtown Pippin.
Rome Beauty.
Statesman.
Sturmer.
Dougherty.
Ballarat.

DOMINION LIST OF PEARS.

The Conference carried a resolution warning intending planters against very extensive planting of any variety of pears for local markets, particularly the early and mid-season varieties. Planting for the local markets should be mainly confined to the later keeping varieties, selected to suit the locality, from the following :—

Beurre Bosc.
Twyford's Monarch.
Winter Cole.
Winter Nelis.
Josephine de Malines.
L'Inconnue.

The following varieties may also be grown with satisfaction in localities having canning-facilities :—

Williams's Bon Chrétien.
Keiffer's Hybrid.

Should, however, a rotation of pears be desired, the following should prove satisfactory :—

Williams's Bon Chrétien.
Louise Bonne of Jersey.
Conference.
Beurre Diel.
Beurre Bosc.
Doyenne du Comice.
Winter Cole.
Winter Nelis.
P. Barry.
L'Inconnue.

DOMINION LIST OF STONE-FRUITS.

PEACHES.

D denotes dessert ; C, canning ; W, white flesh ; Y, yellow flesh ; F, free-stone ; Cl, clingstone ; and S.Cl, semi-clingstone.

Early Varieties.	
Sneed	D.W.F.
Brig's Red May	D.W.F.
High's Early Canada	D.W. S.Cl.
Admiral Dewey	D.Y.F.

Second-early Varieties.	
Hales	D.W.F.
Wiggins	D.W.F.
Mamie Ross	D.W.F.
Carman	D.C.W. S.Cl.
Delicious	D.Y.F.
Peregrine	D.W.F.
Noblesse	D.W.F.

Mid-season Varieties.	
Royal	D.W.Cl.
Surecrop	B.W. S.Cl.
Elberta	C.Y.F.

Mid-season Varieties—*contd.*	
Kalamazoo	D.C.Y.F.
Up-to-date	D.C.Y.F.
Kia Ora	D.C.Y.F.

Late Mid-season Varieties.	
Paragon	D.C.Y.Cl.
Muir	D.C.Y.Cl.
Sea Eagle	D.W.F.
Sea Eagle Improved	D.W.F.
Wheatland	D.C.Y.F.
Prizetaker	D.W.F.

Late Varieties.	
Lippiatt's Late Red	D.W.Cl.
Golden Queen	D.C.Y.Cl.
Solway	C.Y.F.
James's Cling	D.C.Y.Cl.

NECTARINES.

Ansenne.
Early Rivers.
Goldmine.

PLUMS (ENGLISH).

Angelina Burdett.
Coe's Golden Drop.
Damson-Russian.
Diamond.
Early Orleans.
Early Rivers.
Evans's Early.
Giant.
Grand Duke.
Greengage.
Jefferson.
Kirks.
Magnum Bonum (Yellow).
Monarch.
Pond's Seedling.
President.
Takapuna Drop.

PLUMS (JAPANESE).

Burbank.
October Purple.
Ogon.
Satsuma.
Sharp's Early.
Wickson.
Wright's Early.

PRUNES.

Fellenberg.
Golden Prune.
Petite d'Agen.
Tragedy.

APRICOTS.

Boulton.
Hemskirk.
Mansfield's Seedling.
Moorpark.
Newcastle.
Oullin's Early.
Royal.
Roxburgh Large Red.

VARIETIES FOR FURTHER TESTING.

The Conference was of the opinion that the following varieties of the various classes of fruits were worthy of further testing, and recommended that this be done at the Department's horticultural stations:—

APPLES.

Charles Ross.
Cliff's Seedling.
Diadem.
Glengyle's Red.
Goldbridge.
Grannie Smith.
Houblon.
King David.
Marian Red.
McIntosh Red.
McLiver's Winesap.
New Gold Pearmain.
Patoka.
Premier.
Senator.
Shorland Queen.
Stayman's Winesap.
Winter Banana.

NECTARINES.

Brookdale.
Late Jewel.
Lily Baltet.
Mrs. Dr. Chisholm.
Nelson.

PLUMS (JAPANESE).

Ballena.
Formosa.
Gariota.
Hermosillo.
Maynard.
Ngata.
Rutland Plumcott.
Santa Rosa.

PRUNES.

Imperial d'Ephenuse.
Splendour.

APRICOTS.

Blenheim.
Gooley.
Harris.
Louise Lette.
Precose de Wunnie.
Pringle.
Riverside.
Smyrna.
Tilton.

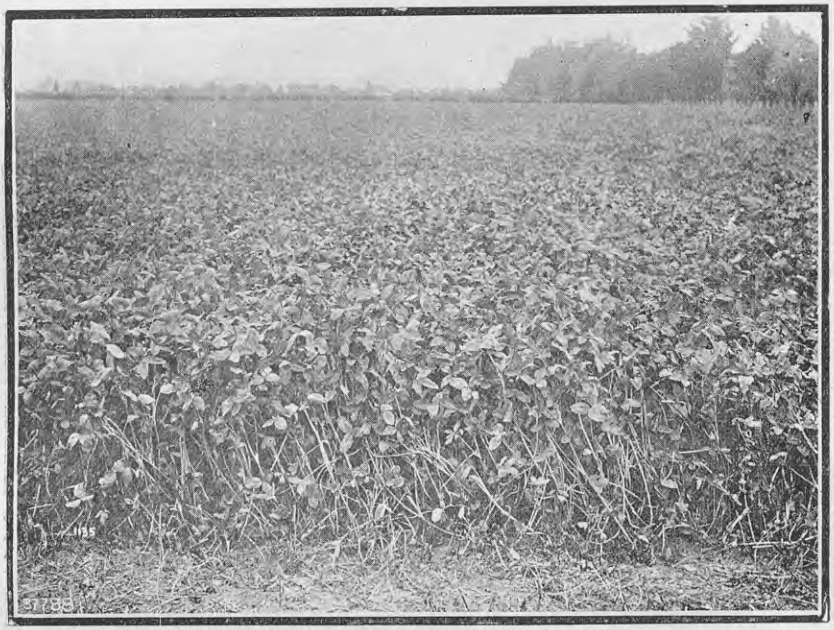
With regard to all the foregoing Dominion lists, the Conference wished to advise intending commercial planters to consult with the Orchard Instructor or local nurserymen of the district as to the varieties most suitable for planting before placing their orders. Intending planters of domestic orchards are advised to apply to the same sources for local information.

RED CLOVER AT RUAKURA.

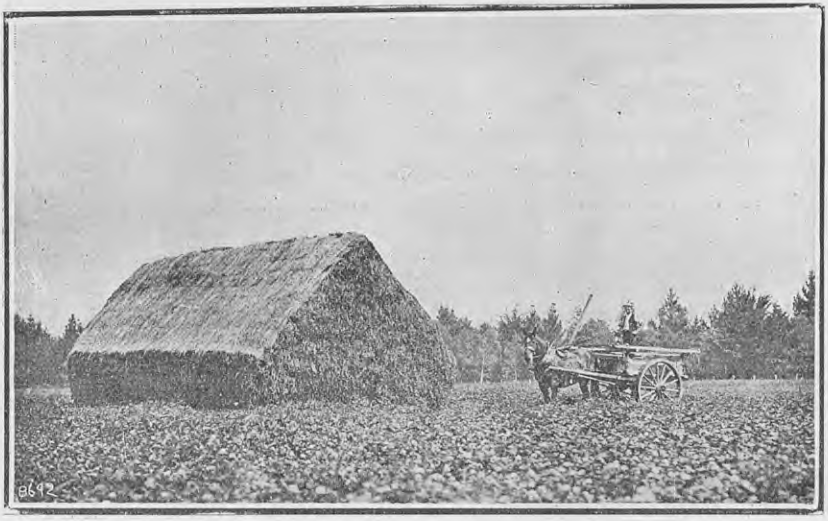
THE 11-acre field of red clover at the Ruakura Farm of Instruction, illustrated opposite, was laid down in conjunction with a wheat crop. The wheat was put in early in September, 1914. About a month later the clover was sown at the rate of 15 lb. per acre, the seed being lightly harrowed in. Fertilizers consisting of 3 cwt. basic superphosphate and 1 cwt. bonedust per acre were used for the combined crop. The wheat crop (Bob's variety) was harvested in January, 1915, yielding 45 bushels per acre. The clover then came away extremely well. During April a portion of the crop was cut and fed out to stock, the remainder being fed off with wethers. On the 1st September the field was shut up for hay, and cut in the last week of November, giving a yield of about $2\frac{1}{4}$ tons per acre. The field was subsequently shut up again, and the clover made another heavy growth, which has been allowed to mature seed. The crop is being harvested this month and promises a good yield on threshing. The first photograph shows the crop at the end of October coming on for hay. In the second picture the resultant haystack is seen standing in the crop maturing for seed.

The ostriches raised at the Yanco Experimental Farm, New South Wales, are kept on lucerne runs, and feed almost entirely on lucerne.

Swedish gorse-vetches at Ruakura this season were badly attacked by caterpillars. The grubs did not touch the leaves, but stripped the pods of almost every seed. Scotch tares yielded very heavily, not being touched by caterpillars, although growing only a few yards distant from the field of Swedish gorse-vetches.



RED CLOVER AT RUAKURA COMING ON FOR HAY.



THE RED-CLOVER HAY IN STACK, AND NEXT GROWTH MATURING FOR SEED.

RIPE-ROT OF STONE-FRUITS.*

A. BAILEY MANSFIELD, Orchard Instructor, Auckland.

QUITE a number of peaches and nectarines affected with ripe-rot were sent in to the Department's Auckland office for examination during the latter portion of January and through the month of February. In most of the Auckland peach-growing districts the loss of fruit from ripe-rot has been considerable.

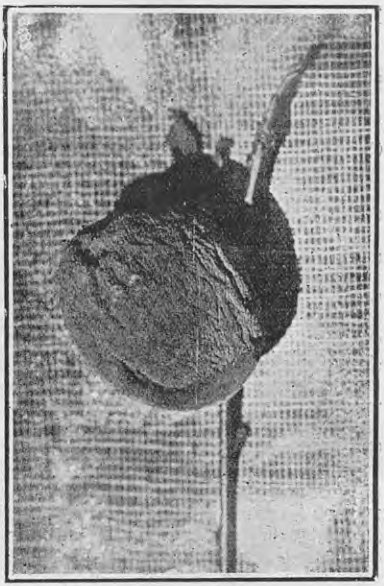
Ripe and partially ripe fruits of the peach and nectarine affected by this disease show a yellowish covering of dust-like powder mixed

PEACHES AFFECTED WITH RIPE-ROT.
Centre fruit showing characteristic white mould and spores of the fungus.

with a bluish tint. If observed in an earlier stage the area affected will be whitish instead of bluish; later the whole fruit becomes either a rotten mass or small and shrivelled, and the powdery substance occupies a larger area. The rotting of the fruit is caused by a fungus (*Monilia fructigena*) allied to the common blue mould which forms upon bread, and the powdery mass

* In New Zealand this disease is frequently termed "brown-rot." More correctly, however, and for the sake of distinction, the latter name should be confined to a similar disease of the apple and other pip-fruits.

is composed of spores. The white coating upon the fruit is the mycelium, the vegetative part which bears the same relation to the fungus that the roots do to a higher plant. The mycelium grows into and through the tissue of the fruit, and after development the fungus spores are formed. These are visible as the bluish powder or mould. The spores, which are thin-walled and oval in outline, are joined together in bead-like strings, and as they become matured break off, blow away, and fall upon the fruit. Given the right climatic conditions they start to grow rapidly. A slender tube is sent out, continues to lengthen, and, finding entrance into the fruit, it grows and develops, and spores are again produced. The disease frequently gains access to the fruit through a puncture in the skin—even a bruise is sufficient. Usually it is first seen in peaches or nectarines that are in direct contact with each other, and it spreads most rapidly during moist, warm weather.



NECTARINE AFFECTED WITH RIPE-ROT.

Although most of the commercial fruitgrowers recognize this form of fungus and are aware of its destructiveness, yet few are familiar with its history. After a season when ripe-rot has been bad a serious reinfection may be expected the following spring, because the disease is carried over in the mummied fruit left on the trees, or by infected fruits and leaves under the trees. Little can be done to cure the disease, but much good can be accomplished preventively by spraying with lime-sulphur solution in the early summer and whilst the fruit is developing on the tree. This will prevent infection of fruits not already affected. Lime-sulphur may be used in the proportion of 1 part of lime-sulphur solution to 100 to 125 parts of water. In the winter the trees should be thoroughly sprayed with sulphate of copper (pure bluestone) in the proportion of 1 lb. of bluestone to 10 gallons of water. The early spring spraying with either lime-sulphur solution or Bordeaux mixture should not be neglected. In pruning the trees all mummied fruits should be cut off.

When marketing the fruit during the season care should be exercised in picking to avoid bruising and puncturing the skin, as the disease will develop during transportation to the markets. Quite a lot of fruit has arrived on the market affected with ripe-rot. Care should also be taken in the packing-house to remove all diseased fruit, otherwise the spores may find lodgment in the building and continue to affect every load brought into it. Thorough ventilation will assist materially in checking the spread of the disease. Cull fruit should not be allowed to remain about to decay, but should be destroyed, preferably by burning.

