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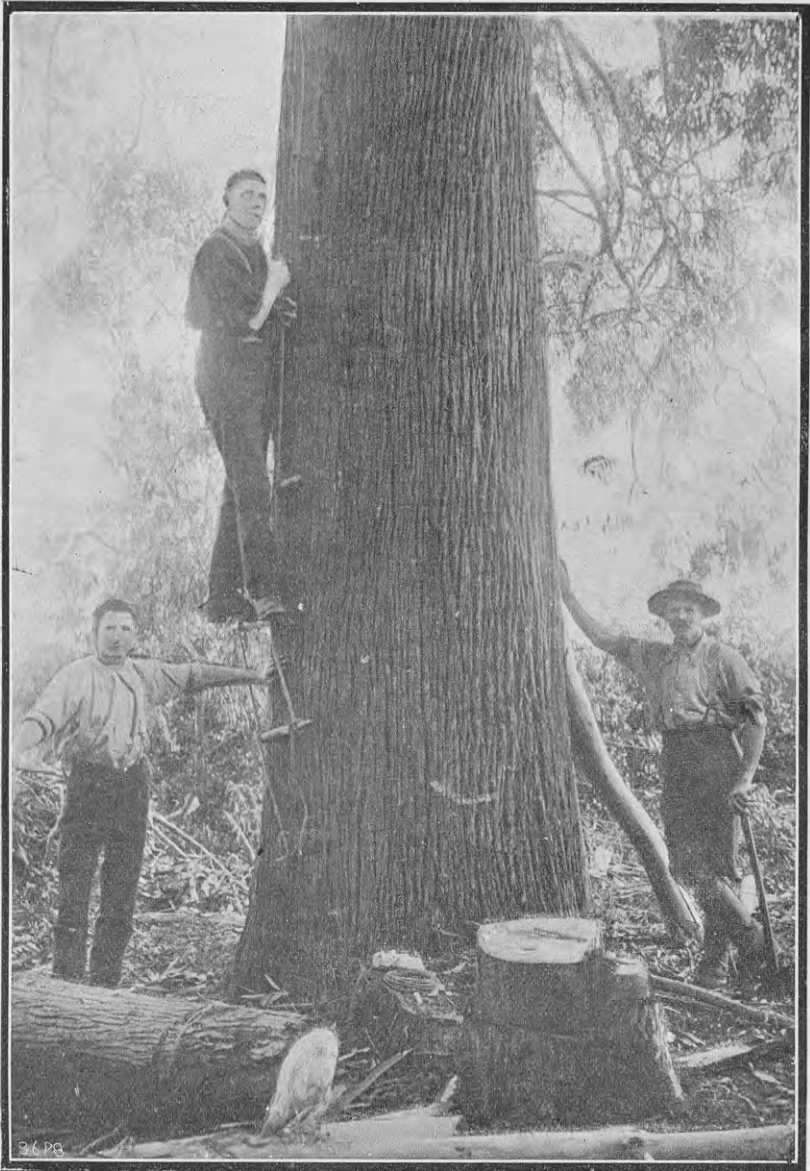
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A FINE SPECIMEN OF EUCALYPTUS MACARTHURI GROWN AT "TRECARNE,"
CAMBRIDGE, WAIKATO.

This tree was planted in 1875, and felled and split into fencing-posts in 1914.



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WELLINGTON, NEW ZEALAND.

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EUCALYPTS FOR FENCING-TIMBER.

SOME SUITABLE SPECIES AND HOW TO GROW THEM.

J. H. SIMMONDS.*

AMONGST the several things that are essential to successful farming and to the happiness of the farmer must be included good fences and well-hung gates. Bad fences waste the farmer's time, try his temper, spoil the habits of his stock, and bring him into conflict with his neighbours. All over New Zealand the question of obtaining an adequate supply of fencing-posts and gate-posts is becoming serious. In many districts the difficulty is already acute. The natural forests that have served us so well and so long have for over half a century been steadily receding before the progress of settlement,

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and now the remnants are everywhere menaced with irreparable exhaustion. The demand increases, the supply declines. Within twenty years from to-day hundreds of thousands of posts that are at present holding up our wires and gates will have fallen with decay. Whence shall we replace them? Within less than that period hundreds of new farms will be broken in and many old ones subdivided. Whence shall we obtain the posts for the necessary new fence-lines? The natural forests of Australia are being used up as our own have been, and the best we can hope for from them is to obtain for a limited number of years timber of receding quality at indefinitely advancing prices. If we look to ferro-concrete or iron, we may find when too late that the cost is prohibitive for general purposes.

The situation is grave, but, happily, there is a possible remedy. New Zealand is a country eminently suitable for growing timber-trees. We cannot profitably reproduce the indigenous trees, for the reason that they are too slow in coming to economic maturity; but there have been introduced numerous exotics, some of which have been found to grow with phenomenal rapidity to a large size in every province of the Dominion. The writer is at the present time using a fine lot of fencing-posts split out of *Cupressus macrocarpa* trees only eighteen years old. As most farmers now know, the timber of this familiar cypress is freely fissile, light to handle, and exceedingly durable, even the branches serving excellently as stakes or fencing-droppers. But in many situations this beautiful tree dies out before it reaches maturity, and at the best it attains only a moderate size. Thorny acacia (*Robinia pseudo-acacia*) yields very durable posts, but it is restricted in range and of small dimensions. Several of the wattles grow rapidly to a fair size, but their timber is not very durable. Larch (*Larix europaea*) is exceedingly valuable as a fencing-timber tree where it finds a congenial home; but its profitable range appears to be restricted to cold, damp uplands at high altitudes. These are, indeed, all good trees, and there are many others that could be mentioned and commended.

But it is in the great genus *Eucalyptus* that the majority of farmers will find trees adapted to their climatic conditions and at the same time capable of quickly yielding large quantities of timber that will prove durable when exposed to the weather or placed in contact with the ground. The relative superiority of the eucalypt as a farmer's timber-tree is so well put by a correspondent who writes from Racecourse Hill, Canterbury (Mr. H. A. Knight), that I cannot do better than quote his words: "I have," he says, "grown a great variety of trees here, and have come to the conclusion that,

for one's own lifetime, the gum is the cheapest, quickest, and best to grow on these plains for shelter, firewood, posts and stakes, rails, bridge-planks, &c., for use on the farm." It will interest the reader to know that Mr. Knight has 55 acres of eucalypts on his present property, and that there are 60 acres distributed on adjacent farms disposed of by him for closer settlement. The trees are in wide belts that effectually break the sweep of the winds; many of them are from 80 ft. to 100 ft. in height, and of proportionate diameter, and almost all of them are still growing vigorously. The total mass of timber is so great that there need be no shortage of either fencing-posts or firewood on those farms for a generation to come. Mr. Richard Reynolds, of Cambridge, Waikato, who has for the last fifteen or twenty years been cutting fencing-posts and firewood out of his eucalypt plantations at "Trecarne," is most emphatic and enthusiastic in his testimony to the superiority of the eucalypt over all other trees for the farmer's general purposes. He has had a great deal of both pine and gum sawn up, and both hold a high place in his appreciation, but the latter he regards as indispensable.

Further testimonies could easily be given, but they are unnecessary. The eucalypt has come to New Zealand to stay and to be the principal hardwood tree for all time. What is needed is not proof of this now evident truth, but information and advice that will enable a farmer in any particular locality to choose the species best suited for his climatic conditions and to go the best way about starting a plantation. It is a peculiarity of the genus *Eucalyptus* that it includes a very large number of valuable species. Some of these species are very sensitive to frost and can be grown only where the climatic conditions are mild and genial; others have a very wide range, and may be safely planted almost anywhere except close to the sea or on high mountains; and a few are even at their best on uplands where they have to endure not only severe frosts but occasional heavy falls of snow. There are probably at least fifty species that can be successfully grown as timber-yielders somewhere in this country, and it is hoped that when the proposed new Government forestry handbook is published most of them will be fully described. In this article it will be sufficient to describe and commend just a few of the hardiest and most rapid growers in each climatic group.

The ideal eucalypt for the farmer should be easily propagated; it should grow rapidly and vigorously to a large size; it should afford effective wind-break shelter and yield good firewood; its logs should be sufficiently fissile to be split with maul and wedges; and its timber when mature should last from fifteen to twenty or

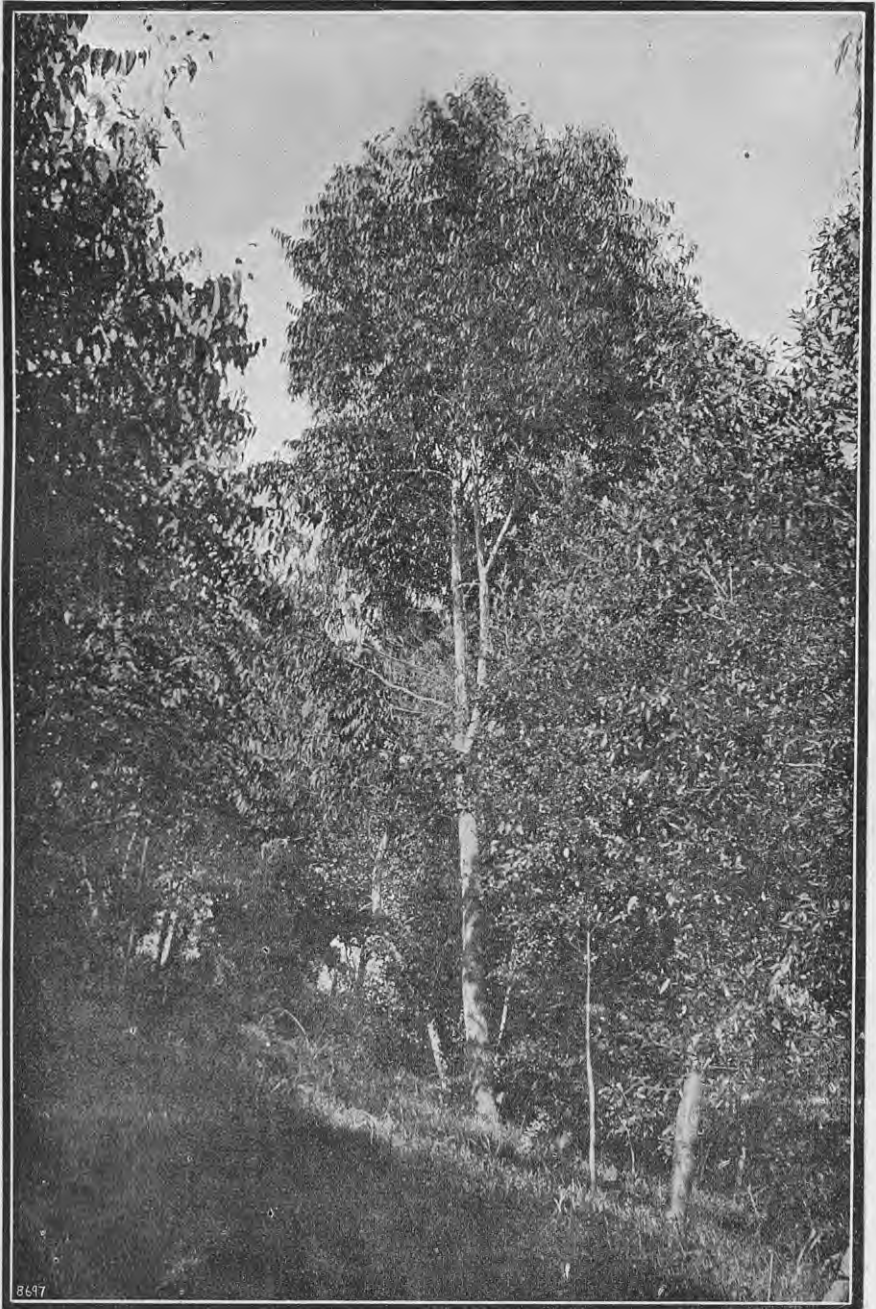
twenty-five years in contact with the ground. It will be a further great advantage if the timber is suitable for sawing up into boards and scantling. A Eucalyptus tree may be said to be mature when 75 per cent. of the timber in its stem has changed into what is technically called heart-wood. The number of years required for reaching this stage may vary from twenty-five to fifty or more according to the species and the nature of the soil upon which the trees are growing. In some species the distinction between sap-wood and heart-wood is not very obvious, but the experienced eye can usually detect the difference. In very old Eucalyptus trees there will sometimes be found a central core that has deteriorated or even decayed, but this does not detract from the value and durability of the heart-wood surrounding it. The sap-wood of eucalypts, like that of most other trees, quickly decays when placed in contact with the ground; the heart-wood of very many species is hard and more or less durable in any situation.

Individual species of eucalypts in the groups indicated will now be dealt with under the headings that follow.

SPECIES THAT REQUIRE WARM AND GENIAL CONDITIONS, SUCH AS ARE FOUND IN SHELTERED LOCALITIES NORTH OF WAIKATO AND EAST CAPE.

Eucalyptus saligna, Smith.—The specific name means “willow-like,” but is not appropriate, as several other eucalypts are much more like willows. This tree is of erect habit, and rapidly develops a long clean shaft crowned with abundant handsome foliage. Its dead bark everywhere falls away, leaving a smooth greenish-white surface except at the base of the stem, where it sometimes persists in the form of thick, hard, non-fibrous plates or sheets. The leaves early pass the juvenile opposite stage, and thereafter may be described as stalked or petiolate, lance-shaped, of medium width, nearly equal-sided, of darker green on the upper than on the under surface, with numerous nearly parallel lateral veins and the intra-marginal vein near the edge. The umbel or flower-cluster has a flattened stalk and carries several flowers on short stalklets. The lid of the bud is conical, or is contracted into a slightly curved blunt apex, and stands just within the edge of the calyx-tube; the seed-case when mature is deep and much smaller at the base than at the rim; the valves while closed form a sunk pyramid within the rim, and when open project a little above it.

The timber, when of the best strain and mature, is of a pale-red colour; it is easily split or sawn, seasons well, is very durable



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EUCALYPTS IN THE GROUNDS OF WESLEY TRAINING COLLEGE, AUCKLAND.

The centre tree is a specimen of *E. pithularis*, planted in 1906. The younger specimens showing on the left are *E. saligna*, planted in 1913.

in contact with the ground, and suitable for a wide range of general purposes. The seed germinates freely, and with reasonable care the plants can be safely removed from the nursery to their permanent home in the forest ground.

The species is indigenous to localities not very remote from the coast in eastern Australia, where it is greatly valued for the rapidity with which it grows to a useful size and for the high quality of its timber. It will attain its best in sheltered situations where the subsoil is free and moist but not wet. Specimens planted in the grounds of Wesley Training College on the Auckland Isthmus in 1912 have attained a height of 25 ft. and a diameter of 4 in. Older and larger specimens have been found doing well at Ruatangata, near Kamo. The species is very strongly commended by competent authorities in New South Wales.

Eucalyptus botryoides, Smith. — This tree usually carries a heavy mass of dark-green foliage; sometimes it has a tendency to become bent or inclined to one side, but under forest conditions it will develop a long straight bole. For a number of years the upper stem remains smooth, but as the tree matures both stem and larger branches become covered with a thick mass of deeply furrowed subfibrous dead bark. The leaves in the juvenile stage and subsequently are similar to those of *E. saligna*, but more shiny on the upper surface. The umbel has a flattened stalk with an indefinite number of sessile flowers. The buds are slightly angular and have a short pointed lid; the mature seed-case is deep-cup-shaped and usually angular at the base. A full umbel of mature fruits, we may suppose, suggested to the founder of the species the idea of a cluster of berries; hence the specific name, which means "grape-bunch-like." The resemblance to grapes is rather remote, but the suggestion is a slight aid to identification.

The timber from well-grown trees is red, hard, heavy, and very durable in any situation, reliable reports from Australia stating that posts split out of mature trees will easily last thirty years.

Though the natural habitat of the species is at low altitudes only a little removed from the sea in eastern Australia, numerous specimens have survived the frost and grown to a large size with us as far inland as Cambridge. Splendid specimens of younger age may be seen at Ruatangata, near Kamo, and at Wesley Training College. Settlers who wish to grow eucalypts on sandy lands near our northern coasts should find *E. botryoides* one of the best for their purposes; and generally within its climatic range the species is easily propagated either by sowing *in situ* or by transplanting, is hardy, vigorous, and of rapid growth.

Eucalyptus pilularis, Smith.—In an open situation the tree may become forked and branchy, but when surrounded by other trees of equal growth its stem will be free from branches and straight to a great height. The dead bark persists on the stem or part of the stem, and is then somewhat fibrous, like that of a stringybark. The juvenile or seedling leaves are lance-shaped, sessile, opposite, and often tinged with a rich purple colour; those of the adult tree are stalked or petiolate, graceful-lance-shaped, sometimes curved to one side and occasionally wavy, deep green on the upper surface and paler beneath; the lateral veins are numerous but not regularly parallel; the intra-marginal vein is distinctly removed from the edge of the leaf. The umbel has a flattened stalk with six to ten flowers on short stalklets. The lid of the bud is conical or pointed, and stands within the rim of the calyx-tube like an egg in egg-cup. The mature seed-case is of full medium size, and shaped like a nearly round bird's egg with one-third cut away; the rim is either flat or convex, and the points of the valves when open are below or slightly above it. The fruits are too large to be described as pilular, and it is supposed that the specific name was originally given to *E. piperita*, which has pilular fruits, and then transferred in error.

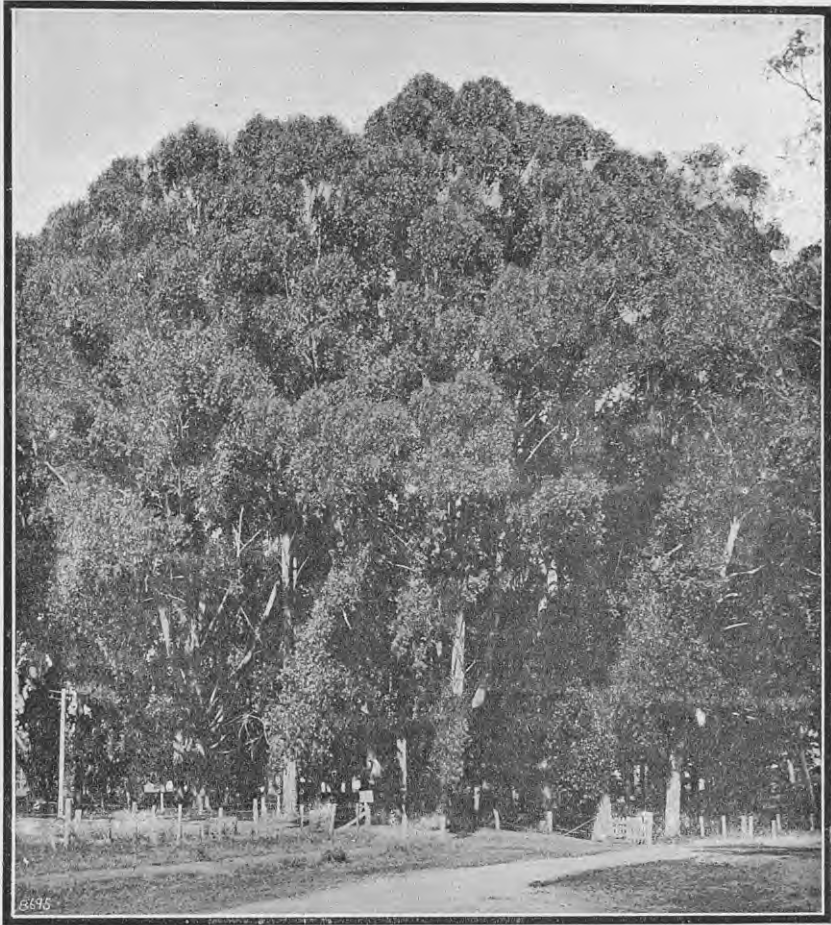
In their native habitat, eastern Australia, the trees now known to botany under the name of *E. pilularis* have often attained an immense height and diameter. The timber they yield is said to be excellent for either splitting or sawing, very durable in any situation, and especially suitable for fencing-posts; but of course the trees must be mature. Specimens planted perhaps forty-five years ago in the grounds of Mr. Robert Glasson, "Linwood," Runciman, and one or two others near Hobson Bay, Auckland, were long since large enough for the sawmill. Other large trees have been noted by the writer at Hakowai, near Napier. Numerous younger specimens are growing vigorously in several localities; one now nine years old in the grounds of Wesley Training College has a height of 47 ft. and a diameter of 11 in. 4 ft. from the ground.

Reports from New South Wales place this species in the first rank for general utility, and encourage extensive trial of it in our northern districts. Seed should be sown *in situ* or the plants worked in boxes, as the seedlings do not easily bear transplantation.

SPECIES WITH A RANGE INCLUDING ALL TEMPERATE AREAS IN THE NORTH ISLAND AND A FEW MILDER LOCALITIES IN THE SOUTH ISLAND.

Eucalyptus fastigata, Deane and Maiden.—This tree is of erect and very vigorous habit, the stem rapidly becoming tall and

strong, and the foliage being abundant and umbrageous. The stem and large branches are covered with persistent dead bark, which is distinctly fibrous, but not quite so tough as that of some other stringybarks. The leaves in the juvenile and adult stages are



EUCALYPTS ON THE RAILWAY RESERVE, PAPANUI, AUCKLAND.

The large fibrous-barked trees are *E. fastigata*, from seed sown in 1884.

not very different. They are stalked, thin, lance-shaped, with gradual taper to the petiole and to the apex, and their two surfaces are of about equal green. The sloping or tapering shape of the leaf is an obvious character and, together with the shape of the bud, gave choice to the specific name *fastigata*. The umbels are produced in pairs in the axils of the leaves, the number of flowers

in each being indefinite. The lid of the bud is pointed but short. The mature seed-case is small, whip-top-shaped, and almost invariably three-celled; the three valves while closed form with the rising rim a smooth dome, and when open project above it.

The timber is pale in colour, and, being freely fissile, is easily converted into fencing-posts. It is also reported to be excellent for sawing into boards and scantling. How long fencing-posts split out of mature trees will last we have as yet not sufficient experience to say. Reports from New South Wales, together with the appearance of the fresh timber and of logs that have been for a considerable time lying on the ground exposed to the weather, seem to warrant an estimate of fifteen to twenty years or more. We must remember that the value of a timber is increased by the rapidity of its production, and in this respect *E. fastigata* certainly takes a very strong place. Trees on the railway reserve at Papakura, only thirty-two years old, have reached a height of 100 ft. and a diameter of 3 ft. to 4 ft. Younger but equally promising trees may be seen in the reserve just below the Cambridge Railway-station; and, again, on Mr. W. Corry's farm near Hinuera there are specimens 150 ft. in height, with tall straight shafts 3 ft. in diameter, and 60 ft. to 80 ft. to the first branch. The age in this last case has not yet been positively ascertained, but it may be put down at less than thirty-five years. Several large trees have also been noted in the grounds of Mr. B. Chambers, Havelock North, Hawke's Bay.

