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CONTENTS:

	PAGE
Fruitgrowing in New Zealand. By J. A. Campbell, N.D.H. (N.Z.)	61
Superior New Zealand Plants Suitable for Cultivation. By B. C. Aston, F.N.Z.Inst.	66
Farm Forestry. By Norman Hall	77
Examination Papers (November, 1930) ...	88
Plant-Recording	92
National Flower Societies in Great Britain	93
Institute Notes	94

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No. 3

FRUIT-GROWING IN NEW ZEALAND.

BY J. A. CAMPBELL, N.D.H. (N.Z.),

Director of the Horticulture Division, Department of Agriculture.

(Concluded).

THE ORGANISATION OF THE INDUSTRY.

Apart from the Department of Agriculture, which has afforded the fruit industry a very great deal of assistance practically from its inception, including the maintenance of a staff of Instructors in the different fruitgrowing areas, the industry is organised and controlled by two major organisations that have arisen from within the industry itself, namely, the N.Z. Fruitgrowers' Federation, Ltd., and the N.Z. Fruit-export Control Board. The former, which, as the name implies, is a federation of district fruitgrowers' associations, came into active operation in the year 1912, and has gained in strength and importance year by year since that time; the latter was established in the year 1924 following the enactment of legislation by the Dominion Parliament in the form of the New Zealand Fruit Control Act.

Although fruitgrowers' co-operative societies established in connection with the grading, packing, and marketing of fruit have only been moderately successful, there is a general desire among fruitgrowers throughout the country to work otherwise in co-operation, and in consequence one or more fruitgrowers' associations exist in every district in which fruit is produced. These societies, which are all duly registered under the Industrial and Provident Societies Act, are established in harmony with the general organisation scheme which recognises the Federation as the parent body. Such local associations meet periodically for the purpose of discussing problems affecting the fruit industry that may arise from time to time, particularly those having special local significance.

The Articles of Association of the New Zealand Fruitgrowers' Federation provide for annual provincial fruitgrowers' conferences and a Dominion conference. Consequently once a year all associations within each province appoint delegates to attend their respective provincial conferences. Each provincial conference appoints

the provincial delegate to the Dominion conference, and in addition considers the Dominion conference order-paper, and where it is considered desirable, directs the provincial delegates as to action they are required to take in regard to any particular remit.

The annual Dominion fruitgrowers' conference is naturally held by the industry to be a highly important gathering. Not only are all matters of importance to the industry discussed and action relative thereto determined, and much instructive matter in the form of papers and addresses imparted to the delegates; but the whole working of their organisation is reviewed and the spirit of camaraderie and good fellowship within the industry is engendered.

The Federation is controlled by a Manager and a Board of Directors, the members of the directorate being drawn from the several fruitgrowing provinces. The activities of the society may be broadly divided into three sections, namely, the progress and welfare of the industry, trading, and the export of fruit. The first, which takes in general organisation work, the promotion of conferences as outlined above, the promotion of reforms and legislation in the interests of the industry, etc., represented the major portion of the society's activities for some time following its inauguration. The finances necessary to enable the society to function were secured by means of an annual tax of 1/- per acre payable by all commercial fruitgrowers in accordance with their orchard acreage. This tax is still collected by the Department of Agriculture, and the proceeds, less cost of collection, paid to the Federation, and are expended on this phase of the organisation's activities only. Although this is still a very important phase of the Federation's work, it has, from the point of view of volume, long since become quite secondary to the second and third sections—trading and export.

In trading the Federation has been highly successful, and in this direction has been of very great benefit to the fruit industry, not only in the volume of trade done on behalf of growers, both in local and indented supplies, and the advantageous prices at which these are generally made available to growers, but in the financial accommodation it can, when necessary, extend to its clients and the check against advanced prices that would no doubt obtain were the growers' own organisation not operating.

For some considerable time the Fruitgrowers' Federation wholly managed and controlled the export of fruit, but although it proved itself to be an organisation excellently situated for this purpose as far as the general handling of the business was concerned, it failed to achieve complete success owing to a weakness which, if not general, is at least common to co-operative societies, i.e., lack of power to fully control in all circumstances the commodity it has to handle and the shipment and disposal of that commodity. Under the most favourable circumstances the successful shipment and disposal overseas of one million cases of fruit is difficult enough when account is taken of the fact that there may be, as is the case in New Zealand, some 700 growers involved in the shipment of 60 to 70 different varieties, each variety having been divided into

three distinct grades, and each grade into three groups of sizes, and the whole sent forward in some forty oversea ships to several markets and numerous agents in different parts of the world; but the position becomes infinitely more unsatisfactory if on top of the whole any grower or number of growers is free to interfere at any time, and thereby upset any well laid scheme that may be in operation. Not only is such interference liable to embarrass the efforts of the forwarding organisation, but it is liable adversely to affect the interests of other shippers. When this weakness in the constitution of the Federation as the sole fruit-exporting agency of the Dominion became manifest, steps were taken by the leaders of the industry towards the setting up of a body having statutory authority to control in every respect the fruit-export trade of the Dominion.

The Government of the day agreed to the enactment of legislation along the lines required, and the movement finally resulted in Parliament passing the New Zealand Fruit Control Act, 1924, under which the New Zealand Fruit-export Control Board was established.

The Board is composed of seven members, two nominated by the Government, and five elected by growers concerned in the export of fruit. Although the Board is an independent body, and one which has adopted a progressive policy in the interests of the fruit exporters of the whole Dominion, with the exception of the Province of Otago (the exporters of which Province, taking advantage of a provision in the Act, had themselves exempted from its operations) it is really the complement of the Fruitgrowers' Federation, securing to that organisation, which, as agents of the Board, still attends to the whole of the work associated with the export of fruit as formerly, that legal authority of control which it previously lacked.

The joint operations of the Board and Federation have contributed very materially to the building up of a very sound, well organised fruit-export trade, and possibly without the knowledge of the average grower concerned has done so not only without additional expense, but have actually succeeded in effect in eliminating entirely all those costs previously incurred by the grower for this work, as the following statement will show:—

As previously indicated the export of all fruit from New Zealand, excepting that produced in the Province of Otago, is controlled by the N.Z. Fruit-export Control Board. The Board has appointed the N.Z. Fruitgrowers' Federation, Ltd., as its shipping agent. Briefly the business relationship between the two organisations is as follows:—

The Federation provides the Board with a Secretary and office staff, attends to the whole of the Board's activities from a clerical and general point of view, and provides the Board with all office accommodation.

Early in the season the Secretary, in the name of the Board, circularises all prospective shippers, calling for a general estimate of quantities each is likely to ship. In the month of December shippers are again communicated with, with a view to their making a specific statement of their requirements, and to sign space contracts accord-

ingly. Specific bookings are then made from month to month with the shipping companies. All necessary adjustments are made from time to time as to growers' quantities that may come forward in lesser or greater quantities than the bookings provide, and attention is given to the relinquishing or securing of more space as occasion demands. For the whole of the foregoing the Federation is paid the sum of £600 by the Board.

Apart from this the Federation attends to all matters arising from the hurly-burly of a fruit season. It receives, stacks, checks, holds, and delivers for export as required, all fruit coming forward by coastal steamer, railway, etc., places in cool storage all fruit that is required to be held for later shipment to different markets, handles all papers, certificates, etc., with respect to all fruit consignments; prepares bills of lading, presents papers to the Bank, and arranges freight, insurance, and advance to growers; advises the Board's agent in London and agents elsewhere of consignments going forward and mails specifications of each shipment; keeps individual growers' accounts; receives all account sales; completes each grower's account; and attends to final payments etc.

FEDERATION CHARGES.

The charge agreed upon by the Board to be made by the Federation against growers for this work is £3,000 for the first 750,000 cases, and three farthings per case for all cases in excess of 750,000.

In addition the Board provides the services of a shipping supervisor.

There are, however, other charges made against the New Zealand fruitgrowers in connection with his fruit-export trade which are frequently used by critics for the purpose of confusing the above issue. Apart from a case levy for the maintenance of the Control Board such charges are non-profit-making, and are part and parcel of the necessities of export, and come practically within the same category as overseas freights. They are insurance, wharfage, cool storage, and a district assembling charge.

Insurance is practically an unavoidable charge.

Wharfage and haulage are scale charges imposed by the several Harbour Boards, and are merely passed on.

Cool storage is adopted in the interests of the fruit, and is only resorted to in the assembling of fruit intended for markets infrequently served by shipping, or in connection with shipping delays which might otherwise arise.

District assembling charge is practically a community charge resorted to for the purpose of saving time and labour on the part of individual shippers in personally attending to the presentation of their individual consignments for inspection and shipment from local ports. Growers are relieved of this by the Federation, for which a small charge is made. If at the end of the season the charge made shows a profit, such profit is rebated *pro rata* to the growers concerned. The charge for this work is a half-penny per case, subject to rebate.

THE LEVY AND ITS EXPENDITURE.

The Control Board imposes an annual levy on fruit exported. Last season this was a penny half-penny per case, but has been reduced this year to a penny farthing.

The proceeds of this levy, apart from the securing of general information regarding export and the employment of a shipping supervisor—both facts previously mentioned—are in no way used in connection with the actual shipment of fruit, but are utilised generally for the maintenance of the Board, the maintaining of a representative of the Board in London, the payment of the expenses of a representative for the investigation of other oversea markets when necessary, advertising, and experimental work in connection with transportation, etc.

However, while considering the cost of the Board to the fruit industry, it is only reasonable to take into account any direct savings effected. An outstanding instance of this lies in the abolition of the local agent. This saving, representing threepence per case, accrues to the grower, in the shape of a reduction of the consolidated charge from a shilling to ninepence per case on the United Kingdom markets.

Now take all charges on the one hand made against the grower by the Board and Federation that can in any way be held to be for the maintenance of the Board or in payment to the Federation in connection with export, and on the other, the ascertainable, apart from the unascertainable, benefits to him, and see what the position is:—

1,000,000 CASES.

Costs to Grower:—

	£	s.	d.	£	s.	d.
Control Board levy, $1\frac{1}{2}$ d. per case	....			6,250	0	0
750,000 cases Federation charge	....	3,000	0 0			
250,000 extra at $\frac{3}{4}$ d. per case	....	781	5 0			
				3,781	5	0
District assembling levy	....			2,083	6	8
				<u>£12,114</u>	<u>11</u>	<u>8</u>

(*Note.*—The £600 paid to the Federation for accommodating the Board and the salary of the shipping supervisor and London representative are included in the £6,250 proceeds of levy. The levy is now reduced to $1\frac{1}{4}$ d. per case).