CO-OPERATIVE HANDLING OF GRAIN IN CANADA.

ONE of the most successful farmers' co-operative enterprises in the progressive Canadian province of Saskatchewan is that of the Co-operative Elevator Company, which was established in 1911 upon the recommendation of a Royal Commission appointed in 1910 to inquire into matters affecting the grain trade. The company was formed to enable the farmers to free themselves from what they asserted to be a monopoly exercised by grain-dealers, combinations of grain-dealers, and private elevator companies in Western Canada. It has power "to construct, acquire, maintain, and operate grain-elevators in Saskatchewan; to buy and sell grain; and generally to do all things incidental to the production, storing, and marketing of grain." The amount of the share capital is not fixed: the shares have a nominal value of $50, and no one may hold more than twenty shares. The general management is in the hands of a Board of nine directors, and each elevator acquired or built by the company has a local board of management consisting of five shareholders. Upon certain conditions the Government advances a large part of the capital required for each local elevator, loans from Government being repayable in twenty equal annual instalments, with interest at 5 per cent. Any number of shareholders in a particular locality may request the company to buy one of the elevators at the local forwarding point or build a new one, but before taking any action the board of directors must be satisfied that the amount of shares held by the supporters of the proposed local elevator is at least equal to the value of the proposed elevator; that 15 per cent. of the amount of such shares has been paid up; and that the aggregate annual crop acreage of the said shareholders represents a proportion of not less than 2,000 acres for each 10,000 bushels of elevator capacity asked for. The growth of the company has been rapid. Between 1911–12 and 1914–15 the following increases took place: Number of shareholders, from 2,597 to 14,922; number of elevators, 46 to 215; grain handled through elevators, 3,261,000 to 12,344,000 bushels; grain handled on commission, nil to 11,000,000 bushels. The annual report of the company for the year ending the 31st July, 1914, shows that the authorized capital at the end of the year was $2,000,000, the subscribed capital $1,911,800, the paid-up capital $382,461, and the profit on the year's working $285,181.

During dry weather this summer at Ruakura weaner calves have been turned on to a break of lucerne, and then into a pasture-field largely composed of *Paspalum dilatatum*. The growth of paspalum on some of the poor swamp land of the farm has been remarkable this summer.

PHOSPHATES AND LIME.

SOME FARMERS' EXPERIENCE.

B. C. ASTON, F.I.C., Chemist to the Department.

IN previous issues of the *Journal* I have endeavoured to show that New Zealand soils are usually so deficient in lime that phosphates, especially superphosphate (which is acid in reaction), benefit by being mixed with either lime or some phosphate containing lime in excess, such as basic slag or bonedust, or even by using basic slag by itself. The following selection of extracts from letters received from farmers in connection with the advice given to them by the writer (through the Fields Division) regarding the manurial treatment of their land contains matter of general interest and instruction bearing on this subject:—

A Stirling (Otago) farmer reports:—

The manurial treatment advised—namely, 2 tons of lime per acre, with a liberal dressing of guano—I have found very beneficial for this class of land. On ground that I treated according to your directions I grew swede turnips up to 25 lb. in weight; on the same ground that was not treated with lime, &c., there were none that would weigh more than 6 lb. The same result was noticeable on all other crops treated.

A farmer at Awarua Plains (Southland) writes:—

Regarding advice as to manurial treatment of soil for grass: The paddock treated was 15 acres. It was ploughed out of oat-stubble at the end of May and early June, cultivated and rolled 10th to 16th October, limed with 9 cwt. burnt crushed lime on the 17th. Owing to rain it was not harrowed until the 20th. The grass, with 2 lb. of rape, was sown on the 3rd and 4th November and harrowed immediately (10 cwt. grass-manure sown with grass). Twenty cows were turned in on the 23rd January, 1914. It grazed fairly well all summer, but in winter had a red unhealthy appearance. It was top-dressed with 2 cwt. basic slag on the 26th July, with simply marvellous results. Twenty cows were put on on the 10th October, and although they were on it almost continually in the daytime the growth of clover was so luxuriant that we fenced off about 5 acres and cut it for hay. It was fenced off on the 11th January and cut on the 15th February, giving, although the weather was very unfavourable, about 2 tons of hay. I think it worthy of mention that one width of the drill was left un-top-dressed, and the rest of the paddock (1 acre) was top-dressed with kainit, 2 cwt. I could see no difference between the untreated strip and that on which the kainit was put—at least not during the summer. I can see a difference now, but hardly traceable. The part treated with kainit was like a saved paddock, the stock not touching it till late in the season. I think I am within the mark when I say the ground treated by your advice will carry three cows for one on untreated ground. You advised 1 ton lime and 5 cwt. slag. Had I used these quantities no doubt the result would be still more marked, but I am well pleased with the results with the lesser quantities, and am very grateful to the Department for the advice.

The following is the report of a farmer at Lichfield, Waikato:—

With respect to slag and superphosphate on pumice soil: Consequent on your statement that basic superphosphate was but ordinary super. with 15 per

cent. of lime added, coupled with the fact that our experimental use of lime had been absolutely resultless, we decided not to use basic super. The failure to do so experimentally was perhaps a pity. We have, however, as advised by you, used the mixture of 1 cwt. superphosphate and 2 cwt. basic slag per acre, and the results would seem to prove that the value of both is increased by the mixing. In fact, in some cases slag seems of little use unless applied in conjunction with super.

In April, 1913 (before receiving advice), we applied the two separately, but in equal quantities, as a top-dressing. The spot chosen was a gully-bottom that was growing tussock, fog, and white clover. By close inspection the clover was just discernible among the fog. On the coming of spring the result of the super. dressing was startling. The white clover took complete possession, the fog disappeared, and by summer there was as fine a showing of leaf and seed-head as one could desire; whereas the only result of the slag dressing was that the grass and clover both became a slightly livelier green, no increase in growth beyond the ordinary being noticeable. It was observed, however, that when the stock had access to it they preferred that portion dressed with slag to that which had received no dressing at all, though certainly not in preference to the super.-dressed portion.

For a comparative illustration of the results of the slag-and-super. mixture as compared with the super. alone I will report from an experimental plot of grasses and clovers established by my brother on the 8th October, 1913. Although the clovers in the super.-dressed portion of the plot were quick to establish and continuous in growth, it was noticeable that in the slag-and-super. portion they had slightly the advantage from the first—an advantage which they have distinctly maintained to the present (May, 1915). The difference was even more marked with the grasses. In fact, the grasses in the super.-dressed plot did little better than in the unmanured part alongside. The slag and super., however, distinctly encouraged the grasses, and was only beaten by the rye in the blood-and-bone portion. I might add here that the clovers in that portion were comparatively a failure.

With respect to slag and super. for turnips, no such careful experiments have been carried out as would give valuable data. Our experimental plot in this crop was quite resultless. After an elaborate system of manuring no one section showed better than another, or little better than the unmanured section. It was, however, our first trial with turnips (swedes), and it taught us that the best and most necessary preparation for any manuring on pumice soil is the thorough working of the soil, concluded with a final firm rolling. We have this year a portion of a swede paddock sown with slag and super., and a portion sown with super. and Island phosphate. So far there is no visible difference in growth, but it was distinctly seen that germination in the slag-and-super. portion was quickest and best.

A farmer near Palmerston North writes:—

I consider I had good results from the fruit-trees I treated as you recommended with 1 lb. each bonedust, superphosphate, and seed gypsum, and ¼ lb. sulphate of potash, forked in round each fair-sized tree. I used it on peach-trees only, and the fruit was well grown, and the trees put on more growth and showed a healthier appearance. The early peaches were well formed and of very good colour and quality; the late peaches were well formed, but not so good in colour, due, I think, to the cold dull weather in the autumn. I hope for better results in the coming season.

A farmer in Waiau (North Canterbury) reports as follows:—

For oats you advised drilling with the seed 1 cwt. of superphosphate and ¾ cwt. island phosphate per acre. This advice was acted on, and gave first-class returns. The mixture was drilled in with the seed on a field of 12 acres on the 16th September, 1912. In January, 1913, there was stacked from the field of oats three 6-yard stacks estimated to contain 40 tons of oat-sheaves. During May, 1913, these stacks were threshed, and yielded at the rate of 80 bushels per acre. For your information I wish to add that in 1911 this field produced one 6-yard stack, which threshed about 34 bushels to the acre; this crop was grown without manure. On the 25th September, 1914, you advised the use of superphosphate, bonedust, and basic slag in equal parts for rape and turnips. This advice has been followed and has given the greatest satisfaction during the past dry summer.

The following report is from an Opuatia (Waikato) farmer:—

Regarding manurial treatment recommended by your Department: I top-dressed with slag as advised, applying 6 cwt. per acre, except for a small portion which received 2½ cwt. per acre, and another portion unmanured. The manure was applied in January, 1914, and for some time I saw no result, partly on account of the dry weather. I am now (May, 1915) well satisfied with the result. That which had the 6 cwt. of slag came away splendidly in the spring, being of a much darker green than the 2½ cwt. piece, and thickening up much more quickly. Although it has had no more top-dressing since, it is a much better sole now than ever it was, and comes away well when closed up, excepting of course the unmanured piece, which shows signs of running out, and is much inferior in every way to the top-dressed grass and clovers. The 2½ cwt. piece does not grow as quickly as the 6 cwt. portion when the stock are off it, and the slag did not appear to act as quickly on it.

A Hukunui (Eketahuna) farmer writes:—

I might mention that I ploughed in a light crop of oats on scrub land and then sowed down in grass, using basic slag as you recommended, and the resulting sward of clover and grass is the best I have had.

BOARD OF AGRICULTURE.

THE Board of Agriculture met in Wellington in February, all the members being present. The Minister of Agriculture (Hon. W. D. S. MacDonald) also attended the meeting.

The proposal of the Stratford Agricultural and Pastoral Association that a model dairy farm, run on commercial lines, should be established in Taranaki was discussed at length, and it was decided, before making any recommendation, to obtain fuller details, which could be considered at a later meeting.

In reference to the reported commandeering of a steamer which is used to convey phosphate rock from the Pacific islands to New Zealand, it was decided to point out to the Government that if this steamer was withdrawn from service it would mean that practically no phosphatic manures could be imported, as basic slag and superphosphate are increasingly difficult to obtain.

The Board was requested by the Hon. A. M. Myers (Minister of Munitions and Supplies) to appoint two of its members, one from each Island, to represent the Board at the conference of tanners, bootmakers, and producers to consider matters arising out of the embargo on the export of hides. Messrs. Hunt and Hall attended accordingly, and the former was appointed chairman of the committee set up to consider prices, &c.

The administration of the Noxious Weeds Act was discussed at some length. This is a matter upon which the Minister of Agriculture has asked for the recommendations of the Board. It was decided that a report embodying the Board's views on the subject should be prepared for presentation to the Minister.

The Board has received a lengthy and comprehensive statement from Professor L. H. Bailey, of Cornell University, New York, setting out the lines on which he considers rural education could best be conducted in New Zealand. It was decided to write thanking the professor for his report, although it is unlikely that much use can be made of it until after the war.

Attention was called to the spread of club-root in various parts of New Zealand, and it was decided to ask the Minister of Agriculture to have an investigation carried out as to the causes of this disease, and the means calculated to prevent its spread.

A number of letters in regard to forestry matters were dealt with.

The Board had a long consultation with the Minister regarding the Government experimental farms, and several matters of detail were fully discussed. It was finally decided that the matter be deferred until the Minister had had an opportunity of making a further personal inspection of these institutions. Other matters of a confidential nature were also discussed with the Minister.

WORK FOR THE COMING MONTH.

NEW ZEALAND is a country of wide variation in climatic and soil conditions. In applying suggested procedure it is, therefore, necessary for the farmer to amend it to suit local weather-conditions and the requirements of his soil—information which can best be ascertained by a study of these problems on the part of the farmer himself. Nothing can take the place of local knowledge. Little advice on an agricultural subject is capable of general application in its entirety.

THE FARM.

FORAGE CROPS.

By the end of March all or most of the autumn forage crops should be sown, but if the dry weather is prolonged some of this work will fall to be undertaken at the beginning of April. The good farmer is usually ahead with his work, but he cannot control the weather. April is, however, generally speaking, quite a good month for sowing forage crops, particularly such as Buda kale and Thousand-headed kale. These are crops, moreover, which are coming into general favour for spring use. A forage crop to be acceptable has to yield abundance of feed at a time when it is specially needed, and it must be cheaply grown. The two kales mentioned fulfil these requirements. The seeding—4 lb. drilled or 8 lb. broadcasted—is comparatively inexpensive, and the amount of forage thrown towards the end of July and in August, when feed is scarce, is considerable. In growing these crops it is usually advisable to employ a small quantity of nitrogenous manure, such as blood, in addition to the usual allowance of superphosphate or basic superphosphate. The sowing of a small paddock of prairie-grass for spring use is also recommended. About 50 lb. of seed per acre is required.

CEREALS.

With forage crops disposed of, paddocks to be devoted to cereals should be ploughed and worked down. In dry districts these paddocks should have been skimmed some time ago, and cross-ploughing should be in season. The chances of a heavy yield on the first furrow are not great even with autumn-sown crops. This is particularly the case on the heavier classes of soil. If possible, the sowing of these crops should be commenced in April,

so as to permit of their being grazed down twice during the following months before being shut up for a crop of grain or chaff. In the North rust as a rule is less prevalent among autumn-sown crops.