The species is one of those that, under favourable conditions, freely reproduce by natural distribution of the seed. When raised in the nursery the seedlings are at first rather tender, but when once established in the plantation the young trees soon become strongly frost-resistant. *E. fastigata* was formerly included as a variety under *E. regnans*, but its leaves, its persistent fibrous bark on stem and branches, and the rising rim of its fruit distinguish it from that species and entitle it to separate specific rank. Seed is still sometimes sold as *E. regnans*, and great care must be used to ensure getting the right tree. In ordering from Australia it may be well to specify "fibrous-barked" *Eucalyptus regnans*, known as variety *fastigata*.

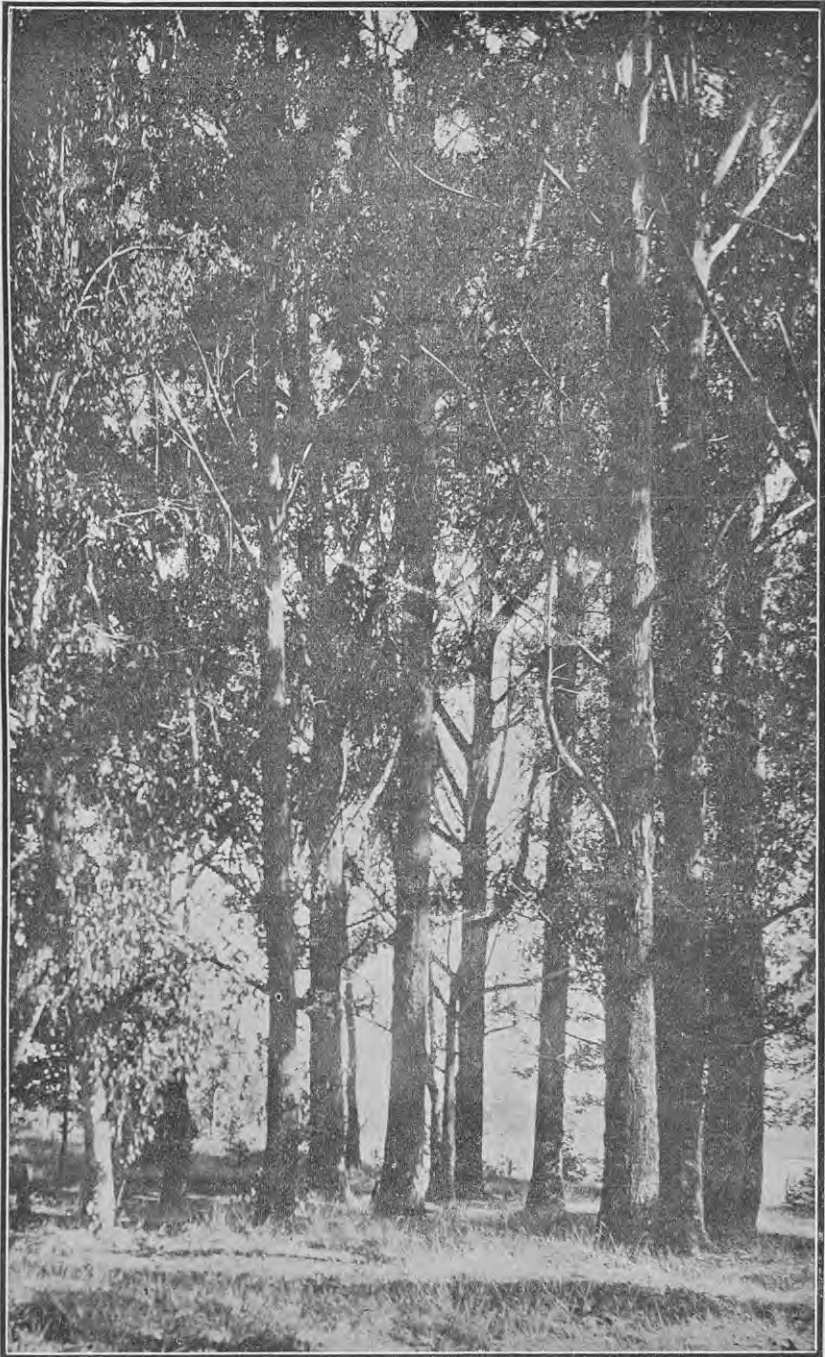
Eucalyptus obliqua, L'Héritier.—Under favourable conditions the tree grows rapidly to a height of 80 ft. to 100 ft. and forms a long clean bole, but on poor land in an open situation it may be stocky and branching. The dead bark usually persists on both stem and branches, is thick and fibrous, and of a pale-grey colour. The leaves of the young plant are broader and shorter than those of the adult tree, but otherwise the two forms are not very

dissimilar. Both are stalked or petiolate and very unequal-sided, with the petiole oblique to the midrib. Those of the adult tree are long, curved to the weaker side, vertically suspended, and of equal dark green on the two surfaces. The specific name was suggested by the shape of the leaf, but, as the leaves of several other eucalypts are similarly unsymmetrical and oblique, it does not help much in identification. The umbel has numerous flowers, the common stalk being about $\frac{3}{4}$ in. long and the stalklets short. The bud is of a pale-yellow colour, has a short hemispherical lid, and tapers from the lid to the base or pedicel, after the manner of a club. The mature seed-case is of medium size, and takes the shape either of an egg with a small part of one end cut away or of a pear with the calyx end cut off. The valves are deeply sunk beneath the somewhat contracted rim.

The timber is of a pale-oak colour, is easily split, and excellent for sawing into boards and scantling. It is said that stout posts split out of mature trees will last fifteen years or more. The species, though indigenous to both Australia and Tasmania, is at its best in the south-eastern portion of the latter country, where the trees are so large and the natural crop so heavy that sawmills at work for many years still have abundant supplies before them. The Government pamphlet, "Tasmanian Forestry," states that *E. obliqua* is "esteemed as the most valuable general-purpose timber produced in Tasmania," and mentions wharf and bridge construction, house-building, railway-sleepers, and wood-paving amongst the uses to which it is applied. The output is immense, and the demand continuous.

The species is represented with us by many hundreds of specimens in various parts of the North Island and in Canterbury, many of which are large enough for the sawmill. A few trees in various localities have already been split or sawn up and utilized. When once established *E. obliqua* reproduces itself very freely by natural distribution and germination of the seed; but the seedlings do not transplant well, and therefore in starting a plantation the seed should be sown *in situ*, or the plants worked in boxes or mossed. Seed should be obtained from the best trees in south-eastern Tasmania or from the best acclimatized trees in Canterbury.

Eucalyptus globulus, Labillardière. — The blue-green colour and angular stems of the young plant, the tall smooth bole and dark-green pendent leaves of the adult tree, the warty lid of the bud, and the large-ridged seed-case of this species are so familiar to people in New Zealand that there is no need here to give a detailed description of the tree. It is important to remark, however, that the species is represented by two or three distinct



EUCALYPTUS FASTIGATA ON THE RAILWAY RESERVE AT PAKAKURA.
Grown from seed sown in 1884.

varieties in this country. A variety with very large single fruits is understood to be identical with the Tasmanian "blue-gum" that for over half a century has commanded such a high reputation as a timber-yielder. Another variety has three fruits of smaller size together on the same stalk. This is believed to have been derived from eastern Australia, and to be a tree of greatly inferior value as compared with the type from Tasmania. The question needs further investigation, but meantime planters of this species will do well to obtain their seed from first-class parent trees and preferably from those of Tasmanian origin.

The species has a very wide range in New Zealand, especially fine stands of it being now seen in certain parts of Canterbury, Otago, and even Southland; but in almost contiguous localities it has been killed out or hopelessly injured by frost or other cause. There is much to suggest that failure in these cases has been due in part to the planting of inferior and weaker strains, and that had seed been always obtained from the best Tasmanian stock, results would have been generally more satisfactory.

Sap-wood of *E. globulus*, like sap-wood of almost all other trees, will soon decay when exposed to the weather or placed in contact with the soil; but experienced men who have made careful tests are of opinion that fencing-posts of good size cut out of the best heart-wood will easily last sixteen years. Mr. B. Chambers, of Havelock North, Hawke's Bay, mentions a case on his farm where a blue-gum gate-post outlasted two mountain-totara posts in succession on the opposite side of the gateway. The timber of *E. globulus* is very compact and interlocked in texture. This greatly raises its value for many technical purposes, but makes a serious difficulty in converting large logs without powerful sawing machinery. Generally in future plantings the farmer will be wise to choose a tree whose timber is more freely fissile.

Eucalyptus Macarthuri, Deane and Maiden.—The tree is of erect habit, and under forest conditions develops a long clean bole with little taper; in open situations it sends out strong side branches and carries a wide-spreading mass of foliage very suitable for wind-break purposes. The dead bark persists on the stem and large branches, and becomes ultimately thick and deeply furrowed; it is of the soft type, with very short brittle fibres, and can be easily crushed in the hand. The leaves in the juvenile stage are sessile (*i.e.*, stalkless), opposite in pairs, broad at the base and acute towards the apex; as compared with the young-state leaves of *E. viminalis*, which they closely resemble, they are usually broader and perhaps a little thicker. The adult or mature-state

leaves are stalked, thin, alternate or scattered, rather narrow, a little curved to one side, and of about equal green on the two surfaces. Frequently both forms of leaf appear on the same tree, and occasionally juvenile leaves and fruit may be seen growing together on the same twig. The umbel has all its parts small and delicately formed. Normally it carries seven flowers, six placed laterally and one in the centre. The common stalk is short and the stalklets very short. The lid of the bud is low-domed with a minute central point. The seed-case is very small and hemispherical



EUCALYPTUS MACARTHURI FELLED FOR FENCING-POSTS AT "TRECARNE,"
CAMBRIDGE.

This splendidly grown tree was planted in 1875.

or semi-ovate in shape. When the valves open their points rise slightly above the rim.

From an early stage in their life the trees develop a large percentage of heart-wood, which is of a pale-red colour, hard and strong. The logs are usually sufficiently fissile to be split with maul and wedges, but, if large, may need to be opened up with blasting-powder. The one serious fault of the tree is a tendency to form large radial cracks in drying. For sawing purposes this would have to be overcome by especial care in felling, milling, and seasoning. In its native country, New South Wales, owing partly to its restricted habitat and partly to the abundance of superior hard-

woods, *E. Macarthurii* has not attracted very much attention. In our country it is certainly a tree of immense value. Long experience in the Waikato has proved that its mature heart-wood will easily last twenty years in contact with the ground. For fencing-posts, culverts, and bridges such a timber, however coarse in grain or full of cracks, meets an urgent and persistent demand.

But this tree has much more to commend it than the strength and durability of its timber. It is strongly frost-resistant from the earliest stage of its life, can be very easily transplanted, and grows with phenomenal rapidity to a large size. It is essentially a cold-country tree, and will be found to attain its best in inland districts a few hundred feet above sea-level; but even on the Auckland Isthmus, where it is somewhat out of its range and has suffered from the saline winds, it has outgrown nearly all other eucalypts. If, as we suppose, it is as hardy as *E. viminalis*, it will in the future make a home on the Canterbury Plains and elsewhere in the South Island, and no time should be lost in there making experimental plantings of it. Splendid specimens of this tree may be seen at "Overdale," near Taumangi Railway-station, on the Rotorua line, and in several localities near Cambridge.

Eucalyptus acervula, Hooker f. — This species is indigenous to Tasmania, where, according to L. Rodway, the tree is of medium size with a strong tendency to branch. As we know the tree in New Zealand it is of erect habit and rapid growth. The dead bark persists on the lower part of the stem, where it becomes scaly and rough, but is not fibrous; from the upper stem and branches it comes off in flakes or ribbons, leaving a surface that is of a greenish-grey colour. The leaves of the young plant are oval, those of the adult tree broadly lanceolate or falcate; both juvenile and adult forms are long-stalked, pendent, shiny, often wavy or undulate, and of nearly equal dark green on the two surfaces. The umbel bears normally seven flowers, but may have less or more; its common stalk is about $\frac{1}{2}$ in. long and the stalklets short. The lid of the bud is domed, conical, or pointed. The mature seed-case is small to very small, is wide at the rim, and has just below the rim a slight groove and flange from which it tapers rapidly to the stalklet or pedicel after the manner of a short inverted cone. The points of the open valves may be just below or a little above the rim.

The species was extensively and very successfully planted some years ago in the State forests at Whakarewarewa and Waiotapu, where it has easily endured the cold winters and grown rapidly in height and girth. Specimens planted ten years ago in the grounds

of Wesley Training College are now 55 ft. high with a diameter of 11 in. In Canterbury well-grown specimens may be seen about Christchurch and on the plains as high up as 900 ft. above the level of the sea. No definite information is yet available with respect to the quality of the timber; but a tree so easily propagated, so well able to endure frosts and winds, and of such rapid growth commends itself as certainly worthy of extensive trial.

Through confusion of botanical names the species was introduced into New Zealand as *E. Gunnii*, and also as *E. Stuartiana*; but these names designate two quite distinct species, and it is to be hoped that the confusion will no longer be perpetuated. A New South Wales tree named by R. T. Baker *E. paludosa* has foliage and fruit closely similar to those of *E. acervula*, and may also be represented by specimens in some of our plantations. It is the Tasmanian tree that is here recommended for experiment in our colder districts, and care must be taken not to propagate some other of similar appearance.

SPECIES WITH A RANGE INCLUDING AREAS IN BOTH ISLANDS SUBJECT TO VERY SEVERE FROSTS AND OCCASIONAL FALLS OF SNOW.

Eucalyptus gigantea, Hooker f. (*E. Delegatensis*, R. T. Baker).—The tree as reported from its native habitat develops a long straight bole crowned with luxuriant foliage. The dead bark persists on the stem or part of the stem, and is there matted and fibrous; from the branches and sometimes from part of the stem it falls away in ribbons, leaving a surface that is of a pale bluish-grey or greenish-white colour. The juvenile leaves soon become stalked, rather wide, and somewhat unequal-sided; those of the adult tree are similar but longer and not so wide; both are of about equal green on the two surfaces, or sometimes glaucous. The umbel carries numerous flowers, the common stalk being long, the stalklets short. The lid of the bud is domed or hemispherical. The seed-case is of medium size, pear-shaped, with short thick stalklet; the rim sunk or descending, the valves enclosed.

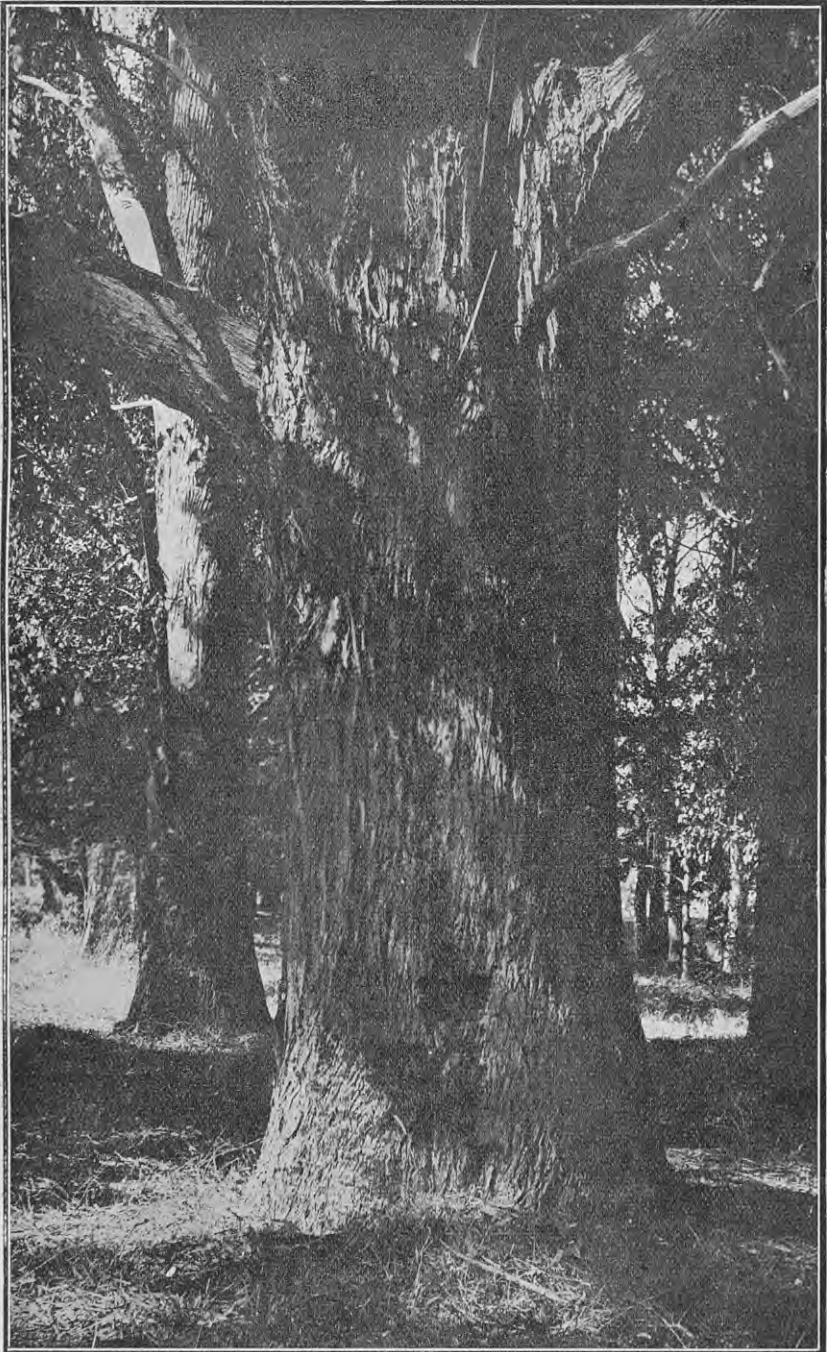
The species is indigenous to Tasmania and south-eastern Australia, and is at its best on the uplands in the region of the winter snow-line. The logs can be easily split into valuable fencing-posts, and are even better for conversion into boards and scantlings under the saw. J. H. Maiden describes the species in his "Forest Flora," Vol. vi, pp. 3 to 8, and concludes by saying, "It, being accustomed to heavy falls of snow, is a useful species for acclimatization in other parts of the world presenting severe but not extreme conditions." Mr. T. H. Williams, District Forester, Tumbarumba,

N.S.W., as quoted by Mr. Maiden in the same article, bestows unstinted praise on this tree as a hardy reafforester and yielder of first-class timber for house-building and general purposes.

The species is closely similar to *E. obliqua*, and has, the writer believes, been occasionally planted in the Dominion under that name; but otherwise it is unknown to New Zealand forestry. One cannot safely say how any species will behave until it has been practically tested; but the probability that this exceedingly valuable timber eucalypt would make itself perfectly at home on our own frosty uplands amounts almost to certainty. Not a season should be lost in obtaining supplies of seed from typical trees above the winter snow-line in New South Wales or Tasmania and putting the question to the test of competent and adequate experiment.

Eucalyptus viminalis, Labillardière.—The specific name, which means "withe-like" or "willow-like," was probably suggested by the graceful and beautiful appearance of the tree, but it does not help us much in separating the species from several others. The tree, in what may be described as its typical form, has a tall central shaft with spreading branches and drooping branchlets. Except for a few feet at the base of the stem, it throws off its dead bark and exhibits a greenish-white smooth surface that often looks as if it had been polished, or touched with white enamel. The juvenile leaves are sessile, opposite, lance-shaped; those of the adult tree are stalked or petiolate, scattered, long, thin, rather narrow, curved to one side, and of about equal green on the two surfaces. The umbel normally carries three flowers, but occasionally has more; the lid of the bud is conical; the mature seed-case is of small to medium size; the rim rises and the valves spring from just within its edge, forming a dome while closed and projecting when open. The heart-wood is pale yellow or sometimes salmon-coloured, never red.

The species is recorded by botanists as indigenous to Tasmania and eastern Australia. The island form is described by L. Rodway as medium to large; of the continental one as seen in their own State Baker and Smith say that it is "a very large tree, probably the largest of New South Wales eucalypts." The species is very widely distributed in New Zealand. It is very easily propagated, either by sowing *in situ* or by transplanting from the nursery. That it is strongly frost-resistant is proved by the evidence of thousands of specimens 600 ft. to 900 ft. above sea-level on the Canterbury Plains. In middle Canterbury, where the phenomenal frosts of 1899 and 1903 seriously injured so many species, *E. viminalis* has made the best recovery.



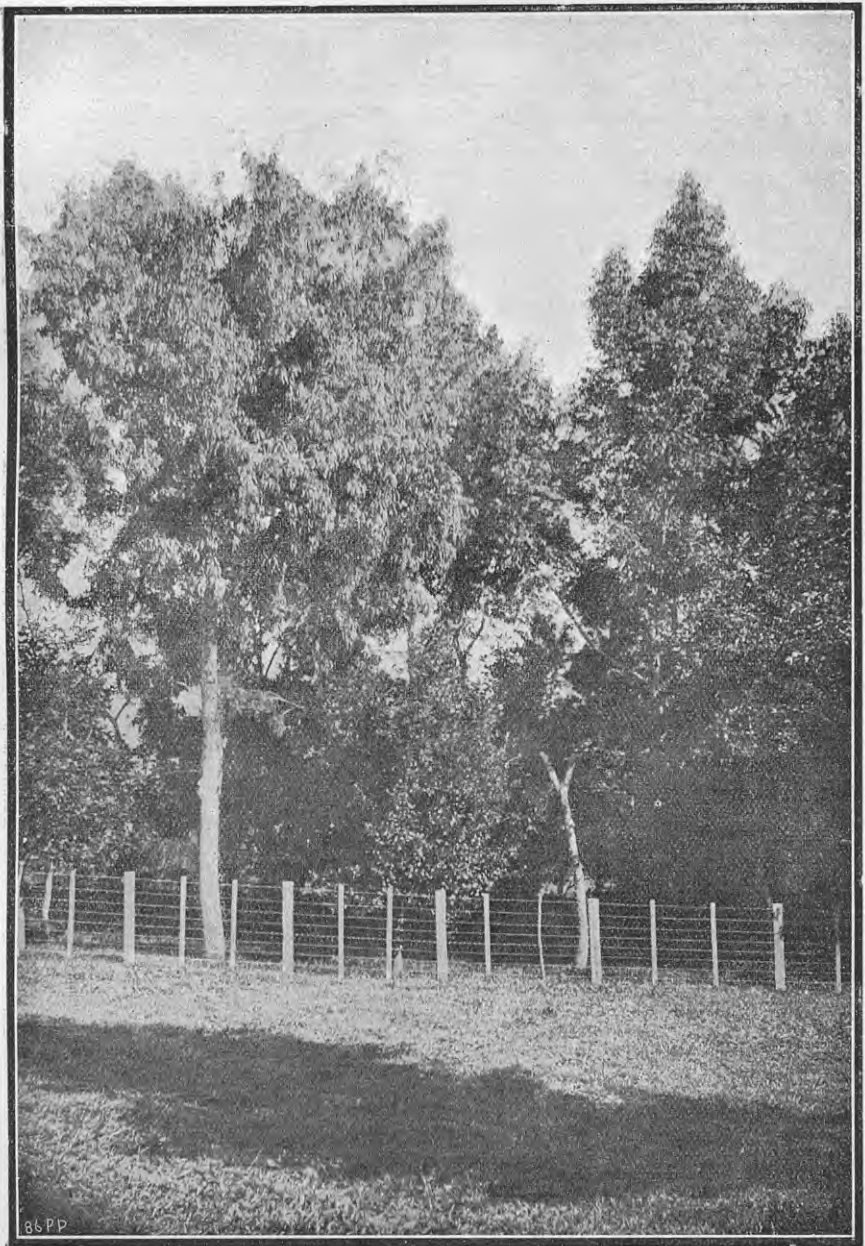
LARGE SPECIMEN OF *EUCALYPTUS FASTIGATA* IN THE RAILWAY RESERVE PLANTATION, PAPA KURA.