Credit to Grower:—

	£	s.	d.
Discontinuance of local agency fee of 3d. per case shown			
reduced consolidated charges from 1/- to 9d.	....	12,500	0 0
Credit balance to industry	....	£385	8 4

Thus the New Zealand grower, out of the monetary savings effected by the Board, has all his shipping arrangements attended to, some £2,000 odd worth of local assembling work done for him—

an expenditure that would be much greater were growers to attend to the work individually, all the benefits the Board has otherwise conferred, and a credit balance of £385/8/4d.

BENEFIT FROM EXCHANGE.

In addition to the foregoing, it may be pointed out that both the Board and the Federation rebate to the grower any savings which may otherwise be effected, such as insurance or other agency rebates, any benefit secured from the exchange rate ruling at the time money is being remitted, etc. On present exchange rates, allowing that 1,000,000 cases would realise in England £600,000, the telegraphic rate should amount to £15,000 in favour of the exporter. Consequently from this source alone shippers of fruit would have passed on to them on a *pro rata* basis the sum of £15,000.

SUPERIOR NEW ZEALAND PLANTS SUITABLE FOR CULTIVATION.

BY B. C. ASTON, F.N.Z.Inst.

Interest in the cultivation of New Zealand plants is being quickened by the offer of His Excellency the Governor-General, Lord Bledisloe, of a trophy valued at £25 supplemented by a gold medal from the Wellington Horticultural Society for the best competing garden in the Wellington district which makes the main feature of its display New Zealand plants.

The following advice is the outcome of some forty years' experience in growing New Zealand plants in which the writer still takes an active interest. The art of growing native plants, as they are still sometimes called, without regard to euphony or taste, will be learned in most cases by attending to several points.

The best time for obtaining the plants is when they are in their period of least growth rate and this time will be in the winter for most plants. This is, however, the very time when it is least convenient to visit either the forest or the mountains and there is the added difficulty that some desirable plants, for instance New Zealand Bluebell (*Wahlenbergia*), in winter retreat into the root, the above-ground portions dying off and becoming inconspicuous. Usually, therefore, the amateur will find that circumstances dictate that plants shall be gathered in summer or autumn and must be kept moist and transferred to some shady, sheltered, moist, and deeply dug position

in the garden to be watched while they pass through the driest period of the year, the most critical stage of their new existence. Having got the plants to a position where they can be carefully watched and the conditions controlled, the right time can be chosen to plant them out to positions which it is intended they shall occupy permanently. This time of transplanting will usually be in the winter months, but some months of residence in the nursery is desirable in order to acclimatise the new plant to the changed habitat as gradually as possible. It is generally found that small plants with large root development are the best specimens to attempt to transplant from their birthplace. A much more interesting way of proceeding would be to raise plants from seed as the development of any new plant from seed is a most fascinating subject to study, many New Zealand plants going through some extraordinary changes in leaf and growth form in their progress to maturity. This method, however, demands the use of a small cool glass house or frame, which few amateurs possess. The method of raising in pots is, with some plants, almost essential, as these require the utmost care in transplanting. A familiar instance of this kind is the Golden Tainui (*Pomaderris elliptica*).

One of the first essentials to the establishment of a native garden is deep trenching of the soil or, what is equivalent, selection of a site on which a large amount of top soil, through excavation operations, has been dumped, forming an extensive slope. All trees and wooded plants grow better on a slope, indeed it is stated by one ecologist that the absolutely flat areas of the world are treeless. Deep trenching will ensure that moisture in sufficient amounts is available for the use of the plants. In breezy situations like those near Wellington City, which supply conditions so enjoyable and healthy to plants as well as animals, it is essential that large supplies of water shall be available for the plant owing to the extra transpiration caused by the greater air-movement—controllable to some extent by shelter-belt planting—and this extra water-supply is assured by deep trenching, green-manuring, and mulching. By studying the conditions under which the plant exists in nature, the right situation in which to grow it in the garden may often be deduced; for instance, sand dune plants would probably require a sandy soil. It is probable in the case of coastal plants growing on sand that this is more necessary than salt. The Sand Convolvulus (*Calystegia Soldanella*), for instance, has sprung from seed along the Upper Hutt railway lines in the ballast brought from the coast. The salt must soon have been washed out. Therefore it is the sand and gravel which provide the desirable conditions, i.e., the right soil texture. The writer has failed to grow the beautiful *Pimelia arenaria*, a sand plant, and the soft-wooded Swamp Maire (*Eugenia*) on ordinary soil. Doubtless they could be grown, the first in a sand garden, the second in a bog, where the large clusters of scarlet fruits make it worthy of the trouble taken. In other plants the obvious conditions of water or bog for plants found in wet situations, and of shade for ferns, and tree stumps and shaded rocks for epiphytes, among which some of

the most charming of New Zealand orchids are to be found, will naturally suggest the right place to grow the plant under domestication.

In any attempt to grow alpine in a rock garden, provision must be made for watering in the dry months of the year. Even in the perpetually moist Dunedin climate, at some seven hundred feet above sea-level the most successful alpine garden was one where a perforated pipe was connected with the high pressure water-supply led along the top of the garden, ensuring that adequate moisture should always be present. A very large measure of success will be observed by paying attention to these points, but it is not meant that every desirable plant can be grown; for there are several of which, although of outstanding excellence, nothing is known of the elements necessary for success in domesticating them. The large Mountain Gentians the writer has never seen cultivated, although the coastal *G. saxosa* is easily grown. Similarly the gorgeous Mistletoe (*Elythranthe Colensoi*) or even the smaller *E. tetrapetala* is not grown. Plants under the names *Gentiana bellidfolia* and *G. cymbifolia* were advertised in George Matthews & Sons' catalogue forty years ago as pot plants. Matthews also grew the "Vegetable Sheep" (*Raoulia*) in pots in an alpine house. If anyone has successfully grown the larger Gentians of our mountains, the scarlet Mistletoes of the beech forest, the *Pleurophyllums*, *Hebe Benthamii*, *Celmisia vernicosa*, *Mysotis capitata*, with blue flowers, the rarer Ranunculuses (*R. Haastii*, *R. Sinclairii*, and *R. Buchananii*) and the Coral Plant, (*Helichrysum coralloides*) it is highly desirable that they should put their experience on record in this Journal for the benefit of others who would be glad to repeat their successes.

Attention may be drawn to the fact that in each of the native types usually grown there are superior species or varieties which are just as easily grown and which make a far better show than the common types. As instances take the two most characteristic New Zealand plants grown in gardens, the New Zealand Flax (*Phormium tenax*) and the Cabbage Tree (*Cordyline australis*). A very much better effect can be obtained by planting selected species, strains, or varieties which differ in size, colour, or form from the usual wild types grown. In *Phormium* there is available a wide range of very much better garden plants, and these exhibit great diversity in the colour, variegation, shape, texture of the leaves, and number of leaves to the fan. One gardener has taken advantage of a form of Flax with a large number of leaves to the fan by placing the plants in lines in order to make a solid wall of Flax leaves, the result resembling a paling fence; but this is an exceptional instance. What it is desired to convey is, of course, the axiom which all good gardeners follow with ordinary garden plants—not to give place in their gardens to inferior when improved strains are available and generally just as easily grown. This precept has not been grasped to the full by growers of New Zealand plants. In the case of the Cabbage Tree there are at least three species practically as easy to grow when the right conditions are chosen, and infinitely more handsome than

the common *C. australis*. These are the Toi (*C. indivisa*), the handsome species so common in the forest on the highest points of the Main Trunk Railway, and which only requires a very deeply dug soil and then can be grown in full light exposure. The *C. Banksii*, common either in dark river gorges or on dry hillsides, is another elegant species with the most graceful habit of growth and inflorescence of any species. Gauntlet's wonderful catalogue of English garden plants contains a striking picture of this plant. The hybrids of this species with *C. australis* are better than the latter parent. The unknown flowerless species which passes under the Maori name of Ti Para, found planted for its saccharine roots in old Maori settlements, is a particularly handsome plant resembling *C. australis* but with a more persistent juvenile form.

Expanding this idea of growing selected forms rather than the common wild forms, the following may be noted—taking only the most prominent examples. The Karaka (*Corynocarpus laevigata*) outstanding as a street tree, with shining leaves and large yellow fruits, is best planted in the form which botanists have not differentiated from the type but which certainly has much larger leaves and fruits. Another shrub much used in civic planting—Rangiora (*Brachyglottis*)—may be cut and trained to any position; and there is no handsomer foliage-tree in cultivation, provided one chooses one of the large-leaved forms which grows perfectly true to type in any situation. The one most usually grown in New Zealand is *B. rangiora*, which is highly ornamental, and apparently comes entirely from a few stock plants by propagation of cuttings, as it has not again been found growing wild. This is so far superior to the common wild form *B. repanda* that no one would think of growing the latter while the Rangiora was available, yet it is *B. repanda* which is commonly grown in England. A fine-leaved form worthy of planting also occurs on Mokoia Island, Lake Rotorua. The bronze-leaved form now on the market is one of the finest of New Zealand cultivated plants for colour of leaf. The re-discovery of *B. repanda* growing wild would be an interesting botanical find, as it would give some ground for maintaining the species separate from the common form. A form of *Helichrysum glomeratum* is now on the market having much larger leaves than that usually seen and being more ornamental. There is, so far, no trivial or Maori name for this plant. Of one of the plants called Akeake (*Dodonaea viscosa*) the purple-leaved form should certainly be grown.

The Wharangi (*Melicope ternata*) is a handsome plant with scented leaves, and when this hybridises with a scrubby, small-leaved species (*Melicope simplex*), more a curiosity than an ornament as a garden shrub, there is produced a swarm of hybrids from the cross and the progeny of the cross, some of which make charming garden plants quite distinct in appearance from the beautiful *M. ternata*. The group of plants known as Lace-barks, Thousand-jackets, and Ribbon-woods, of which *Hoheria glabrata* (*Gaya Lyalli*) is the finest, contains a number of handsome flowering shrubs with white flowers, and all are plants of rapid growth. A form of *Hoheria*

populnea with blue stamens is an attempt to obtain a blue colour from a white-flowered genus, and is an improvement on the usual plant. The red-flowered Manuka (*Leptospermum scoparium*, var. *Nichollsii*) is a good example of a successful attempt to change the colour from a white-flowered to a crimson-flowered shrub. The white-coloured Manuka is, however, quite a beautiful plant, although so common, but with the change to the red flower comes a welcome variety. Some of the large white-flowered forms should be selected and only these, propagated by cuttings, grown in gardens. The Manuka, it may be observed, is excellent for a nurse crop for forest trees such as rimu, kauri, etc., and may be used for a shelter-belt, being exceptionally hardy and revelling in a windy situation. The taller-growing Kanuka (*L. ericoides*) is worth experimenting with. It has a more graceful habit of growth, but the flowers are of little account. Forms from the hot-spring district of Rotorua growing in hot soil show a procumbent habit of growth. These apparently retain this habit in cultivation, and are suitable for the garden. The most notable example of an improvement which can be effected by growing the right plant is that of *Rubris Barkeri*, a discovery of Dr. Cockayne's, supposed to be a hybrid between the common Tataramoa (*R. australis*) and *R. parvus*, the latter a noble fruiting-plant which should be in every garden. *R. australis* is useful for covering up awkward parts of the garden such as stony banks or steep slopes, but *R. Barkeri* is much better for the purpose and the foliage turns a charming colour in autumn, while the whole habit is less woody and prickly than *R. australis*.