On rich soils, where cereal crops are apt to lodge, they should be manured freely with superphosphate or basic superphosphate and gypsum, an average application for northern conditions being 2 cwt. of either phosphate and ½ cwt. of gypsum. The rankness of growth on these soils is due to an excess of nitrates. The addition of the manures mentioned tends to balance the mineral ingredients, thus securing an evener and less forced growth. The use of gypsum is an indirect means of supplying potash.

FIELD-BEANS.

The present month is a good time to get in a few acres of field-beans. This is a crop which is not much grown in New Zealand, but it is one to which more attention might be given. Field-beans are exceedingly valuable as part of a ration for all classes of horses, while for dairy stock they rank high as a milk-producing concentrate, for feeding when grass is immature and watery in spring, and when sappy, carbonaceous forage like maize is being fed in autumn. Perhaps the reason why more are not grown is that podding is sometimes uncertain, and the crop also liable to rust and black aphis. These troubles are not prevalent when the crop is sown in early autumn. Sow at the rate of 2½ bushels per acre.

TOP-DRESSING.

The price and scarcity of basic slag is prompting inquiries from farmers who have top-dressing in prospect. It appears probable that good results will be obtained from Ephos basic phosphate as a winter top-dressing. The average results of this manure so far on turnips and other crops indicate that it is much more slow-acting than superphosphate or basic superphosphate. This is generally true also of basic slag, but it has been shown that the steady even growth of slag-manured crops results in crops of better feeding-value. This may be true also of Ephos phosphate. Ephos phosphate, in point of analysis, is superior to basic slag. It contains 25 to 28 per cent. phosphoric acid, of which about 40 per cent. is soluble in a 2-per-cent. solution of citric acid. Basic slag contains about 15 per cent. of phosphoric acid, and of that amount from 65 to 80 per cent. is soluble in 2-per-cent. citric acid. About 90 per cent. of the phosphoric acid in high-grade slag is soluble in the 2-per-cent. solution. Considerable shipments of Ephos

phosphates are expected from Egypt from April onward. Other basic phosphates can also be relied on to give good results in districts of ample rainfall.

ROTATIONS.

In many respects April may conveniently be regarded as the beginning of the farmer's year in this country. It is a time for stock-taking and for laying plans for another year's work. In this connection it cannot be doubted that great advantage would accrue to many farmers by the adoption of a systematic rotation of crops. Rotation farming is fairly general throughout the cropping districts of the South Island, but could be much more widely practised in the North Island. Rotation does not consist merely in avoiding the successive repetition of the same crop or kind of crop in a paddock; it means a more or less regular plan of cropping for all the paddocks. There are a number of reasons why it is advisable to adopt a definite system of cropping. These need not be gone into here further than to observe that until some system based on stock-requirements, soil-fertility, distribution of work throughout the year, &c., is adopted, farming means only muddling along. A man may be a grazier, a soil-robber, or a cow-puncher without farming. Farming properly so called is characterized by method and system.

Where mixed farming is carried on the following rotation is well designed from the point of view of the various considerations on which all rotations must be based: First year, forage crops and roots, including potatoes; second year, cereals, autumn and spring sown; third year, forage crops; fourth year, grass; fifth year, grass; sixth year, grass; seventh year, grass; eighth year, grass; ninth year, grass. One of the grass leas would be cut each year for hay.

In drier districts and on less fertile soils where six years might be considered too long for grass lea a more suitable arrangement would be: First year, cereals; second year, forage crops; third, fourth, and fifth years, grass; sixth year, forage crops and potatoes and roots; seventh year, grass, sown in autumn after forage crops and potatoes, and again in spring after roots; eighth and ninth years, grass.

The ratio of crops to grass in these rotations is 1 to 2, and this is a very good allocation. In the case of a farm which is in course of development from the bush the aim should be to provide a cropped area under rotation, in the proportion of 1 acre of crops to not less than 2 acres of permanent pasture. In this case the rotation of the land under crop may be a short

one, such as: First year, Western Wolths or Italian rye-grass and clover for hay; second year, roots (including potatoes); third year, cereal crop for chaff or grain; fourth year, forage crops.

In framing a system of cropping it is always an advantage to have one or two crops for direct sale. Such crops are potatoes and grain and chaff, while similarly any surplus of hay over and above live-stock requirements on the farm has a market value.

It may be mentioned that none of the rotations here given are put forward in a hard-and-fast way. Varying circumstances and conditions call for adaptations which the farmer should make it his business to study.

CROPS FOR PIGS.

For pigs special crops have to be provided. Pigs kept on the paddock system are a paying proposition at the ruling prices for pork and bacon. The following rotation is suggested as suitable for pig-raising as part of mixed-farming activities: First year, field-peas; second year, clover; third year, clover; fourth year, mangels; fifth year, one-half in rape followed by green maize, the other half in turnips and swedes.

Such a rotation provides all the bulky feed required throughout the year and part of the concentrated food, in the form of peas, fed during the winter months. For fattening purposes, dairy by-products, seconds of home-grown barley or wheat, or purchased pollard would be available.

For northern districts where maize can be grown successfully for grain the following rotation would be more suitable: First year, field-peas; second year, clover; third year, clover; fourth year, maize, with rape broadcasted between the rows after cobbing; fifth year, pumpkins and mangels.

In both cases a small area of lucerne should be provided.

LIVE-STOCK.

Horses in work should now be rugged at night, otherwise their coats will grow very coarse and cause heavy sweating when the animals are at work. It is exceedingly important that newly weaned foals should not be allowed to lose flesh at this stage. They should be provided with regular supplies of sound sweet oaten chaff, a fair allowance being 3 lb. to 4 lb. per head per day. A small supply of good clover hay in addition (say, up to 6 lb. each per day) is also worth while. A rough shelter-shed should be provided as a protection from cold wet winds. Cold itself does not harm colts, but they are adversely affected by wet conditions.

The earliest calved cows should be gradually dried off towards the end of the month. These and heifers coming to profit next year require fair treatment during the ensuing months. It is not sufficiently realized that the growing fœtus during the last few months of pregnancy makes considerable demands on the system. If a well-grown healthy calf is to be delivered, and the cow or heifer is to do her best at the pail next season, it is not enough to turn her out now to scrape for her living on bare and comparatively innutritious pasture. Roots and well-got hay should be available when required.

The time has passed—in fact, never was—when dairy stock could be wintered to advantage on grass alone. It is not contended that supplementary feeding should be given to the extent practised in countries where pastures are absolutely dormant during the wintertime. On a dairy farm which is worked as suggested in the foregoing notes, on a somewhat long rotation, or on which two-thirds of the acreage is left in permanent pasture, there will not, as a rule, be any considerable surplus of hay or forage if milkers, heifers, and young stock are properly treated. The young stock in particular require proper care and feeding.

Dairying can never rise to a high level where the stock are not year by year graded up by a purebred sire of good milking ancestry. This means retaining a fairly large proportion of the heifer calves. But no matter how good the bull may be, if his female progeny, which are eventually to raise the standard of the herd, are not adequately fed and cared for, the results cannot possibly be satisfactory.

Cows still milking should now be rugged on cold nights.

Rams which were put to ewes during March should be withdrawn towards the end of April, and from now onwards the ewes should receive good treatment. By this it is not meant that they should be placed on rank pasture, but the herbage should be fresh, and the pastures arranged so that the ewes take plenty of exercise while obtaining the necessary food.

When the rams are got together it is a good practice to run them through the dip again. Any sheep that may, through various causes, have missed dipping should also be put through the dip at once. It is good policy to dip all bought sheep before turning them out with the home flock, as sellers often fail to dip sheep they are disposing of, or do it in a perfunctory manner.

Towards the end of the month the first break of roots will be ready for stocking in early districts, and where the crop is to be utilized for carrying store hoggets through the winter the sooner they become accustomed to the roots the better. It is not good

policy to delay stocking roots just because pastures appear fresh. Old pasture at this season is apt to be lacking in nutriment, and is certainly not the class of food that hoggets require. The start with root-feeding should be made either by carting out a small allowance to the grass-paddocks, or the break should be stocked for a few hours only in the afternoon until the sheep become thoroughly accustomed to the change.

Porkers and baconers should now be approaching market condition. At this stage it is good policy to spend more freely on grain. There may not be much of a margin on the profit side at the present price of grain, but porkers in prime market condition realize a higher price per pound than half-finished stock. The use of grain, therefore, although not in itself very profitable, enables a better return to be secured from the rough feeding which preceded it. With good doers at the proper stage 4 lb. of grain can be counted on to produce 1 lb. of pork or bacon.

Sows should now be put to the boar (if not already done) for spring litters, and every care should be exercised to keep the sows in good condition until farrowing. High condition in sows and in the case of any other breeding-stock is a mistake, but one which not one in a hundred pig-keepers is guilty of; whereas the opposite extreme is quite a common condition of brood sows. Let the sow have plenty of feed and plenty of exercise, and if she is full half fat when she comes in, all the better. If she is of the right class nearly all her accumulated fat will find its way through the milk into the little ones before they are six weeks old.

THE ORCHARD.

J. A. CAMPBELL, Assistant Director, Horticulture Division.

THE SPRAYING PLANT.

THE end of March practically sees the close of spraying operations for the season. Although in very hot and dry seasons some growers take the precaution of spraying for codlin-moth early in April, this is hardly necessary unless conditions are very exceptional.

The spraying-outfit should not be required again till the late autumn or early winter comes on. Advantage should therefore be taken of the opportunity to thoroughly overhaul, clean, and repair the plant where necessary. Renew all worn washers, valves, nozzles, &c. See that the hose is left in sound working-

order. All these matters can be better attended to now whilst the defects are fresh to the mind than if left until plant is required for use.

HARVESTING.

The principal work in the orchard for some time will be in harvesting the later varieties of apples and pears. Fruit intended for storage for any length of time, either in cool storage or otherwise, should be very carefully handled. Bruised or injured fruit, particularly if the skin is broken, fails to keep satisfactorily. In fact, skin-punctured fruit will, under certain conditions, rot in a few days. The conditions which result in this are the wrapping of the fruit in paper and packing it while the wound is still fresh. The confined atmosphere of a packed case is all that is required to set up a damp mouldy action on the injured part, resulting in rapid decay. Skin-punctured fruit, often the result of rough handling at picking or when carted in bulk over rough roads, is very easily overlooked at sorting. Fruit wrapped and packed as above stated often rots in a few days when on the market, greatly to the surprise of the packer. This class of fruit, too, is often responsible for the half-dozen or so of decayed fruit so often found in an otherwise sound case after being cool-stored for some time.

COVER-CROPS.

Cover-crops, particularly those intended for ploughing-in in the early winter, require to be sown as early as possible, so as to assure a good start whilst conditions are still favourable; otherwise poor growth is likely to result throughout, such crops at the end of the season being of comparatively little value for the purpose for which they are required. Sowing during March usually provides the best opportunities for raising a satisfactory crop; but where this has not been done the work should be attended to as early as convenient in April.

Practically all soils are improved by the addition of humus such as is provided by the ploughing-in of a cover-crop. Sandy and light soils are enriched, and their moisture-containing power is considerably increased. Heavy soils are rendered more porous, friable, and easily drained. In all cases the quality of the soil is improved by the addition of such organic matter and the consequent increase in the soil organisms in the form of beneficial bacteria.

Weeds and other vegetable matter, if allowed to grow, provide a certain amount of humus when ploughed in; but this course

is inadvisable and unsatisfactory as compared with a selected cover-crop, and should be altogether avoided.

There are many different kinds of crop used for this purpose. If the principal object is to supply humus, which is often the case with heavy soils, a cereal is commonly used, such as oats, buck-wheat, rye-corn, &c.; but if the object is to supply nitrogen as well, a leguminous plant should be used, such as field-peas, beans, white and yellow lupin, common vetch and hairy vetch, &c. The latter is a very popular cover-crop in the United States of America.

THE POULTRY-RUN.

F. C. BROWN, Chief Poultry Instructor.

PULLETS AND WINTER EGGS.

To secure eggs in the dear season the pullets must be chiefly depended upon for production, as even with the late-moulting hens it will only be an odd bird that is not then taking a rest and undergoing the process of producing a new coat of feathers. In many cases the early hatched and particularly the more precocious pullets will have commenced to lay before now, but it is hardly likely that these will continue laying during the winter season, for the reason that they will go into a moult at the same time or perhaps a little later than the adult stock. The pullets that are going to be most profitable are those that have been hatched at the right time (say, at the end of September for the light breeds and a month earlier for the heavier), and which are well grown and start to lay about April. Providing these birds are properly handled they will go right through their first laying season without moulting.

The management of the pullets when nearing the laying-point is all-essential, for even when hatched at the right time they are apt to go into a moult if the treatment they receive is not uniform in every respect. In the first place there should be no delay in getting the birds into their winter quarters, so that they will be well settled down before the laying-period commences. Care must also be taken that no sudden change of food is given, nor a change made in the manner in which it is supplied. The changing of the food or quarters, even if it be ever so slight, when the pullet is on the point of laying or just started to lay, will generally bring on a false moult, and the producing of new feathers rather than

the production of high-priced winter eggs. Rough handling is another common cause of the pullet moulting at this stage. An endeavour should always be made to make the birds tame by going quietly among them and talking to them, so that they will have confidence in their attendant instead of doing their best to get out of his way.