This tree, which has a diameter of 4 ft., is only thirty-two years old, the seed having been sown in 1884.

That this eucalypt can quickly produce for us in New Zealand an immense *quantity* of timber is certain, but there remains to be considered the question of *quality*. Relatively to the many exceedingly valuable and durable hardwoods produced in the Australian States, *E. viminalis* has only a weak reputation; but we have to inquire what its value is likely to be in parts of New Zealand where those superior hardwoods cannot possibly be grown. The position of this eucalypt from an Australian point of view appears to be fairly stated by Mr. Andrew Murphy, of Woy Woy, New South Wales. This gentleman has for many years been carrying on business as a tree-seed collector, and has an exceedingly wide knowledge of the timber-yielding eucalypts. In reply to express inquiries with respect to *E. viminalis* he writes as follows: "It is a very fast-growing tree in its own climate—that is, cold climate—and the cooler the climate the more value its timber will be; not so good when grown in a warm locality. It is a good useful timber, but no good for posts. It is good for rails and palings, &c.—anything out of the ground. Of course, the posts may last ten years easily enough, but we do not consider that anything here; most of our posts last thirty years, particularly *E. corymbosa* and *E. botryoides*."

In making our deduction from this and similar statements we have to remember that timber values are relative to circumstances. We are inquiring just now what the value of *E. viminalis* will be in parts of New Zealand where such durable hardwoods as *E. corymbosa* and *E. botryoides* refuse to grow. The question is one to be settled by our own experience, and such competent experiments as have been already recorded are certainly encouraging. Two of them are as follows:—

(1.) Some posts split out of trees of this species in 1901 when the trees were twenty-six years old were put into a fence in 1902. In September, 1915, the writer, together with Mr. Richard Reynolds, made a careful inspection of the fence. We examined about twenty posts, digging the soil away with a spade and chipping each post with an axe. The sap-wood had decayed, but the heart-wood was still in all cases quite sound. The posts we examined were not specially selected, but taken as average specimens, and not one was found that needed to be replaced. The fence had then been erected thirteen years, and we estimated that the posts would last another four or five years, giving a maximum life of eighteen years. It is fair to say that these posts had been split light, and that a still more favourable report could have been given had they been split with more timber in them. In this and other fences Mr. Reynolds has tested *E. viminalis* side by side with *E. Macarthuri*,



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PLANTATION AT WESLEY TRAINING COLLEGE, AUCKLAND, STARTED IN 1906.

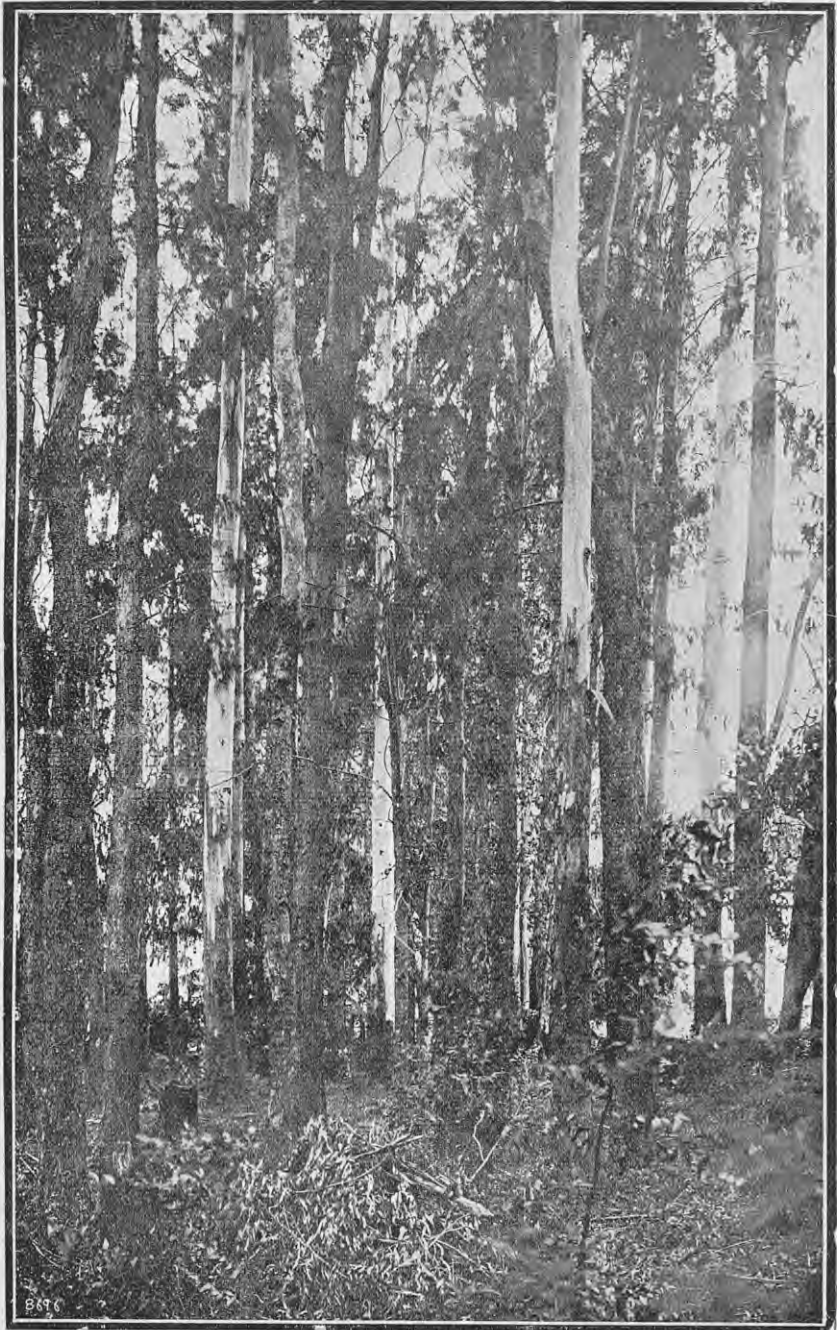
The tall tree on the right is *Eucalyptus acervula*, and the large one on the left *Eucalyptus viminalis*.

and as yet neither has outlasted the other. The two timbers are quite easily distinguished by their colour and texture, and can at any time be compared in these fences.

(2.) The second example comes from the St. Leonards Station, near Culverden, North Canterbury. Forty-seven years ago the proprietor of the station, Mr. John H. Davison, sowed a patch of ground with Eucalyptus seed and had a good take. When the trees were twenty years old he cut down some of them and used them for the stringers and sleepers of a bridge. Twenty years after that the foundations of the bridge needed renewal and the upper part was removed to get at them. The sap-wood of the Eucalyptus had decayed, but the heart-wood was still quite sound and was used for fencing-posts, the bridge being decked this time with sawn Eucalyptus planks. The posts after twenty years' service in the bridge and seven in the fence are still sound, and the planks after being on the bridge seven years show no signs of decay except a very little in cracks where rain-water has been held. The writer visited St. Leonards on the 12th February, 1916, and carefully inspected both the bridge and the living Eucalyptus trees. Mr. Davison, who is an intelligent and thoroughly practical man, was clear that the trees used for the bridge were identical with those still standing in the plantations, and the only species found in the plantations was *E. viminalis*. Some of Mr. Davison's trees are now 150 ft. high; and on the neighbouring station of Mount Palm Mr. Thomas Chapman has about two thousand specimens of the same species grown from St. Leonards seed, many of which rival the parents in height and girth.

The object of these remarks is not to encourage the planting of *E. viminalis* all over New Zealand, but to show that where the climatic conditions become too severe for nearly all the larger and more valued species this easily propagated, exceedingly hardy, fast-growing, large, and beautiful tree can still supply the settler with abundant useful timber, and meantime shelter his stock against summer heat and winter storms.

Eucalyptus Gunnii, Hooker f.—In earlier Eucalyptus literature the definition of this species was extended to include as varieties the tree we now know as *E. acervula*, an Australian tree called by R. T. Baker *E. paludosa*, and one or two others. Later research has inclined the botanists of to-day to regard these so-called varieties as distinct species, and to restrict the name *E. Gunnii* to the Tasmanian mountain-tree locally called "cider-gum." It will be convenient for us in New Zealand to accept the restric-



EUCALYPTS ON MR. J. McCARTY'S FARM, CLAUDELANDS, WAIKATO, PLANTED IN 1881.

E. viminalis with smooth white bark *E. Macarthuri* with rough, darker bark.

tion without further hesitation. As thus understood *E. Gunnii* is a medium-sized tree, of branching habit when grown in open situations, but capable of forming a long clean bole when closely surrounded by other trees. The dead bark is non-fibrous and comes off in sheets or scales, leaving the stem and branches more or less smooth and of a pale greenish-grey colour. The juvenile leaves are short, of a round or oval shape, and stalkless or on very short stalks. The adult-tree leaves are stalked, nearly equal-sided, sometimes rather broad, but never very long. The umbel is very constantly three-flowered. The lid of the bud is short and forms a low conical cap to the almost cylindrical calyx-tube. The mature seed-cases vary a little in size and shape, but may be described as oblong or deep-cup-shaped and sometimes contracted a little below the rim. The valves are deeply enclosed, and usually three in number.

The species has found a congenial home in the State plantations at Waiotapu, on the higher Canterbury Plains, as at Racecourse Hill, and especially in Southland, where it is represented by many vigorous and very beautiful specimens. A belt on two sides of the homestead enclosure on the property of Mr. P. C. C. McLeish, in the Drummond district, is particularly worthy of mention. The trees, now thirty-six years old, are in a vigorous growing condition, and stand up firm and erect without any indication of having suffered from prevailing winds. An average specimen carefully measured with the Abney level and steel tape was found to have a height of 100 ft. and a girth of 6 ft. 9 in. Many of the boles are straight and clean, and the majority of them would cut into good boards and scantling if put on the sawmill. Timber from such trees cannot fail to be of considerable value in the near future, and no time should be lost in putting it to the test of competent experiment.

Messrs. Baker and Smith, in their "Research on the Eucalypts of Tasmania," make in respect to the timber of this species the following statement: "The timber is pale-coloured, and very hard and heavy, and Mr. L. G. Irby states that it is almost if not quite as hard as that of the Australian ironbarks *E. paniculata* and *E. crebra*." Mr. Irby was Museum Collector, and had a very wide knowledge of the Tasmanian timber-trees. Seed for propagation of the species should be obtained from the best Southland trees.

Eucalyptus Muelleri, T. B. Moore.—This is another mountain species indigenous to Tasmania, and the accounts we have received of it from its native home place it very high as a timber-yielder.

It is described as a larger and better tree than *E. Gunnii* and equally hardy. So far as the writer is aware, no specimen supposed to represent the species in New Zealand has yet attained a useful size, and there is the possibility that our plants belong to a dwarf or inferior form. Seed should be obtained without delay from the best and largest trees on the mountains of Tasmania, and the species given a thorough trial on some of our cold uplands.

HOW TO START A PLANTATION.

The simplest way to start a plantation of eucalypts is to sow the seed broadcast or with a drill on thoroughly prepared land, just as grass-seed is sown. The seed should be mixed with dry sand to prevent sowing too thickly. It will be a great advantage if the land has already been well manured. Failing this, a little blood-and-bone or guano may be mixed with the sand and seed immediately before sowing. When the work is finished the seed should be within a quarter to half an inch of the surface in a firm but not compressed bed. By using only the two outside hoppers of the drill the seed may be sown in rows sufficiently far apart for after-working. There are two sowing seasons for eucalypts—spring and autumn. Spring is the better when the land is free from weeds and there is sufficient moisture to germinate the seed and keep the young plants going while their roots are still very short. If the land is weedy and moisture uncertain, autumn will be better, at the falling of the early rains. A very little Italian rye-grass sown with the seed will protect the young plants either from the summer sun or from the winter frosts. Mere surface sowing after a burn will often succeed without any further trouble.

Another method is to sow the seed in nursery rows in October or November, wrench the plants as soon as the autumn rains come by driving a spade down along each side of the row so as to cut all the long roots, and then in May or June lift them and puddle the roots and immediately carry them rolled in wet sacks to the planting-ground, and plant them in already prepared places 8 ft. to 10 ft. apart each way. The best puddle will be made with thoroughly decayed farmyard manure and clay mixed with a sufficient quantity of water. The roots must in no case be allowed to become dry, and to prevent this while planting the plants should be carried in a bucket containing sufficient puddle to cover the roots. The very bad transplanters should be individually mossed as soon as lifted from the nursery rows and again heeled in for a few weeks before the final planting. The method simply consists in wrapping the roots of each plant with a pad of damp sphagnum or other

moss, which is fastened with a strip of flax. Small pieces of scrim or old sacking may be used as an outside wrapping to help in keeping the moss together. As soon as a few plants have been thus prepared they should be freely sprayed with water and immediately heeled in. Then within two or three weeks it will be found that the plants have thrown out numerous small rootlets into the moss, and can be removed to their permanent home without risk, always provided that they are still kept damp and planted with the wrapping undisturbed.

Still another method is to prick out the plants in the spring while they are very small into shallow boxes filled with fibrous vegetable mould, and then in the early winter or following spring to plant them out direct from the boxes with a little mould adhering to the roots.

PURE AND MIXED PLANTING.

Theoretically speaking, it is bad practice to mix two or more species together, and yet in actual experience many a man has been saved from failure and disappointment by doing this very thing; for again and again it has happened that out of several species sown or planted in a particular locality one or two have done well, while the others have for some cause proved unsatisfactory. Pure planting is certainly best wherever conditions guarantee a good take and a uniform crop, as will generally be the case in systematic State forestry; but for the busy amateur mixed planting will often be safer. The one thing to be rigidly insisted upon is that the species planted together shall be of equal rapidity in height-growth, so that no one of them may overtop and depress the others.

For wind-break purposes it will sometimes be desirable to mix a few plants of *Pinus insignis* with such rapid-growing eucalypts as *E. Macarthuri*, *E. viminalis*, or *E. fastigata*, examples having shown that these trees all maintain about the same rate of upward growth and blend well together. *Cupressus macrocarpa* may also be planted with eucalypts for wind-break purposes. In exposed situations near the sea it will always be advisable to place a screen of hardy pines on the outside of the belt, as many of the eucalypts, even though they may be extremely hardy inland, suffer at their tender growing tips from exposure to the full blast of saline winds. It must be remembered, too, that trees help trees, and that wide belts always give better results than narrow ones. Single or even double rows along boundaries are unsatisfactory. It is better to plant a belt 60 ft. to 100 ft. wide, and better still to plant a square block of several acres.

PROTECTION AGAINST STOCK, ETC.

Eucalypts, like all other trees, must be securely protected against stock. It is only a waste of time, money, and good temper to plant trees for the farm animals to destroy. An ordinary seven- or eight-wire fence with plenty of battens will be sufficient protection against sheep, cattle, and horses, provided a space of 6 ft. is left between the fence and the nearest row of trees; but the fence must be kept tight and in good order. If rabbits and hares are numerous it will, unfortunately, be necessary to protect the plants while young against them also, by netting the lower half of the fence. The correct rabbit-netting is 42 in. wide, with a mesh of $1\frac{1}{2}$ in., and of 16 to 17 gauge wire. Six inches should go into the ground, and the remaining 3 ft. be stretched tight and well fastened to the posts and wire. If the mesh is larger than $1\frac{1}{2}$ in. small rabbits may pass through and live inside the plantation.

SEED-SUPPLY.

There remains the vital question of seed-supply. Intending planters by carefully using the foregoing descriptions may in many instances identify local trees and collect for themselves. If the twigs bearing the ripe fruits are laid out on a floor or hung up in a sack, the seed will within a few days fall out of the cases, and can then be easily separated with a sieve. But more frequently it will be found necessary to purchase the seed, and it is here that we encounter a great risk. The ordinary seedsman has to purchase from other seedsmen or from collectors. Quite honest collectors, unless possessed of considerable botanical knowledge, may make mistakes and unwittingly deceive the seedsman, who will then just as unwittingly pass the deception on to his customers. In this way the planter may find, after spending his time and money and waiting long years, that he has planted the wrong trees and failed of the result that he had a right to expect. Until the Government Forestry Branch can supply the seeds, or some one New Zealand seed-house will undertake to keep guaranteed stocks, planters who cannot collect from local trees will be well advised to import the Australian seeds direct from Andrew Murphy, tree-seed collector, Woy Woy, New South Wales, who knows all the timber-yielding eucalypts well, and is thoroughly accurate and reliable. The special Tasmanian species may be obtained from C. Creswell and Co., seedsmen, Hobart.

CONCLUSION.

Many farmers and settlers will no doubt desire information about numerous eucalypts not mentioned in this article. They must be

asked to wait until all the important species now growing in this country and others thought worthy of introduction can be described in the proposed forestry handbook or in a separate bulletin. Several eucalypts yield much more durable timbers than the majority of those described above, but they are all comparatively tender and slow of growth. First plantings everywhere should be of sure and heavy croppers.

There are many examples in New Zealand of the self-propagation of eucalypts, and the writer hopes to contribute an article on that subject to some future number of the *Journal*. A full account would then be given of two species that have spread very remarkably from a few parent trees at Waitati, in Otago.

NOMENCLATURE OF EUCALYPTS.

It will be observed that in the foregoing article popular names have not been given for the eucalypts dealt with. Writing to the Editor, Mr. Simmonds makes the following remarks on this subject: "I have given a great deal of thought to the question of bushmen's names, and corresponded with Australian foresters about it. The result is that I have no hope whatever of deriving a useful nomenclature from this source. Even in Australia these names are in hopeless confusion, and here in New Zealand we lack the local associations and explanations that sometimes give them a little colour of appropriateness in limited areas over there. If I call *Eucalyptus fastigata* 'cut-tail,' what possible meaning can the word have here? If I call *Eucalyptus pilularis* 'black-butt,' I shall set people looking in vain for black bark on the stems of *Eucalyptus pilularis* trees in this country. There are six stringybarks, five ironbarks, several boxes, three blue-gums, three or four red-gums, as many mountain-ashes, two or three 'messmates,' three or four peppermints, and quite a large group of white-gums. One or two species rejoice in being called apples. The use of these names as we find them in seedmen's catalogues is worse than useless. Let us use them as little as possible and prepare to drop them altogether in favour of the botanical names, which anybody may quickly learn by associating them with the trees."

Demonstrations at Arataki.—With a view of bringing the Hawke's Bay fruitgrowers into closer touch with the Arataki Horticultural Station arrangements have been made, in co-operation with the advisory committee of the Hawke's Bay Fruitgrowers' Association, to hold practical demonstrations at the station at regular intervals. The first gathering of the series was held on the 25th March, and took the shape of a demonstration of hard-pan breaking by means of explosives, conducted by Mr. A. H. Mazure, Vine and Wine Instructor, who has had considerable experience of this method in Australia. An orchard-ploughing competition will be held shortly, and the Horticulture Division has asked the committee of the Fruitgrowers' Association to draw up rules for this event.

POLLEN-GRAINS AS SOURCE-INDICATORS OF HONEY.

CONTINUED.

R. WATERS, Biological Assistant.

THE first account of the work under the above head done by the writer appeared in the *Journal* for September last. A further account, with illustrations and descriptions of some of the more important ellipsoid pollens, was published in the November issue. Reference to these two articles will afford those interested such details concerning the objects of the investigation, the methods employed, and the system of classification as will give a better understanding of the following notes in continuation of the subject.

ELLIPSOID POLLENS.

Type II (Gorse Type).

Similar to gorse are,—

Broom (*Sarothamnus scoparius*) figured and described in *Journal* for November, 1915, p. 387.

Apple (*Pyrus malus*).



Fig. 1.



Fig. 2.

PLATE VII.—APPLE (*PYRUS MALUS*).

Fig. 1, side view. Fig. 2, transverse section through the middle of the longitudinal axis. Natural size: Length, 50.4 μ ; breadth, 24.3 μ . Magnification, 920 diameters. [Original.]

Apple differs from gorse and broom in its noticeably greater length and breadth. In transmitted light the yellowish-green shade of fresh specimens is readily distinguished from the golden-yellow and very pale watery yellow of fresh broom and gorse respectively. This pale-yellowish-green shade of apple is similar to that of wild turnip, from which, however, it clearly differs in its greater length and breadth, in its polish due to its capacity for transmitting light, and in its smoothness of surface. The shape of apple is often less regular than that of the other two. Magnified 465 diameters, the surface sculpturing appears as of minute striations, sometimes composed of straight lines, sometimes of curved. Again, the sculpturing may appear as granular. In these surface characters the appearance of apple differs from the reticulated sculpturing of broom and the still finer one of gorse. Sculpturings are often more clearly shown when the grains have been crushed flat on a glass slide.

Type IV (Red Clover Type).

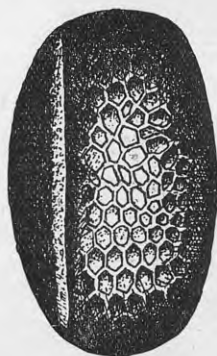


Fig. 1.



Fig. 2.

PLATE VIII.—RED CLOVER (*TRIFOLIUM PRATENSE*).

Fig. 1, side view. Fig. 2, transverse section through the middle of the longitudinal axis. Natural size: Length, $50.2\ \mu$; breadth, $30.7\ \mu$. Magnification, 920 diameters. [Original.]

Red clover (*Trifolium pratense*) is a type easily distinguished from types I (white clover), II (gorse) and III (wild turnip) by reason of its noticeably greater breadth and length. In cubic capacity red clover appears two or more times greater than gorse, the largest of types I, II, and III. Unlike II and III, the ends of red clover are bluntly rounded—not pointed. Moreover, in proportion to its size, the grooves of red clover are relatively noticeably shallower and narrower than I and II. Red clover is most

distinct in surface sculpturing, the very coarse and bold reticulation of which alone justified its classification as a separate type of ellipsoid pollen.

Type V (Escallonia Type).



Fig. 1.

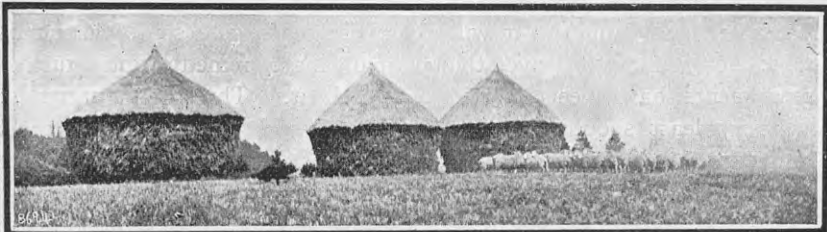


Fig. 2.

PLATE IX.—ESCALLONIA (*ESCALLONIA MACRANTHA*).

Fig. 1, side view. Fig. 2, transverse section through the middle of the longitudinal axis. Natural size: Length, $29.1\ \mu$; breadth, $18.0\ \mu$. Magnification, 920 diameters. [Original.]

