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HORTICULTURE

CONTENTS:

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1. Junior Certificate in Horticulture.
2. Intermediate Certificate in Horticulture.
3. Diploma in Horticulture.
4. Junior Certificate in Fruit-culture.
5. National Certificate in Fruit-culture.
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TREES AND SHRUBS, TOGETHER WITH THEIR PROPAGATION AND USE IN HORTICULTURE.

By J. G. C. MacKenzie, N.D.H. (N.Z.), Director of Reserves, Hastings

INTRODUCTION:—Trees and shrubs have enjoyed ever increasing popularity in gardens of recent years. This is due to the introduction of new plants from Asia, also to the work of horticulturists in raising garden hybrids which, in many cases, are more desirable garden plants than their parents. One just needs to think of such a genus as Rhododendron to realise the development in both these spheres.

Changes in garden fashions, particularly in public and large private gardens, due to some extent to economic conditions, have meant beds previously given over to expensive formal bedding being devoted to shrubs, or put in grass and planted with specimen trees and shrubs. Thus, many choice shrubs neglected in the past, have been recognised and extensively planted in all types of gardens.

With the increasing importance of trees and shrubs, the need of a well grown and correctly labelled collection or collections of trees and shrubs becomes urgent. Such a collection ensures that rare plants are increased and perpetuated, that nurserymen and others have an opportunity to gain the correct nomenclature, that the prospective grower has an opportunity to see mature specimens in flower and to compare different genera and species and their suitability for his particular requirements. Apart from this aspect, a well planned and planted arboretum can be a beautiful and a restful retreat from the rush of everyday life.

In this thesis I shall endeavour to describe the formation, arrangement, planting and maintenance of such an arboretum.

For a foundation I shall work upon notes made while employed in the Arboretum, Royal Botanic Gardens, Kew; and observations made while visiting the arboretums at Royal Botanic Gardens, Edinburgh; Glasnevin Botanic Gardens, Ireland; large private gardens throughout the British Isles; Botanic Gardens at Sydney, Melbourne and Adelaide, Australia; and New Zealand gardens.

SITE:—If possible, select land partly flat and partly undulating, where there are differences in soil and altitude, and near water. A lake is an added asset. It is advisable to delay planting for twelve months in order to study the ground for frost holes, soil conditions, prevailing winds, best positions for avenues, entrances, etc. Obtain as large an area of suitable ground as possible so that there will be ample room for future expansion. British arboretums are suffering through lack of foresight in this direction in the past. Try and obtain land where the destruction of native bush will not be necessary. Drainage and shelter may prove desirable. Drainage is usually supplied by agricultural drain pipes set in lines at suitable distances apart. If shelter is necessary, plant belts of Pinus radiata, or Cupressus macrocarpa, which can afterwards be removed when the permanent trees are established If gorse or broom is on the ground in exposed situations it is as well to leave it to provide shelter.

BOUNDARY:—The type of boundary hedge or fence depends upon the degree of shelter necessary, whether the garden is facing a road or residential property, also upon the fact of whether the grounds will be open to the public during daylight hours only or all the time.

PATHS:—One of the first tasks will be to construct main paths. These should run from point to point in as direct a line as possible. All bends or curves must be justified by some object, a bed or a tree, in the way. Main paths should be at least twelve feet wide. A permanent sealed surface is advisable. If the ground is flat, put down as many paths and avenues as possible in grass; they are more in harmony with the trees and in dry weather people much prefer to walk on grass than on a hard surface. Avenues leading to some outstanding object can be made a feature. The longer the avenue, the wider it should be. Plant avenue trees suited to the locality; the success of the avenue may depend upon this point. Examples of wise planting are seen at King's Park, Perth, Western Australia, where a native tree, Eucalyptus ficifolia, makes a magnificent avenue, as does the Horse Chestnut, Aesculus Hippocastanum, at Bushy Park near London. The width of the avenue should correspond with the average height of the tree and the distance apart in the rows will give the width of the tree when fully grown.