The Lancewood (*Pseudopanax crassifolium*) is a plant which is frequently grown in gardens for its remarkable deflexed leaves, changing, in its mature form, to an entirely different-looking plant. It is of quick growth and, therefore, not so suitable as the slower-growing *P. ferox*, or toothed lancewood, which is certainly more curious in the long-retained young stage and is very suitable for the small garden.

There is a wealth of species to choose from in the genus *Pittosporum*, the members of which differ a good deal in hardiness and rapidity of growth. A great favourite in Wellington should be the Tarata, *P. eugenioides*. It is not too quick in growth compared with some of the others, and has delightful foliage and yellow scented flowers in season. The hardiest would seem to be the one which grows on the volcanoes, which can only be referred to as a form of what is known as *P. Colensoi*, with flat leaves and a delightful habit of growth somewhat resembling fruit-trees. It is particularly desired to draw attention to a charming, very small *Pittosporum* shrub usually found on forest trees (*P. cornifolium*), which grows quite well on the ground, may be easily raised from seed, and never grows more than a few feet high. It provides an airy shelter for many plants desiring half-shade, and in fruit is the most distinctive of all the species. A form of *P. tenuifolium* which passes under the garden name of *P. nigrescens* is very attractive. The mystery surrounding the germination of *P. Dallii* seed will, no doubt, shortly be solved.

No difficulty was experienced by Major Stern in germinating seed from the Collingwood plants. It is undoubtedly the finest of the New Zealand Pittosporums and should be grown in every garden.

The genus *Hebe* (the woody Veronicas) and the true Veronicas have some hundreds of hybrids and species, which will be familiar in one or other of their protean forms. Of course, no New Zealand garden should fail to show typical examples of each group represented by the large-leaved purple-flowered *H. speciosa*, the whip-cord class, having no visible leaves at all, the creeping class instanced by the numerous forms under *V. catarractae*. There are very handsome blue-flowered forms grown under the name *H. Lewisii*, while perhaps the finest-coloured *Hebe* grown in gardens is a form of *H. macrocarpa* var. *latiseptala*, the flowers of which are deep violet. Alpine gardeners will have something to puzzle them in the diverse conditions required for the glorious pink-flowered *H. Lavaudiana* from hot rocks of Banks Peninsula and the extraordinary beautiful *V. spathulata* of the moist pumice of the volcanoes and other high mountains of the vicinity. *H. Bentharii* with deep blue flowers and delightful foliage has already been mentioned as a difficult plant. The writer can only suggest for it salt-sprayed peaty soil. *V. canescens*, a tiny herb with minute leaves but with a multitude of flowers abnormally large for the size of the plant, is adaptable, but needs to be carefully marked and weeded. The Marlborough Lilac, *H. Hulkeana*, is a New Zealand plant grown all over the world, and should certainly not be omitted. It has very delicate lavender-coloured flowers, and is one of the easiest Veronicas to grow. *H. buxifolia* is distinctive in foliage and worthy of a place.

The genus *Carmichaelia* has species distributed all over New Zealand, and is often grown in gardens owing to the ease with which it may be propagated from seeds or cuttings, or from plants pulled up in the scrub. It is more curious than ornamental, but if, instead of this, is planted the beautiful *Notospartium*, the curious leafless growth-habit of *Carmichaelia* is exhibited, and, in addition, in season, the splendid massed effect of bluish or pink pea-shaped flowers. The closely allied plant *Chordospartium* exhibits, even in the young stage, a delightful weeping habit with the addition of a strong flowering tendency similar to *Notospartium*. Both of these genera could, therefore, supplant *Carmichaelia* in gardens. The one *Carmichaelia* which is worth growing for its flowers is a shade plant (*C. Williamsii*), with very large pea-shaped flowers, yellowish or reddish in colour and distinctive in its broad, flat branches. The *Nothopanax* or Houhou, Five-finger, or Ivy Tree, is a favourite in New Zealand collections of shrubs. The growth-form is similar in most species, the size of the leaf being the varying factor. A species highly superior to all the others, and one which may be used instead of them, is *Nothopanax laetum*. The leaves of this species are extremely large and handsome, with a peculiar patina which is not often found on the other species with shining leaves. A variety on the market with the garden name of *Daviesii* is obtainable.

Another leguminous genus is the Kaka-beak, *Clianthus*, which must certainly be grown in both its scarlet and cream-coloured flower varieties, either of which comes true from seed. A tree with handsome foliage, which can readily be grown from small seedlings taken up in the forest with the nut attached, is the Mangeao, *Litsaea*, offering a contrast in foliage to any other tree in the flora and readily grown under Wellington conditions. The Pimelias, closely allied to the Daphne and similar to it in the scented nature of the flowers, supply handsome shrubs which may be grown under sheltered conditions. The best is *P. longifolia*, which is sometimes sold as cut flowers in Auckland. There are several other species, some of them erect and others scrambling in habit, the latter being most valuable for the rock-garden, producing blue berries which attract native birds.

A flowering shrub that has been neglected is the giant Rata found in the North Island forests. This species, which usually starts life on the fork of a tree as an epiphyte, flowers at a very early stage when planted on the ground, and is easily propagated by cuttings or from seed. The closely allied Ratas and the Pohutukawas are great favourites in the gardens, but it is regrettable that the two most vivid shrubs, the Southern Rata, *Miumbellata* (*lucida*) and the beautiful Climbing Rata of the north, *M. carminea* (*diffusa*), are not as suitable as the faster-growing ones for Wellington gardens. The ones recommended are the Pohutukawa, *M. excelsa* (*tomentosa*), the Kermadec Island Rata, *M. kermadecensis* (*villosa*) and the Giant Rata (*M. robusta*), the last named being easily propagated from cuttings; and for the rock-garden, the yellow-flowered *M. scandens* (*florida*). The more vivid Rata *M. umbellata*, of the South Island is very slow-growing, and on garden soil the flowering is likely to be postponed for years.

The New Zealand Myrtles belong to a remarkable genus, represented by three or four species in New Zealand, of which, some hybridise readily and some are of extremely slow growth. There is a pretty, bronze-leaved variety of a *Myrtus* hybrid with small leaves on the market, *M. bullata*, which is faster in growth than the smaller-leaved species and has highly decorative bronze foliage and fairly large white flowers, should always be grown.

Mesembryanthemum, a glorious South African genus suitable for dry situations, is represented in New Zealand by two species, the commoner of which (*M. australe*) seems to be difficult to cultivate. Curiously enough, the rare one (*M. aequilaterale*) from Castle Point is more easy to grow.

The Southern Beech, *Nothofagus*, affords such a bewildering variety of beautiful forms that any of them should be welcome in gardens. The difficulty is to restrain those who would pick branches off them for house decoration from crippling the plant in its young stage of growth, as the foliage is so highly sought after and lasts so long in water. The best species are the large-leaved true *N. fusca*, abundant in Otago and some of the higher mountains of the North Island, the lowland Wellington species, *N. truncata* and *N. Solandri*, and the common sub-alpine, *N. Menziesii*. It is quite possible that this

genus may be propagated from cuttings, and the writer has experiments in hand to test this point, using various media as soil.

In the noble *Phyllocladus*, or Celery Pines, which are easy to cultivate, pride of place should be given to what Sir Joseph Hooker called the most beautiful of all New Zealand Pines, *P. glauca*. This species has the merit that it never becomes a tree, merely a sapling, and is, therefore, eminently suitable for small gardens, whereas the more commonly planted *P. trichomanoides* becomes a forest tree from which planks can be cut. This is, indeed, one of the most valuable trees in New Zealand economically, and scientific forestry has possibilities here in experimenting with the growth of a fairly rapid forest-tree with a view to its economic utilisation. The Tawhero (*Weinmannia racemosa*) has a sister species (*W. sylvicola*) which is far handsomer in its juvenile form and, therefore, should have preference. There are several species of *Pomaderris* grown in gardens, but *P. elliptica* is the best owing to its bright-yellow flowers.

In the Kowhai (*Edwardsia* or *Sophora*) a number of species and varieties are obtainable, some of them retaining a curious but unattractive juvenile form for a number of years and being, therefore, likely to be disappointing to the small gardener. The species known as *E. tetraptera*, or the North Island *E. microphylla*, are the most suitable for the small garden. A variety from Nelson for which Cheeseman tentatively proposed the name *Treadwellii* has very beautiful minute leaves and large flowers. It is quick in growth and goes through no juvenile form.

In composite shrubs there are so many beautiful plants embraced under the name "Daisy Tree" that in deciding what to grow it is difficult to make a selection. They are combined under two genera, *Olearia* and *Senecio*. In the first the flower-heads are white or coloured, and in the second generally yellow, and are two showy garden plants; but in either genus there may be a suppression of the showy part of the flower, in which case the plant is grown for attractive foliage or scent. Under *Olearia arborescens* (*nitida*) will be found a number of forms, possibly hybrids, but certainly derived from several diverse habitats, some forms perfectly hardy in the open border, others requiring shade and moisture, but all very free-flowering, so that from a floral viewpoint this species must head the list. Then there are some strictly shade plants whose beauty is chiefly shown in the large handsome leaves (e.g. *Senecio Hectorii*). The group which must be represented is the macrocephalous (large-headed) *Olearias*, chiefly sea-coastal shrubs of high merit, from the Bluff, Fiords, and Chatham and Stewart Islands. These revel in a deep, rich, salty soil with full exposure to the sun. They are *O. Chathamica*, *O. semidentata*, *O. angustifolia*, *O. operina*, and a hybrid *O. Traillii*. For the rock-garden *Pachystegia insignis*, from the dry Marlborough district, will be delightful; and of the group embracing *O. Hectori*, *O. virgata*, *O. odorata*, and *O. fragrantissima*, the last is certainly the best. It is generally deciduous and finely

scented when in flower, but is remarkable for its delicate foliage and a beautiful habit of growth as well.

Some very fine, free-flowering, yellow, dwarf shrubs are to be had under the names of *Senecio Greyii*, *S. laxifolius*, and *S. custii*, a garden name, of which the first is the best for the border; while in dwarf rock-plants (*S. compacta* and *S. Monroi*) the first is the more charming in foliage and general habit. *S. perdicoides* is a handsome, scented foliage-plant which should certainly be grown. There are also some sticky-leaved dwarf shrubs found at four or five thousand feet in the mountains, *S. Adamsii* and *S. revolutus*, which do not seem particularly happy under Wellington conditions at or near sea-level. *S. rotundifolius* is a useful hedge and border plant with very distinctive foliage, which is so leathery that the white under-surface may be and is used as a post-card by visitors to Stewart Island. In Wellington gardens composite shrubs will often suddenly from an apparently healthy condition display wilting foliage without obvious reason, and finally die. The leaves drop as if drought-stricken, while the soil is quite moist. Under these conditions, if desired to save the plant, cuttings should be taken, and it is usually found that they strike easily, the parent plant invariably subsequently dying, probably due to some grub at the root.