Escallonia (Escallonia macrantha), the common dark-foliaged pink-flowered hedge-plant, differs sufficiently in the size and shape of its pollen-grains from previously mentioned types to justify its classification as a separate type. Of the other types, it resembles type III (wild turnip) most, mainly in its colour, which in transmitted light is of slightly paler yellowish-green than the shade common to both type III and apple. It is, however, noticeably broader in proportion to its length than wild turnip, and its ends are more broadly rounded. Moreover, it is not opaque like type III, but highly transmissive of light; this character lends a highly polished appearance to its surface, which under a magnification of 465 diameters appears also as almost imperceptibly reticulated. Some of the grains of *Escallonia* approach more or less a spheroidal shape—these are probably immature pollens.



STACKS OF OATS AT RUAKURA THATCHED WITH RYE-CORN STRAW.

DISEASES OF THE VINE.

PREVENTIVE AND REMEDIAL MEASURES.

A. H. MAZURE, Vine and Wine Instructor.

THE majority of the methods described below for coping with the various diseases of the vine have been thoroughly tested in all the leading wine-growing countries of the world, and can therefore be recommended with confidence. There are also some treatments which are practically new, and further experimental work will be necessary before finally deciding their respective values. It is not always a wise course to wait for the disease and then treat it. In districts where vine-diseases are known to exist, preventive measures are always the best. Most of the following treatments are based on the fact that prevention is better than cure.

VINE OIDIUM (OIDIUM TUCKERII.)

This is probably the best-known fungus disease in vine-growing, and is fortunately the most amenable to treatment. Nevertheless, it can be very troublesome, particularly in cool vinehouses. Vines attacked by oidium may be recognized by the following symptoms: The green parts become covered with a whitish dust, and after a while grey spots appear on the places attacked. Close and moist weather-conditions are favourable to the development of oidium.

Sulphur (triturated) is probably the best remedy for mildew. A new remedy described in the December issue of the *Journal*—namely, permanganate of potash—appears to be giving excellent results in France. However, as sulphur is the standard treatment and a fairly sure remedy if applied at the right time—November, December, and January—it will be advisable to give some particulars of it here, and to leave the permanganate remedy until further experiments have been carried out with it. Three sulphurings at the very least should be carried out. The first two are the most important. It is absolutely necessary that the sulphur should be applied when the shoots are from 8 in. to 10 in. long, and also during the florescent period; again in December, and, if necessary, again in January. The quantities to be used per acre are—for the

first application, 8 lb. to 12 lb.; for the second, 15 lb. to 24 lb.; and for the third, 30 lb. to 35 lb. Choose, if possible, warm calm days. Be sure to use the best sulphur, and see that it is finely ground, as this will ensure the foliage being completely covered.

BLACK-SPOT (ANTHRACNOSIS).

This disease is caused by a microscopical fungus called *Sphaeceloma Ampelinum*. It is undoubtedly one of the worst diseases of the vine, and is very difficult to cope with. It can be readily recognized by spots or cankers appearing on the green parts of the plant. The spots are small when the disease commences, and then extend, gradually sinking into the tissues. If some preventive measure is not used the disease generally results in the total destruction of the crop and in many cases of the vine. It is very prevalent in damp muggy seasons on low soils. I have noticed in New Zealand four varieties that are particularly susceptible to black-spot—namely, Thompson's Seedless, Golden Chasselas, Temperano, and Cabernet Sauvignon.

In districts where the disease is known to exist everything that can be done should be done to prevent a recurrence, for when started on the young growth it is extremely difficult to check—in fact, it has been found almost impossible to then control the trouble. In planting, avoid any notably susceptible varieties of vines, and do not plant in situations which are favourable to the development of the disease.

The treatment which so far has proved most successful in France and in Australia is the following one: A 10-per-cent. solution of sulphuric acid is applied to the vines in the winter as soon as possible after pruning. Use a mop made with rags tied to the end of a stick and paint the solution on to the wood. If a spray-pump is used it should be lead-lined. Be sure and wet the vine all over. This will destroy a large number of spores, which would have started the disease early in the spring. An application is made, just before the florescent period, of triturated sulphur and bolted lime in the proportion of sulphur 4 parts and lime 1 part. Immediately after the florescent period a further application of sulphur 3 parts and lime 2 parts is given. A few days later another application is made in the proportion of sulphur 2 parts and lime 3 parts. This should be repeated until the disease is completely eradicated.

As black-spot is extremely prevalent in this country the treatment just mentioned should be given a thorough trial here. It is

claimed that, although a good deal of labour is entailed in carrying it out, the treatment practically eliminates the disease for at least three years. If such is the case the cost naturally amounts to very little.

Another useful check for black-spot is Bordeaux mixture at the rate of 4-4-40, but this spray is by no means a cure, nor is it a preventive for the disease.

Spraying with lime-sulphur, 1 in 125, after the florescent period, is also a preventive, provided it is followed later by a solution of increasing strength as the growth of the vine becomes stronger. The strength of the mixture should gradually rise until 1 in 80 is reached. It is not advisable to have it higher, as otherwise the spray tends to burn the vines severely.

GRAPE-ROT (*BOTRYTIS CINEREA*).

Thin-skinned grapes often rot when the weather is damp and rainy at the time of ripening, and particularly so if the vineyard is in a low situation. This is due to a fungus, *Botrytis cinerea*. This fungus also affects the wine which is made from affected grapes, causing the disease called "casse." The best cure for the disease is to strip the leaves *below* the bunch a few days before picking the grapes. This allows a free current of air, and more heat is reflected from the soil, the action of both factors helping the maturation of the fruit. This disease is sometimes known as grey-rot.

BLACK-ROT (*PHOMA NIRCOLAE*).

Black-rot is first seen on the berries as a bluish-red spot, which increases in size and eventually surrounds the whole fruit. After this stage it becomes red-brown and soft, and the berries will dry in three or four days, the colour becoming nearly black and the skin adhering to the pips, while the whole surface is covered with small prominent brown spots. These latter make their first appearance when the fruit is gradually drying.

The disease appears to develop easily in low and very damp situations, particularly with varieties of grapes of a very juicy nature. The best means of coping with this trouble is to spray with Bordeaux mixture, 3-3-50, taking care that the spray thoroughly covers the vine. If the mixture is applied four or five times in the season the disease will be entirely overcome.

LUCERNE-GROWING.

A CANTERBURY OBJECT-LESSON.

A REMARKABLE example of the value of lucerne as a fodder crop, and its adaptability and productiveness under most unfavourable conditions, has been furnished during the past season on the farm of the School for the Deaf, at Sumner, near Christchurch. An account of how, with bare grass-paddocks, the half-dozen cows of the institution were kept in good condition and yield during a

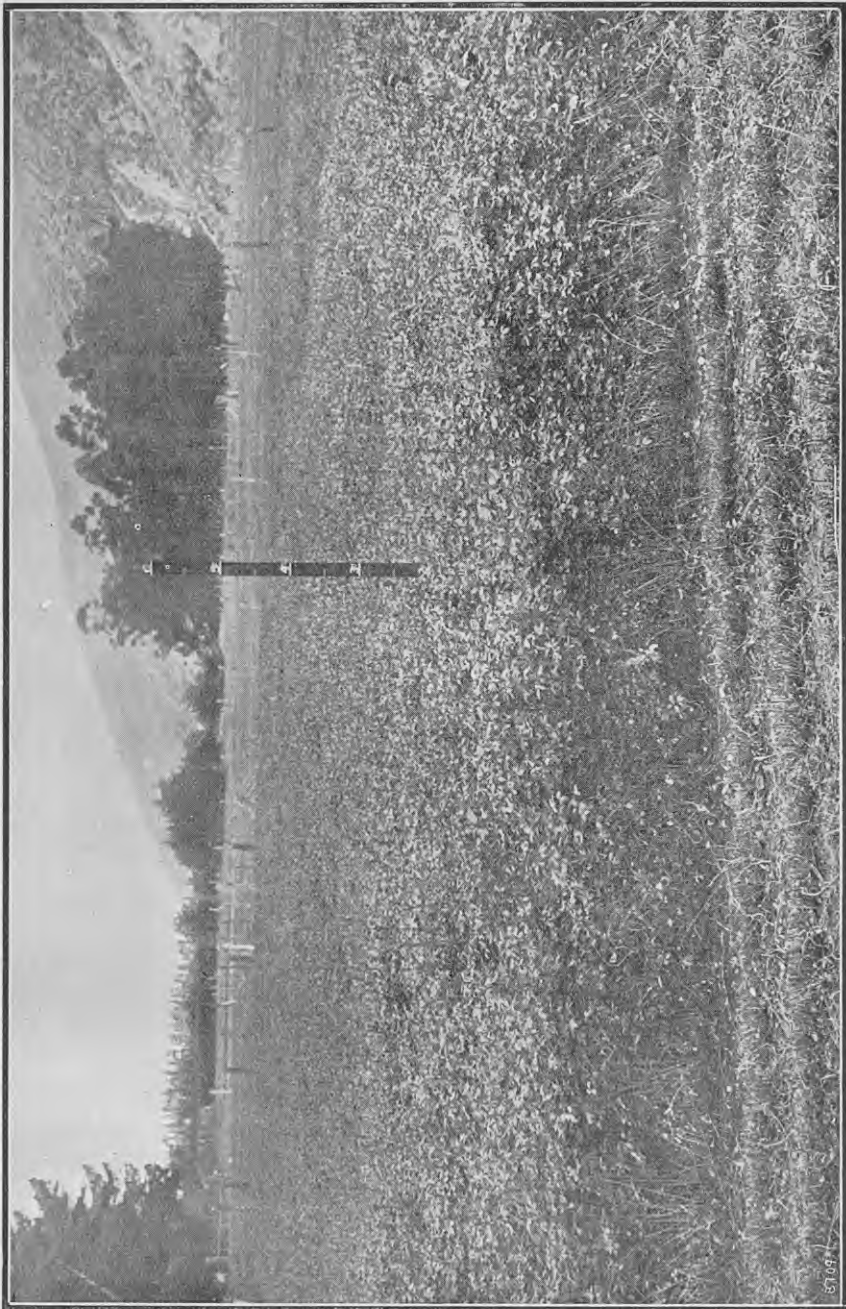


THE COWS FED FROM THE SCHOOL-FARM LUCERNE PLOT.

The grass-paddock here shown was practically bare.

droughty spell of four months and a half by means of half an acre of lucerne growing practically on sand is contributed below by Mr. J. E. Stevens, Director of the School. The majority of dairy-men and other farmers in Canterbury—men depending in summer on grass, with perhaps some of the commoner forage crops—have had such a hard experience this past season that no excuse is needed to point a moral from this Sumner object-lesson. Dealing first with the establishment of the lucerne plot Mr. Stevens says,—

“Our first trial in lucerne-growing was made in the autumn of 1908, when we sowed down a quarter-acre, which germinated well,



LUCERNE PLOT AT SCHOOL FOR THE DEAF, SUMNER.

Showing fifth crop of the season, ten days off full growth. This part of the plot was sown only fifteen months previously.

but which was soon smothered with weeds. In the following spring the same plot of ground was prepared again, to see if better results could be obtained at that season of the year. The lucerne again germinated well, but so did the fat-hen, and the result was again a failure. The plot was put back into grass, and nothing further was done in the way of lucerne-growing until the spring of 1913. Then, on the advice of officers of the Department of Agriculture and following out their instructions to the letter, we selected for a further experiment the most worthless piece of ground on the School farm, a quarter-acre of sand hummocks covered by a very thin coating of soil. This area was levelled, what soil there was being kept on the surface, and a dressing of 4 cwt. of lime applied. The seed was sown in rows 15 in. apart, not broadcast as in our previous experiments. The seed germinated well, and when the rows could be easily distinguished the hoe and the Planet Junior cultivator were kept going between them. When the crop was about 6 in. or 8 in. high it was cut and left on the ground for a mulch. After that, beyond resowing one or two bare patches, we had no further trouble. The following spring, 1914, we increased the size of the plot to a little less than half an acre, and it is now well established. With both these sowings inoculated soil was used.

“As showing the value of lucerne as a fodder crop, I may say that the past year was the driest we have ever experienced, and, in consequence, from the beginning of October until the middle of February, when the rains came, our paddocks were almost devoid of grass. Yet during the whole of that time we were able, with our lucerne as almost their only feed, to keep our six cows in splendid condition. During that time four cuts were taken from the plot, each averaging 3 ft. in length. A fifth cut was made in March. This crop is shown in the photograph, which, however, does not give as good a representation of it as might have been the case, for, apart from the lucerne being about ten days off its full growth, the recent rain had made it lie down to some extent. As indicated, the other four crops were much higher when cut. No manure was used, and the land has not been irrigated. The plot has been kept scrupulously free from weeds by regular cultivation between the rows, and this has been, I think, the main reason why the growth has been so good.

“This season we are laying down a further area in lucerne, and are experimenting with nine varieties of seed supplied by the Department of Agriculture—viz., Turkestan, Peruvian, Poitou, Provence, Russian, Spanish, Dryland, Hungarian, and Arabian.”

SHEEP IN NEW ZEALAND.

MR. CLIFTON ON THE BREEDS.

IN the course of a recent address to the National Woolgrowers' Association of America Mr. E. Clifton, late New Zealand Commissioner at San Francisco, gave the following sketch of sheep breeds in this country, which will be read with interest by many of our sheep-farmers and others:—

There have been introduced into New Zealand sheep of every breed. After trials, those remaining in general use are,—

The Merino, that is the basis of our flocks, but now very much less in numbers than formerly, contributing only 9 per cent. of the sheep of the country. Our Merino sheep are smaller and more active than your splendid Rambouillets. Yours are much heavier in wool and in grease, ours are plainer in fleece but equally as fine in the wool. Still, we have many types. A favourite is a sheep producing a strong combing-wool. That wool is in great demand.

The Romney.—This is the dominating sheep of New Zealand, the very special reason being that the Romney is of eminent vigour of constitution. The sheep itself is of sturdy form; the wool is improved in quality and increased in weight. Further, it crosses well with most other breeds, and the ewe is an excellent mother.

The Romney was introduced with the first of the British longwools. The greater part of the original flock was dispersed many years ago, but a part has been continued in the flock of the doyen of the Romney men, Mr. Alfred Mathews. Some of this gentleman's sheep were very successfully presented for competition at the Panama Pacific Exposition.

We believe that the New Zealand Romneys are an improvement on the sheep of their own original home in Kent. There, close to the great meat-market of London as it is, the chief aim was the production of a sheep for the butcher. We claim that owing to this fact sufficient attention was not directed to the wool. It is believed that the New Zealand sheep retain the form and constitution, with a fleece of heavier, evenner, and better quality of wool.

We demand that the Romney ram shall exhibit a thoroughly masculine head, a bold eye, a good carriage, strong neck, level wide back and loins, well-sprung ribs, and a full quarter. It is possible that all this is looked for in all sheep, but it is certainly these characteristics that we find present in the type of Romneys that our flockmasters have succeeded in standardizing in New Zealand.

It is entirely accepted that the wool of the Romney exhibits variations. There are considerable differences in the wool of individuals of a flock; there is still greater divergence in the flocks of breeders. This is common to all breeds, but is probably accentuated in the Romney.

But this feature is diminishing; our breeders are working to a single type—a wool of fine staple, good length, free, fairly dense, and lustrous. The fleece should open freely—that is, there should be no cross-fibres holding the locks together.

A well-bred, carefully selected, well-conditioned flock of ewes and hoggets with a fair proportion of wethers has clipped up to 10½ lb. of wool. A stud flock is reported of which the ewes clipped 21 lb., hoggets 22 lb., and the rams 28 lb.

As a sheep for the butcher the Romney is also esteemed.

To repeat, it is vigour and constitution that place the Romney foremost among the flocks of New Zealand.

The Lincoln.—The Lincoln was at one time in the highest favour both as a purebred and for crossing purposes, and still holds prominence. This breed, that of all sheep provides the greatest weight of meat and wool, is firmly established in the estimation of those breeders whose farms are situated on rich soil. The Lincoln is the sheep of the heaviest and richest districts of New Zealand. It requires better feeding than some other sheep, and it responds generously to liberal treatment.

The Lincoln has been selected by the New Zealand sheep-breeder, with one exception, as the sire the most suitable for development of the Corriedale.

The English Leicester.—The New Zealand type of English Leicester is a very different type of sheep from the fashionably bred animals that have been lately imported from that country. They are tall sheep; in colonial parlance, they are “on the leg.” They are certainly large sheep, but it is extremely doubtful if the wool is as fine, or if it is even of a true Leicester type. To us of New Zealand the modern English Leicester fails to appeal as did those beautifully formed sheep of the older type, Bakewell’s English Leicester, the autocrat of the British longwools.

The Border Leicester.—This sheep is in special favour in the southern part of the South Island, where the farmers are chiefly of Scottish origin. It is of great hardiness, and is in favour with the butcher.

The Southdown is used entirely for the production of crossbred lambs for refrigeration. The half-bred Southdown lamb matures early, and at a weight of 32 lb. it is well finished in the condition and at the weight most desired on the London market.

The Shropshire is used for the same purpose as the Southdown. It is claimed, however, that the lambs do not fatten quite so quickly as the Southdown cross, and that when fat they are heavier than is desired for refrigeration.

Corriedales.—Of all the breeds of sheep the New Zealand Corriedale and its evolution attract the greatest interest. A sheep was wanted to take the place of the Merino on the more fertile and better-grassed hills and for the heavier soils of the plains—one that would submit to the greater restraint than the Merino that thrive on the open hills. A flockmaster of our country, Mr. James Little, was seeking such a sheep. He wanted a wool with the best characteristics of the Merino with the form of one between an English Leicester and a Down—a sheep for

wool and mutton. He entered on the undertaking, and created the Corriedale. The name of the property—"Corriedale"—was that given to the sheep. In 1865 the first cross was made—a Lincoln ram with a Merino ewe. From this progeny selection was made. Not then satisfied, another cross of the same breeds was made, with selection on different lines. This has been continued with marked success.

The system that Mr. Little originated has since been followed by others. There are now twenty-two registered stud flocks of pure Corriedale sheep.

With one exception, where an English Leicester was used, the New Zealand Corriedale is the progeny of a Lincoln sire with a Merino ewe. The breeding of the selected progeny then continues without further crossing. The Corriedale is therefore the result of the continued and careful selection of the inbred progeny of half-bred or first-cross parents. Most undoubtedly to secure and maintain the desired type the most skilful selection extending over many generations is essential. It may be accepted that those sheep-breeders who have secured the recognition of their flocks have been most justly rewarded for their perseverance, and the New Zealand Corriedale is being appreciated in many lands.

The appreciation may well be merited. The Corriedale was evolved from decidedly divergent parents—from those, indeed, of a violent contrast—the active mountain Merino, the inactive Lincoln of the rich level country; the Merino probably the oldest of the breeds of domesticated sheep, the Lincoln already a cross of the original breed and an English Leicester.

The establishment of the Corriedale is an interesting subject to the student of breeding. If there be the intention to further introduce this most desirable sheep into the United States, let it be in sufficient numbers to permit of liberal selection of the progeny; for, however careful and skilful the purchaser, there will be, as in all breeding, some to discard if the type is to be maintained.

Half-breeds.—There is in New Zealand yet another most interesting development in sheep-breeding—one that I should be unwilling to mention unless with the support of the record of the New Zealand Flock-book. It is the use of a direct half-bred ram on half-bred ewes. I may be permitted to read a copy of the record in Volume IV, as follows:—

In 1886 a commencement was made in breeding half-bred sheep by Lincoln rams from Merino ewes at Stonyhurst, and the main breeding-flock is now half-bred. The practice throughout has been to mate first-cross Lincoln-Merino rams with half-bred ewes, which are now descended from many generations of half-bred mothers. The stud rams bought have been exclusively Lincolns from the flock of Mr. H. J. Hall, and after its dispersal from that of Mr. J. S. Holmes; but they are now bred in the Stonyhurst Lincoln flock. These rams have been used with the Stonyhurst stud Merino ewes to produce half-bred rams. The result has been to create a very level flock of about ten thousand half-bred breeding-ewes. The hoggets are culled before March, and the faulty ones are thrown out to breed fattening-lambs by Shropshire Down rams. It is now found sufficient to take about 15 per cent. The success attained is attributed to the persistent use of the same types of Lincoln and Merino sheep from the same stud flocks. Experiments have been made in breeding rams by prize half-bred rams from picked half-bred ewes; but sheep so bred, though generally satisfactory, have not displaced the first-crossbred rams for use in the station flock. For supplying these rams a selection of the Merino stud flock is annually drafted to be put to the stud Lincoln rams.

The flockmaster in question (Sir George Clifford) is one of the foremost sheep-breeders of our country, and lately there are others, among them one of the very shrewdest of our sheep men, breeding these same sheep as described in the record just read to you.

There are claims and counterclaims for the Corriedale and half-bred as to which results in the better or the more even flock. Both are crossbreds—the half-bred the more immediate.

CANTERBURY SEEDGROWERS' ASSOCIATION.

THE following communication from Dr. F. W. Hilgendorf, of Lincoln College, will, it is hoped, act as a reminder to farmers of the seed-improvement work now being pioneered by the Canterbury Seedgrowers' Association, and stimulate extended support of the movement:—

The association exists for the purpose of providing good and pure seed to farmers. It consists of farmers who have appointed an inspector to examine their crops and seed, and to keep all members in touch with each other and working on the same lines.

The procedure is as follows: A member notifies the inspector when his crop is nearly ripe, and the inspector examines it standing in the field. If it is true to name and sufficiently pure and free from weeds he agrees to register the crop. If it is not sufficiently pure he advises the grower to remove impurities from an acre or so, in order to have pure seed for next year. After harvest the grower of any crop that has been passed sends a large sample of his seed, which the inspector then examines for purity and germination-capacity. If still satisfied, he then again visits the farmer, samples all the bags, compares them with the sample on which he made his analysis, and seals the bags with the association's seal.

Only a small number of growers have so far joined, but it is hoped that the numbers will now increase. Any one that is willing to take the small amount of trouble requisite to grow pure seed of any kind whatever is eligible for membership if he lives in or near Canterbury. Later on other associations may be started in other centres. There is probably a good demand for registered seed of wheat of the established varieties, for Algerian, Dun, Danish, and other oats, as well as for the grass and clover seeds.

While comparatively few farmers can make a speciality of seedgrowing, yet it is to the advantage of all farmers to have the association well established, so that they may have in time a sure source of good seed when they wish for a change of either wheat, oats, barley, grasses, or clovers. Any one can help the association this year by purchasing seed from the growers of registered crops, so that they may be encouraged to continue their efforts and expand their operations. Wheat-seed of three varieties—College Hunters, White Tuscan, and Solid-straw Tuscan—is available for the coming seed-time.

Particulars of growers and registered crops will be supplied on application to the writer. Any farmer wishing to join the association is also requested to communicate with the writer, whose address is Lincoln College, Christchurch.

The best cropping-potato this season at Weraroa Experimental Farm has been Maori Chief, yielding 14 tons per acre, and the tubers being of good size and quality for table use. Gamekeeper was a good second with 12 tons per acre, and proved the best blight-resister. Seasonal conditions generally have been adverse for potato-growing at the farm.