The houses should be roomy and well ventilated without draughts. It is also essential that they be kept in a thoroughly sanitary state and free from vermin. If there has been adult stock in the houses previous to the pullets being placed in them, a sharp watch should be kept for vermin. Even where the houses have been sprayed and cleaned it is surprising how red-mites will turn up and multiply if not kept in constant check. Red-mites will remain in a house for months without living on the fowls, and if the pullets are to do their best it is imperative that they should not have to fight against parasitic life. The floor of the house should be well covered with litter and the grain foods scattered in it. This will induce the birds to exercise and keep busy.

If the birds are to reach their maximum artificial production ample food of the best quality should be supplied. On no account should sound wholesome grain be fed at one time and an inferior quality at another, or a false moult may be expected. While meat or its substitutes are necessary if the best results are to be obtained, it should be gradually introduced and, if possible, fed separately, so that the birds may be given a chance to balance their own ration. Green food, such as lucerne, cabbage, rape, silver-beet, &c., may be fed separately during the day. Where lucerne hay or clover hay is available, this, if chaffed fine and steamed overnight, will make a valuable addition to the morning mash. It should, however, be introduced by degrees, and if at any time it is observed that a quantity of it is left in the trough, and the pollard, bran, or ground grains eaten, the proportion of chaffed hay should be reduced, as neglect of the latter food is a sure sign that the quality is inferior, or that the birds are getting too much. Gravel grit, crushed oyster-shell, and clean water should be always before the birds.

MATURITY.

A matter that must very often confuse the novice in reading poultry literature is that of early maturity and whether this is desirable or not in the pullet. Some authors hold that early maturity is a sure indication of laying-power, while others disapprove of it. It would therefore appear that there is a wide conflict of opinion on this particular point. This, however, is not

necessarily the case, for what one man considers late maturity another may consider early or even pre-maturity. It is well known that certain breeds and strains of breeds mature earlier than others, and this to a great extent is responsible for the conflicting opinions so freely expressed — often by practical men — on this important matter. A case in point recently came under my notice. The owner of a plant, a strong advocate of the view that early maturity is a sign of laying-capacity, pointed out to me a special laying-hen which was the first one of a particular batch of pullets, full sisters and of the same age, to commence laying. On making inquiries as to the age when this particular bird started to lay I was informed that she produced her first egg when six months old, being from three to five weeks earlier than any of her sisters. As the bird in question was a White Leghorn, I remarked that it could not be considered as an early-matured bird, but rather that the sisters were late-maturers.

In the circumstances the breeder was right in advocating early maturity, but only so far as his particular strain was concerned. I have frequently seen White Leghorn pullets start laying at four months old. In fact, it is not uncommon to see birds of the heavier breeds, such as Black Orpingtons, laying at four and a half months. It will therefore be seen that very often when early maturity is spoken of by different persons it may mean on the one hand condemning a pullet that commenced to lay at the early age of four months and, on the other hand, recommending it (early maturity) with a bird that started to lay at nearly double the age.

It should always be remembered that when a pullet starts to lay she ceases to grow, and as a consequence she never attains the desired size as a breeder, nor will she produce suitable-sized eggs for market or reproductive purposes, if she starts to lay at a very young age. Early maturity is certainly desirable, but only when the bird has attained a complete stage of development. Generally speaking, with light breeds about six months is the proper time for a pullet of a laying-strain to start on her laying season, and this may be extended a month in the case of the heavier breeds.

RESERVE BREEDING-COCKERELS.

When making the selection of cockerels for the next season's breeding-pens it is always a sound policy to keep an extra bird as a reserve sire. It often happens that a breeder has had his breeding operations upset because of depending on one bird which met with an accident or proved himself useless for fertilizing the eggs. The cost of keeping a second bird is a minor consideration, but

instances are common where the best part of the breeding season has been lost all for want of keeping an extra cockerel as a stand-by. It is always a good policy to cull a drone hen rather than dispose of a cockerel which promises to make a good breeder.

LEG-WEAKNESS IN COCKERELS.

Many inquiries have reached me in regard to leg-weakness in young cockerels. This is one of the many troubles affecting poultry which prevention is the only way of fighting. The invariable cause is insufficient exercise and the overfeeding of forcing-foods. In the case where cockerels are intended for breeding purposes forcing-food and confined quarters at this stage are a mistake. It stands to reason that feeding rich foods to birds in small runs will have the effect of encouraging size of body beyond that which the undeveloped legs are capable of carrying. Of course, where birds are to be marketed young and in prime condition forcing-food as well as confined quarters are necessary, in order that the bird may make the greatest growth possible in the shortest space of time. The highly forced male, however, is not the one to be regarded as a desirable bird for heading the breeding-pen. The fact of the bird being weak in the legs indicates that it has an hereditary weakness or that constitution has been weakened through improper management. It may be emphasized that the breeding-cockerel should have ample range under the most natural conditions possible. Where this is not available the bird should be compelled to exercise by providing ample litter, and feeding the grain foods in it.

THINGS TO REMEMBER.

Never attempt to keep more fowls than can be properly handled.

The first birds to moult should be the first to be culled.

On no account should late-hatched pullets be forced to maturity.

Drastic culling is imperative on the majority of plants at the present time.

No flock of fowls can produce their maximum number of eggs if the houses are infested with red-mite.

He who stints his fowls of food and water is cruel, and should be employed at some other occupation.

Keeping birds till they die of old age, and careless methods of marketing, are the chief weaknesses in farm poultry-keeping.

It is unwise for any one to take up poultry-farming unless he has the ability to conduct it on the same strict business principles as those of any other commercial undertaking.

THE APIARY.

E. A. EARP, Apiary Instructor.

PRECAUTIONS AGAINST ROBBING.

IN most districts in the Dominion extracting will now be finished, and in cases where for any reason it has been delayed care must be taken not to excite robbing. Autumn robbing is exceedingly difficult to check once it has started, more especially when fine weather is experienced. Do not leave combs lying about or expose vessels that have contained honey, as this certainly will cause trouble. Handle every hive with the utmost expedition, and keep all honey covered in carrying it from the hives to the extracting-room. The best article for this purpose is a wet cloth spread over the super. It is better to carry a few bees into the honey-house, allowing them to escape at your leisure, than to spend unnecessary time in brushing all the bees off each comb. However, for the removal of honey late in the season the beekeeper can hardly employ a better appliance than the Porter bee-escape. In using this care should be taken that the supers contain only honey, or the escape will fail in its purpose. If robbing has started it may be advisable to postpone outside apiary work until the colonies are quiet. Possibly nothing is more disastrous to the beekeeper than bad cases of robbing, as it leaves the colonies weak for wintering. Contract all entrances, and place wet grass in front of the hives that are attacked. Keep wetting the grass at frequent intervals for several hours. This is the best way to quell the disturbances.

WINTER STORES.

A careful examination of all hives in the apiary should be made, in order to note the amount of honey that each possesses. It is not a good policy to winter on less than 30 lb. honey, and in the warmer parts of the Dominion it is advisable to increase this amount by half. If a colony is short of that weight and it is to be wintered successfully, feeding will have to be resorted to. Just in proportion to the amount of honey that is left so will the colony thrive in the spring. If it is found necessary to feed, do so, and do not delay feeding until the cold weather sets in. Use only inside feeders, as outside feeding is dangerous. On no account feed honey unless you are sure that it comes from a clean source. Using honey from a diseased hive is a certain method of infecting the apiary. For particulars in regard to feeding see the Department's Bulletin No. 39, which may be

obtained free from the Director of the Horticulture Division, Wellington.

FOUL-BROOD.

In closing down the hives for winter the combs must be carefully examined for brood disease. Where disease is detected in a bad form do not waste time in treating, but destroy the colony. In mild cases remove the diseased combs and insert either sheets of foundation or drawn-out combs — the latter for preference. Make a note of the infected stocks for treatment in the spring, when fine weather will enable the work to be carried out successfully. Do not tinker with diseased hives in the off season, as the trouble is more likely to spread among the clean ones by robbers.

UNITING COLONIES.

On making his final rounds the beekeeper will often find stocks that are too weak to survive the winter or that are queenless. In either case it is advisable to unite with a stronger colony to save the bees. A simple method is to put on top of the stronger the queenless or weak colony, placing a sheet of newspaper between the two supers. In the course of a few days the bees will gnaw their way through and unite. The surplus combs can then be removed and extracted, or retained for spring feeding if required. It is a good plan to destroy the queen in the weak hive prior to uniting.

CARE OF UTENSILS.

When extracting is finished for the year care should be taken that all traces of honey are removed from the extractor, tanks, &c. Wash carefully with boiling water, and dry thoroughly. Cleanliness should be observed as a very important matter where articles of food are concerned. Cover everything carefully from dust which may accumulate during the winter months. Loose washing covers of close texture are the best for the purpose. Give a good coating of oil to any metal parts likely to rust: this will save a lot of trouble the following season.

CARE OF HIVES.

Where necessary the hives should be given a good coating of paint. Stop up all cracks and replace faulty hives with sound ones. Pay special attention to roofs, as it is very important that the bees should come through the winter dry. It may be necessary to cover the roofs with some waterproof material. If zinc is found too expensive, a cheap substitute, such as ruberoid,

may be used. Clean all bottom boards by scraping. The simplest plan is to provide a spare bottom board. Lift the hive on to the spare one, scrape the old board, and replace the hive. Contract entrances against robber bees and mice, the latter pest being one for which apiarists must watch during the bees' dormant season. If the above precautions are followed the colonies will be ready for winter.

HONEY FOR TROOPS AT THE FRONT.

The Hon. Colonel Rhodes has written his manager, Mr. Beadel, suggesting that a scheme might be formulated and donations of honey sent to our boys at the front. In order to give the scheme a start he has sent a donation of £100 for the purpose of purchasing honey. It is suggested that 1 lb. tins are the most suitable and convenient for transport, as the honey has to travel by mules. I would like to see all our beekeepers, large and small, come forward with gifts of honey according to their means. They can send their honey in large tins to the receiving depot, where it could be retinned and packed in suitable size. Mr. McCartney, chairman of the Tai Tapu Patriotic Committee, Tai Tapu, will be pleased to receive all donations. Probably one of the beekeepers' associations of the North Island will also take up this matter.—T. W. KIRK, *Director of the Horticulture Division.*

THE FARM GARDEN.

W. H. TAYLOR, Manager, Arataki Horticultural Station.

VEGETABLE-CULTURE.

A LONG spell of dry hot weather serves to show more than any other condition the importance of deep trenching. On a former occasion I pointed out that more is expected from the domestic garden than from the open field. It is accepted that field culture is largely dependent on weather-conditions. If the season is favourable field crops succeed; if abnormally dry they naturally fail more or less. The top soil only is worked, and this is soon deprived of moisture. From the domestic garden, however, a daily supply of produce is expected. The area being small, it is usually possible to prepare the soil in a manner that renders it to a large extent independent of weather. Deep trenching removes the danger of the soil being too wet in winter and too dry in

summer. Deeply worked soil, in which is incorporated a liberal supply of vegetable humus, seldom becomes really dry: it acts as a reservoir for moisture.

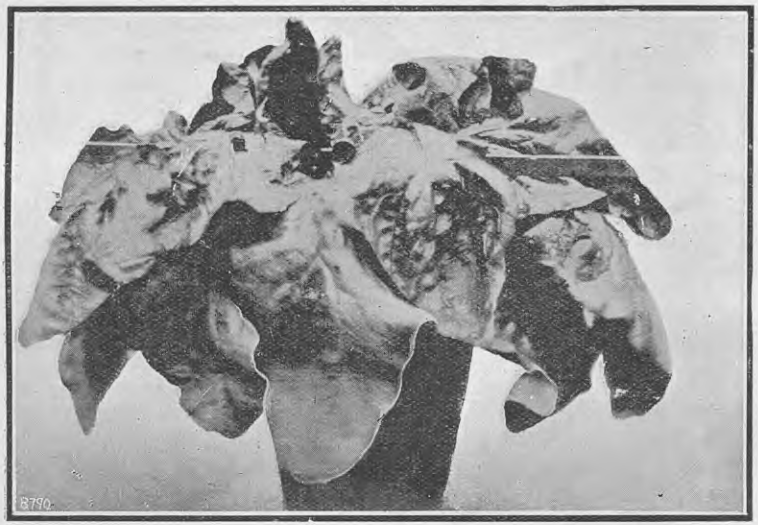
Where these conditions obtain I cannot conceive the soil being too dry for the sowing of seed in proper sequence, and my lengthy experience leads me to that conclusion. The first few inches may be perfectly dry, but, given proper tillage, well-prepared garden soil should always have some reserve of moisture even in the driest season. The purpose of a domestic garden is to maintain a supply. This can be done, and is done, despite the vagaries of the weather. It is wrong to top-water seed-drills, for the moisture quickly evaporates, and the seed is likely to be disturbed. The soil above the seed almost surely becomes caked, and the

HOW SPINACH SHOULD BE GROWN IN WINTER.

seedlings only with difficulty push their way through it. When the surface soil is too dry to germinate the seed thoroughly water the drills after the seed is in, then cover over with the thrown-out soil. This acts as a dry mulch and prevents evaporation, and seeds will quickly germinate.