Other shrub plants which may be grown for foliage or flowers are the Kawakawa, *Macropiper excelsum*, of distinctive habit, the best form to grow being the variety (*M. psittacorum*) from the Poor Knights Islands, with very large leaves. The Mahoe (*Melicytus*) species are useful plants, having scented, though minute, flowers. *M. lanceolatus* is distinctive. The Fuchsias range from a climbing *F. procumbens*, with very large fruits, suitable for covering shady rock, up to the well-known tree (*F. excorticata*), such a good host for climbers—*Clematis*, *Parsonsia*, *Rubus australis*, *Muehlenbeckia*. It is certainly a representative New Zealand tree, and should be found in any collection of natives, being quick-growing and suitable for any exposed situation. The magnificent Whau, *Entelea*, or Cork Tree, is highly decorative as a foliage shrub, easily raised from cuttings from any wooden part of the plant, and may be grown in full exposure and pruned drastically.

Of the *Coprosma*, the best to grow are *C. lucida*, *C. robusta*, and *C. australis* (*grandifolia*). There are about twenty others, some of them quite distinctive in foliage (*C. linariifolia*), but the first three will sufficiently represent the genus and provide a fine show of coloured berries of which the birds are very fond. Under the Broad-leaf (*Griselinia*) there are two species, one very useful for hedge plants (*G. littoralis*). Where a decorative effect is aimed at, the very large-leaved epiphyte (*G. lucida*) should be used, as it grows readily on the ground. *Suttonia*, embracing plants known as Matipos, contains a range of very diverse plants and if a number of the charming *S. nummularia* individuals are grouped together the delightful blue fruit will reward the cultivator. The shrub tree *S. salicina* has finely-coloured young leaves, and there is the common Matipo

(*S. australis*). The others are merely divaricating shrubs of uncompromising habit.

The better types of plants, the brozen-leaved varieties and the rarer plants, will in most cases have to be obtained from nurseries, two of which, one in the North Island and one in the South, issue special catalogues dealing with New Zealand plants for sale. The average price of these well-rooted and often pot-grown specimens is between two and three shillings each; but it should be pointed out that most New Zealand plants root readily from cuttings, and if garden-circles for amateurs are formed in different localities cuttings can be exchanged, which will minimise the cost of obtaining a representative collection of beautiful New Zealand plants.

OUTSTANDING FOLIACEOUS HERBS.

There are a number of noble foliaceous herbs which are found in littoral situations, mostly on peaty off-islands. The finest of these is the Chatham Island Forget-me-not, often miscalled a Lily, though it is nothing like one, *Myosotidium hortensia* (*nobile*) with giant leaves and huge cymose stalks showing white, pink, or blue flowers. When properly grown in deep soil with plenty of decayed vegetable matter the leaves and flower-stalks are often two feet tall, with the leaf blade one foot in diameter. The flowers give to the New Zealand garden a touch of colour quite desirable in a flora distinguished by the rarity of colour in its wild plants. Allied to this beautiful plant are some smaller *Myosotis* species with yellow flowers, worth growing in the alpine garden. *Arthropodium cirrhatum*, having the local name of Mabel Island Lily, abundant on that island in Pelorous Sound, is now being grown in gardens for its foliage and flowers, but a more desirable taller plant with larger flowers is found on the Poor Knights Islands, and should be grown in preference to the local plant found round Wellington coasts and islands. *A. candidum* is a charming small grass-leaved herb suitable for hanging baskets or shady rock-work, and is to be found growing in many localities near Wellington. *Stilbocarpa* is a genus of araliaceas, plants with enormous highly ornamental leaves. The Snares Island plant *S. robusta* is well worthy of cultivation. The flowers are small, but the general habit resembles that of the gigantic Brazilian *Gunnera*. Allied to *Stilbocarpa* are the spear grasses of New Zealand, which owe their survival from the attacks of animals to a rigid prickly habit, but are, nevertheless, highly decorative. The best of these are *Aciphylla Colensoi* and *A. squarrosa*, the latter being the most easy to establish and common on the shores of Cook Strait. The smaller species are, however, highly attractive on the rockery with their palm-shaped leaves. There are some recently described species no doubt worth growing, as the whole genus is highly decorative and unusual in the habit of growth. Some should certainly have a place in any New Zealand garden striving to present typical plants of the country. *Sonchus grandifolius*, the Chatham Island sow-thistle, has very large handsome leaves, and is distinctly a decorative plant, and easily grown in deep soil.

Senecio Turneri is another fine foliage-plant which might be grown in damp, dark situations, near the water-garden. *Angelica* has two handsome foliage-plants, the one most easy to grow, and which in the Ruahine Mountains covers yards of pumice by the river beds, is *A. rosaefolia*. In the writer's garden it has been found useful in covering almost vertical situations with attractive foliage. *A. gingidium*, the native anise, is a pretty plant with no tendency to scramble.

Plantago is not usually considered a garden genus, but the New Zealand species with characteristic rosettes of unusual shape and hairiness, fill crevices in rock-work without difficulty. *Craspedia* is a genus of similar habit, but with soft, hairy, scented leaves, the larger varieties of which are quite worth growing.

Astelia, known as Captain Cook's Birds' Nests, possess some fine plants almost rivalling the *Phormium* in distinctiveness. They are best grown in the shade, equally well on the ground or as epiphytes on trees or rocks.

Coriaria, the poisonous tutu, must be represented by one of the species, all of which are handsome, but the herbaceous fern-leaved *C. angustissima*, which grows on Mt. Holdsworth, will certainly repay efforts to domesticate it. *Elatostema*, one of the outstanding foliage-plants of the flora, is always found growing in a drip of water and will ornament any creek side, preferably one having a wet wall. It does not mind exposure if water is abundant, but the leaves are naturally larger in the shade. *Calceolaria Sinclairii*, now referred to the genus *Jovellana*, is easy to grow and is more a foliaceous plant than a floral one. The charming little *C. repens* requires, like *Elatostema*, a dripping wet habitat.

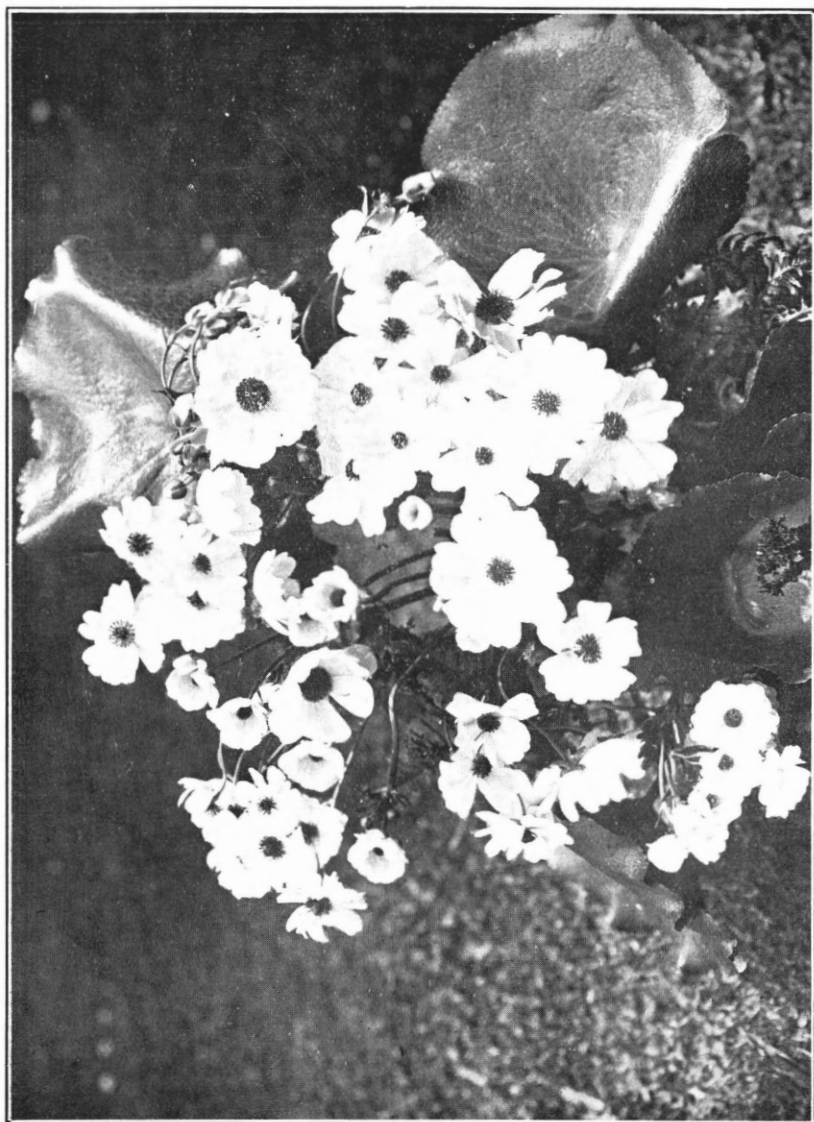
OUTSTANDING FLORAL PLANTS.

The marvellously beautiful Mt. Cook Lily (*Ranunculus Lyalli*) must head the list, but is too well known to dwell upon. *Alseuosmia*, "Scent of the Woods," must certainly be grown. *A. macrophylla* is likely to prove the finest in cultivation, but must be grown in the shelter of manuka or other taller growth. The local Tararua plant is small, and has inconspicuous flowers, although, like all the species, it is sweetly scented. The genus *Celmisia* is a regal group of plants which must be represented. Fertile seeds are obtainable from the Dunedin district, and the most successful attempts are likely to be made from seed. Those experimenting with this genus for the first time should obtain a supply of *C. spectabilis* from the Tararua Mountains, and certainly *C. Lindsayi* from Otago sea cliffs, which is quite hardy in Wellington hill gardens in the open border and easily propagated from cuttings.