ENSILAGE NOTES.

W. DIBBLE, Assistant Fields Instructor.

IN the writer's travels through the Dominion, in the course of his special work as ensilage instructor, he has noted with considerable encouragement that once ensilage is made under personal supervision in a district the practice extends from season to season. Ensilage has been specially appreciated during the droughty seasons experienced—in fact, many dairymen milking large herds now candidly admit that they could not do without it. Ensilage, however, is still very much neglected in most districts. It was reported in March that in some districts farmers were milking their herds once daily owing to the falling-off of the milk-supply. This seems incredible in a country like New Zealand. The quantity of surplus feed that was allowed to waste during the spring months of 1915 was enormous, many thousands of tons of valuable material that could have been utilized for ensilage having been lost.

Some stack ensilage made from meadow-grasses, recently shown to me, was quite equal to the best pasturage growing at that season. The sample referred to was light green in colour, had an excellent aroma, and was very succulent. Some persons have an idea that ensilage should be black and have a disagreeable odour, but with sweet green ensilage such is not the case. The sweetness and light colour are obtained by regulating the temperature between 125° and 145° F. Attention to control of temperature is no doubt the secret of success.

Many farmers complain of the labour attached to the making of ensilage. With up-to-date appliances silage can be made with very little labour—stack ensilage now being referred to. The principal work is in the building, which is easily accomplished if instructions, given personally or in the Department's publications, are carried out. Ensilage will keep good for many years in stack form. In early autumn the chief material available is maize, which when converted into ensilage makes a very valuable asset for producing milk. Maize has proved to be rather disappointing when fed green. It has a tendency to put on flesh rather than produce milk. But when made into ensilage it is found to be an

excellent milk-producer, and is readily digestible. Not only does silage increase the quantity of milk, it also improves the quality.

It cannot be too often urged that farmers should pay more attention to conserving fodder for their stock, and thus increase the carrying-capacity of the land. Too many find their mistake in being overstocked at this season, with insufficient provision made for autumn or winter feed. In the present international situation it more than ever behoves the farmer, with regard to live-stock, to breed and feed to his utmost ability.

IMPROVEMENT OF RED CLOVER.

J. BEVERLEY, Assistant Plant-breeder.

IN connection with plant-breeding operations at Moumahaki Experimental Farm considerable attention has been given to red clover and cow-grass. A red-clover single-plant selection (five years old, August, 1915) is being developed at the present time. Usually red clover dies back after flowering, but in this case the flowering-stems layer themselves with ease, which indicates that the selection is likely to be truly permanent. From the parent plant 270 flowering stem-growths were removed and planted out in rows 3 ft. apart in October, 1915. The photograph on the following page shows the vigorous growth and seeding of these plants three months later in January, 1916. The parent plant gives a large kidney-shaped good-coloured seed, and a little over a thousand seedlings have been grown from it as single plants, the best of which are now under observation for further selection. It is interesting to note that 4 per cent. of the seedlings have white flowers.

In another experiment several varieties of red clover were sown in the open at the end of May, 1915, with a view to the winter killing off all the weakest plants. Some germinated and damped off later. Runciman's clover, however, did well under these winter conditions of seeding, and is worthy of notice in many other respects. This clover is supposed to have been brought from England by the early missionaries, and to have been perennial for over forty years on the site of a mission station near Paemako, on the Mokau River, twenty miles from Te Kuiti. Mr. Runciman, who had a property at Paemako, recognized the value and perennial nature of the variety, and spent time and money in propagating it. From this source it is now found in many places.



MOUMAHAKI SELECTED RED CLOVER.

Plot of 270 flowering stem-growths taken from the parent plant.

(See preceding page.)

SEEDS AND THEIR IDENTIFICATION.

CONTINUED.

E. BRUCE LEVY, Biological Assistant.

- (1.) Rib-grass (*Plantago lanceolata*).
- (2.) Greater Plantain (*Plantago major*).
- (3.) Rugel's Plantain (*Plantago Rugelii*).
- (4.) Bracted Plantain (*Plantago aristata*).
- (5.) Large-leaved Plantain (*Plantago hirtella*).
- (6.) Shore Plantain (*Plantago Coronopus*).

RIB-GRASS is a very common impurity in most agricultural seeds, and the weed itself is common in almost any pasture.

Greater plantain is fairly frequently met with. The plant is common in pastures and waste places.

Rugel's plantain is fairly common in imported seed, but the plant has never yet been recorded growing in New Zealand.

Bracted plantain is very common in imported meadow-fescue of American origin, and is looked upon as a source-indicator for this seed. The plant itself has never been recorded in New Zealand, although the writer has raised plants from seed sown in pots, which plants produced mature seed.

Large-leaved plantain is a rare impurity, although the plant is very common throughout the Auckland District.

Shore plantain is not commonly met with. The plant is restricted almost entirely to seashores, and is very plentiful around the Hawke's Bay District.

When present in small numbers none of the above-mentioned seeds are of any moment in lines of seed.

RIB-GRASS.

Size: Average length, $\frac{1}{11}$ in.; average width, $\frac{1}{25}$ in.

Colour: Amber-coloured to a dark brown, both colours often being present in the same seed.

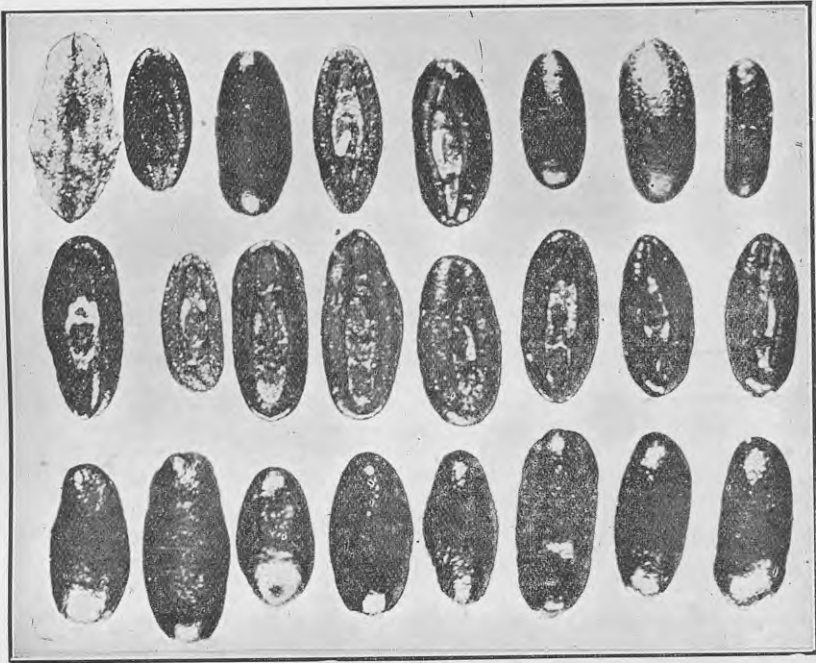
Shape: Shaped like a shallow, thick-walled canoe, with ends rounded alike, the cavity varying in size from a mere slit to a wide shallow depression. The sides of the "canoe" present a folded-over appearance, and are at times folded almost to meet each other. In the centre of the cavity is a roughened, slightly raised, and often dark-coloured scar. The bottom of the canoe-like seed is often light amber in colour, while the walls are generally much darker. The surface of the seed is smooth and shining, the convex surface being more shiny than the concave. Occasionally a seed is met with the surface of which is somewhat minutely waved or very finely sculptured. The seeds are borne in pairs in the seed-head, cavity to cavity. Between each seed thus placed is a thin corky-like straw-coloured partition. This partition occasionally adheres to the one or the other seed, especially when the seed is immature. The seed when moistened for some hours becomes enveloped in a thick layer of transparent mucilage.

GREATER PLANTAIN.

Size: Very variable. Average length, $\frac{1}{10}$ in.; average width, $\frac{1}{12}$ in.

Colour: Light to dark brown, generally tinted with green, often quite dark-greenish to black.

Shape: Extremely variable; oblong and flattened, one end usually more pointed than the other; seed often almost triangular, and often irregular in outline—at times oval, rhomboidal, or trapezoidal in outline when lying flat. The flat surface is generally slightly curved upwards at the ends, and at times is slightly twisted. The edges of the seed are acute. The inner surface is raised gradually to a central point marked by a distinct whitish scar. This scar is generally situated about the middle of the surface, but is placed at times near one end. This scar marks the point of attachment of the seed to the central partition in the seed-capsule. Situated near the scar is a small depression, and radiating from this and completely covering the seed are very fine wavy lines. These lines are very distinctive, and distinguish this seed from that of Rugel's plantain, next described. The surface of the seed is dull and rough in appearance. The seed when wetted for some hours becomes enveloped in a thick coating of transparent mucilage.



RIB-GRASS (*PLANTAGO LANCEOLATA*). ENLARGED 10 DIAMETERS.



GREATER PLANTAIN (*PLANTAGO MAJOR*). ENLARGED 10 DIAMETERS.

RUGEL'S PLANTAIN.

Size: Very variable; average length, $\frac{1}{12}$ in.; average width, $\frac{1}{16}$ in.

Colour: Dark brown to black.

Shape: Very variable; resembles greater plantain very closely, although in general the seed is larger; oblong, and more or less flattened; often decidedly truncate; oval, rhomboidal, or triangular in outline. The outer surface is slightly rounded and often twisted.



RUGEL'S PLANTAIN (*PLANTAGO RUGELII*). ENLARGED 10 DIAMETERS.

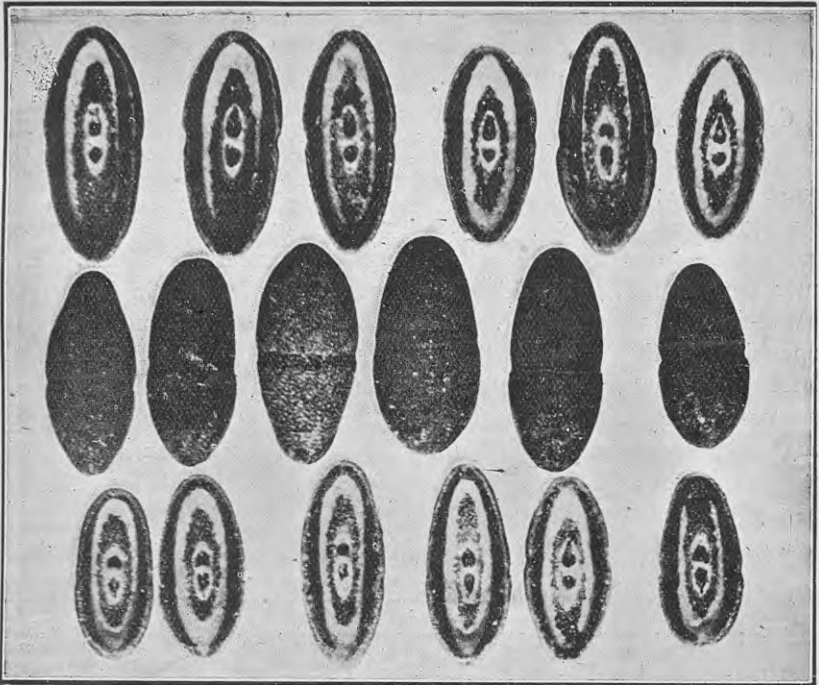
The inner surface is generally raised, but not so regularly as is that of greater plantain. About the middle of the inner surface is a well-marked whitish scar, but there is no small depression alongside this scar as in greater plantain. The edges of the seed are acute, and the seed is frequently acute-angled or sharply rounded at one or other of its ends. The surface of the seed is dull and rough, although not marked by raised lines as is greater plantain. The seed when wetted for some hours becomes enveloped in a thick coating of transparent mucilage.

BRACED PLANTAIN.

Size: Average length, $\frac{1}{9}$ in.; average width, $\frac{1}{20}$ in.

Colour: A fairly uniform deep brown, sometimes dark brown, relieved on the inner surface by white markings.

Shape: Typically canoe-shaped; very regular; ends rounded alike. The walls are thinner than and not folded over as in rib-grass. The inner surface is much depressed, and bears in the



BRACED PLANTAIN (*PLANTAGO ARISTATA*). ENLARGED 10 DIAMETERS.

middle a well-marked scar. This scar takes the form of two depressions in line with the long axis of the seed. The two depressions are divided off from each other, and are surrounded by a whitish border. Right around the bottom, as it were, of the canoe-shaped seed is a distinct white border. This white border really runs round the edge of the inner face, and is composed of mucilage-forming tissue, as is also the white border surrounding the scar. The walls of the canoe-shaped seed are apparently continuous, but at one end is a Y-shaped slit, dark in colour and seen at the

base of the convex face at one end. From the inner surface this slit is obscured by the white mucilage-forming tissue, but becomes evident after the seed has been wetted and the mucilage-forming tissue broken down. The outer face is distinctly convex, and is marked about its middle by a shallow groove extending right across the face from rim to rim at right angles to the longitudinal axis of the seed. The surface is in general dull and of a roughened granular appearance. The seed when moistened for a few hours becomes enveloped by a thick coating of transparent mucilage. The white markings on the inner face then disappear.

LARGE-LEAVED PLANTAIN.

Size: Average length, $\frac{1}{12}$ in.; average width, $\frac{1}{20}$ in.

Colour: Yellowish-green; dark green to black.

Shape: Very uniform; oblong and fairly flattened; both ends rounded alike; edges acute. The outer face is evenly convex, as is rib-grass, although not quite so rounded as is that seed; more rounded, however, than is either Rugel's or greater plantain. The inner face is flat, not raised or depressed, and bears in its centre a well-marked whitish scar, alongside of which is a small circular depression, both in line with the longitudinal axis of the seed. These two scars can be seen much more plainly when the seed has been wetted. The surface of the seed is dull and slightly roughened by minute sculpturing over the entire surface. The seed when wetted for some hours becomes enveloped by a thick coating of transparent mucilage.

SHORE PLANTAIN.

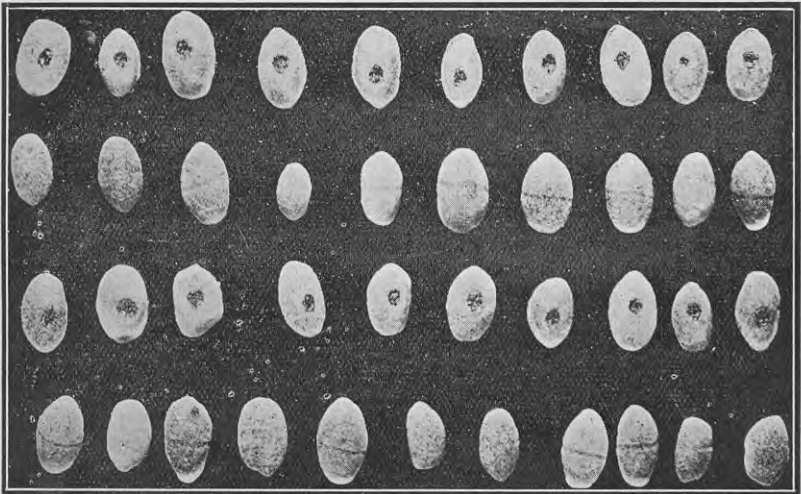
Size: Very small; average length, $\frac{1}{25}$ in.; average width, $\frac{1}{40}$ in.

Colour: Slatey; whitish around the margin.

Shape: Oval to obovate; both ends bluntly pointed, generally evenly so; edges fairly acute and in general lighter in colour than the rest of the seed. The outer face is convex, and turns upwards towards the ends like the bow of a canoe. Across the middle of this face of most of the seeds, and extending from rim to rim at right angles to the longitudinal axis of the seed, is a shallow groove similar in effect to that of bracted plantain. The inner face is raised in a convex fashion, and bears at its centre a very well-marked, deep, circular depression. The surface of the seed is dull and slightly roughened. The seed when wetted produces a copious supply of thin transparent mucilage.



LARGE-LEAVED PLANTAIN (*PLANTAGO HIRTELLA*). ENLARGED 10 DIAMETERS.



SHORE PLANTAIN (*PLANTAGO CORONOPUS*). ENLARGED 10 DIAMETERS.

The following table, compiled from analyses made in the Biological Laboratory, shows the relative frequency of occurrence of these seeds in the main agricultural seeds:—

Agricultural Seed in which found.	Of 100 Samples examined					
	Rib-grass was noted in	Greater Plantain was noted in	Rugel's Plantain was noted in	Bracted Plantain was noted in	Large-leaved Plantain was noted in	Shore Plantain was noted in
Perennial rye-grass ..	16	..	..	..	..	I
Italian rye-grass ..	20	I	..	..	..	..
Cocksfoot ..	26	..	..	..	..	I
Crested dogtail ..	30	3	..	..	..	..
Chewings fescue ..	5	..	..	..	..	I
Timothy ..	26	19	47	5	..	..
Fiorin ..	16	16	14	4	4	..
Meadow-foxtail ..	4	..	..	..	..	..
Meadow-fescue ..	7	..	2	64	..	..
<i>Poa pratensis</i> ..	33	3	..	..	..	..
White clover ..	85	28	2	..	..	..
Alsike ..	38	9	2	..	..	..
Cow-grass ..	93	3	2	I	..	..
Red clover ..	94	5	3	I	..	..
Lucerne ..	66	2	..	..	..	..
Lotus ..	72	8	..	..	..	..

Rib-grass was also noted in hard fescue, sand clover, Yorkshire fog, trefoil, sheep's fescue, ratstail, *Danthonia pilosa*, *Danthonia semiannularis*, kidney-vetch, phalaris, sheep's burnet, yarrow, crimson clover, *Poa trivialis*, *Poa nemoralis*, and strawberry clover.

Greater plantain was also noted in Canadian blue-grass, Yorkshire fog, and *Poa trivialis*.

FORTHCOMING AGRICULTURAL SHOWS.

- Southland A. and P. Association: Winter Show at Invercargill, 16th to 19th May.
 Raglan A. and P. Association: Winter Show at Raglan, 19th and 20th May.
 Otago A. and P. Society: Winter Show at Dunedin, 30th May to 2nd June.
 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.

A Blenheim correspondent inquires regarding the formation of a certain number of small or partial cobs among male flowers in maize experimental plots he is conducting. Bisexual tassels—*i.e.*, male inflorescences with a few female spikelets amongst them—are not infrequently met with. This is especially the case with those borne on sucker-shoots, which arise from the lower nodes or from beneath the soil-surface. Bisexual ears are also found, but these are much rarer.—*A. H. C.*

PAPA ROCK AS A SOIL-DRESSING.

THE following report on trials with crushed papa rock as a soil-dressing has been made by Mr. G. de S. Baylis, Fields Instructor (North Island). The trials were undertaken at the instance of the Dominion Conference of the Farmers' Union:—

With a view to making some trials as to the possible benefits to be derived from papa, samples were procured from various places. Analyses which were made by the Department's Chemist of many samples gave indifferent results, the lime-content being low and phosphoric acid only a trace. A sample was eventually procured from Mangaweka showing calcium carbonate 4.538 per cent. This was handy to the railway and at a convenient place for quarrying.

Considerable difficulty was experienced in getting anybody to grind the papa in order that it might be evenly distributed by means of a drill, and owing to breakdowns in the machinery it was very late in the season before the material was delivered.

At Ashhurst, on a clay loam with a stiff clay subsoil, the following trial was put in, with oats and vetches as the crop: Plot 1, 2 cwt. basic slag; plot 2, 2,000 lb. limestone; plot 3, nil; plot 4, 2 cwt. of a mixture of superphosphate, bonemeal, dried blood, sulphate of potash, and sulphate of ammonia. A strip across the top of each plot was dressed with papa at the rate of 8,000 lb. per acre.

Owing to very heavy rains in the early part of the season the crop did not do so well as it promised at first. There was, however, a superior growth on the portion to which papa had been applied. The best growth was made on the slag section. These plots are now to be put down in grass, and observation will show if any future benefit is derivable from the application of papa to this soil.

A sample of papa was obtained already ground from the brick-works at Patea, and forwarded to Mr. Blackhall, of Lepperton. This was applied at the rate of 4 tons per acre. A crop of swedes was sown with the usual freezing-works manure mixture. An equivalent area was also sown with the same manure on land not previously dressed with papa. Mr. Blackhall noticed no difference in the swede crop, "but the following crop for green manure," says Mr. Blackhall, "stood out with marked advantage in favour of the papa dressing, giving much heavier weight and being of a better colour. The soil to which papa had been applied was also, when ploughed, of a better texture than that of the 'nil' plot. I am of opinion that, provided one could apply, say, 6 tons of papa per acre, or more, it would give good results."

Last year ground papa was applied at the rate of 2 tons per acre to a small plot at Marton. The crop was Thousand-headed kale. The crop on the land dressed with papa was noticeably of a better colour than that on the no-lime plot, but the limed plots were superior to the crop on the papa plot.

It is hoped to pursue experiments with papa by treating a plot with a heavy dressing and leaving a check-plot alongside of it. A preliminary plot will then be grown to assist to mix the papa well with the soil, after which the land will be laid down in grass-and-clover mixture for observation purposes.

Although there are deposits of papa to be found having a fairly good lime-content, the average papa does not contain a high percentage. It would appear to me that to reap any real advantage papa would require to be heavily applied—say, in lots of 4 tons and considerably over. The cost of cartage and carriage would therefore prohibit its use, save where it is handy to the land to which it is to be applied.

The application of papa should improve the soil by its content of lime and what traces of phosphoric acid it possesses, and it should help, when applied in large quantities, to make the soil more absorbent and more retentive of moisture. It would probably need, like lime, to be applied some months before any real benefit would be likely to accrue from its use.

Lucerne usually does well on deep loams with rubbly papa sub-soils, and where lime is not available a heavy dressing of papa, applied the previous season and well worked into the soil, would probably be found beneficial.

Papa might be quarried and left for twelve months in small heaps exposed to the atmosphere: it would then readily break up upon being applied to the soil. The better method, however, would be to apply it to grass lands, say, twelve months before same were ploughed.

Another use for papa would be as drier for manures. If ground into grit size like bonedust and then artificially dried, it would form a splendid make-weight or drier, and help to make the manure run better through the drill. When gypsum, which is largely used for this purpose, is high in price it is probable that papa artificially dried would answer the same purpose at probably a lower figure.



GATHERING WINE-GRAPES AT TE KAUWHATA HORTICULTURAL STATION.

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.

CULTIVATION.

DURING May favourable weather should be made the most of for further cultivating the land for winter wheat, and for the preliminary conditioning of the soil for spring-sown crops by ploughing. Heavy soils particularly are greatly benefited by exposure to the frosts of winter, the texture being improved considerably and the larvæ of destructive insects appreciably reduced. For spring-sown grains especially the fallowing of the land during the frosts of winter is particularly desirable, if not essential. The operation also conserves moisture, and this is important for districts of comparatively low rainfall.

TREATMENT OF WHEAT-SEED.