Spinach and Silver-beet. — The foregoing remarks refer to all kinds of seeds, including peas, but have more special reference at the moment to spinach and silver-beet. Silver-beet is a very useful vegetable. Being comparatively free from any disease or from attack by insects, it is practically sure to succeed. It does well in any weather, and is a useful stand-by. I consider the midribs of the leaves to be the best part. Cooked as sea-kale and served with white sauce, they are very palatable.

Spinach is a vegetable of higher value than silver-beet, but less easily got during summer. Those who have or may acquire the taste for spinach consider it the best of all vegetables. Its medicinal value is also great. A good bed of winter spinach gives gatherings for about six months. The quantity of usable matter it yields depends mostly on how it is treated. The drills should be far enough apart to allow of the free use of the hoe—not less than 12 in. As soon as the plants are large enough to handle they should be thinned to single plants, leaving from 8 in. to 10 in. space between each plant. The plants should grow strongly, and the leaves of the various plants overlap each other. It is important that the leaves be freely gathered as they become



SINGLE PLANT OF SPINACH FROM THE BED SHOWN IN PRECEDING PHOTOGRAPH.

large enough for use, otherwise the coming leaves suffer. Spinach purchased from the greengrocer consists of plants tied in bundles, this being the only convenient method of marketing. In the home garden the leaves only should be gathered. The accompanying photographs were taken for the writer last winter: one shows the bed, the other a single plant lifted from the bed—a fair sample of the whole. The bed was not on rich soil nor in any way abnormal. It was sown on the 26th March.

On the same date Early Horn carrot was sown, and did well; cabbage of various kinds was also planted, producing rather small but useful heads. Broccoli turned out small, there being insufficient time for growth. These results are proof, however, that by planting late—a thing that can scarcely be avoided in some

of the dry parts of the Dominion—some measure of success may be obtained in the hotter localities that would not be possible in average districts.

Current Work.—In most places winter crops of plants of the kind just referred to are now well advanced in growth, and it only remains to keep the ground clean and loose about them until they practically cover it with growth.

The last week in the month is the time to sow *onions, cabbage, cauliflower,* and *lettuce.* Lettuce, if wanted for use during winter, is most advantageously sown in drills, the plants to be thinned out in lieu of transplanting. Much more rapid advance is made by this method, because the check of transplanting is avoided. The main purpose, however, is for the spring crop, for which sow in beds for transplanting. For winter use sow Tennis-ball or All-the-Year-round. For spring any of the larger kinds, such as Webb's Wonderful and Iceberg, or if dark green is preferred grow Neapolitan. The best early cabbage is Flower of the Spring, a British variety; and Enfield Market, or other larger kinds, may be sown for succession. Good early cauliflowers are Early London or Early Snowball, with Veitch's Autumn Giant to succeed. The first-named come in from October to December, the latter subsequently.

Onions to be sown are mainly for transplanting. Ailsa Craig is the best; others are Giant Rocca and Prizetaker. One of the latter is the largest I have grown, weighing 3 lb. 6 oz., without special cultivation. Brown Spanish varieties may be sown and not transplanted. The earliest ripe bulbs are obtained in this way, also larger ones of the keeping kinds than can be grown by spring sowing in hot and dry places; but the autumn-sown bulbs are never the best of keepers.

SMALL FRUITS.

Strawberries.—The best first-year fruiting-plants are obtained by taking the runners off early and planting them in nurse-beds for the winter. The plants may be about 4 in. apart in rows, 12 in. asunder. Keep the soil loose and clean between the plants. When the plants are lifted it will be found that each is furnished with a good cluster of roots, many times as numerous as would be the case if they were left on the old bed, or if after lifting they were huddled together in a mass. Strawberries will not do well on shallow ground. Trench a plot and work in farmyard or stable manure if it can be got, or vegetable matter of any sort that

is available, and in the latter case supplement it with artificial manures in spring. Any one intending to purchase plants should get them at once and plant in a nurse-bed as indicated. Madame Melba seems to be the most reliable variety at present.

Loganberry plants may be raised very easily by cuttings, the best of which are furnished by young rods. These should be cut in lengths of from 12 in. to 18 in., cutting the lower end square across just below a joint. For planting, insert the cuttings to fully half their length in free soil; make sure that the bottom of each cutting rests firmly on the soil, and tread the soil firmly about them, leaving the surface loose. April is a good time to put the cuttings in, provided there have been good rains, which should be waited for.

Gooseberry cuttings should be made from young shoots: 18 in. is not too great a length to make them. All the buds except about four at the top should be cleanly cut out. The cuttings should be firmly planted about 8 in. in the ground. Cuttings of *red currants* should be prepared in the same manner, but from *black currants* no buds should be removed. In the case of gooseberries and red currants, the object in removing the buds is to prevent suckering. Black currants should be allowed to make suckers (the technical term is "stool"), therefore the buds are left.

THE FLOWER-GARDEN.

Roses.—In countries subject to severe frosts it is necessary to have roses growing on stocks able to bear the extreme cold, as roses on their own roots would mostly die. In such countries cuttings are struck mainly to provide plants for growing in pots. A special method for rooting the cuttings is employed, and a special kind of cutting is taken. These provide the right class of plant for pot culture. In our climate most roses succeed on their own roots, though there are some exceptions, as to degree of success at any rate. The great white Frau Karl Druschki, so far as my experience goes, does much better on other roots, growing to a stronger plant. Few are in a position to bud plants, and in very many cases the roses in the garden would necessarily be limited if all the plants had to be purchased. Rose-cuttings strike root quite easily, provided the proper cuttings are used and properly put in at the right time. There are several months during which the cuttings may be put in, but most success will be attained by choosing the best time. The best period is that which allows some time between the insertion of the cuttings and the natural cessation of growth in the plants. That period is April, and,

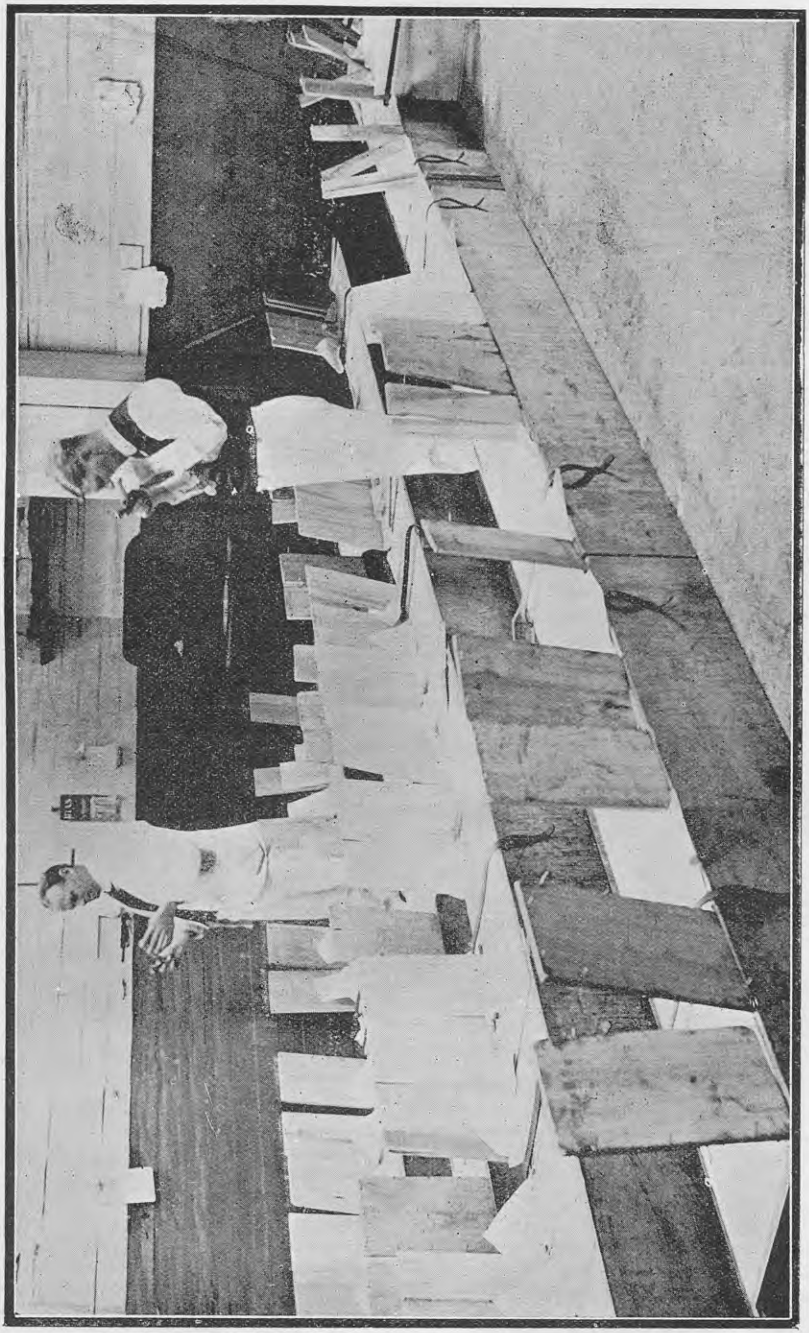
provided autumn rains have commenced, the cuttings should be put in from mid-April to mid-May. If the exigencies of the case cause the work to be delayed till a much later time success will be only partial, as the cuttings will not make actual roots to any extent till growth begins in spring. But if put in at the time stated a callus will form at the base, and roots will start with growth. Making of the callus is thus necessary. This takes time, however, and if the cuttings are late in there is not time for it to form before roots are demanded by the pushing shoots. Hence a little growth may be made, and then die off because there are no roots.

Cuttings for inserting in the open ground are, roughly, of two kinds—one kind for hybrid perpetuals and such kinds of hybrid teas as resemble them in growth, and the second kind for all other sections. For those first mentioned choose clean, moderately stout shoots of current season's growth—that is, firm, with little pith, and devoid of branches. Make the cuttings about 10 in. long, cutting squarely across with a sharp knife just below a joint. Insert the cutting at least two-thirds its length, making the base very firm. Tea roses, and others not specified, must be propagated by heel cuttings. A small branch with several branchlets should be chosen, the whole being 9 in. or more in length. Tear the branch from the parent by a sharp downward jerk. This will secure a shield of the old wood on which the callus, and later the roots, will form. The half-ripened tips should be cut off; no other preparation is necessary. Insert so that a portion of the top is exposed, but not too much. If carefully taken, and firmly planted in free soil in a moist condition, nearly every cutting should root. On no account water them, or they will fail.

Lawns.—April is a good month to sow lawns. This is particularly the case in hot climates. In Hawke's Bay the seed should be got in after the first rain, so as to give time for the grass to strengthen before the frost occurs.

FORTHCOMING AGRICULTURAL SHOWS.

Amuri A. and P. Association: Annual Show at Waiau, 21st March.
Westland A. and P. Association: Show at Hokitika, 22nd March.
Temuka and Geraldine A. and P. Society: Show at Temuka, 30th March.
Oxford A and P Association: Annual Show at Oxford, 6th April.
Mackenzie County A. and P. Society: Annual Show at Fairlie, 24th April.
Raglan A. and P. Association: Winter Show at Raglan, 19th and 20th May.
Waikato Winter Show Association: Show at Hamilton, 30th May to 3rd June.
Manawatu and West Coast A. and P. Association: Winter Show at Palmerston North, 20th to 23rd June.



DAIRY-PRODUCE GRADERS OF THE DEPARTMENT AT WORK.

ANSWERS TO CORRESPONDENTS.

IN every instance a question to which an answer is desired in these columns must be accompanied by the full name and the postal address of the inquirer, not necessarily for publication, but as a guarantee of good faith. The question should be written on one side of the paper only.

TEMPORARY BLINDNESS IN SHEEP.

"ONETOKO," Tokomaru Bay :—

What is the cause of a number of ewes (about ½ per cent.) becoming blind just at this time of year? Among my flock (six thousand) there are at present about the above proportion affected. A bluish-pink scum seems to form right over the eye. Sometimes only one eye or sometimes both eyes are affected. Will the ewes get right again? It is my own impression that the complaint is only temporary and has something to do with weather-conditions. Is there any preventive? If there is no preventive, what is the best thing to do to either cure the complaint or minimize it?

The Live-stock Division :—

Cloudiness of the eye, opacity of the cornea, rendering sheep wholly or partially blind, is of common occurrence during a dry summer. It appears to depend on some disturbance of the digestive functions which, indirectly, through the nervous system, affects the eyes in this manner. Direct irritation of the eye from exposure to the effects of dust and bright sunlight cannot be held accountable for the production of this condition. The complaint is generally of a temporary character, and disappears if the sheep can be changed to fresh pasture where a plentiful water-supply is available, or on the advent of wet weather affording a fresh growth of grass. Preventive measures would consist of changing the pastures as indicated, with a view to ensuring fresh and more succulent feed. Attention must also be given in regard to water-supply. Treatment is, as a rule, not practicable on account of the large number affected at one time. Individual treatment would consist of application of an eye-lotion containing 2 grains sulphate of zinc to 1 ounce of distilled water, and 4 ounces of Epsom salts given internally in a pint of water. Shade should be provided for the affected sheep, in order that they may have shelter from the effect of the sun's rays.