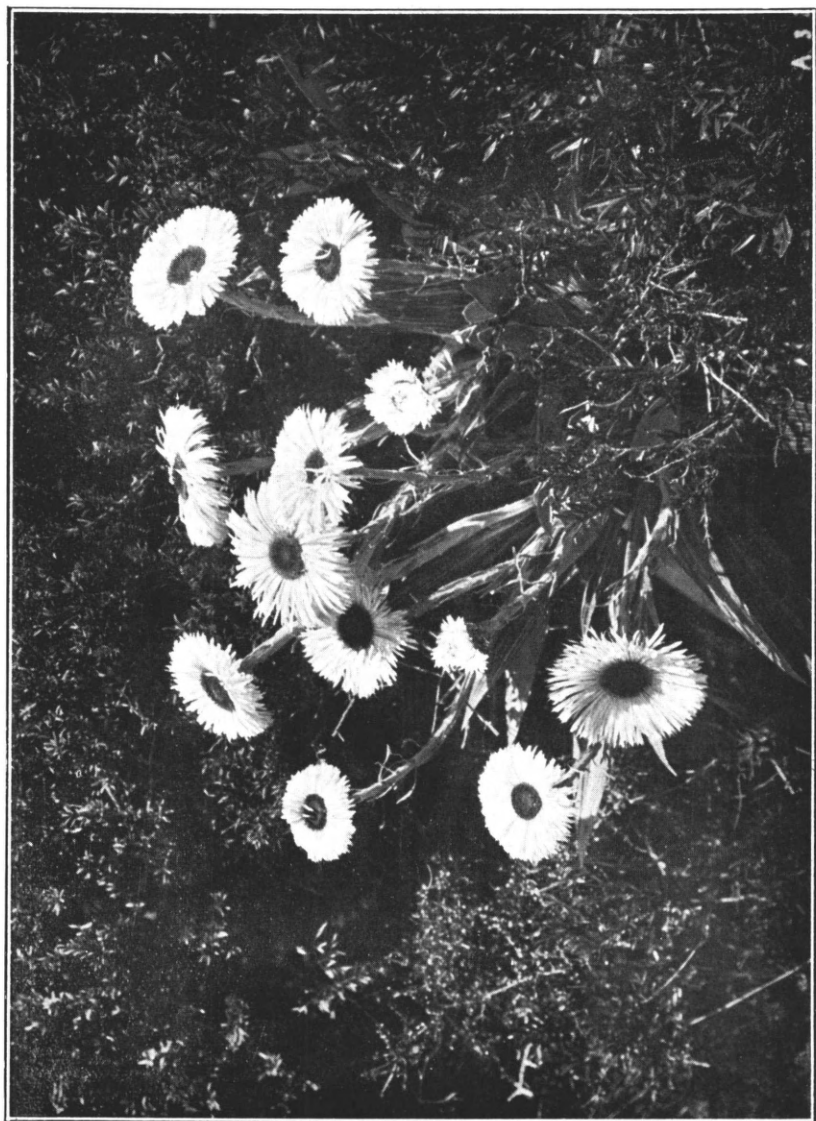
Ourisia contains some outstanding plants from the mountains of the South Island, and also quite good plants from the North Island uplands. *O. macrocarpa*, var. *calycina*, should certainly be grown if possible. *O. macrophylla* is easily grown from seed and does quite well in the herbaceous border. *Herporhizon* is a charming small



Hoheria glabrata.



Ranunculus lyallii.



Celmisia coriacea.



Cordyline indivisa.

liliaceous plant with blue and white flowers suitable for the bog-garden, where also *Chrysobactron Rosii* (*Bulbinella Rossii*) of the Southern Islands with its large yellow heads of flowers is worthy of a place. *Senecio saxifragioides* and *S. lagopus*, with yellow daisy-like flowers, prefer crevices in a damp wall. The latter species is obtainable about Cook Strait. *Linum monogynum* is easy to grow and has charming white flowers; but a blue-flowered variety from the Chatham Islands should be obtained. The relief of the New Zealand flora from the accusations of lack of colour in the flowers must certainly be combatted by the selection of those plants which show useful floral variations exhibiting a departure from white flowers.

Creeping plants which should be grown for their coloured flowers on the moist rock-garden are *Mimulus repens*, with charming blue flowers, a plant which possibly requires salt; *Mazus pumilio*, large white flowers with a violet spot, easily grown; *Epilobium*, with white or pinkish flowers, many fine species are available; *Convolvulus* and *Calystegia*, with white or pinkish flowers, several species; *Claytonia* with white flowers; *Leucopogon Fraseri*, a little heath with strongly scented yellowish flowers; and *Geranium Traversii* of the Chatham Islands, with pink flowers and silvery foliage. *Hibiscus trionum*, a black-and-yellow-flowered herb or small shrub, is being well spoken of by English gardeners.

(To be continued).

FARM FORESTRY.

BY NORMAN HALL.

(continued).

I. ESTABLISHMENT.

Using the above term comprehensively, we include all operations from the preliminary clearing of the planting site to the final steps involved in securing a full stocking. It is one of the most straightforward steps in forestry.

Classification of Methods of Reproduction:

A. Natural regeneration from seed.—This requires the presence of seed trees on the site and has little application in New Zealand at present. It may be of value in established eucalypt plantations.

B. Artificial.—(1.) *Seeding*.—This implies the direct sowing of the seed in the permanent site and is suited to a few species difficult to transplant. So far as farm forestry is concerned it is of

limited application, besides suffering from the disadvantage of slower establishment. When a species grows very slowly during the first few years of life it is usually better to raise the plants in nurseries where they can secure the weeding and other attention essential to the production of vigorous young plants. With "seedling" *in situ* there is usually a big loss by drought, mice, birds and insects.

(2.) *Planting*.—This is doubtlessly the best way of establishing forest growth, be it farm woodlot, or a hundred-thousand-acre plantation. In shelter belts one is able to use two- or three-year-old plants and thus secure a great initial advantage over any other means of reproduction. Planting is especially suitable for establishing growth in exposed sites, on poor soils, and above all amongst rank growth where artificial seeding is seldom satisfactory. There are several methods of planting, but the two that I am about to describe should fulfil most wants.

(a) *Notch Planting*.—In this method the planting spade is driven perpendicularly into the soil, and then pulled back so that a plant can be inserted between one side of the "notch" and the back of the spade. Care should be taken to ensure that the roots are straight and not twisted. The spade is now withdrawn and the sides of the slit closed with the heel of the boot. A better method is to make one slit first, and then another at right angles to it, so that a cross is formed. The young tree is inserted at the "centre" of the cross and the four corners firmed with the heel. It is essential in all methods of planting that the young tree be set in the soil at about the same height as it was in the nursery and that the soil be properly firmed, with no air spaces around the roots. If a grass turf be present it should be skimmed off with a *shallow* cut of the spade.

By this method good men can plant 1000 to 1500 trees a day under favourable conditions. This method is most suitable for light or pumiceous soils and for areas clear of dense vegetation, and for small plants, e.g. seedling *Pinus radiata*.

(b) *Pit-planting*.—This consists in making a pit not less than eight-by-eight inches, and chopping up the soil in it. The tree is planted in the centre of the pit, which should vary in size according to the size of the tree to be planted. This is the method which should be most commonly used for farm forestry. A good man can plant 400 to 800 trees per day according to the nature of the soil, type of surface cover, and so on.

(c) *General*.—The general planting rules of the State Forest Service are given below:—

1. Plant the tree no deeper than it was when in the nursery.
2. Place the tree in the centre of the pit so as to allow the roots an even chance all round. In very exposed places the young trees should be placed against the solid earth on the side of the pit opposite the prevailing wind.

3. Plant the tree in an upright position with tap-root going straight down and lateral roots spread out and not bunched together or bent.
4. *Never allow the roots to become dry or even have the appearance of dryness.*
5. Work the soil first gently in about the roots, then firm it well by tramping the surface.
6. Care must be exercised to avoid damaging or barking the stem when firming the soil round the planted tree.
7. Use only sturdy, well-rooted plants.

2. NURSERY PRACTICE.

The young trees may be either grown by the farmer or purchased. Nowadays, with the satisfactory standard attained by nurseries it is usually more satisfactory to purchase small lots of plants. However, when larger quantities are required for plantations they can usually be raised more cheaply on the farm. A well drained, deep, moderately fertile, sandy loam is best suited for a forest nursery site. The area should be level or nearly so, but not so that flood water remains after rain. The soil should be well prepared some time before seed-sowing, especially if it has not been worked before. If necessary, manure may be added, but not in excessive quantities. On no account should large amounts of artificial forcing manures, as sodium nitrate, be used. Farm-yard manure, if used, should be well rotted and dug well into the soil some months before seed-sowing. Of the artificial manures superphosphate has been found satisfactory. The most suitable time for seed-sowing varies from October to December according to the locality. Allowance must be made for danger from late frosts or from summer droughts.

(a) *Seed-sowing*.—For small scale production, the seed beds should be four feet wide and in lengths of twelve feet or multiples of twelve. Intermediate paths should not be less than two feet wide.

Within the beds the seed should be sown in strips eight to nine inches wide, with four feet six inches between adjacent strips.

The beds may be marked off by a plank of suitable size, but in large nurseries it is done with a roller suitably marked. When the seed is sown it should be covered by an eighth to a quarter of an inch of fine soil which has preferably been passed through a sieve. These beds should be covered by frames four feet by twelve, and about ten inches deep, covered with scrim, with or without a fine netting under the scrim. The bottom of the frame should fit snugly on the soil so that birds and mice cannot gain access.

(b) *Hardening Off*.—The frame may remain in situation until the seedlings are about two inches high, when they should be "hardened off." This is the term applied to the process of gradually accustoming the plants to doing without shelter. This is commenced by lifting one side of the frame about an inch and propping it in

that position. The side lifted should be away from the sun, and the first day should be a mild one, as it must be remembered that the seedlings have been grown under protected conditions and hence are somewhat tender. The frame should be let down at night; but later on, during mild weather, it may be left up. It should be lifted first on one side and then on the other, so that all the seedlings are hardened off. The whole process will take about three weeks, and the frames may be finally removed during a spell of mild weather.

In the less severe parts of New Zealand hardy seedlings such as *Pinus radiata* can be grown in beds or in drill-sown rows about ten inches apart, in the open, doing without any shelter. In this case the nurseries usually need watching during germination of the seed to prevent loss by birds; hence it is a method more suited to extensive nurseries where millions of trees may be raised annually. A Planet Jnr. can be used for this type of seed-sowing.

(c) *Wrenching*.—Apart from any necessary weeding the next process in the nursery consists in "wrenching." This consists of cutting the tap-root of the young seedlings with a *sharp* spade, so as to encourage the free development of laterals so essential in successful tree planting. Practically all plants at first send down a vigorous tap-root with but few laterals. They are quite unsuited for transplanting, and much of the heavy mortality many farmers experience from home grown seedlings may be attributed to lack of proper wrenching. In wrenching, the tap-root is severed, four to six inches below the surface of the ground, with a spade inserted from the side of the seedbed at a suitable angle. The spade must be sharp, and the actual severance of the tap-root done quickly, so that the roots are cut, and not bent or bruised.