The procuring of good seed of a variety or varieties of wheat suitable to the soil and climate is important. Clean seed is particularly desirable, and for ensuring this the use of a fanning-mill should be availed of. To prevent bunt, or stinking-smut, of wheat the grain should be treated with formalin solution. There are two smuts that more commonly attack wheat—namely, the loose smut of wheat (and barley) (*Ustilago tritici*) and the stinking-smut, or bunt, of wheat (*Tilletia foetens*). For the former ordinary formalin and bluestone methods are not effective. The only effective method is what is known as Jensen's modified hot-water treatment, but, unfortunately, this is not practicable on a large scale. For stinking-smut of wheat (and for loose smut of oats) the formalin (a 40-per-cent. solution of commercial formaldehyde) treatment is considered the best. In Canada it has been tested fully, and

has given the best results of any of the various treatments tried. It is effective, handy, and cheap. The method consists of dissolving 1 lb. (1 pint) of formalin in 42 gallons of water, and immersing the sack of seed in the solution for twenty minutes. The operation is best performed by making use of a good-sized barrel, and a rope, connected with a pulley overhead, for suspending the grain in the solution. After immersion the grain should be rapidly dried on a clean floor, to avoid injury to the germinating-power. The smut balls, if any, should be skimmed off as they rise to the surface of the solution. Though this treatment is suitable for stinking-smut of wheat and loose smut of oats only, yet it should be used for all seed-wheat in preference to the bluestone treatment. Jensen's modified hot-water treatment cannot, for the reason indicated above, be recommended for use for large seedings, but for the production of a source of seed free from loose smut it is highly suitable.

WHEAT AND OAT VARIETIES.

In Canterbury and North Otago the following wheats have given a good account of themselves from the point of view of yield: Red Marvel (French), Dreadnought (French), Hunter's White, Velvet Ear, Velvet Chaff, Webb's Challenge, Talavera Tuscan, Red Chaff, Solid-straw Tuscan. For South Otago, Velvet Ear and Hunter's White are two very suitable varieties; while for the wind-swept areas of Canterbury and Marlborough the Tuscan varieties are specially suitable. Among other good varieties suitable for sowing in early winter in the South Island (especially in Canterbury) are Snowdrop White, Essex Conqueror Red, Kinver Red, Eclipse Red, and McCallum's Solid Straw.

The varieties of wheat mostly grown in the North Island are Marshall's White, White Tuscan, Solid-straw Tuscan, Federation, and John Brown. In the Rangitikei district Marshall's White was at one time the chief wheat, and is still fairly largely grown. There is a good deal of Federation also grown in the district. Tuscan wheat is largely grown in the Wairarapa.

The variety of oat mostly grown in the North Island is Algerian, on account of its rust-resistance. Green's Ruakura oat has made a reputation as a rust-resister and a good early cropper. Among other varieties grown in districts where rust is not so prevalent are Garton's, Sparrowbill Record, and White Ligowo. The latter is a special favourite in the Wairarapa. As an early forage crop, very good results have been obtained with this oat in Rangitikei, Manawatu, and Taranaki. In the South Island the oats chiefly grown

are Garton's, Sparrowbill, Leader, Record, Abundance, Yelder, and Waverley.

WINTER SOWING OF OATS.

The principle of sowing oats early and feeding them off is believed to enable the oat crop to ultimately resist rust to a degree, the explanation being that the crop, through advanced development, is better fortified against attack by rust-spores when they appear with warmer weather in the spring. Some farmers affirm that Algerians sown in May and fed back during winter are never affected by rust, although the straw is heavier and the oats are lighter in the chaff resulting from such crop; whereas spring-sown Algerians are more liable to rust, and will yield chaff containing less straw and more oats than autumn-sown crops.

POTATOES.

When digging the main crop of potatoes, which is usually lifted during the month of May, an endeavour should be made to select in the field, and not from the mass, seed for next year's crop. Sound, shapely tubers, about medium size, should be selected from the shaws yielding the largest number of potatoes. This can readily be done by keeping the shaws separate when digging, and placing in special sacks the selected potatoes taken from the prolific shaws.

Where potato-moth is present the tubers should be gathered and boiled for pig-feed. Where either potato-moth or Irish blight has attacked the potatoes all shaws should also be gathered and burned. In the event of growers being compelled to use seed from such crops (the practice is bad), the tubers should be treated with a weak solution of formalin.

PASTURES.

At this time of year pastures should be harrowed with a chain harrow or ordinary tine harrows turned upside down, for the purpose of scattering the droppings of manure, dragging out moss when present, and generally aerating the soil. The scattering of the manure aids materially in maintaining the proper balance between the coarse grasses and the finer grasses and clovers. Where the droppings of stock accumulate, the coarser, less nutritious grasses are encouraged.

LUCERNE.

In the milder sections of the country the last growth of the season of lucerne should be cut (not too closely), or fed off lightly.

Being too late to be made into hay, this last cut could be made into ensilage. Such lucerne chaffed with maize, if available, and blown into a silo, in the proportion of 1 part by weight of the former to 2 of the latter, makes a most excellent "balanced" ensilage. The late growth of lucerne may also be used for soiling, being fed out to stock as required.

LIMING.

The liming of lands in late autumn or early winter is desirable, in order that the lime may exert an appreciable action by the following spring. Grass land is greatly benefited by an application of lime. For sour soils well supplied with humus 1 ton per acre of ground burnt lime will be sufficient, while for sour soils not well supplied with humus 2 tons per acre of ground limestone (carbonate of lime)—which is the equivalent, approximately, of 1 ton of burnt lime—will be required. Where sour soils are situated a good distance from the railway the burnt lime is the most economical form to use; and where light sour soils obtain, small dressings (5 cwt. to 10 cwt. per acre) of ground burnt lime every three years should be used in preference to 1 ton per acre every five or six years. For cultivated land the lime is best applied half before ploughing and the other half on the ploughing, to be disked and harrowed in. If this method is not convenient the whole can be applied to the ploughing, and well disked and harrowed in.

COW-SHEDS AND YARDS.

If not already done, all material such as timber, gravel, cement, &c., required for repairing cow-sheds and yards should be got on the ground, so that the work may be put in hand immediately the bulk of the herd is dried off. The wet days of the month could be utilized at this work and for generally attending to the sanitary arrangements connected with the milking of the cows. The cow-sheds should be cleansed and whitewashed, the inclusion of a little crude carbolic in the whitewash being desirable for disinfecting purposes.

OTHER WORK.

The crutching of sheep should, if possible, be completed this month, and where foot-rot is prevalent the feet of the sheep affected should be attended to, and the flock grazed as far as possible on high ground or land that has been well drained.

The majority of farmers who are troubled with rabbits will have made an attempt during the past three months to reduce the pest by means of pollard poison, thus assisting to preserve their winter

feed. Where the work has been neglected it should be put in hand at once. It is bad policy to feed rabbits now and have your stock starve later. When poisoning choose dry weather, and do the work carefully and well.

When pressing work has been completed a general cleaning-up of paddocks, compatible with the labour available, should be carried out. Ditches overgrown with weeds should be cleaned out, rubbish removed from fence-corners and headlands, fences trimmed, and gorse and other rubbish grubbed.

THE ORCHARD.

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

WITH the fall of the foliage commences the dormant season's work in the orchard. There are two main advantages of making an early start—firstly, in order to apply at the most beneficial time the autumn or early winter sprays; and, secondly, on account of the amount of general important work and numerous odd jobs to be done in the orchard during this period.

AUTUMN SPRAYING.

The main diseases requiring early attention are die-back of the peach (*Clasterosporium*), San Jose scale, and woolly aphis. Red-mite and the various scales and other diseases can be quite safely left until a little later in the season, when stronger mixtures can be more safely used for their control.

Die-back.—*Clasterosporium* is a fungus disease particularly affecting the peach and nectarine trees. The effects of the fungus are to be noticed in the form of brown spots of varying size on the previous year's wood, gumming buds, and dead twigs. The bark of the diseased twig within the affected area becomes corky and dry, failing to expand with the normal growth of the twig in the spring. When the affected spots are large or numerous the non-expansion of the bark results in the entire stoppage of the flow of sap and the death of the growths affected. It is from this characteristic of the disease that the common name of "die-back" originates. The bark of the diseased growths that survives the attacks invariably splits more or less to allow of expansion, the indication of which is often very noticeable on the older wood.

of affected trees, and is often erroneously deemed to be bark-scorching as a result of using oil sprays. This disease becomes particularly active after the early winter rains, and is, together with a very dry summer, responsible for the heavy falling of the buds in the spring. The trouble is a difficult one to entirely eradicate, but a considerable amount of good will result from the application of a reliable fungicide applied sufficiently early in the season. The formula recommended for this purpose, in cases where die-back is the only disease to be considered, is 8-6-40 Bordeaux mixture; but if San Jose scale is also present, lime sulphur solution, 1 in 15, is advocated in preference.

San Jose Scale.—This very minute scale insect is extremely prolific and destructive, and for this reason every effort should be made to entirely eradicate it from the orchard. For this purpose very careful and thorough work is necessary, as the process of eradication has to be practically completed during one dormant season. It matters little how well the work may be done if it falls short of the complete extermination, for the insect, owing to the rapidity at which it multiplies, will still remain a serious consideration. This scale is, as far as actual killing is concerned, far more easily destroyed than either mussel scale or red mite, but it is far more destructive than either, as it is capable of destroying large portions of a tree in one season and wholly killing a tree in two seasons. Although the insects are sucking the life out of the tree throughout the summer, there is no doubt that the most vital period is from the time the sap of the tree ceases to flow until the scale becomes dormant. The reason of this is that during the growing season the roots supply a sufficient quantity of sap to keep the tree comparatively healthy despite the robbery carried on by the scale, but the moment this ceases the loss of sap becomes permanent and naturally much more dangerous. As a result, it is quite a common thing to find quite dead in the spring limbs which at the end of the growing season appeared to be comparatively healthy and well clothed in foliage.

During the height of the season there is little opportunity of adopting any very beneficial measures against this pest. There are several sprays that will destroy the young unprotected insect, but there are none having a lasting effect sufficient to destroy those that hatch out subsequently. At the same time the foliage of the tree will not withstand a mixture sufficiently strong to destroy the mature insects; therefore the proper time to commence operations is as soon as possible after the tree has reached the stage when comparatively strong mixtures can be used without damage.

Emulsified oil is no doubt the best remedy for this as well as other soft-bodied insects, but, especially in the respect of the peach and nectarine, strong oil sprays are very liable to damage the fruiting-wood when applied early whilst such growths are more or less immature. Lime-sulphur, although not equal to oil, is fairly effective and much safer to apply than oil at this stage; besides, lime-sulphur is a fungicide also, and for this purpose would take the place of Bordeaux mixture.

Woolly Aphis.—Summer treatment for woolly aphis is carried out mainly with the idea of keeping the disease within bounds until the stronger winter remedies can be applied. This is the utmost good that can be expected of the summer treatment, as the eradication of the aphis is a matter that can only be attended to properly when the trees are dormant. It will also, in order to be entirely successful, require a great amount of care and supervision, and is practicable only as far as trees up to a moderate size are concerned. This refers to painting the aphis colonies with strong oil emulsion, and to the renewal of treatment immediately a fresh outbreak is observed. Where practicable this is an excellent remedy, and one which, if regularly applied to young trees, would save much labour and trouble. In respect to large trees which have long been affected, the only practicable remedial treatment up to the present is that of spraying. To what extent spraying is successful depends mainly on the material used and the manner in which it is applied. Oil emulsion is now the recognized remedy for aphis, and owing to its value in this respect many varieties of apples can now be very successfully grown in localities where similar varieties had previously to be destroyed owing to attacks from aphis.

Although oil spraying is regularly adopted there is still a considerable difference of opinion in regard to the strength of mixture and the time of application. In this respect there has been a general tendency during the last few seasons towards increasing the strength very materially, particularly in spraying pip-fruits; but there are also undoubtedly many who still use the oil sprays at too weak a strength. Large numbers of growers strongly favour one thorough dressing of oil at the ratio of 1 in 8 to 1 in 12, applied when the trees are quite dormant, as being the most satisfactory all-round winter remedy for all sucking-insects. For the control of woolly aphis others particularly favour two applications of oil at a considerably reduced strength—1 in 25; the first application as soon as the foliage has sufficiently fallen to allow of thorough work being carried out, and the other just before the

buds burst. For general purposes I should recommend the single application, but there is no doubt that the double application has resulted very satisfactorily in the control of the aphid. The drawback to this method, however, lies in the fact that the spray used is far too weak to give satisfaction with either mussel scale or red mite. If the second application was increased to 1 in 12 or 1 in 15 the main points of both ideas would be carried at the expense of a little more material on the one hand and labour on the other.

Summary.—To sum up, the sprays recommended for the control of the diseases mentioned are as follows:—

For die-back of the peach, spray with 8-6-40 Bordeaux mixture as soon as possible after the foliage has fallen.

For die-back of the peach and San Jose scale, spray with lime-sulphur solution at the rate of 1 in 15 as soon as possible after the foliage has fallen.

For woolly aphid spray with oil emulsion at the rate of 1 in 25 as soon as the foliage has fallen sufficiently to allow of the work being properly carried out.

PRUNING.

The pruning of stone-fruits will be well under way during May. Whether this should be done before or after spraying depends very much upon circumstances. There is no doubt that thinning out should be done only before spraying in respect to trees affected with diseases which multiply rapidly during the summer, such as San Jose scale. In this way practically all unshortened wood diseased when spraying would be cut away when subsequently pruned; whilst, on the other hand, the unsprayed tips—the weak spot with all sprayers—of pruned trees would still remain. Such unsprayed parts of an affected tree provide the main source of reinfection.

CULTIVATION.

The advantage to be derived from turning up the soil in the autumn for exposure throughout the winter is very great. Not only is the soil sweetened and altogether improved in this way, but provision is also made for the full advantage to be taken of the rainfall, whilst better provision is made for the drainage of surplus water. When ploughing at this season of the year the sod should be turned in towards the trees, leaving the finishing furrow between the rows. The ploughing of steep slopes or comparatively steep slopes, however, particularly when composed of

light soil, should be left till the spring, owing to the danger of such soils washing out seriously during heavy rains.

PLANTING.

Fruit-tree planting can be carried out during May where land has been properly prepared and is in suitable planting condition. Before planting all trees should be dipped in a barrel or other suitable receptacle containing a strong solution of emulsified oil, to ensure the destruction of the eggs of the red mite and other injurious insects.

THE POULTRY-RUN.

F. C. BROWN, Chief Poultry Instructor.

COLDS IN YOUNG STOCK.

Now is the time to keep a sharp lookout for colds in young stock—errors in housing and exposed quarters being the chief causes of this trouble. It should be remembered that colds are the fore-runners of roup, and the sooner the cause is discovered and prevented the less risk there will be of the whole flock becoming affected. While the house should be roomy and well ventilated, every precaution must be taken to prevent draught. It is generally recognized that the deep open-front house is the ideal. It is imperative, however, that the slightest crack in the side or back walls should be repaired if colds are to be kept at bay. Where the house is a very long one the compartments—at least, every 20 ft.—should be made of some draught-proof material, otherwise a current of air will sweep along the building during rough weather, and the birds will probably become affected with colds. Another frequent cause of colds is having the perches too high from the floor. Especially does this apply where the breakwind or the boarded-up part at the front of the house is lower than the level of the perches. It will always be found that the lower the perches the greater the comfort of the birds during unfavourable weather-conditions.

The chief symptoms of colds are sneezing, eyes watering, and a watery discharge from the nostrils, on which dust adheres. In addition, the breath becomes offensive, and, when bordering on the stage of roup, one eye becomes swollen, and finally a cheese-like substance protrudes from it. While the fact cannot be empha-

sized too strongly that prevention is the best way of fighting this trouble, there are, however, remedies which will help to keep the colds in check. When fowls are observed to show any of the symptoms indicated, put half a teaspoonful of Condy's crystals into a pint bottle of water and add one dessertspoonful of the mixture to, say, two quarts of the drinking-water three times a week. Should this fail, take a saucer, a shallow dish, or similar vessel, fill it with pure kerosene, and dip the bird's beak into this sufficiently deep to cover the nostrils. Hold the bird in this position until it breathes; this will have the effect of drawing the kerosene to the seat of the trouble. Repeat the treatment on alternate days until a cure is effected. Care must be taken to give an ample supply of good grain food and green stuff, while grit and clean water should always be before the birds.

AGE DISTINCTION.

As it is practically impossible to distinguish between the hens and the pullets after the former get their new plumage, no time should be lost in marking the young birds. For this purpose a punch for marking the web of the feet can be obtained for 2s. Another reliable means of distinguishing the young stock is by using pig-rings. The cost of these is extremely low, and if properly put on (for which purpose a ringer is required) the birds seldom or never lose them. This cannot be said for many of the more expensive leg-bands on the market.

OVARIAN TROUBLES.

Many inquiries have already reached me this season as to ovarian troubles in pullets, the chief among these being protrusion of the oviduct. Very often this condition is due to constitutional weakness, some strains being more prone to it than others. Generally speaking, however, the trouble is brought about by oversupplying foods of a forcing nature, such as meat, or substitutes in the form of meatmeal or bonemeal. The desire to secure a big egg-yield now that the price of fresh eggs is ruling at a high level is leading many poultry-keepers to overforce their pullets, which is a very mistaken policy.

In order to obtain a good supply of eggs in winter, animal food is necessary, but there is a limit which cannot be safely overstepped. As to the correct amount to feed, local conditions must always be taken into consideration. When the pullets are just commencing to lay, for instance, these foods should be introduced by degrees until the birds become well developed and

settled down to their business. Again, when birds have free range and have thus an opportunity, especially after rain, of picking up insects, worms, &c., which has a forcing effect, meat materials must be sparingly fed. The same applies when large quantities of milk are given to drink. When these conditions are not fully considered, and the birds are given the usual amount of meat food recommended, the proceeding is practically inviting ovarian troubles.

If meat materials are fed separately, and the bird is given an opportunity of balancing its own ration, there is certainly less risk; but where boiled meat, and especially meatmeal or bloodmeal, is mixed with the mash and the same ration fed to all members of the flock where there is naturally a variation of egg-producing capacity, ovarian troubles will be rife in consequence. When boiled meat is available the ideal arrangement of feeding it separately is a simple matter; but in the case of substitutes this is not always practicable, owing very often to the birds refusing to eat it when placed in a separate hopper. When this is the case a small proportion of dry pollard and bran mixed with the nitrogenous material will often have the desired effect. Where the birds are enclosed in small runs and this handy meat-substitute is mixed in the mash it should never constitute more than 6 per cent. of the entire mixture. Of course, the foregoing does not mean that where only an odd bird or two becomes affected with an oviduct trouble the whole of the flock should have their forcing diet eliminated or reduced, thus bringing about a decline in the egg-yield; but if the trouble increases it is advisable to exercise caution and see that the proportion of nitrogenous matter is not provided in excess.

MISMANAGEMENT.

It is to be regretted more poultrymen do not realize that with poultry, as is the case of other classes of live-stock, half the breeding goes down the throat. It is not uncommon during my visits of instruction to hear breeders condemned and their stock pointed out as being inbred weeds or something to the same effect, such stock having often been produced from sittings of eggs, purchased as day-old chicks, or bred from birds supplied by a noted breeder. Complaints of the kind are sometimes justified, but in the majority of cases which I have an opportunity of investigating I find that the blame for the stock being undesirable is placed on the wrong shoulders. Instead of the specialists being at fault, the trouble is solely due to the person who makes the charges, on account of his own improper management.

Only the other day a case in point came under my notice. A number of miserable-looking half-grown pullets, six months old, produced from sittings of eggs supplied by a reliable breeder, were referred to by a poultry-keeper as weeds, owing to the fact that they were only half the size of his neighbour's pullets of the same breed and age. I soon discovered the cause. Not only had the mistake been made of rearing the little ones from a month old with the adult stock, but it was clearly seen that the starving process had been in operation. Apart from these adverse factors, the birds were confined in a small dirty run, which was not sufficiently large for half the number of stock. An examination of the house clearly indicated that the droppings had not been cleaned out for many a month, and, as could only be expected, the place was overrun with red mite. In these circumstances the young birds must have possessed a strong constitution to have even lived.

It is next to useless securing high-class stock from a specialist and expecting them to give a good return if they are not given an ample supply of food and kept under the most sanitary conditions possible. To be successful in poultry-keeping the person must have a natural love for his birds, and when this is present it will generally be found that not only are the best results obtained, but the business is made a pleasant undertaking. Unfortunately, however, there are too many people who apparently forget that fowls are living creatures. The way some flocks are neglected in regard to food and water, and compelled to roost in dirty vermin-infested quarters, is not only cruel to the birds but a disgrace to the people who own them.

THINGS TO REMEMBER.

One of the chief weaknesses in farm poultry-keeping is boarding too many old-age pensioners.

A good way to make sure there are no red mites about is to examine the perches at night.

Don't forget that a change of food or quarters will invariably cause the pullet to go into a moult at this season of the year.

Deep open-front houses, without draughts, containing ample litter for the birds to scratch in are essential to winter-egg production.

Fowls relish green food the whole year round. Remember, it reduces the grain account.

A hen when laying will eat much more than when she is not laying. When feeding poultry discretion should be exercised in this respect.

THE APIARY.

E. A. EARP, Apiary Instructor.

PREPARING THE CROP FOR MARKET.

THE matter of preparing the crop for local market or export must not be overlooked. It should weigh seriously with the producer. The requirements of the Sale of Food and Drugs Act cannot be ignored, and in time its provisions will eliminate old-style methods in handling honey. The law is framed to protect the purchaser against fraud and the honest producer against the unscrupulous trader. The regulations relating to honey provide that the bee-keeper must show plainly on the labels the contents and weight of the package, also his name and address. Do not label your honey "Pure Clover Honey" when you know distinctly that you are in a district where the bees are working on mixed flora. The correct description in such a case is "Pure Honey." See that all containers are clean (and free from rust in the case of tins) before filling, and secure tightly all lids before despatching to market. Remember that honey is an article of food, and should be treated with the care and cleanliness that other foods require.

SPARE SUPERS.

Where extracted combs have been placed on the hives for the bees to clean up, these should be removed and the bees confined to as small a space as possible consistent with the size of the colony. It may be necessary to leave some of the supers on during the winter months, and these can be dealt with in the spring. Do not leave the bees more space than they require, as it will be found that the bees will desert the lower ones and cluster on the top for warmth.

MATS.

See that each colony is provided with one or two good mats during the winter months, to keep the bees as warm as possible. Mats should be cut to fit exactly on top of the frames, and may be made from clean sacking or canvas. Sugar or corn sacks make excellent mats and are easily procured. Wood mats are adopted by some beekeepers, and, if desired, may be secured from dealers in bee material at a moderate cost. In districts where the bees do not bring in a great deal of propolis wood mats are effectual. On no account use calico mats, as these afford practically no warmth.

WEEDS.

Keep the hives clear of all weeds, so that the flying bees may have free access to the entrances. Many bees are lost in striking growing obstacles on returning to the hives. For the next few months, when the air is charged with moisture, it is important that plenty of air and as much sunlight as possible should penetrate beneath the bottom boards. In damp situations place the hives sufficiently high from the ground to avoid the dampness. Old bricks or concrete blocks make admirable supports for the bottom boards. Make sure that hives have sufficient cant towards the front before the winter rains set in. The presence of much moisture on the bottom boards will be the means of much loss to the beekeeper, and, in addition, cause the hives to become sour and foul-smelling.

SHELTER.