LOTUS MAJOR AND COW-GRASS FOR SEED.

H. A. HAWKE, Pukekawa, via Tuakau :—

Would you kindly advise me the best way to grow *Lotus major* and cow-grass for seed, when to sow, how many pounds to the acre, and the most practical method of harvesting?

The Fields Division :—

Lotus major and cow-grass, especially the former, do best on soils inclined to be damp. Sow these on clean well-cultivated land at the rate of about 6 lb. per acre. Lightly cover the seed with a chain or brush harrow. The best time to sow the seed is in the early spring—early in August. The second growth of these crops will be best for keeping for seed. The crop need not be dead-ripe before cutting. When the heads are brown and the seed can be rubbed out in the palm of the hand with ends of the fingers it may be cut. If cut later a good deal of the seed falls to the ground. The best machine for cutting clover for seed is the

old-time tilter, which leaves it in bunches on the ground where the wind can get through it to dry it. It may also be cut with a binder without twine. To thresh, the bunches are lifted carefully from the ground and carted direct to the threshing-machine. Threshing-machines are now provided with special attachments for threshing clover. Special clover hullers (threshers) are also manufactured.

ESTABLISHING RASPBERRIES.

JOHN WATSON, Annat :—

Would you please inform me, in regard to growing raspberries, how to prepare the ground, what manure to use, when to plant, and also what kind will suit a rather cool district ?

The Horticulture Division :—

In preparing the land for growing this plant deep working is essential, as raspberries require a fair amount of moisture and suffer considerably from anything in the nature of a drought. The soil should be treated to a good dressing of lime, and farmyard or stable manure, where available, should be worked in. If the latter is unprocurable, then dress with 3 cwt. superphosphate, 2 cwt. bone-dust, and 1 cwt. suplhate of potash per acre. Planting can be done either in the autumn or spring, or at any time during the dormant season when the soil is in a suitable condition. The plants are set out at various distances, the common method adopted being in rows 5 ft. apart, and the plants 3 ft. to 4 ft. apart in the rows. Popular varieties include Semper Fidelis, Cuthbert, Antwerp, and Kentish Fillbasket.

MILK-TESTING.

ERNEST PRESTON, Longbush :—

Can you please inform me through the *Journal* as to the cause of my failing at times to get proper results in testing the milk of my cows ? At times in testing with the Babcock tester the fat-column has a grey and blackish-looking curd, varying in size in different samples, at the botton of the fat. I find it more frequently in testing Jersey milk, the low-testing Shorthorn milk invariably comes out clear. I do not think it is burnt fat, as such fat is black. Again, if the acid was not strong enough, how is it that the Shorthorn fat comes out all right ? Moreover, sometimes all the samples are quite clear. I keep the fat well treated, and mix the acid and milk at about 63° to 70°. I also let the acid combine very slowly on the surface of the glass.

The Dairy Division :—

The cause of the discoloration in the tests is due either to the acid or the milk being of too high a temperature when mixed together. That is to say, if the strength of the sulphuric acid is correct—namely, of a specific gravity of 1·82 to 1·83—the temperature of the sulphuric acid should be brought down to as near 60° as possible, by setting the jar containing it in cold water. If the milk-samples are too warm the Babcock bottles containing the samples may be set in a shallow tray of water for the same purpose. Given the right degree of temperature in the samples and acid, all the tests will be clear. Of course, if the acid be too weak, then the fat-column will be more or less clouded. There is no difference in testing milk from Shorthorn cows and Jersey cows by the Babcock method. The variation referred to must be due to some other cause. Bulletin No. 51, "Milk and Cream Testing," has been forwarded to you.

SPEYING OF HEIFERS.

"SUBSCRIBER," Kaitieke :—

Would you advise me on the subject of speying heifers as follows : Is it legal ? The advisability of the operation, keeping in view that the animals will have to run on hilly bush country. The probable risks. The time the animal might be expected to take to recover. All things considered, is it worth while ? I may say

that I have attended several sales lately with a desire to get steers, but have found them, from a financial point of view, out of my reach; also, they seem to be very scarce—that is to say, for every steer in the yards there are two heifers. We require beef as well as butter.

The Live-stock Division :—

The operation of speying is a perfectly legal one, although it is not generally practised except under certain circumstances. On some of the large practically unfenced runs in the back country the operation is regularly performed in order that the animals should not get in calf and so that the owner can give a guarantee to buyers to that effect. That is practically the only thing to say in favour of the operation. We do not know any other advantage it has, and as division and fencing of large areas becomes more general it will probably die out. If a good operator is employed there is little risk. There are two methods of operating, one through the right flank (which in the case of heifers is the only one) and the other through the vagina. With the latter method the vagina must be so developed as to admit the arm of the operator. Cows are usually speyed this way. Whatever the method, there is, of course, always some risk, but it may be put down as 1 or 2 per cent. only. After the operation the animals are usually simply turned away, no after-treatment being given.

SWAMP-LAND MANAGEMENT.

"FARMER," Te Puke :—

I have a swamp property, and, as a result of drainage, trunks and roots of trees are coming to the surface. May I ask what is the best method of dealing with a swamp of this nature? Ploughing would be impossible. The covering of earth over the trunks of trees is of a hard baked substance, a sort of baked peat. The timber is mostly white-pine; it decays gradually after years of exposure to the air.

The Fields Division :—

The most satisfactory procedure would be to remove the timber, and plough; but this is costly, and would probably cost more than the land is worth at present; besides, it is wonderful what nature will do in clearing up this class of swamp if given time. As ploughing seems to be out of the question at present, the hard surface might be broken by hand labour, but here again the question of cost comes in. We would suggest that you try a strong drag harrow. This could be made out of 6 in. by 4 in. hardwood, and steel spikes 1½ in. square set 12 in. apart. These spikes should be 13 in. long, which, after allowing for going through the timber and bolting on top, will give a spike 8 in. clear. For two horses, which is the best team for a swamp, a harrow 3 ft. by 4 ft. will be big enough. This should be weighted by placing a sack of earth or some timber on top. A few strokes with the harrow might give sufficient mould to get grass to take. Subsequent feeding with cattle would tend to further break up the surface, when a little surface sowing might be done. As all white-pine swamps are more or less sour, you should apply burnt lime at the rate of 1 ton per acre. This should be applied a month or two before the grass-seed is sown. It may be added that Mr. S. Barr, Onehunga, is the maker of a swamp harrow considered to be suitable for rough work.

SHELTER-TREES ON SWAMP LAND.

A. HOPKINS, Takaka :—

What is best kind of tree shelter to plant on swamp land—durable timber, when cut, for fence-posts? At present the swamp is in process of draining.

The Horticulture Division :—

A swampy situation restricts the selection of useful shelter-trees to grow, suitable for fencing-posts. There are, however, several Eucalypti and other trees that thrive under such conditions, and which provide very useful timber. For your purpose a selection might be made from the following: *Pinus austriaca, Cupressus Lawsoniana, Castanea vesca, Eucalyptus viminalis, Eucalyptus robusta, Eucalyptus rostrata, Eucalyptus sieberiana.* On the other hand, the practice

adopted in America, of planting some of the faster-growing soft-wooded trees, such as willow, poplar, &c., may appeal to you. Under this system the wood is treated with a preservative for fencing purposes. (See article on the Preservation Treatment of Farm Timber, by E. Phillips Turner, in the *Journal* for September, 1915.)

TUTU POISONING OF SHEEP.

"INQUIRER," Glenorchy :—

What remedies are recommended for tutu poisoning? I lose many sheep, especially at mustering-time, bringing the sheep off the tops on to tutu land.

The Live-stock Division :—

As you will know, when the sheep are coming on to the tutu country you can be prepared for any cases of poisoning. We should advise you to get a trochar and canula for puncturing the rumen through the left flank and allowing the gas to escape. This you could get from any one who stocks veterinary instruments. Perhaps, however, you had better get one made specially for sheep. Messrs. Denyer Bros., 281 George Street, Sydney, would no doubt supply what you require. A small lancet for bleeding the sheep at the eye-vein should also be got. With regard to medicines, the active principle of tutu—tutin—acts on the whole central nervous system, causing convulsions and paralysis. In the Department's Annual Report of 1908 Mr. B. C. Aston, Chemist, published some reports of experiments that had been made on the physiological action of tutin. Dr. Fitchett and Professor Malcolm, of Dunedin, recommend lime-water, relieving the gastric tympany (distention), and keeping the animals as quiet as possible during the convulsions. 4 oz. to 6 oz. of lime-water may be given; also a dose of sulphuric ether combined with aromatic spirit of ammonia, 1 oz. of each in a pint of water, to a full-grown sheep.

TREATMENT OF SEA-SOAKED LAND.

G. S. J., Christchurch :—

I have some land which receives soakage from the sea-water at high tide, making it unproductive. Would you kindly advise me as to the way of putting this land into cultivation? The land is full of twitch.

The Fields Division :—

Having cut off the seepage of the sea-water as far as you can by ditches or banks according to conditions, cultivate the ground for the express purpose of eradicating the twitch. A crop like mangels, whose natural habitat is near the sea, might be grown in drills, and cultivated frequently to kill the twitch. Before sowing the mangels, however, the land should be cleared to some extent. The use of the spring-tooth cultivator will be found useful for this purpose. Subsequently a smother-crop (heavily seeded) of rape, kale, or mustard might be used to complete or augment the effect of the earlier cultivation. To offset the alkalinity caused by the continuous impregnation with sea-water, use about 5 cwt. gypsum per acre. When manuring the various crops grown use superphosphate, for it contains gypsum. As special crops for growing on soils impregnated with salt the annual lupin and sea-kale are suitable, but they are not specially desirable from a feeding standpoint. They would, of course, act as smother-crops to choke out the twitch.

CONTROL OF EARWIGS.

COLEMAN PHILLIPS, Carterton :—

Can the Department tell me a cure for earwigs? They are now doing more damage in my orchard than any other pest, having greatly increased in the past two or three seasons and are gradually taking possession of all the orchards in this district. Thirty to forty fowls have a free run of my orchard, and I am breeding twenty to thirty guinea-fowl specially to see whether they will do any good. The wig will take quite a ton of good apples this season.

The Horticulture Division :—

Earwigs are difficult to thoroughly control once they take possession of the garden. As eggs are laid under clods and rubbish, keep the ground well cultivated and allow no rubbish to lie about. Use traps, such as flower-pots with some hay pressed firmly in the bottom, and then inverted on a short stake. When examining the traps have a bucket partly filled with water to which a few tablespoonfuls of kerosene have been added. Shake the earwigs out of the traps into the bucket. The kerosene will kill them. This class of trap has been found very successful in other countries. The bucket of water and kerosene will last for weeks. As you state these insects are attacking fruit in your orchard, we would recommend you to try spraying the fruit with arsenate of lead next season, if this practice is not already followed. This will also control the codlin-moth at the same time.

SEPARATION OF BUTTERMILK IN CHURNING.

W. H., Waikanae :—

Will you kindly inform me the best way to make buttermilk separate from the butter in churning during the hot weather, as we are having some difficulty in this respect.

The Dairy Division :—

The buttermilk may be got rid of by lowering the temperature of the cream, and the best method of cooling cream on the farm is to lower the vessel containing it (preferably a can with closed lid) into a well for eight or ten hours prior to churning. The churning should be carried out in as cool a place as possible, and at the first sign of the cream breaking a small quantity of cold water should be added to the churning, and the process continued until the grains of butter are properly formed. Then the buttermilk should be drawn and the butter washed with cold water.

FITS OF EXCITEMENT IN COW.

S. H. THOMPSON, Waihi :—

I have a Jersey cow aged about ten years. In the hot weather she takes turns of racing round the paddock with her tail on end, as if she was mad. She then runs for shelter either into the cow-shed or into the tea-tree, lashing her tail as though tormented with flies. In about an hour she seems all right again, eating as usual. She is a very quiet cow usually. I have not noticed her doing it in the winter. The other cows running in the same paddocks are unaffected. Could you tell me what is the matter with her, and the cure, if any ?

The Live-stock Division :—

It is difficult to say precisely what leads to these fits of excitement. Probably the presence of biting flies of some variety may account for it. On the other hand, there may be some passive congestion of the brain, due to the heat, which would make the cow behave in this manner. We would suggest giving her a good dose of salts—¾ lb. Epsom salts in a quart of warm water and treacle.

SWELLINGS ON NECK OF HEIFERS.

"ANXIOUS," Westport :—

I have two heifers which shortly after calving developed a swelling behind the ears similar to mumps in human beings. They showed a slight stiffness in the neck. In about three weeks' time the swelling went down altogether on one heifer, while with the other one it continued to get bigger, leaving the back of the ears and swelling in the centre of the neck. One side has gone down until it is only the size of an egg, while the other side is quite as big as a clenched hand. On feeling the swelling they appear to be quite soft. Both these heifers pulled back

in the bail, the heifer that is still bad being the worst. Can you suggest any reasons for the above symptoms, and a cure for the trouble ?