The first wrenching, which is by far the most severe on the young plants, should be done in mild, damp weather in early autumn. Wrenching should be done from both sides of the strips when the seed is sown in beds as previously mentioned. But when sown in rows wrenching from one side is enough, but the second wrenching should be done from the opposite side. The second wrenching should follow three to four weeks after the first, depending on the growing weather during the interim. When cold winter weather is experienced a final wrenching about a fortnight before the plants are transferred to the plantations is sufficient, but in the milder districts of the North Island more wrenchings will be necessary. This completes the procedure in the production of seedling stock.

(d) *Pulling and Puddling*.—Plants should not be taken out of the nursery or "pulled," longer before planting than necessary. In dealing with shelter-belts and woodlots, plants should be placed in their final situations the day they are pulled, and in small plantations they should not be out of the ground more than two days. Immediately before "pulling," the soil should be broken by inserting the spade, as in wrenching, and giving the handle a short, sharp pull down, so as to slightly lift the seedlings. The plants are now pulled by hand, and tied in bundles of twenty-five to fifty, according to the

size of the plants. Flax (phormium) is suitable for tying, and the knot should be one which can be readily untied by pulling one end of the flax. When the bundle has been tied, all long straggly roots should be *trimmed* off with an old pair of sheep shears, or it may be done immediately prior to "puddling." This does not imply severe root-pruning. Immediately afterwards a slight hollow should be scraped in the soil and the roots of the bundle placed therein and covered by soil. When the required number of plants have been "pulled" the bundles should be collected to a central depot and "puddled." This consists in dipping the roots into a muddy mixture about the consistency of gruel. The object is to cover all the roots with a thin film of mud, and care should be taken to see that this is done. Large bundles frequently prevent the inner trees from receiving a proper coating of puddle. The puddling may be done in a kerosene tin for small lots, or in a half-barrel for large scale operations. The puddle should be kept at the proper consistency by constant mixing and any necessary addition of further water or mud. The puddle can be prepared from any fine, clayey loam, and it should be of such a consistency that it will not wash off the roots, but at the same time be thin enough to reach all the roots in the bundle. After puddling, the bundles may be packed in kerosene cases and taken to the planting site. In the case of plantations where all the stock is not to be immediately used, the bundles should not be left in the boxes but "heeled in." This consists in digging a shallow trench, placing the bundles therein and covering the roots with soil. The roots should never be unnecessarily exposed or allowed to dry.

(e) *Production of Transplants.*—When plants are to be carried over for another year or two in the nursery, they should be removed from the nursery beds to transplant lines during favourable weather in *early* spring, before the new season's growth has commenced. The process of transferring the seedlings is known as "lining out." The seedlings should be placed in rows, ten to twelve inches apart, with two to three inches between adjacent plants, the exact spacing depending on the species and type of plant being produced. Closer spacing would be suitable for two-year-old *Pseudotsuga Douglasii* (Douglas Fir), but the wider spacing would be needed for three-year-old *Cupressus Lawsoniana* (Lawson Cypress). The process of lining out may be done by either one of two methods. The prevailing method in New Zealand is first to rake the soil to a fine tilth, and then stretch a wire guide line along the proposed row. The worker then takes a bundle of seedlings in the left hand and a straight edged plasterers' trowel in the right hand. The trowel is inserted perpendicularly against the guide wire and the blade part at an oblique angle to it, and pulled back so that a seedling can be placed in the slit made. The trowel is now withdrawn and the soil firmed against the seedling by the toe of the left boot. The space must be of sufficient size to permit of the roots of the seedling being set straight and not twisted. This is of vital importance, and the principal weakness of this method of transplanting is the liability of twisted roots.

A method little used in New Zealand, but extensively used abroad, is to carry out the operation by means of a transplanting board. In its simplest form this is a board, about six by one and five feet long, with notches cut into one edge and corresponding in spacing to the spacing of the seedlings in the rows. The seedlings are strung in these notches and held in position by a string or small strip of board. The transplanting board is now placed over a trench prepared for it and the soil is filled in and firmed, then the string or strip holding the seedlings in the transplanting board is released and the board is withdrawn. Carefully carried out there is less danger of twisted roots by this method than by the method prevailing in New Zealand. On the other hand it is slower, but capable workers are said to be able to transplant five thousand to seven thousand seedlings in an eight-hour day. If the transplanting is done in mild moist weather the mortality should be not more than one or two per cent. The Planet Jnr. is an excellent tool for cultivating between the rows of transplants. Wrenching will be needed in the autumn as previously described for the seed beds.

(f) *Trayed Plants*.—There are some species, such as many of the eucalypts and *Cupressus macrocarpa*, which will not readily transplant bare rooted. The best procedure with such species is to plant them from trays, especially when small numbers are being dealt with. Excellent trays can be made from kerosene cases or boxes of similar size. Such cases are divided so that the two largest sides form the bottoms of the two trays secured. Trays can also be made from half kerosene tins with drainage holes punched in them. The bottoms of the trays are covered with a thin layer of straw for drainage purposes, and on top of it is placed three to four inches of fine, loamy soil, which should be shaken down before the seedlings are placed in it.

"Pricking out" or transferring the seedlings from the nursery beds to the trays should be done as soon as the seedlings are large enough to handle—say when about an inch high, or two to four weeks old, according to type. When only small quantities are being dealt with pricking out should be done in mild, damp weather in a sheltered place such as an old shed. A hole is made for each small seedling with a wooden peg of suitable size, and the soil is firmed around the stem of the seedling with the fingers. If any seedling has developed a very long, thread-like root which cannot be straightened out in the hole, it should be pinched off to a suitable length. When a few hundred plants are being raised, or in dealing with delicate species, the seed may be sown in trays and pricked out from them to other trays.

These trays may be watered after pricking out, and they should be placed on battens laid on the ground to prevent the bottoms of the trays rotting. They should at first be covered by frames, and subsequently hardened off as previously described.

About a hundred and ten seedlings can be readily grown in a tray made from a half kerosene case. To ensure regular spacing in

the trays the firmed soil should be marked off by lightly pressing a marking board on the surface. An excellent board can be made from a three-quarter to inch piece of timber which will just fit in the tray and which is studded by three-inch nails regularly spaced and evenly nailed. The head of each nail forms a slight depression marking the correct position for a seedling. When planting takes place each plant should be cut out of the tray with a sharp knife so that a small block of soil surrounds the roots. Care should be taken that the soil around the roots is not unnecessarily loosened.

3. PREPARATION OF THE PLANTING SITE.

A very important and often neglected point is the proper preparation of the planting site. This need not necessarily be very elaborate, but varies with the species and type of plant used and the vegetation present on the planting site. When the native vegetation is short fern and tea-tree (*Manuka*), and hardy plants are being used, sufficient preparation consists in thorough burning of the site during the summer previous to planting. When a thick sward of grass is present the problem is different, since few seedlings, or even transplants, will thrive under these conditions. In such a case it is best to plough the area as long as possible before planting, so that the turf will be at least partially rotted. If this is not possible a *shallow* furrow may be ploughed and the trees placed in the bottom of the furrow. When the ground is not ploughable it is necessary to skim off the turf around each plant site. In the case of shelter belts it is best to plough a strip four inches wide for each row of trees, so that the grass will not readily smother them. Ploughing is not essential or even very advisable in the case of woodlots and plantations where no grass sward is present. Rough vegetation such as fern should be burnt, and gorse, broom, tea-tree, etc., cut and then burnt.

4. EARLY CARE OF PLANTATIONS.

It is essential that the planting sites be fenced against farm animals, and rabbits and hares must be killed. Hares are especially harmful, as a single hare may bite off hundreds of young plants in a short time. Where rabbits are numerous, poisoning, followed by intensive trapping and digging out, will soon clear the area.

Attention after Planting.—All plants must be kept reasonably free of weeds during the early years of their life; this is especially the case with species such as eucalypts and most of the pines, which demand full light for successful growth, but less so with species such as *Sequoia sempervirens* (Redwood) and *Pseudotsuga Douglasii* (Douglas Fir), which will thrive in moderate shade. In the case of plantings on ploughed sites, little attention should be needed other than perhaps filling in any blanks. With species such as *Cupressus Lawsoniana* (Lawson Cypress) planted for shelter, more rapid growth will be ensured by cultivating the soil around the trees and using a little fertiliser such as superphosphate. When a rapid growth

of rank vegetation such as bracken fern threatens to suppress the trees it is necessary to cut the fern in lines so that each plant is opened up. The number of times which the fern needs cutting will vary with the growth of the fern and the type and species of tree used, but one or two openings a year for the first two or three years is usually the maximum required.

5. TENDING.

"Tending" covers the period between the establishment of a wood and the time when it is finally cut over. It is concerned with the regulation of the state of woods during the growth of the constituent trees. The great importance of tending in the production of a wood is brought out by Schlich in Vol. 3 of his *Manual of Forestry*, p. 274:—

"To sow or plant an area is a comparatively simple business when once the most suitable species has been selected; the process of natural regeneration requires considerable skill; the most important work of the forester is the application of a suitable method of tending and especially the method of thinning from the completion of the process of regeneration to the time when the wood is ripe for final cutting. The tending must be so arranged that throughout life each tree receives just that growing space which produces the most profitable results according to the objects of the proprietor."

One forester can direct establishment operations over very extensive areas, but tending demands personal attention.

With shelter belts there is practically no tending except a little cutting-back or pruning so as to encourage denser lateral development. Some species such as Lawson Cypress stand this treatment much better than others such as the majority of pines, while little advantage is gained by cutting many of the eucalypts. It is a good practice to tar the end of living branches which have been pruned back, and such work should preferably be done in winter.

Tending as a branch of forestry is more intimately associated with woodlot and plantation practices than with shelter belts.

(a) *Pruning*.—This is rarely needed in the case of eucalypts, but may be beneficial in coniferous woodlots and plantations, when the removal of *dead* lateral branches ensures that the future increment on the pruned portion of the tree is knot-free. Speaking generally it may be said that no pruning of living branches should be done (other than in shelter belts).

Let us consider the case of a plantation of *Pinus radiata* spaced about eight by eight feet. For a few years after planting, the young trees stand free, but after five years or so the living branches meet. In the next few years the trees commence to form a definite canopy and the lower lateral branches die, so that when about twelve years of age an average tree is say fifty feet high, with a d.b.h. (diameter breast high) of eight to ten inches, the lateral branches being dead

on the lower twenty feet of the bole. If these dead branches are cut off close to the bole, but without damaging the living tree, the new increment laid on is free of knots and hence more valuable. Everywhere pruning is practised it is not customary to prune more than the lower twenty to thirty feet of the bole, not only because of the expense in pruning higher, but because of the fact that probably fifty to sixty per cent. of the volume is contained in the lowest thirty feet of the bole. In order to further reduce the cost of pruning, the process may be restricted to those trees which it is intended leaving to maturity.

(b) *Thinning*.—This is a most difficult subject to deal with in a short non-technical article. The views of even professional foresters frequently differ radically. Here I will give a few notes on the subject, which should be applicable to woodlots and small plantations. In larger areas it is expedient to have professional advice.