It is essential that suitable artificial shelter should be erected where the hives are exposed. Brood-rearing must be encouraged until a late date, and this will not be carried on by the bees if there is a lack of shelter. It is necessary to prevent the keen driving winds from gaining access to the hives, and the consequent bad effects of chilling the brood. In most districts there is an abundance of manuka scrub, and this affords capital shelter when erected in the form of a breakwind. On no account place hives under high evergreen trees with the idea of affording shelter. This is one of the worst locations, as the trees prevent the entrance of the sun's rays, and there is invariably a cold draught between the trunks.

CARE OF COMBS.

Good extracting-combs are the most valuable asset the beekeeper possesses next to his bees, and great care should be taken to secure them from the ravages of the wax-moth and mice. Hundreds of combs are destroyed annually through carelessness, and this can be prevented by attention to small details. Mice destroy the combs to gain access to the pollen and honey, and render the best combs foul and distasteful to the bees. Combs can be stacked in a mouse-proof room or in supers tiered one above the other. Queen-excluders may be utilized to keep mice out of the combs, and in the absence of close-fitting roofs are a complete success. If the presence of the wax-moth is detected the tiers of combs should be fumigated. Bisulphide of carbon is effective in destroying insect-life, but should be used with great care, as it is highly inflammable. Prevention is better than cure, and a few moth-balls placed in the supers will prevent the attack of the moths.

APIARY REGISTER.

A register for the purpose of keeping records of individual colonies will be of great assistance to the apiarist. If the apiary is to be conducted on commercial lines such a register will be indispensable as a complete record of the hive and its work, and will act as a guide to the beekeeper in laying out his plans for the forthcoming season. A record of the best queens and the average yield of each colony is important, more especially when working to improve the strain of bees kept.

THE FARM GARDEN.

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

VEGETABLE-CULTURE.

Peas.—In places where the soil is well drained peas may now be sown. Where the soil is extra dry in summer the resulting crop may be the best of the season, and this also applies to very hot districts. It is customary to sow only dwarf varieties at this season, but this need not be made a hard-and-fast rule. Dwarf kinds come into bearing earlier than other kinds because they have less growth to make before fruiting. In some parts the crop is a precarious one, a cold winter or a heavy rainfall causing slow growth, so that very little progress is made. In such cases it is wise to sow only dwarf sorts and only a small quantity. But where they are known to do well more should be sown and a taller kind also. A difficulty in some parts is the ravages of birds and slugs. It is a hard matter to rid the garden of slugs in winter when there is frequent rain, and birds are a still greater difficulty. Both slugs and birds may be overcome by putting sticks to the peas. Birds seldom trouble them when so protected, and slugs do serious harm only when the haulm lies on the ground. If the haulm is clear of the ground a sprinkling of lime and soot occasionally is sufficient protection and, further, acts as a fertilizer. I always sprinkle a little soot over the peas before covering them with soil. It protects them from all insect pests while in the early stages of growth, and the manurial effects of the soot is seen in the rich green foliage and strength of growth.

Broad beans may be sown anywhere. The plant is a hardy one that grows well during winter. Beans do not form till there is a certain degree of warmth in soil and atmosphere; therefore the haulm may run up too tall. In summer it is best to top

the plants when about a foot high. It would not be wise to do so in winter, as it would at that time delay the crop. When it is seen that the pods are holding, the tops may be pinched off if the haulm is getting very tall.

Rhubarb.—If the clumps of the summer varieties stool out freely they become, after two or three years, very weak in the centre. It is advisable on that account to lift the roots every three years or so. As they are now dormant, they may be lifted at once if it is desired to work up the ground. The clumps may be piled in a stack in any convenient place in the open—the weather will not hurt them. Replanting should be done just as soon as they show signs of growing in the spring. The clumps are then to be chopped up with a sharp spade. Plant back strong pieces from the outside of the clumps—one to three good crowns should be taken for each new set.

Winter rhubarb is best renewed by seed sown at any time except winter. Present beds, if they have been manured fairly, will be benefited by occasional dressings of nitrate of soda. Give 2 oz. per square yard at about four weeks' interval. It is not good economy to give heavy dressings, as nitrate of soda is very soluble in water, and what the plants do not absorb quickly is washed away.

Seakale should be cleared of the old leaves, weeds, and other rubbish, and the soil forked over. Do not dig deeply; it is unnecessary and would cut the roots. Crowns that are strong enough may be forced at any time during the dormant season. What is necessary for covering them depends on the size of the clumps. In Europe earthen pots are made for the purpose; we have to use what we can get. If the clumps are small, kerosene-tins will answer. Both ends must be cut out; the open end at the top can be covered with pieces of board. The whole should be surrounded by fermenting manure; a covering about a foot thick all round—that is, a foot through to the box on all sides as well as the top, which means nearly a yard through all—will provide sufficient heat. Cover only a few clumps at a time, for seakale quickly spoils. It takes about a fortnight to force. If the kale has not all been forced before natural growth begins it will be sufficient to cover the remaining clumps with tins or boxes, not using manure. All crevices must be stopped up to secure perfect darkness inside, or the process will be useless. I have read of the clumps being ridged over with earth when the crowns break up into the soil and so becoming blanched. I never succeeded, however, in getting good stuff that way. It may answer in a dry climate.

Spinach from recent sowings should be growing freely. Thin the plants so that they stand singly at least 8 in. apart. Be careful not to leave two plants in a place instead of one—a very easy matter. The plants do not grow freely unless they each have plenty of room for their roots.

Turnips sown recently will stand through the winter. Timely thinning promotes good growth, and is easiest. Broad lines are the most profitable; excessive thinning is not required. If the seed was thinly sown, very little thinning is required. The capability of a bed for production is enormously increased if a little trouble is taken, when pulling for use, to take always the most forward. Such is the way with growers for market, who seek to produce a large number of medium-sized bulbs with the least possible expenditure of labour and space.

Cultivation.—In summer-time a fine surface kept loose is the order, as it conserves moisture, while allowing a proper ingress of air. During winter it is better to leave the surface in a rough state, by which means a greater surface of soil is exposed to the beneficial effects of sun and wind. Soil that might be heavy and sour with a loose surface may be kept sweet and friable if dug up and left rough. Vacant plots should be so treated. This method of cultivation refers to the surface only. Lumps below the surface should be broken up, or they will remain lumps, which will become very hard in summer. This should be kept in mind when trenching ground. If lumps are left unbroken it will be hard to get good crops.

SMALL FRUITS.

Strawberries.—Where leaf-blight has been troublesome, means should be taken to destroy as much of the foliage as possible. The most simple plan is to mow the foliage with a scythe, let it wither, and then set fire to it. Where a mulch of littery stuff has been employed its remains will help the burning. If necessary, dry straw may be littered over the bed to assist the burn. The straw will not be wasted, as the resulting potash will benefit the plants.

Black Currants.—Black currants will not succeed on dry soil. It is useless to plant them on such places. A fairly strong rich soil is best, but, above all, a moist subsoil is necessary. The mode of pruning should vary according to locality and climate. In all but the coldest parts of the Dominion there is trouble with the borer. In some parts the black currant was thrown out of cultivation because of the destruction wrought by borers. That is, however, not necessary. Where there is but slight trouble

from the borer the English method of training and pruning should be adopted. This is the same as for the red and the white currant. A framework of branches is trained up in the form of a cup, and all side shoots are reduced to short spurs. When this style of bush is adopted care must be taken not to allow suckers to come up. Where the borer is troublesome a different plan must be adopted to ensure success. Non-suckering bushes are secured by carefully cutting out all buds on the cuttings that are to make the bushes, except four or five at the top that are required to make the branches. When this is carefully done and good long cuttings are put in, suckering will not take place to any extent. When a stooling bush is required none of the buds should be cut out. The object is to allow the underground shoots to come up to a sufficient extent to ensure a constant supply of them in various stages of development. A young branch is seldom, perhaps never, lost through the borer. It is old stems that are attacked, or perhaps they are old before they become seriously injured. The management of the bush consists in so working up young branches from suckers that the older may be cut out before they are enfeebled by the work of borers. The black currant bears fruit on wood of the preceding year, so that the frequent renewal of wood does not lead to loss of fruit. This style of bush is pruned quite differently to the one first mentioned. Fruit being taken from young shoots as well as from spurs, and a sufficient number of such shoots being annually left to furnish the bush without crowding, it will not be cup-shaped, but have a full centre. Young shoots left for bearing should be shortened a little, merely nipping off 3 in. or 4 in. of the tips, fruit-buds being wanting or but feeble in that position.

Cape Gooseberries.—Growers should sow seed now in preference to waiting till spring. Sow in boxes, prick off as soon as large enough into other boxes, and keep them just growing till spring. These make strong, hardy plants that will make much greater early growth than spring-sown plants, and give much better crops the first year.

Gooseberries, red currants, &c., will be dealt with in the next issue of the *Journal*.

THE FLOWER-GARDEN.

Roses.—Transplanting roses can be successfully done at any time after cool weather sets in until growth becomes active in spring. There is a period of from sixteen to eighteen weeks available for this work, beginning about mid-April. If everything is ready the best time is from the middle of April to the middle

of May. Planted at the time stated the foliage is still active, so that new roots are quickly formed and the bushes are re-established before they go to rest. Naturally the bushes start stronger in spring than they would if only then planted. Bushes transplanted in the autumn should not be pruned at that time—the growth is wanted to promote root action; but it may be wise to cut back tall shoots somewhat, just enough to take away some top hamper, so that the bushes may stand firm. There is no need to try to lift soil with the roots; it is usually impossible, and is not required; nor is there any occasion to lift long roots. Dig straight down about 12 in. from the stem, cutting through any roots the spade may meet. All broken or cut roots should be cut again by knife or seccateurs; unless cut with a clean cut they are likely to die back for some distance, greatly impairing the root-system of the bush. For planting, a hole should be made wide enough to allow the roots to be spread, and a little deeper than the length the roots will be left. Stand the bush in its place and fill the hole about two-thirds full with soil. Shake the bush so as to distribute the soil among the roots, and at the same time lift it a little. The roots will then be placed. Now tread the soil very firmly over the roots, and finish by filling up the hole with loose soil, leaving it in that state. It is highly important that the soil be trodden very firmly about the roots, also that the surface soil be left loose so as to allow the free passage of rain and to prevent caking.

Rose-bushes should not be allowed to send up suckers. When suckers are allowed to grow it is very difficult to control the bush. Some of the suckers are sure to be extra strong and dominate the rest of the growths, which become weak, and the bush then becomes difficult to manage and altogether unsatisfactory. This refers to bushes growing on their own roots. Budded bushes, of course, only throw stock suckers, unless they have been planted too deep. If suckering is troublesome the only way to subdue the trouble is by lifting the bush. All the suckering roots and all underground branches should be cut off. A single stem only should be allowed, and branching should occur well clear of the ground.

Rose-bushes at times become overgrown and comparatively flowerless. In such cases transplanting is the remedy. Cut the roots well back, thin out the shoots, and when the bushes become again established prune severely. The latter remarks apply mostly to hybrid perpetuals, which are the offenders in this respect. Pruning should be done in June or July. Flowerless growths in other sections are usually the result of bad pruning. The pruning of roses will be dealt with in the next issue of the *Journal*.

Primroses and all the family may be planted now. *Violets* can be planted now, but it should be done only as a matter of

convenience. They are best planted immediately after flowering. They never flower well the following spring if planted in autumn.

Transplanting.—All kinds of shrubs and trees as well as most perennial plants may now be transplanted. In most places autumn planting is best, because, as they get a new roothold at once, they make growth in spring. Local conditions must rule this question. Where the soil becomes waterlogged in winter and early spring, planting should not be done until that condition is past. Early summer is the best time to plant in some places. It has been my experience to deal with places where October was the best month for planting. In such cases growth is made the following autumn.



SIXTEEN THOUSAND CRATES OF CHEESE AT WHARF, WELLINGTON.

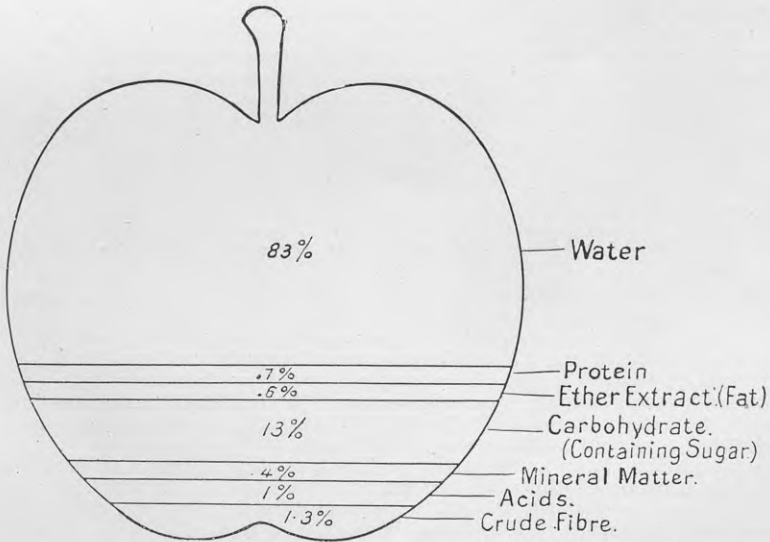
The photograph was taken just prior to loading of shipment.

ALL ABOUT AN APPLE.

H. BENJAFIELD, M.B., in the "Fruit World of Australasia."

As both food and medicine an apple is a wonderful example. Professor McAlpine gives us the accompanying diagram, of which the following is an explanation in plain English. Suppose this apple to be the size of a large breakfast-cup, and into this cup you put nearly half a pint of water, and stir into it—of concentrated food like that contained in an egg, half a teaspoonful; of fatty stuff like butter, a little less than half a teaspoonful; of sugars, both cane and grape sugar, two tablespoonfuls; of mineral matter, as much as will lie on a sixpence; of acids, a little more than half a teaspoonful; of skin and core, about two-thirds of a teaspoonful.

From a medical point of view we look upon each of these elements as follows: The food, or protein, is pure and strengthening, and exists in the apple combined



with sugars and acids, and when taken enters rapidly into the muscles, where it is readily broken up, imparting heat and strength, so that the athlete under great exertion soon gets the stimulus.

The fatty matters are so combined with acids that even the most delicate child does not recognize that he is taking fat when he is eating an apple.

The sugars, or carbohydrates, form the most attractive as they are the most nourishing part of the fruit. And these sugars are just crystallized sunshine, and are far more digestible than any ordinary sugar. The child from babyhood just loves it, and it is excellent food for him. In the adult, especially in advanced age, ordinary chemically prepared sugar when taken freely produces rheumatism, gout, and suchlike diseases, but these sugars never set up any of these troubles; indeed, gouty people get relief from fruit.

The mineral matter in the apple is one of Nature's wonders. The blood must keep its red colour or it cannot do its work in the body, and we die. When we eat an apple we take just the right dose of iron which the blood needs, and the invalid with poor blood will get iron in the apple which is far more easily absorbed by the blood than is any preparation of iron compounded by the chemist. Lime is found in the apple, in the same form as it is found in our bones, and in the apple the lime is so beautifully combined with phosphoric acid that when an apple is eaten the bones of the body are nourished by these lime salts, and by these additions of lime the child is able to build up the young growing bone. Rickety children have bones deficient in lime. I have never seen rickets or soft bones in a Tasmanian orchard.

Magnesia! Yes, Nature has placed in the apple quite a nice little dose of magnesia, and it helps to keep off rheumatism by purifying the blood and assisting the bowels.

Phosphorus: Professor Schaffer told us recently in the great scientific lecture of the year that life could not exist without phosphorus, and in the apple this great nerve-tonic exists in quite a full dose, and it exists in its most soluble form as phosphoric acid.

Sulphur, as sulphuric acid, is also a great blood-purifier, and has an especial effect on blood and skin diseases.

There is just one more thing which science has not yet explained, and that is the wonderful life processes by which all these tasteless elements were blended together into a beautiful fruit and a perfect food.

The bee loves honey because its nature cries for a perfect food, and for the same reason the child cries for an apple, which will help its digestion, will make its blood richer, will strengthen its muscles, and stimulate and feed its brain and nerves. The sailor fed on salt meat and biscuit dreams of an apple as he is dying of scurvy, and our soldiers write me from the trenches that an apple a day would greatly help them with their bully-beef-and-biscuit diet.

PATRIOTIC NATIONAL APPLE SHOW.

EVERY New Zealand fruitgrower should carefully consider the claims of the Patriotic National Apple Show, to be held in Wellington from the 8th to the 13th May, with a view to supporting the movement to the best of his ability. The show has for its object the double purpose of bringing the New-Zealand-grown apple before the public and the raising of a fund by the sale of gift fruit for patriotic purposes in connection with the war. The first object is of prime importance to the fruitgrower, while the laudable nature of the second is in itself sufficient to ensure the general and hearty support of those in a position to do so. A large list of exhibition classes has been arranged for, as indicated by the official schedule of exhibits, copies of which have been largely distributed. In addition, consignments of fruit for patriotic sale will be welcomed by the show officials. Arrangements have been made to receive and have all fruit forwarded to the show either for exhibition or for sale. Consignments should be forwarded addressed to T. C. Webb, Secretary, National Patriotic Apple Show, Wellington, in ample time to allow of proper arrangement before the opening of the show. The show is being held under the auspices of the New Zealand Fruitgrowers' Federation (Mr. J. Longton, managing director), assisted by the Committee of the Wellington-Moutere Fruitgrowers' Association, with Mr. T. C. Webb, Orchard Instructor, Wellington, acting as honorary secretary.

Writing on 8th February, the High Commissioner mentions that the prices then ruling on the market for wool were higher than they had ever been since the London wool auction sales in Coleman Street were inaugurated.

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.

PALISADE-WORM IN HORSE.

H. ASHWORTH, Kohekohe :—

I have a horse that is troubled with a little red worm about $\frac{3}{4}$ in. long. He passes a few every day. He is scoury, weak, and thin. Are these worms only in the digestive tract? What treatment would you advise? The horse is a light draught, about twelve years old.

The Live-stock Division :—

Your horse appears to be infested by the worm known as *Sclerostomum equinum*, or palisade-worm. It is a very dangerous parasite to horses. The embryos sometimes are found to invade the larger blood-vessels, giving rise to thrombosis and frequently setting up attacks of colic. The adult worms inhabit the intestines and are very difficult to get rid of. Horses infested in this manner are constantly infecting the paddocks with the eggs of these worms passed out in the dung, and thus reinfection of the animal is constantly taking place by means of the food and water-supply. Affected animals should be moved to different pastures, and old pastures should be ploughed and cropped before being laid down in grass again. Efficient drainage, and top-dressing with lime, are also remedies which suggest themselves. Individual treatment of cases is best carried out by the administration on a fasting stomach of 1 dram of thymol dissolved in a pint of linseed-oil, for horses, or 13 grains of thymol for foals. Good quality of foodstuffs in ample quantity must be given to animals suffering from the effect of parasitism in any form. Improvement in the condition of the subject is more important than medicinal remedies.

GRASSING DRAINED PEAT SWAMP.

“SETTLER,” Dargaville :—

Will you kindly advise me of a suitable mixture of grasses and suitable manure to surface-sow on drained peat swamp? Scrub and rushes have been burnt off, and the swamp is sufficiently consolidated to carry young cattle or sheep, but will not stand horses, so that it is impossible yet to cultivate it.

The Fields Division :—

If you have sufficiently drained the land top-dress it with at least 1 ton of ground burnt lime per acre. As manure, after satisfactory drainage, you could use the following (all quantities being per acre): Basic slag, 3 cwt. (or Egyptian basic phosphate, 3 cwt., or basic superphosphate, 3 cwt.), and 2 cwt. to 4 cwt. kainit (or 1 cwt. muriate of potash, or 3 cwt. to 5 cwt. wood-ashes). The following grass mixture should give you satisfactory results after such treatment: Timothy, 4 lb.; meadow-foxtail, 6 lb.; cocksfoot, 7 lb.; Italian rye, 5 lb.; red-top, 1 lb.; alsike, 2 lb.; cow-grass, 2 lb.; *Lotus major*, 1 lb.: total, 28 lb. per acre. Sow only clean seed of good vitality.

SODA-BLESTONE SPRAYING-COMPOUND.

W. H. THOMPSON, Reefton:—

Regarding the substitution of washing-soda for roche-lime in Bordeaux mixture, as recommended by the Department for spraying potatoes, can this same compound (blestone and washing-soda) be applied in winter to fruit-trees for black-spot, peach leaf-curl, and as a fungicide generally?

The Horticulture Division:—

The mixture prepared with washing-soda may be used in all cases of fruit-tree spraying for which Bordeaux mixture is used, but the lime is the most popular. In using the soda-blestone mixture for summer spraying it is advisable to test carefully with litmus in order to as far as possible avoid scorching, which is the greatest drawback to the use of this mixture.

VENTILATION OF DAIRY.

A. D., Ouruhia:—

Would you kindly let me know the best means for ventilating a small dairy? We get wind and dust very badly. The dairy is about 7 ft. square, under tank-stand. I had one in the same position before, but had to stop up all ventilation on account of dust.

The Dairy Division:—

Good ventilation can be obtained by constructing two air-shafts in opposite walls of the building, between the weatherboards and inside lining. The one for the intake of air should be 8 in. by 4 in. and, say, 4 ft. 6 in. in height, with an opening at the base to the outside wall and a similar opening for the inside at the top. The other shaft should extend from near the floor to the top of the roof, and have the bottom opening inside the building, and the one at the top to the outside air. To prevent dust passing into the dairy the inner opening on the shorter shaft may be covered with a double thickness of buttercloth. Hinged covers may also be fitted to regulate the draught. All joints in the air-vents should be made tight in order to prevent counter-draughts.

WIND TROUBLE IN HORSE.

“HORSE,” Henderson:—

We have a mare that developed a cold, with a thick whitish discharge from the nose running constantly, also a violent cough. Sometimes the cough seemed to almost shake her to pieces. One day blood was mixed with the nasal discharge. We gave her a spell and applied a steam bath to the head. She is now apparently all right, has regained her condition and somewhat of her former spirits, but seems to have lost her wind-powers. What is the best remedy to use in the circumstances?

Live-stock Division:—

The severe catarrhal trouble from which your mare has suffered seems to have affected her constitutionally, and she may now have contracted that form of unsoundness known as “broken wind.” We would recommend you to give a little linseed mash—not more than 1 lb. per day—in the feed, and try the effect of the following mixture, giving two wineglassfuls in the food or drinking-water three times daily: Extract of belladonna 2½ drams, bicarbonate of soda 2½ oz., Fowler’s solution of arsenic 5 oz., water up to 1 pint.

INFECTION THROUGH FOAL’S NAVEL.

“SUBSCRIBER,” Mayfield:—

Some time ago a foal a month old became lame in one of its hind fetlocks. At the end of two days it became lame in the opposite front fetlock also, and appeared to be in pain. I bathed its legs, which seemed to relieve it, but on the

fourth morning its joints were swollen. I gave it castor-oil, but it grew worse during the day and died that night. From what I can gather it died from a disease contracted through the navel. If that is so, is there a cure or preventive?

The Live-stock Division:—

Your opinion that infection had proceeded by way of the navel is probably quite correct. Wherever trouble of this nature is known to occur it is a wise plan to paint the navels of newly-born foals with a little tincture of iodine. This simple procedure is of great value in preventing infection from source in question.