The Live-stock Division :—

The swellings referred to as affecting your heifers may be the result of bruising in the bails followed by formation of abscesses. Your best plan would be to foment the swollen part thoroughly with hot water twice daily, and if it seems inclined to break, open it up with a sharp knife, and clean out the contained matter. The abscess cavity should afterwards be syringed out with a solution of tincture of iodine and water (1–15), and dressed daily in this manner.

"TREE-LUCERNE" FOR HEDGE SHELTER.

"TOMATOES," New Lynn :—

Would you please tell me if tree-lucerne planted in the autumn would give sufficient shelter for tomatoes for next season ? The position is rather exposed. How far apart should the tree-lucerne seed be planted ?

The Horticulture Division :—

Tagasaste, commonly but erroneously known as "tree-lucerne," is one of the quickest-growing plants suitable for hedge purposes. It is usually grown at a distance of about 2 ft. apart, but it is advisable to sow the seed more thickly and thin out later to the required distance. Although a fast grower, if sown in the autumn it would provide little or no useful shelter by the following spring.

STORAGE OF POTATOES.

W. N. C., Omaio :—

Will you kindly let me know the best way to store potatoes for winter use ?

The Fields Division :—

The best method of storing potatoes is in a cool dry shed with plenty of space for air and ventilation. If you have a pine plantation the shed could be built under the trees in this. It should be roofed, with open sides covered with wire netting. If you decide to have shelves they could be made of narrow battens, or partly battens and part netting. To prevent sprouting, as much as possible potatoes require to be kept cool and hard.

SULPHUR AND PIGS.

"COCKATOO," Shannon :—

Recently I gave a handful of sulphur in pollard to two pigs ; next day one pig was dead and the other was very seedy. Do you think the sulphur caused the trouble ? The weather was very hot.

The Live-stock Division :—

Sulphur may be given to pigs in doses up to 1 oz. without causing any harmful effects. In moderate doses it has a slight laxative action. Larger quantities give rise to irritation of the bowel, purging, and great prostration. It is difficult to say for certain whether the sulphur given was actually the cause of death in this instance, but you should be careful in future in the matter of its administration.

DYING OF PIGS.—RAW POTATOES.

R. J. STEVENS, Tokomaru Bay :—

Ten days ago three six-months-old pigs died here all within half an hour of each other. These pigs were fed upon skim-milk, raw potatoes, fruit, and had plenty of shade enclosed in about ¼ acre. They were about 70 lb. live weight, and

just in good condition, not too fat. Two of them seemed to have died in their sleep without any sign of struggling, and upon opening them all organs seemed normal. Could you suggest cause of death ?

The Live-stock Division :—

We would not advise feeding raw potatoes to pigs. Potatoes in their raw state are very indigestible; moreover, should they have become green through exposure to sunlight they develop poisonous properties. It is possible that acute digestive trouble was the cause of death. In the circumstances nothing further can be suggested by us.

BEARING OF PASSION-FRUIT.

M. WALLACE, Te Atatu :—

Will you kindly give information about passion-fruit as follows: How many years do the vines bear, and what signs are there of old age ? Some we have that are bearing very heavily are withering up and bearing shrivelled fruit. We do not know how old they are.

The Horticulture Division :—

A passion-fruit vine will bear for many years when grown under suitable climatic and soil conditions. Although passion-fruit requires a comparatively hot climate to properly mature, the vine is apt to suffer considerably from drought and attacks of sucking-insects such as mealy bug. The withering of fruit and the dropping of foliage, &c., are indications of weakening vitality.

GROWING OF PASPALUM.

W. MCMULLIEN, Waimamaku, Hokianga :—

Will *Paspalum dilatatum* grow on high altitudes as well as low—say, 1,000 ft. to 1,500 ft.; and should seed sown last May be showing now ?

The Fields Division :—

Paspalum in your latitude will grow at the elevation mentioned. Seed sown last May should have been showing some time ago.

PHOSPHORIZED POLLARD AND LIVE-STOCK.

F. CLOSE, Waihi :—

Will you please inform me if phosphorized pollard laid for rabbits would injure a horse or fowls ?

The Fields Division :—

Should horses eat the phosphorized pollard it would certainly cause injury, and even perhaps death. This would depend on the quantity taken. Fowls eat the poison readily, and an ordinary-sized pellet would be certain death.

Self-sucking by Cows. — A Henderson subscriber writes: "A neighbour of mine claims to have stopped this practice by the simple device of tying up the udder in a bag, which is, of course, removable for milking. The bag needs to be well made, and is held with a broad, tight girth-band forward of the udder, and straps round the hind legs, well up. In the case of valuable cows the device should be worth while."

COMMERCIAL INTELLIGENCE.

FRANCE AND FROZEN MEAT.

IN a despatch dated London, 4th January, 1915, the High Commissioner states that according to French official advices communicated to him it was thought likely that the proposed legislation for the purchase by the French Government of frozen meat from Argentina and the United States, by contract with two American firms under favoured conditions, would be abandoned as a result of strong official representations made to the French authorities. The High Commissioner also forwards an extract from "War Bulletin" No. 63, dated 22nd December, 1915, issued by the British Chamber of Commerce, Paris, which deals with the matter more definitely, as follows:—

"We may say that the frozen-meat Bill which was adopted by the Senate in July last has now been dropped upon an adverse report drawn up by the *Rapporteur* to the Budget Commission, to whom we had supplied details of the unfair manner in which Australasia would have been treated had the Bill become law. We are informed that M. Meline, Minister of Agriculture, is at present engaged in drawing up a proposal which will not contain any clauses harmful to Australasian interests. He is also proposing that a fleet of steamers fitted with refrigerating machinery be purchased, to remain for the present under the British flag and manned by British crews; though the matter is, we hear, not making much headway owing to the present premium in shipping."

STAMPING OF IMPORTED EGGS.

THE following regulations under the Sale of Food and Drugs Acts, relating to the stamping of eggs imported into New Zealand, were gazetted on the 2nd March, and came into force on the same date:—

REGULATIONS.

For the purpose of these regulations "eggs" means the eggs of poultry, and includes only eggs in the shell.

(1.) All eggs imported into New Zealand, and the packages containing the same, shall be stamped as hereinafter set out, to indicate the country of origin, and no eggs shall be admitted into New Zealand unless and until such stamping has been effected.

(2.) Each egg in every consignment shall be stamped on the shell in indelible ink and in bold sans-serif capital letters of not less size than six points face measurement, with the words "Imported from" followed by the name of the country in which the eggs were laid.

(3.) Each package in which eggs imported into New Zealand are contained shall be stamped in bold-faced capital letters not less than 1 in. in height, with the words "Imported from" followed by the name of the country in which the eggs contained in the package were laid.

(4.) Every person who introduces or attempts to introduce any eggs into New Zealand without having them stamped in accordance with the requirements hereinbefore prescribed for the stamping of eggs and the packages containing the same shall be deemed to have committed an offence against these regulations.

(5.) Any person who commits an offence against these regulations shall be liable to a penalty not exceeding £50.

MEAT-FREEZING WORKS IN NEW ZEALAND (MARCH, 1915).

District.	Name of Company.	Location of Works.	Beef-killing Capacity per Day.	Sheep-killing Capacity per Day.	Storage Capacity, in 60 lb. Carcases Mutton.	Products of Works.
Auckland ..	Whangarei Freezing Company, Ltd., Auckland ..	Whangarei Hds.	150	1,000	50,000	Frozen meat, preserved meat, hides, wool, pelts, tallow, manures, &c.
	Auckland Farmers' Freezing Company, Ltd., Auckland	Southdown ..	200	3,000	66,000	Frozen meat, tallow, dried flesh, manures, wool, pelts, glue, &c.
	,, ,, ,,	Horotiu ..	200	3,000	66,000	,, ,, ,,
	R. and W. Hellaby, Ltd., Auckland	Westfield ..	120	500	3,000	Frozen meat, tallow, manure, wool, pelts, &c.
Poverty Bay, &c.	Tokomaru Sheep-farmers' Freezing Company, Ltd...	Tokomaru Bay	45	2,500	60,000	Frozen meat, wool, pelts, tallow, manure.
	Poverty Bay Farmers' Meat Company, Ltd., Gisborne	Kaiteratahi ..	100	2,000	120,000	Frozen meat, preserved meat, tallow, manure, wool, pelts, casings.
	Gisborne Sheep-farmers' Frozen Meat Company, Ltd., Gisborne	Kaiti ..	150	6,000	150,000	Frozen meat, preserved meat, tallow, pelts, oil, manure.
	Nelson Bros., Ltd., Gisborne	Taruheru ..	85	2,500	82,050	Frozen meat, casings, bungs, tallow, wool, pelts, hides, oil, manure.
Hawke's Bay	North British and Hawke's Bay Freezing Company, Ltd., Napier	Westshore ..	40	1,500	36,000	Frozen meat, wool, tallow, pelts, casings, manure.
	Thomas Borthwick & Sons (Aus.), Ltd., Christchurch	Pakipaki ..	30	1,500	50,000	Frozen meat, tallow, wool, pelts, oleo, manures, &c.
	Nelson Bros., Ltd., Tomoana	Tomoana ..	80	3,000	92,400	Frozen meat, preserved meat, meat-extract, tallow, wool, pelts, hides, oil, manures, &c.
	Hawke's Bay Farmers' Meat Company, Ltd., Hastings	Whakatu ..	80	2,000	40,000	Frozen meat, tallow, wool, pelts, manures.
Taranaki ..	Thomas Borthwick & Sons (Aus.), Ltd., Christchurch	Waitara ..	200	2,000	90,000	Frozen meat, tallow, oleo, runners, pelts, wool, &c.
	Patea Farmers' Co.-op. Freezing Company, Ltd. ..	Patea ..	120	1,000	52,000	Frozen meat, preserved meat, tallow, manures, &c.
Wellington..	Wanganui Meat-freezing Company, Ltd., Wanganui	Castlecliff	100	2,200	70,000	Frozen and preserved meat, meat-extract, tallow, manures, wool, &c.
	Otaihape Farmers' Meat and Produce Company, Ltd., Taihape	Winiata ..	50	1,200	30,000	Frozen meat, wool, pelts, hides, manures, tallow.
	National Mortgage and Agency Company, Ltd. ..	Longburn ..	60	1,500	60,000	Frozen meat, tallow, manure, pelts, oil.
	Wellington Farmers' Meat Company, Ltd., Masterton	Waingawa ..	250	6,000	239,000	Frozen meat and sundries, wool, pelts, tallow, oil, hides, preserved meat, meat-extract, manures.
	Gear Meat Preserving and Freezing Company, Ltd., Wellington	Petone ..	100	10,000	300,000	Frozen meat, preserved meat, meat-extract, tallow, manure, wool, oil, hides, pelts, &c.
	Wellington Meat Export Company, Ltd., Wellington	Ngahauranga ..	120	8,000	240,000	Frozen and preserved meat, tallow, manure, wool, pelts, casings, &c.
Marlborough	Christchurch Meat Company, Ltd.	Picton ..	30	1,000	23,000	Frozen meat, wool, pelts, tallow, casings, manures, &c.
Nelson	Nelson Freezing Company, Ltd., Nelson	Stoke ..	..	350	10,000	Frozen meat, tallow, manure, &c.
Canterbury	Canterbury Frozen Meat Company, Ltd., Christchurch	Belfast ..	50	7,000	130,000	Frozen and preserved meat, wool, pelts, tallow, and manures.
	,, ,, ,, ,, ..	Fairfield ..	..	4,000	100,000	Frozen meat, tallow, wool, pelts, manures.
	,, ,, ,, ,, ..	Pareora ..	25	4,500	125,000	,, ,, ,,
	Christchurch Meat Company, Ltd., Christchurch ..	Islington ..	50	7,000	235,000	Frozen and preserved meat, wool, pelts, tallow, oleo, casings, manures, &c.
	,, ,, ,, ..	Smithfield ..	50	6,000	126,000	Frozen meat, wool, pelts, tallow, oleo, casings, manures, &c.
Otago ..	,, ,, ,, ..	Pukeuri ..	..	3,000	80,000	,, ,, ,,
	,, ,, ,, ..	Burnside ..	50	3,500	136,000	,, ,, ,,
	South Otago Freezing Company, Ltd., Balclutha ..	Finegand ..	30	1,200	85,000	Frozen meat, wool, tallow, oil, manure, pelts.
Southland ..	Birt and Co., Ltd., Invercargill	Ocean Beach ..	100	2,500	110,000	Frozen meat, rabbits, casings, &c.
	Southland Frozen Meat Company, Ltd., Invercargill	Mataura ..	50	2,000	87,000	Frozen meat, rabbits, wool, pelts, tallow, oil, manures.
	,, ,, ,,	Makarewa ..	70	2,000	14,000	,, ,, ,,

NOTE.—Several other works are in course of construction at date of publication of this list, those of the Westfield Company and Oroua Company being near completion.

NEW ZEALAND EXPORTS TO BRITAIN.

COMPILED FROM MANIFESTS OF VESSELS SAILED DURING RESPECTIVE MONTHS OF CURRENT AND PRECEDING SEASONS.