It is well known that if a pure, regularly spaced plantation be left alone the trees will grow up and commence to crowd one another, so that growth is slowed up and eventually stagnation may result. Meanwhile the crowns of the trees become smaller, and the trees themselves become less resistant to disease, strong winds, and snow damage. To ensure vigorous growth of the plantation at all times, thinnings must be commenced when crowding becomes noticeable and the lateral branches are dead on a large length of the stems. For healthy and vigorous growth it may be said, as a general rule, that a tree should have a crown a third to half of the total height. Thus when the crowns commence to become too short and small, thinnings should commence. At any thinning the following trees should be removed: All those dead, suppressed, or diseased, and as many forked and otherwise badly shaped ones as possible. If further thinning is required then better-class trees must be removed. No hard and fast rules can be laid down as to the frequency of thinnings or the intensity of operations. It depends on the species, rate of growth, locality, and class of produce desired. The degree and extent of thinnings particularly differ with the characteristics of the tree. Trees which stand a certain amount of shade and have persistent lateral branches, such as Redwood and Douglas Fir, do not require so heavy an opening-up in early youth as other species. With intermediate types such as most pines, thinnings should proceed until there is a small, but distinct opening between the crowns of adjacent trees. When the trees approach maximum height the intensity of the thinnings may be increased.

With rank light-demanders such as the eucalypts, there should be an appreciable break between the crowns of adjacent trees if they are to grow with vigour. With most species thinning should not take place when there is much grass or fern growing on the floor of the wood. This standard does not apply to light-demanders, as eucalypts, larch, etc.

6. PROTECTION.

Protection is a division of forest science which becomes of increasing importance as time passes. However, so far as the small private owner is concerned, the subject is fairly simple. The two big points which all forest growers should remember are that trees in unsuitable localities, especially on heavy, damp soils, and trees in untended, crowded woods are far more liable to disease than trees in carefully tended woods growing in a suitable environment. This applies to all causes of damage, but especially to damage by insects, fungi, wind, and snow.

Specifically the forester should guard his forest against damage by—

(a) *Animals*.—There are two divisions to this section. First of all there is the problem of rabbits and hares when a plantation is first established. It is waste of money to plant young trees when the area is infested with either rabbits or hares—even a few hares may damage thousands of young trees by biting them. When an area is overrun with these animals extensive poisoning is best, followed up by trapping and hunting any survivors. The former is referred to in the following free publications of the New Zealand Department of Agriculture:—Bulletin 110, Rabbit-poisoning with Strychnine; and Bulletin 111, Rabbit-poisoning with Phosphorised Pollard. These two papers will explain the technique of poisoning to farmers not already familiar with it. Naturally it is only during the first one or two years of establishment that protection against these animals is necessary. Fully stocked coniferous plantations lead to the natural extermination of them.

The second division is protection against grazing animals. It is astonishing that so few people fully realise the damage done to young plantations by grazing. Even in older plantations the presence of heavy animals especially, consolidates the soil and thus injures the healthy growth of the trees. Shallow-rooted trees are especially damaged. Preferably no animals should be allowed access to plantations, and if it is allowed at all it should be only for limited periods. Shelter belts especially need fencing, since the effectiveness of such belts lies largely in the presence of living lateral branches down to the ground.

(b) *Insects*.—Control methods against insects can be effected in two ways. One is the introduction of entomological investigations, which is an affair for State enterprise; while the second is to maintain the plantation in a clean and healthy state. This is largely effected by growing trees in suitable areas and keeping the plantations properly cleared and thinned. Any tree which has been seriously attacked by boring insects, etc., should be removed immediately the attack is noticed to ensure that the whole plantation is not infected. Such removed material should be destroyed. Trees which have been killed by lightning are particularly subject to attack and should be removed as soon as possible.

When insect depredations are noticed in a plantation, specimens of the insect causing the damage, together with samples of affected material, and a description of the species of tree, should be forwarded to the State Forest Service, who should be able to advise the best method of combating the damage.

(c) *Fungi*.—The general remarks made under "Insects" apply here. Fungi at present are not of serious importance in New Zealand, and when damage occurs it is usually due to trees being planted on unsuitable soils, especially heavy, cold, damp soils. As with insects, it is essential to remove all affected material and destroy it, as soon as possible; and when a branch of a living tree requires cutting off, the stub end should be covered with some antiseptic such as tar or creosote to guard against future infection by either insects or fungi.

(d) *Fire*.—Probably the greatest danger of serious loss is that due to fire. In New Zealand we have become so used to the fire-resistant properties of the local "bush" that we frequently fail to realise the danger due to fire in coniferous forests, especially young stands, and in eucalypt areas.

The danger is greatest during the early stages, before forest conditions have become established by closing in of the canopy and suppression of weed growth; and, again, when thinnings and fellings are made and there is consequently much inflammable material on the ground. The danger is less in well laid out plantations properly tended and managed. Plantations along railway lines and along public roads are particularly exposed to accidents in the one case and to incendiarism and carelessness in the other. Elsewhere the greatest danger lies from scrub fires, and precautions in maintaining clean protective belts by timely burning and ploughing should be taken. With a small plantation in the midst of grass paddocks, a few furrows ploughed around the area should stop any grass fire in summer, but with more valuable plantations alongside public roads or waste scrubland, cleaned firebreaks a half to one and a-half chains wide should be made. Either edge of the firebreak may be ploughed, while the intervening strip could be burnt, with or without previous cutting of the vegetation. If the whole breadth of the firebreak is ploughed, a satisfactory condition can be maintained by discing. Coniferous plantations should not be alongside railway lines if it is possible to avoid it; this applies especially where there are steep grades causing the locomotives to eject showers of sparks. Other measures are in keeping roads and paths, and their edges, clear of inflammable matter during the fire season. The intensity of these measures depends on the size and value of the plantation, the number and width of roads or belts provided, and the nature of the plantation. As previously stated young coniferous stands carry the greatest risk, as a fire would completely destroy the area. Older and properly cleaned coniferous stands do not constitute so great a hazard. Eucalypt plantations are particularly subject to fire, due to their light and open spacing. However, a fire may run through the floor of a mature eucalypt stand without doing serious damage.

(e) *Wind*.—Wind is not usually a serious factor to be considered in forest protection. The protection of young woods and tender species against strong prevailing winds, including hot dry winds, is usually the chief factor to be allowed for. Most of the species I have listed are not usually seriously damaged by strong winds, but with young woods, or woods in very exposed sites, especially when open to salt-laden winds, some protection is desirable. When a plantation is to be established it may be desirable to plant a belt one to three rows wide of some rapidly growing tree on the windward side a few years before the main plantation is to be established, but not so long beforehand that the protective belts may be liable to overshadow the younger trees. The protection belt should be well spaced in order to encourage a bushy form. Probably the most useful species to plant for this purpose is *Pinus radiata*, mainly on account of its rapid growth. In the case of eucalypt plantations a narrow belt of a dense-foliaged species on all edges of the plantation is desirable. This belt may be planted at the same time as the main area, and should be a suitable distance away from the nearest eucalypts to ensure that the former trees have sufficient room for development—a distance of ten to twelve feet is usually enough, especially if the tree planted be a shade-bearer. *Cupressus Lawsoniana* is a good type of tree, but of rather slow growth. Douglas Fir and Redwood are both very suitable in areas where they will grow well, as they are able to withstand moderate shade, branch right down to the ground, and have a relatively dense foliage. *Pinus radiata* and *P. muricata* may also be used.

(To be continued.)

EXAMINATION PAPERS.

NOVEMBER 1930.

PRELIMINARY EXAMINATION (SYLLABUS No. 1).

HORTICULTURAL BOTANY.

1. What is meant by cellular structure? Describe fully a typical plant cell.
2. Distinguish between a root, a stem, and a leaf from the viewpoints of function and structure. What are the main modifications found in these organs?
3. Distinguish between transpiration, respiration, and carbon assimilation. How are these processes connected with growth.
4. In what parts of the plants are reserve food-supplies stored? And what structural modifications are met with in storage organs?

5. Give an account of the main ways in which seeds are dispersed, and describe some of the special modifications in structure that aid the process.
 6. Describe the main features of the family Cruciferae, and name some of the more important genera of this family grown in gardens.
 7. Describe carefully the process of fertilisation of a flowering plant and the essential organs concerned in the process.
 8. Name and describe the main potato diseases in New Zealand, giving details as to methods of control.
 9. Describe in technical language the botanical specimen supplied by the Supervisor. (Aquilegia).
- Note! *Six only* of the above questions are to be answered, of which the last is compulsory.

PRELIMINARY EXAMINATION (SYLLABUS No. 1).

HORTICULTURAL ZOOLOGY.

1. Describe the general characters, life history, and habits of a woodlouse and an earthworm.
2. Describe the general structure of the adult, pupal, and larval stages of a beetle, a moth, and a two-winged fly.
3. What do you know about scale insects? Discuss their control by biological and insecticidal methods.
4. Give the general symptoms indicating attack by (a) grass grub, both in the larval and adult stages; (b) red mite; (c) thrips; (d) woolly aphis; (e) slugs, and (f) leaf miners.
5. Name six important insects that are of value in controlling pests in the garden.
6. Discuss the main methods of insect control under the following heads:—
 - (a) Cultural methods.
 - (b) Biological control.
 - (c) Contact sprays.
 - (d) Poison sprays.
7. Give the main methods of fumigation and the materials that are used.

Note! *Any six only* of the above questions are to be answered.

INTERMEDIATE EXAMINATION (SYLLABUS No. 2).

THE PRINCIPLES OF HORTICULTURE.

1. Explain carefully the various processes that result in the formation of soil.
2. Given air-dried samples of two soils, state how you would compare (a) their "humus" content, and (b) their total organic matter content.
3. Name four fertilising substances used in New Zealand. Discuss the origin and characteristics of one of them.

4. Describe the process and the advantages to soils of nitrification.
5. Name six chemical elements that are the most necessary for plant life, giving the sources from which each is obtained.
6. What are the physical effects on different classes of soil of the addition of lime to them?
7. Name three kinds of modifications by means of which certain plants, named by you, secure protection against severe winds *or* Write a short essay on the advantages of shelter.
8. Name four fungoid diseases attacking fruit-trees and state how these can be controlled.
9. Give four reasons why surface cultivation is so vital to the welfare of crops.

Note! *Any six only* of the above questions to be answered.

INTERMEDIATE EXAMINATION (SYLLABUS No. 2).

THE PRACTICE OF HORTICULTURE.