LIMING GUM LAND.

“INQUIRER,” Albany:—

I have a paddock of gum land which I intend to plough this autumn, allow to fallow till next autumn, and then put in grass. I intend to give it a dressing of lime. Would it be advisable to put the lime on this winter, or next autumn immediately before sowing the grass-seed?

The Fields Division:—

It would be preferable to put half the lime on the ploughing this coming early winter and disk in somewhat, and the other half next spring, disking in well and tine-harrowing. The soil should be in good shape from the point of view of lime-improvement by next autumn when you work up the ground by ploughing, disking, tine-harrowing, and rolling for the grass-seed sowing. Use 15 cwt. ground burnt lime or 1 ton ground limestone per acre at each liming.

HEDGE FOR ROAD-LINE.

“SUBSCRIBER,” Auckland:—

Will you be good enough to tell me what would be a good suitable hedge to plant along a wire fence on a main road? I want the hedge to cover the wire eventually. The soil is loose with a good subsoil. The situation is exposed to rather strong winds, but the hedge would be sheltered by a belt of lapantha. *Pittosporum crassifolium* has been suggested.

The Horticulture Division:—

Pittosporum crassifolium would no doubt suit your purpose very well. It makes a capital hedge when planted closely—not more than 18 in. apart—and well and regularly cut. Barberry, eleanus, or broad-leaf privet should also be suitable.

CROPPING QUESTIONS.

W. H. J. H., Otaki:—

1. I have a paddock of about 12 acres which has for a number of years been down in grass. Last year the paddock was ploughed and sown with oats, a fair crop resulting. I wish to put it down again in grass. Would it be advisable to put it in rape, and after feeding this off with sheep to lay it down in grass? The soil is light loam with a tendency to get dry at the latter end of summer. I shall be glad to have advice regarding manuring and the varieties to sow.

2. I wish to grow tares for seed. When is the best time to sow, and is it advisable to feed off the first growth and let the second go to seed?

The Fields Division:—

1. The soil being light loam and inclined to become dry in late summer, it would probably not be strong enough to grow a crop of rape before seeding to grass. We would advise your sowing the grass mixture in the spring with a lightish seeding (broadcast) of soft turnips—say, Imperial Green Globe variety. As an alternative you could sow the grass with 1 to 1½ bushels per acre of Black Hulless barley and feed off the latter periodically, but not closely, as the young grass may be injured by close feeding. As manure use 1½ cwt. basic superphosphate and 1½ cwt. blood-and-bone manure per acre. The following grass mixture should

suit your soil-conditions: Cocksfoot, 6 lb.; Italian rye, 4 lb.; perennial rye, 5 lb.; crested dogstail, 2 lb.; *Poa trivialis*, 3 lb.; hard fescue, 2 lb.; cow-grass, 2 lb.; white clover, $1\frac{1}{2}$ lb.; *Lotus corniculatus*, $\frac{1}{2}$ lb.: total, 26 lb. per acre.

2. Tares or vetches are best sown in the spring (October) and harvested in the early autumn. It would be preferable not to feed off before allowing to go for seed, but, if done, feed off fairly early and lightly, and then let the crop mature.

MORTALITY AMONG SUCKING-PIGS.

X.Y., Avondale:—

Can you advise me regarding a sickness that is taking off my sucking-pigs? They appear quite healthy and doing well until seized with a kind of fit, which passes off in a few minutes, leaving them twitching or shivering. In the interval between the fits they frequently run about, but appear not to know where they are. Some become weak in the back, and lose use of legs and die. The largest and strongest are taken first; the small ones seem healthy and still live.

The Live-stock Division:—

This complaint in your young pigs is due to an alteration in the sow's milk, brought about probably through digestive troubles. The remedy would be to treat the sow by administering a dose of 5 oz. or 6 oz. of castor-oil. An alteration in the sow's feeding would also be beneficial.

TREATMENT OF FOOT-ROT.

"NOVICE," Tuatapere, Southland:—

On account of wet season and soft grass my sheep are very much troubled with foot-rot; even some of the lambs are affected. I have tried hand dressing with bluestone and Stockholm tar, also bluestone liquid in troughs, with little result. Any advice would be very much appreciated.

The Live-stock Division:—

As you appear able to treat the cases of foot-rot individually, we would suggest that the affected sheep and lambs have their feet trimmed in the usual manner, and that tincture of iodine be applied with a stiff brush. This treatment should be carried out twice a week.

DESTROYING FAIRY-RINGS.

W. CHARMAN, Lower Manaia, Masterton:—

I have a piece of land of good quality, although fairly dry, which is infected with a fungus growing in rings of about 6 ft. in diameter. The fungus seems to absorb every particle of moisture within the ring and the grass dies right out. Could you suggest any top-dressing likely to be beneficial in eradicating the pest?

The Fields Division:—

The only direct method of destroying fairy-rings that has proved successful—though costly for agricultural purposes—is to water the ground with ferrous sulphate solution, 8 lb. dissolved in 50 gallons of water being applied to each 60 square yards. The application is repeated about four times at intervals of one week, and then ground burnt lime is applied at the rate of 1 ton per acre.

RECLAIMING MANGROVE SWAMPS.

"INQUIRER," Russell:—

Could you tell me whether it is possible to successfully drain and grass mangrove swamps which are covered with a growth of small and large mangrove-trees, and which are always flooded from 6 in. to 24 in. with the rising tide? The intention is to construct a dyke just above low-water mark, right through the mangroves, enclosing everything, with flood-gates at intervals to prevent the

rising tide from getting in, and to let out surface water; also to construct a drain all round the foothills to carry away hill-water. Would this be a suitable method? If it can be done, at what length of time after draining would it be possible to grass it? What grasses would be suitable? Would it be necessary to break it up, or would surface sowing do? The flooded area is composed of very sticky, deep mud, and the part bordering the hills looks to be composed of decayed vegetable matter covered for the most part with rushes.

The Fields Division:—

As to whether successful drainage and grassing of mangrove swamps can be effected is primarily an engineering problem, and this would be required to be determined on the spot by an expert. Once it is drained, however, the dried mud could be treated with gypsum to remove brackishness to a large extent, and grasses suited to brackish marshes could be planted out from nurseries established on special portions of the areas. The following grasses should serve their purpose: Salt reed-grass (*Spartina polystachya*), rush salt-grass (*Spartina juncea*), salt marsh-grass (*Spartina stricta*), found thriving from Pennsylvania southwards in North America; rough marsh-grass (*Spartina glabra*), found thriving from New England southwards in North America; smooth marsh-grass (*Spartina alterniflora*), black-grass (*Juncus bulbosus*), goose-grass (*Glyceria maritima*). Seed of these grasses does not appear to be stocked by American seed firms. You may, however, obtain them through a firm such as Thorburn and Co., 33 Barclay Street, New York, or, failing this, through the Bureau of Plant Industry, United States Department of Agriculture, Washington, D.C. The seed, of course would have to be specially gathered.

TREATING SCALD IN SHEEP.

“SUBSCRIBER,” Okaiawa:—

I have a number of sheep badly affected with scald in the feet. The foot itself is quite sound, but the trouble is between the claws. I would be obliged if you could suggest a cure.

The Live-stock Division:—

Keep the space between the claws clean, and wash away any accumulated matter. Then get a stiff paint-brush and apply tincture of iodine, 1 part to 10 parts of water. If a very large number of sheep are affected a trough will have to be constructed to contain a 4-per-cent. solution of creolin, and the sheep must then be driven through this.

SETTING OF LEMON-FRUIT.

W. E. RIDDLE, Foxton:—

What is the cause of fruit not setting on lemon-trees? The trees in question are young and look well in their foliage; the blooms come and appear to set, then shortly after fall off.

The Horticulture Division:—

Unsuitable climatic conditions are probably the cause of your lemons failing to set fruit. Lemons when grown under more or less severe weather-conditions rarely set fruit satisfactorily, particularly when young. When, however, such conditions are not excessive, an improvement may be expected as the trees mature, provided the variety is a reliable one.

SHELTER-BELT.

“ENGINEER,” Mangere:—

I have a farm at Mangere running right down to the beach (Manukau Harbour). It is absolutely open to all westerly winds, consequently very cold in winter. Will you kindly advise me the best shelter-trees to plant, and what time to put them in?

The Horticulture Division:—

We would advise you to plant Lombardy poplar at a distance of about 2 ft. apart. Use either good stout cuttings or rooted plants. Prepare the soil well before planting, and keep it worked around the plants for a few seasons. Planting may be done at any time during the dormant season.

COMMERCIAL INTELLIGENCE.

MEAT-FREEZING WORKS.

SINCE the publication of the list of New Zealand meat-freezing works in the last issue of the *Journal* the works of the Oroua and West Coast Meat-freezing Company (Limited), at Aorangi, near Feilding, have been completed and have commenced operations. These works have a killing-capacity of 100 cattle and 2,200 sheep per day, and cold-storage space equivalent to 70,000 carcasses of mutton. The works of the Westfield Freezing Company (Limited), at Westfield, near Auckland, are expected to be completed and in operation about the middle of May. The slaughtering-capacity of the works will be 200 cattle and 3,000 sheep daily, with cold storage equal to 175,000 mutton carcasses.

Including the two establishments just referred to, the total capacity of the meat-freezing works in New Zealand is shown to be as follows: Sheep-slaughtering, 109,650 head per day; beef-slaughtering, 3,085 head per day; cold storage, 3,516,450 60 lb. carcasses of mutton.

The list of meat-freezing works published in the February issue was inadvertently given as at March, 1915. This, of course, should have been 1916.

IMPORTATION OF SALTPETRE FROM INDIA.

THE Government has received a cablegram from the Indian Government to the effect that exports of refined saltpetre from India for meat-curing purposes can be permitted only on receipt of applications from the New Zealand Government. Merchants who may therefore desire at any time to import saltpetre from India should communicate with the Secretary, Department of Agriculture, Industries, and Commerce, Wellington, stating names of shippers in India, quantities of saltpetre required, and refraction. The exportation of crude saltpetre from India remains prohibited.

LONDON WOOL-SALES.

THE following are the High Commissioner's cabled reports regarding the London wool-sales, received since those published in the February issue of the *Journal*—

SECOND SERIES.

29/2/16.—The wool-sales commenced with good competition for coarse cross-breeds and medium cross-breeds, although the high prices ruling are making buyers cautious and reluctant to bid freely. Prices are slightly lower than at the close of last series, but better bidding is anticipated during the next few days. For fine cross-breeds and merinos the market is a shade weaker, with prices 1d. lower. 33,000 bales of New Zealand wool are catalogued.

17/3/16.—The wool-sales closed firm at the lower prices established, after having been 10 per cent. lower. Prices recovered slightly, and present quotations

for medium and coarser sorts are 1½d. to 2d. below the closing rates of last sales. Finest grades about maintain old prices. 8,000 bales have been taken for export to the Continent and Russia. America is not operating. Estimated values are as follows: Fine crossbreds, 1s. 8d. to 1s. 11d.; medium crossbreds, 1s. 6d. to 1s. 8d.; coarse crossbreds, 1s. 4d. to 1s. 6d.; superior merinos, 1s. 7d. to 1s. 9d.; medium merinos, 1s. 4d. to 1s. 6d.; inferior merinos, 1s. 1d. to 1s. 3d. Future prospects are good at these lower prices. 3,500 bales of New Zealand wool were held over.

THIRD SERIES.

11/4/16.—The wool-sales have commenced. There is great competition for all wools, but buyers are cautious on account of the high prices and uncertainty as to attitude with regard to limitation of future contracts. Values average ½d. lower than the closing rates of last sales. 56,000 bales of New Zealand wool are catalogued.

15/4/16.—Market firm, with hardening tendency; merinos ½d. dearer, crossbreds unchanged.

THE HOP-MARKET.

REPORTING on the hop-market in London, under date 8th February, the High Commissioner states:—

“Owing to recent licensing legislation (which considerably restricted the hours for the sale of alcoholic liquors) the market for hops has been rather dull. During the past fortnight, however, the demand has considerably improved, and holders of hops are now firm in their demands for any lots they may have for sale. I do not anticipate, however, that prices will advance to any extent.”

The High Commissioner's cabled market report, dated 15th April, gives the following information regarding hops: “The market is quiet but firm. Stock is small—English per cwt., 130s. to 150s.; Californian, 100s. to 120s.”

THE WORLD'S CEREALS.

In a note, dated the 10th January, 1916, on the World's Yield of Food Crops, Sir J. Wilson, British delegate to the International Institute of Agriculture, dealing with cereals—wheat, rye, barley, oats, and maize—states as follows:—

“These grains are not all of the same nutritive value, but they are all used to some extent for human food, and can be substituted one for the other in case of need. Putting these five grains together, countries which on the average produce more than four-fifths of the reported crops have officially estimated their yield for the harvest year now ending as equivalent to 119 per cent. of their last year's yield, and to 114 per cent. of their average yield for the previous five years. Even after making allowance for decreased production and waste of grain in the countries at present devastated by war, there seems reason to believe that the supply of the cereal food-grains in the world as a whole is at present considerably larger than it was at the same period of the year on the average of the last five years, while the effective demand for these grains for the world as a whole is likely to be below the average of the years before the war.

NEW ZEALAND EXHIBIT AT NEW YORK.

UNDER the management of an organization styled the Panama Pacific Medal-winners' Association, shows were held at Chicago and New York after the close of the Exhibit on at San Francisco. The exhibits at these shows were confined to goods, &c., which had been awarded medals at the Panama Pacific Exhibition.

A small but attractive exhibit of New Zealand products was made at the New York show by the New Zealand Commissioner, the display running from 12th to 22nd February. The accompanying photograph shows the exhibit in the Grand Central Palace. In view of a prospective trade development with the eastern United States after the war, it is considered that a useful advertisement has been secured for the Dominion.



NEW ZEALAND EXHIBIT AT NEW YORK.

The exhibits on side not shown in photograph consisted chiefly of wool and preserved-meat samples.

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.	Wood, Bales.	Wheat, Sacks.	Oats, Sacks.	Rabbits, Crates.	Hemp, Bales.	Tow, Bales.	Kauri-gum, Pags.
January,	1916 166,700 1915 137,816	295,170 296,439	41,726 45,622	179 339	108,593 138,081	101,917 85,123	92,849 87,393	..	..	..	7,438 683	1,666 ..	1,218 1,209
February,	1916 170,973 1915 433,585	266,414 517,581	29,056 77,421	23 311	96,096 119,371	84,740 96,090	96,016 159,347	..	..	..	8,161 13,111	1,804 6,619	1,900 2,763
March,	1916 327,977 1915 80,439	363,269 203,480	83,725 30,176	..	59,671 55,280	62,082 51,811	49,750 49,809	..	..	474 ..	2,666 8,410	637 185	1,247 274
April,	1915 286,155 1914 234,765	328,779 366,786	45,340 22,185	..	6,703 7,822	38,561 63,796	41,371 58,488	..	2,901	1,011 ..	9,328 1,247	1,474 888	3,461 5,909
May,	1915 257,953 1914 336,632	433,831 638,397	34,780 39,315	655 54	148 837	17,065 37,776	21,615 43,364	..	..	2,923 ..	4,968 8,355	808 2,112	2,636 9,316
June,	1915 99,080 1914 261,877	154,785 634,981	19,316 36,400	932 ..	.. 1,153	26,869 19,247	11,946 18,774	..	..	9,800 1,000	5,027 7,924	1,320 4,258	1,229 7,881
July,	1915 243,420 1914 225,411	340,476 239,143	21,231 38,170	154 ..	.. 1,355	21,520 2,003	16,939 15,868	..	..	5,968 1,000	5,068 5,810	1,639 2,584	4,184 8,053
August,	1915 510,418 1914 84,251	570,381 63,111	51,750 19,094	35 516	.. 1,979	18,287 50	19,416 4,845	..	38,220	31,790 10,403	7,138 367	1,466 245	4,848 3,705
September,	1915 299,715 1914 53,386	330,643 49,200	59,487 2,353	..	26,416 15,885	2,595 ..	5,360 3,337	..	5,896	7,750 7,288	2,022 1,143	3,091 57	595 ..
October,	1915 367,198 1914 291,432	417,794 128,016	87,104 49,104	..	111,468 81,842	49,160 30,487	7,272 8,938	..	68,660	56,636 38,121	5,650 2,042	1,645 1,050	1,230 1,683
November,	1915 93,777 1914 136,346	92,601 27,577	21,609 48,302	.. 27	81,102 98,729	47,243 70,048	18,715 37,604	..	24,289	13,538 35,783	5,064 885	1,789 110	868 1,377
December,	1915 91,124 1914 192,952	59,231 149,835	36,467 44,876	..	214,967 172,990	81,939 80,144	33,527 86,317	..	..	3,052 9,306	6,016 1,136	1,940 116	5,555 2,157

LONDON MARKET VALUES.

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

London Date.	Wool.		Mutton.		Lamb.		Beef.		Butter.		Cheese.		Hemp (Spot).		Hemp (Forward Shipment).		Wheat.		Oats.				
	Bradford Quotations for Tops.		Canterbury.	North Island.	Canterbury.	Other than Canterbury.	New Zealand Hinds.	New Zealand Fores.	Danish.	New Zealand.	New Zealand White.	New Zealand Coloured.	Canadian.	New Zealand Good-fair.	New Zealand Fair.	Manilla Fair (New Grade).	New Zealand Fair.	Manilla Fair (New Grade).	N.Z. Short-berrid.	N.Z. Long-berrid.	N.Z. Sparrowbills.	N.Z. Danish.	
1916 Jan. 8	7½ p	7½ p	7½ p	7½ p	5½ d	156/0	148/0	94/0	93/0	97/0	..	..	..	40/10/0	38/10/0	50/0/0	..	..	..	..
" 15	7½	7½	7½	7½	..	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	7½	7½	7½	7½	..	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	7½	7½	7½	7½	..	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	7½	7½	7½	7½	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	7½	7½	8	8	6½	160/0	153/0	..	..	97/0	..	..	..	..	55/10/0	..	..	..	..	..
" 19	2/3	2/5	7½	7½	8½	8½	6½	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	2/4	7½	7½	8½	8½	6½	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	7½	7½	8½	8½	..	179/0	162/0	97/0	98/0	99/0	..	..	..	46/15/0	45/5/0	56/10/0	..	..	..	..
" 11	7½	7½	8½	8½	..	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	..	..	..	..
" 18	7½	7½	8½	8½	6½	181/0	163/0	102/0	103/0	105/0	..	46/0/0	56/10/0	46/5/0	44/5/0	55/0/0	..	..	..	..
" 25	7½	7½	9	9	..	178/0	163/0	102/0	103/0	106/0	..	..	55/0/0	..	45/5/0	..	..	..	..	..
April 1	7½	7½	9	9	..	172/0	163/0	103/0	103/0	107/0	47/10/0	45/10/0	..	46/10/0	44/10/0	..	..	..	..	..
" 8	7½	7½	8½	8½	7	174/0	163/0	103/0	103/0	107/0	49/0/0	47/0/0	54/0/0	47/10/0	45/10/0	55/0/0

* New season's.

STOCK EXPORTED.

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

Port of Shipment.	Horses.		Sheep.			Cattle.		Pigs.	Dogs.
	To Australia.	To Eastern Pacific.	To Australia.	To Eastern Pacific.	To San Francisco.	To Australia.	To Eastern Pacific.	To Eastern Pacific.	To Eastern Pacific.
Auckland ..	20	11	..	268	..	..	10	21	..
Gisborne ..	..	..	..	..	..	..	..	..	..
Napier ..	..	..	..	..	..	..	..	..	..
Wellington ..	11	..	26	..	..	..	..	..	..
Lyttelton ..	2	1	623	..	95	..	..	..	..
Dunedin ..	12	..	1	..	..	..	..	..	..
Bluff ..	2	..	100	..	..	..	..	..	..
Totals ..	47	12	750	268	95	..	10	21	..

The following are particulars of horses shipped: 12 draught stallions and 2 mares; 4 light-draught mares; 6 medium-draught mares and 1 gelding, 1 light mare; 5 thoroughbred colts, 5 fillies, and 1 mare; 1 gelding hack; 20 mixed horses (Worth's circus troupe).

Auckland also exported 1 crate poultry.

STOCK IN QUARANTINE.

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

No.	Description.	Sex.	Port of Origin.	Owner or Agent.	Address.
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MOTUIHI ISLAND (AUCKLAND).

20	Romney ewes ..	Female	London ..	E. Mitchelson and Co.	Auckland.
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SOMES ISLAND (WELLINGTON).

1	Pomeranian dog	Female	London ..	S. Johnson ..	20 Waldegrave Street, Palmerston N.
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QUAIL ISLAND (LYTTELTON).

Nil.

HEMP AND TOW GRADING RETURNS.

MARCH.

Hemp.—The total number of bales graded was 16,622, as compared with 9,373 for the corresponding month of last year, an increase of 7,249 bales. For the twelve months ending 31st March, 1916, the number of bales graded was 137,882, as compared with 82,987 for the previous twelve months, an increase of 54,895 bales.

Tow.—During the month 4,598 bales were dealt with, as compared with 2,192 for the corresponding month of last year, an increase of 2,406 bales. For the twelve months ending 31st March, 1916, the number of bales graded was 38,893, as compared with 23,374 for the previous twelve months, an increase of 15,524 bales.

Stripper-slips.—The number of bales graded was 831, as compared with 276 for the corresponding month of last year, an increase of 555 bales. For the twelve months ending 31st March, 1916, the number of bales graded was 5,885, as compared with 1,482 for the previous twelve months, an increase of 4,403 bales.

HEMP, TOW, AND STRIPPER-SLIPS GRADED THROUGHOUT THE DOMINION DURING THE MONTH OF MARCH, 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	10	326	1,062	1,022	426	38	..	2,884
Napier	67	9	..	..	..	..	76
Wairoa
Foxton	2,605	1,548	1,368	126	65	..	5,712
Wellington	1,449	3,168	1,203	79	2	..	5,901
Picton	62	10	..	..	..	..	..	72
Blenheim	147	3	11	..	..	..	161
Lyttelton
Dunedin	131	106	15	..	..	..	252
Bluff	248	1,090	208	18	..	..	1,564
Totals	72	4,983	6,986	3,827	649	105	..	16,622
Percentages of totals	..	0.43	29.98	42.03	23.03	3.90	0.63	..	..

Tow.

Port.	First Grade.	Second Grade.	Third Grade.	Condemned.	Total.
	Bales.	Bales.	Bales.	Bales.	Bales.
Auckland ..	..	364	580	106	1,050
Napier ..	..	13	..	..	13
Foxton ..	489	856	201	..	1,276
Wellington ..	324	647	420	19	1,410
Picton ..	..	34	..	..	34
Blenheim ..	86	10	..	..	96
Lyttelton ..	..	..	..	..	..
Dunedin ..	..	101	..	1	102
Bluff ..	..	227	362	28	617
Totals ..	899	1,982	1,563	154	4,598

Stripper-slips.—Auckland: First grade, 5; second grade, 9; condemned, 3. Napier: Second grade, 9. Foxton: Second grade, 419. Wellington: First grade, 149; second grade, 131; condemned, 3. Blenheim: Second grade, 21. Dunedin: Second grade, 45. Bluff: Second grade, 35; condemned, 2.