Month.		Mutton, Carcases.	Lamb, Carcases.	Beef, Quarters.	Pork, Carcases.	Butter, Boxes.	Cheese, Crates.	Wool, Bales.	Wheat, Sacks.	Oats, Sacks.	Rabbits, Crates.	Hemp, Bales.	Tow, Bales.	Kauri-gum, Pkgs.
January,	1916	166,700	295,170	41,726	179	108,593	101,917	92,849	..	..	..	7,438	1,666	1,218
,,	*1915*	*137,816*	*296,439*	*45,622*	*339*	*138,081*	*85,123*	*87,393*	..	..	*2,860*	*683*	..	*1,209*
February	1916	170,973	266,414	29,056	23	96,096	84,740	96,016	..	..	..	8,161	1,804	1,900
,,	*1915*	*433,585*	*517,581*	*77,421*	*311*	*119,371*	*96,090*	*159,347*	..	..	..	*13,111*	*6,619*	*2,763*
March,	1915	80,439	203,480	30,176	..	55,280	51,811	49,809	..	..	..	8,410	185	274
,,	*1914*	*446,522*	*551,313*	*36,689*	..	*61,060*	*62,732*	*95,175*	..	..	..	*8,187*	*2,562*	*3,958*
April,	1915	286,155	328,779	45,340	..	6,703	38,561	41,371	..	..	1,011	9,328	1,474	3,461
,,	*1914*	*234,765*	*366,786*	*22,185*	..	*7,822*	*63,796*	*58,488*	..	*2,901*	..	*1,247*	*888*	*5,909*
May,	1915	257,953	433,831	34,780	655	148	17,065	21,615	..	..	2,923	4,968	808	2,636
,,	*1914*	*336,632*	*638,397*	*39,315*	*54*	*837*	*37,776*	*43,364*	*3,623*	*11,062*	..	*8,355*	*2,112*	*9,316*
June,	1915	99,080	154,785	19,316	932	..	26,869	11,946	..	..	9,800	5,027	1,320	1,229
,,	*1914*	*261,877*	*634,981*	*36,400*	..	*1,153*	*19,247*	*18,774*	..	*28,141*	*1,000*	*7,924*	*4,258*	*7,881*
July,	1915	243,420	340,476	21,231	154	..	21,520	16,039	..	..	5,968	5,068	1,639	4,184
,,	*1914*	*225,411*	*239,143*	*38,170*	..	*1,355*	*2,003*	*15,868*	..	*1,425*	*1,000*	*5,810*	*2,584*	*8,053*
August,	1915	510,418	570,381	51,750	35	..	18,287	19,416	..	..	31,790	7,138	1,466	4,848
,,	*1914*	*84,251*	*63,111*	*19,094*	*516*	*1,979*	*50*	*4,845*	*600*	*38,220*	*10,403*	*367*	*245*	*3,705*
September,	1915	299,715	330,643	59,487	..	26,416	2,595	5,360	..	..	7,750	2,022	3,091	595
,,	*1914*	*53,386*	*49,200*	*2,353*	..	*15,885*	..	*3,337*	..	*5,896*	*7,288*	*1,143*	*57*	..
October,	1915	367,198	417,794	87,104	..	111,468	49,160	7,272	..	..	56,636	5,650	1,645	1,230
,,	*1914*	*291,432*	*128,016*	*49,104*	..	*81,842*	*30,487*	*8,938*	..	*68,660*	*38,121*	*2,042*	*1,650*	*1,683*
November,	1915	93,777	92,601	21,609	..	81,102	47,243	18,715	..	..	13,538	5,064	1,789	868
,	*1914*	*236,346*	*27,577*	*48,302*	*27*	*98,729*	*70,048*	*37,604*	*15*	*24,289*	*35,783*	*885*	*110*	*1,377*
December,	1915	91,124	59,231	36,467	..	214,967	81,939	33,527	..	..	3,052	6,016	1,940	5,555
,,	*1914*	*192,952*	*149,835*	*44,876*	..	*172,990*	*80,144*	*86,317*	..	..	*9,306*	*1,136*	*116*	*2,157*

LONDON MARKET VALUES.

COMPARATIVE STATEMENT COMPILED FROM THE HIGH COMMISSIONER'S CABLES FOR THE PAST THREE MONTHS.

London Date.	Wool. Bradford Quotations for Tops. 36's.	40's.	44's.	50's.	56's.	60's.	Mutton. Canterbury.	Mutton. North Island.	Lamb. Canterbury.	Lamb. Other than Canterbury.	Beef. New Zealand Hinds.	Beef. New Zealand Fores.	Butter. Danish.	Butter. New Zealand.	Cheese. New Zealand White.	Cheese. New Zealand Coloured.	Cheese. Canadian.	Hemp (Spot). New Zealand Good-fair.	Hemp (Spot). New Zealand Fair.	Hemp (Spot). Manila Fair (New Grade).	Hemp (Forward Shipment). New Zealand Good-fair.	Hemp (Forward Shipment). New Zealand Fair.	Hemp (Forward Shipment). Manila Fair (New Grade).	Wheat. Short-berried.	Wheat. Long-berried.	Oats. Sparrowbills.	Oats. Danish.
1915.							d.	d.	d.	d.	d.	d.															
Dec. 4	..	..	..	..	..	..	7	..	7½	7⅜	..	..	181/0	167/0	90/0	89/0	91/0	36/0/0	34/10/0	44/10/0	35/10/0	33/10/0	44/0/0	..	..	..	..
„ 11	..	..	..	..	..	..	7	..	7½	7⅜	5½	4¾	168/0	165/0	90/0	91/0	92/0	36/10/0	35/0/0	44/10/0	36/0/0	34/0/0	44/0/0	..	..	..	..
„ 18	..	..	..	..	..	..	..	..	7½	7⅜	6½	5½	172/0	156/0	91/0	92/0	92/0	37/10/0	35/10/0	45/0/0	37/0/0	35/0/0	44/10/0	..	..	..	..
„ 24	..	..	..	..	..	..	7½	..	7½	7⅜	5⅝	5	164/0	150/0	92/0	91/0	94/0	39/0/0	37/0/0	46/0/0	38/0/0	36/0/0	45/0/0	..	..	..	..
„ 31	..	..	..	..	..	..	7½	..	7½	7½	6	5	153/0	142/0	93/0	92/0	94/0	39/10/0	37/10/0	48/10/0	38/10/0	36/10/0	47/10/0	..	..	..	..
1916.																											
Jan. 8	..	..	..	..	..	..	7½	..	7¾	..	6¼	5¼	156/0	148/0	94/0	93/0	97/0	..	..	..	40/10/0	38/10/0	50/0/0	..	..	..	..
„ 15	..	..	..	..	..	..	7½	..	7¾	7¾	..	..	158/0	152/0	98/0	98/0	99/0	41/10/0	40/0/0	51/0/0	41/0/0	39/0/0	50/0/0	..	..	..	..
„ 22	..	..	..	..	..	..	7⅝	..	7⅞	7⅞	..	..	158/0	146/0	98/0	98/0	99/0	45/0/0	43/0/0	55/0/0	44/0/0	42/0/0	..	..	..	..	..
„ 29	..	..	..	..	..	..	7⅝	..	7⅞	7⅞	..	..	157/0	146/0	98/0	98/0	99/0	47/10/0	46/0/0	55/0/0	46/10/0	45/0/0	54/0/0	..	..	..	..
Feb. 5	..	..	..	..	..	..	7⅝	..	7⅞	7⅞	6½	5½	157/0	151/0	98/0	98/0	99/0	47/10/0	45/10/0	55/0/0	47/0/0	45/0/0	54/0/0	..	..	..	..
„ 12	..	..	..	..	..	..	7⅝	7½	8	8	6½	5½	160/0	153/0	..	..	97/0	..	..	..	..	..	55/10/0	..	..	..	..
„ 19	2/3½	2/5	2/6	2/11	3/4	3/8	7⅝	..	8⅛	*9	6½	5½	166/0	155/0	95/0	96/0	99/0	47/10/0	45/10/0	56/0/0	47/0/0	45/0/0	..	..	..	..	..
„ 26	2/3	2/4½	2/5½	3/10½	2/3½	3/7½	7⅝	..	8¼	*9	6½	5⅝	174/0	159/0	95/0	96/0	99/0	49/10/0	45/10/0	..	46/10/0	44/10/0	55/10/0	..	..	..	..
March 4	..	..	..	..	..	..	7⅞	7⅞	8¼	*8¼	..	..	179/0	162/0	97/0	98/0	99/0	..	..	..	46/15/0	45/5/0	56/10/0	..	..	..	..
„ 11	..	..	..	..	..	..	7⅞	7⅞	8¼	*8¼	..	..	182/0	163/0	99/0	99/0	103/0	47/0/0	45/10/0	57/0/0	46/10/0	44/10/0	56/0/0	..	..	..	..

* New season's.

STOCK EXPORTED.

THE following table shows the number and descriptions of stock exported from the Dominion during the month of February, 1916:—

Port of Shipment.	Horses.		Sheep.			Cattle.		Pigs.	Dogs.
	To Australia.	To Eastern Pacific.	To Australia.	To Eastern Pacific.	To Montevideo.	To Australia.	To Eastern Pacific.	To Eastern Pacific.	To Eastern Pacific.
Auckland ..	..	7	..	120	..	..	5	17	..
Gisborne ..	..	..	..	..	..	..	..	..	..
Napier ..	..	..	..	..	..	..	..	..	..
Wellington ..	..	..	41	..	..	..	..	..	..
Lyttelton ..	2	..	174	..	..	..	..	..	..
Dunedin ..	16	..	5	..	..	..	..	..	..
Bluff	..	..	20	..	..	..	..	..	..
Totals ..	18	7	240	120	..	..	5	17	..

The following are particulars of horses shipped: 1 thoroughbred gelding, 1 trotting-stallion, 12 Clydesdale colts and 4 mares, 2 harness geldings, 5 light-harness mares.

STOCK IN QUARANTINE.

THE following stock was received into quarantine during the month of February, 1916:—

No.	Description.	Sex.	Port of Origin.	Owner or Agent.	Address.
	MOTUIHI ISLAND (AUCKLAND).				
	Nil.				
	SOMES ISLAND (WELLINGTON).				
	Nil.				
	QUAIL ISLAND (LYTTELTON).				
1	Collie bitch ..	Female	London ..	James Lilico ..	Lochiel.
3	,, pups ..	,,	Dropped on voyage	,, ..	,,
1	,, pup ..	Male ..	Ditto ..	,, ..	,,

HEMP AND TOW GRADING RETURNS.

FEBRUARY.

Hemp.—The total number of bales graded was 14,408, as compared with 8,477 for the corresponding month of last year, an increase of 5,931 bales. For the twelve months ending 29th February, 1916, the number of bales graded was 130,633, as compared with 88,069 for the previous twelve months, an increase of 42,564 bales.

Tow.—During the month 4,363 bales were dealt with, as compared with 2,174 for the corresponding month of last year, an increase of 2,189 bales. For the twelve months ending 29th February, 1916, the number of bales graded was 36,492, as compared with 25,666 for the previous twelve months, an increase of 10,826 bales.

Stripper-slips.—The number of bales graded was 828, as compared with 271 for the corresponding month of last year, an increase of 557 bales. For the twelve months ending 29th February, 1916, the number of bales graded was 5,330, as compared with 1,357 for the previous twelve months, an increase of 3,973 bales.

HEMP, TOW, AND STRIPPER-SLIPS GRADED THROUGHOUT THE DOMINION DURING THE MONTH OF FEBRUARY, 1916.

Hemp.

Port.	Superior.	Fine.	Good-fair.	Fair.		Common.	Rejected.	Condemned.	Total.
				High Point.	Low Point.				
	Bales.	Bales.	Bales.	Bales.	Bales.	Bales.	Bales.	Bales.	Bales.
Auckland ..	..	..	220	974	893	223	73	..	2,383
Napier ..	..	..	..	..	..	..	..	..	..
Wairoa ..	..	..	..	..	..	..	..	..	..
Foxton ..	..	..	2,191	1,595	823	251	13	..	4,873
Wellington ..	..	..	697	2,776	1,768	183	14	..	5,438
Picton ..	..	34	118	19	..	..	..	..	171
Blenheim ..	..	..	..	32	..	..	..	..	32
Lyttelton ..	..	..	..	..	..	..	..	..	..
Dunedin ..	..	..	172	58	..	1	..	..	231
Bluff ..	..	..	165	962	153	..	..	..	1,280
Totals ..	..	34	3,563	6,416	3,637	658	100	..	14,408
Percentages of totals	..	0·23	24·73	44·53	25·24	4·57	0·70	..	..

Tow.

Port.	First Grade.	Second Grade.	Third Grade.	Condemned.	Total.
	Bales.	Bales.	Bales.	Bales.	Bales.
Auckland ..	..	276	552	159	987
Napier	..	..	..	..	..
Foxton	527	443	167	..	1,137
Wellington ..	214	611	331	75	1,231
Picton	44	26	..	..	70
Blenheim ..	22	..	..	..	22
Lyttelton ..	..	360	..	..	360
Dunedin ..	..	66	..	..	66
Bluff	..	184	267	39	490
Totals ..	807	1,966	1,317	273	4,363

Stripper-slips.—Auckland: Second grade, 14. Foxton: First grade, 41; second grade, 361; condemned, 33. Wellington: First grade, 45; second grade, 253; condemned, 11. Blenheim: Second grade, 6. Dunedin: Second grade, 24. Bluff: Second grade, 29; condemned, 11.