1. What are the advantages of trenching over ordinary digging? On what classes of soil would it be disadvantageous to trench? Give reasons.
2. What are the conditions that are ideal for seed germination? Explain your method of preparing a seed bed.
3. Explain your method of pruning the following trees:
(a) Apple, (b) Plum, (c) Raspberry, and (d) Peach.
Illustrate your meaning by diagrams.
4. Name five garden insect pests and describe your methods of control.
5. Write an essay on the cultivation of one of the following crops:
(a) Cabbage, (b) Celery, or (c) Tomato.
6. Make a brief calendar of kitchen garden operations for the last six months of the year.

Note! *Any three only* of the above questions to be answered. Also *any three only* of the questions on the attached sheet dealing with the special subject nominated.

INTERMEDIATE EXAMINATION (SYLLABUS No. 2).

Special Subject.

GLASSHOUSE MANAGEMENT.

1. Explain in general terms the propagating and raising of ferns from spores.
2. Choose one of the following and write a short essay on its propagation and management:
(a) Cyclamen, (b) Bouvardia, or (c) Begonia.
3. Give the composition of a good general potting mixture, and explain how this is prepared.
4. Show by a plan drawing your idea of what an ideal propagating house should be.

5. Write fully on the principle of watering pot plants under glass.
6. Detail your method of growing one of the following crops:

(a) Tomatoes, (b) Cucumbers, or (c) Grapes.

Note! *Any three only* of the above questions to be answered, *in addition to any three only* from the attached paper on "The Practice of Horticulture."

The whole of this paper formed the second paper for the special subject for the Diploma Examination, a higher standard of answers being required.

DIPLOMA EXAMINATION (SYLLABUS No. 3).

PRINCIPLES AND PRACTICE OF HORTICULTURE.

1. Given air-dried samples of two soils, state how you would compare (a) their "humus" content, and (b) their total organic matter content.
2. Name six chemical elements that are the most necessary for plant life, giving the sources from which each is obtained.
3. What are the physical effects on different classes of soil of the addition of lime to them?
4. Name three kinds of modifications by means of which certain plants, named by you, secure protection against severe winds, *or* Write a short essay on the advantages of shelter.
5. Name four fungoid diseases attacking fruit-trees and state how these can be controlled.
6. Explain your method of pruning the following trees:
(a) Apple, (b) Plum, (c) Raspberry, and (d) Peach.
Illustrate your meaning by diagrams.
7. Write an essay on the cultivation of one of the following crops:
(a) Cabbage, (b) Celery, or (c) Tomato.
8. Make a brief calendar of kitchen garden operations for the last six months of the year.

Note! *Any six only* of the above questions to be answered.

RECORDING OF NEW VARIETIES.

No. 1.

"KIDD'S ORANGE RED" APPLE.

J. H. Kidd, Udy Street, Greytown.

Extract from the "The Orchardist of New Zealand" of
1/8/1929 (page 21).

"This apple is one of two seedlings raised as far back as 1912 from seed of a Delicious apple which had been cross-fertilised by Cox's Orange Pippin pollen. The stamens were cut away from the blossom just before the flower opened, and the pollen was applied with a small brush to this pistil. The blossom was then covered with a paper bag to prevent foreign pollen being taken to the flower until the fruit had set.

"The seedling was grown in its own roots till 1916, and as it then showed no signs of fruiting, a graft was put on to a fruiting Cox's Orange in the hope that it would come into earlier bearing. However, it was not until 1924 that the grafted branch flowered for the first time, and developed a few fruit on the upper portion of the limb, which had in the meantime grown very strong, and quite out of proportion to the rest of the Cox tree upon which it was grafted.

"All the grafts and buds which have been used for propagating have been taken from the fruiting portion of the grafted limb, and the worked trees have come into very early bearing, in striking contrast to the time taken by the seedling itself. The growth of this new variety is quite distinct from either of the parent varieties. Though the wood is nearly as dark as the Delicious, the leaves are more like the Cox in shape but are tougher and seem to stand up to the same spray schedule as Delicious. The tree is a good strong grower, and makes plenty of lateral growth. It flowers about the same time as Delicious, and the blossoms are strikingly distinct and somewhat like Delicious, only larger, and have a very large supply of pollen. The fruit, which matures just after the Cox, is very highly coloured, of fine quality, and has a distinct flavour which favours the Cox more than the Delicious. It is not quite as sharp as the former, however, nor is it quite so juicy, but much firmer in consequence. The flesh is of good texture and much better colour than Delicious, and the core is entirely free of the rot, as the calyx tube is closed. In shape and markings the apple is more like an improved Delicious with the golden ground colour of the Cox. Having a skin similar in texture to the Delicious, the fruit stands up well to handling.

"The variety would be well described as good half-way between its parent varieties. Some of the fruit held in cool store experimentally this season opened out in good condition after nearly four months' storage. A few apples developed bitter pit, which was not surprising with fruit from young trees of a variety with Cox parentage."

No. 2.

"CLIMBING GOLDEN EMBLEM" ROSE.

Rosa pernetiana.

W. H. Walker, Omaha Road, Hastings.

This Rose is a fixed sport from the dwarf Rose "Golden Emblem" from which it differs by being a climbing variety, more vigorous in growth and richer in colour.

NATIONAL FLOWER SOCIETIES IN GREAT BRITAIN.

The following particulars of national flower societies in Great Britain are published for the information of members:—

Alpine Garden Society.—Hon. Secretary: Selwyn Duruz, 11 Montagu Gardens, Wallington, England.

British Carnation Society.—Hon. Secretary: F. W. Alesworth, 17 Avenue Road, Isleworth, Middlesex, England.

National Carnation and Picotee Society.—Hon. Secretary: A. E. Blake Amos, 10 Bergholt Road, Colchester, England.

National Chrysanthemum Society.—Secretary: Charles H. Curtis, 5 Tavistock Street, Covent Garden, London, W.C.2.

National Dahlia Society.—Hon. Acting Secretary: F. W. Alesworth, 17 Avenue Road, Isleworth, Middlesex, England.

British Delphinium Society.—Hon. Secretary: S. Halford Roberts, 3 Warwick Road, Thornton Heath, Surrey, England.

British Gladiolus Society.—Hon. Secretary: A. E. Blake Amos, 10 Bergholt Road, Colchester, England.

Rhododendron Association.—Secretary: Gurney Wilson, R.H. Society's Hall, Vincent Square, Westminster, S.W.1.

National Rose Society.—Hon. Secretary: Courtney Page, 28 Victoria Street, Westminster, S.W.1.

National Sweet Pea Society.—(Information not yet available).

National Tulip Society.—Hon. Secretary: W. Peters, 6 Union Road, Cambridge, England.

INSTITUTE NOTES.

National Conference on Horticulture.—This will be held in Wellington, commencing on Tuesday, 27th January, 1931, and continuing until the following Friday, under the combined auspices of the New Zealand Horticultural Trades' Association, the Association of Directors of Parks and Reserves, and this Institute.

Arrangements are being made with the Railway Department for first-class tickets at holiday excursion rates, available to all members attending the Conference as well as to the wife and children of such members. Members of the Institute desiring to take advantage of this concession should make application to the Dominion Secretary, G.P.O. Box 1237, Wellington, as early as convenient, so that the certificate may be issued to them for presentation to the local Station-master.

In connection with the Conference there will be held in the Town Hall, Wellington, on Thursday, 29th January, the first New Zealand National Flower Show. The Hutt Valley and Wellington Horticulture Societies are co-operating in this. A Show Schedule is enclosed with this issue of the Journal.

November Examinations.—These were held in the four principal centres, there being five candidates for the Preliminary Examination, one for the Intermediate Examination, and two for the Diploma Examination.

Classified List of Daffodil Names.—The names of ninety-eight new varieties registered with the Institute have been forwarded to the Royal Horticultural Society for inclusion in the new edition of the "List."

Control of Wild Life in New Zealand.—Messrs. Pope and Oliver were appointed delegates to a Conference convened by the New Zealand Forestry League to consider this matter.

Mr. R. G. Hatton, M.A., Director of the Imperial Bureau of Fruit Production (East Malling Research Station, Kent, England) is at present in New Zealand, and the Executive Council has arranged to meet him during his stay in Wellington.

HORTICULTURAL SHOWS:

NATIONAL FLOWER SHOW.

In connection with the National Conference on Horticulture and in association with the Hutt Valley and Wellington Horticultural Societies: in Wellington Town Hall, 29th January, 1931.

AUCKLAND HORTICULTURAL SOCIETY.

President: Sir Edwin Mitchelson, K.C.M.G.
Secretary: c/o. Box 124, Auckland.

Dahlia Show: 12-13 March, 1931.
Chrysanthemum Show: 23-24 April, 1931.
Daffodil Show: September, 1931.
Summer Show: December, 1931.

WELLINGTON HORTICULTURAL SOCIETY.

President: Dr. Arnold Izard.
Secretary: J. G. MacKenzie, N.D.H. (N.Z.), c/o. Town Hall.

Autumn Show: 22-23 April, 1931.
Spring Show: September, 1931.
Summer Show: November, 1931.
All shows held in Town Hall, Wellington.

HUTT VALLEY HORTICULTURAL SOCIETY.

President: D. S. Patrick, Esq.
Secretary: A. J. Nicholls, P.O. Box 19, Lower Hutt.

Mid-Summer Show: 4-5 February, 1931.
Autumn Show: 15-16 April, 1931.
Spring Show: September, 1931.
Summer Show: November, 1931.

All Shows held in King George Theatre, Lower Hutt.

MATAURA HORTICULTURAL AND INDUSTRIAL EXHIBIT SOCIETY.

President: J. L. Mitchell Esq.
Secretary: James Ingram.
Annual Show: February, 1931.
Spring Show: October, 1931.

All Shows held in Society's Hall, Balclutha.

New Zealand Institute of Horticulture (Inc.)

Patrons: Their Excellencies *LORD BLEDISLOE*, Governor-General, and *LADY BLEDISLOE*.

Vice-Patron: The Hon. The Minister of Agriculture.

President: F. J. NATHAN, Esq., Palmerston North.

Dominion Secretary: A. R. STONE, G.P.O. Box 1237, Wellington.

Dominion Organiser: GEO. A. GREEN, 16 Aratonga Avenue, Green Lane, Auckland.

Hon. Secretaries of Local District Councils.

Auckland: N. R. W. Thomas, 54 Campbell's Bldgs., High Street.
Gisborne:

Hastings: L. A. Denton, P.O. Box 18.

Palmerston North: J. J. Stevenson, Boys' High School.

Nelson: E. R. Neale, P.O. Box 114.

Christchurch: H. Firman, 89 Western Ter., Beckenham.

Dunedin: Geo. H. McIndoe, P.O. Box 445.

Invercargill: Jas. A. McPherson, P.O. Box 51.

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Individuals: 12/6 per annum.

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Advertising Rates:

These will be supplied on application.

Examinations:

Examinations will be held half-yearly (June and November). Students desiring examination should make early application to

DOMINION SECRETARY,
N.Z. Institute of Horticulture,
G.P.O. Box 1237, Wellington.