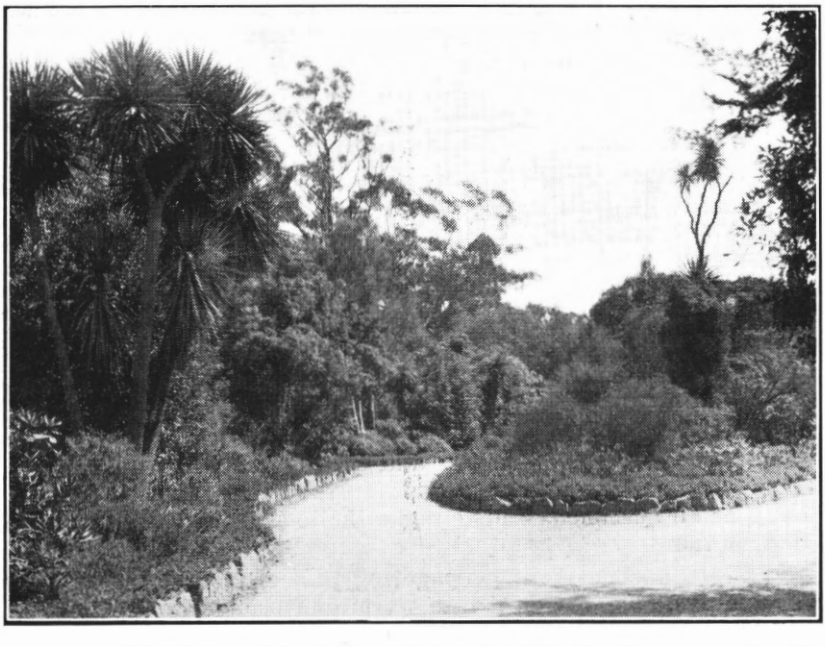
HEDGES:—These will be necessary for shelter or for dividing sections of the grounds. Holly, Ilex Aquifolium, makes the best evergreen hedge but is slow growing. Cupressus macrocarpa is a quick growing shelter hedge but is liable to die out in places. Quick

growing hedges suitable for dry exposed conditions include Escallonia exonienses, Viburnum Tinus, and Coprosma Baueri. Lonicera nitida is a suitable dividing hedge in some localities but, in my experience, does not like light soils. Olearia Traversii is very useful in such positions, also on sand. Where a deciduous hedge is required to allow light through in winter, Betula alba will serve. Veronica parviflora makes a neat evergreen division or background. Brachyglottis rangiora is one of the best for a quick growing screen. Flowering hedges include Berberis Darwinii, Berberis stenophylla, Abelia floribunda, Olearia stellulata, Fuchsia macrostemma var. Riccartoni, Hydrangea hortensis. The site of the hedge should be trenched to the width of three feet. Plants should be selected for the number of strong growths arising from the base. Distance of the plants apart ranges from nine inches to eighteen inches according to the kind. A single row of plants is generally sufficient to give a good hedge but a double row may be used. If the plants are poor, cut them down to within a few inches of the ground once they are established. This will encourage the dormant buds to break and throw up strong shoots from the base.

Once a general idea of the lay-out of the grounds is arrived at, shelter belts and hedges planted where necessary, and drainage and the main paths are in order, preparations for planting may commence. Many trees will be bought in from nurserymen, but others must be raised from seed procured from other parts of the world. The next step is the formation of a nursery.

NURSERY:—The nursery is a most important part of an arboretum. It differs from a commercial nursery in that a wide range of trees and shrubs in small numbers will be grown. It will be necessary to raise plants from seed and cuttings sent in from other gardens also to propagate from plants in the garden to insure perpetuation of all specimens and to make the more rare ones common for distribution.

Erect one or more propagating pits or houses. If one house only is available, divide it into warm and cool sections. The warm section should have propagating cases along one side. The most suitable type of case is one fronted with brick and containing a bed of sand or peat fibre and covered by glass lights. If the plants are to be rooted in the bed, sand has proved to be the most suitable medium for the majority of trees and shrubs. Members of the Ericaceae root best in a medium of four parts sand to one part peat fibre. Experience shows that five inches is about the ideal depth of sand or fibre for rooting purposes. A layer of bricks or sheet iron holds the bed above the heating agent, usually four-inch hot water pipes. An electric element regulated by a thermostat is proving to be fairly satisfactory in Wellington but is expensive to operate. Producing an acid medium by watering the sand with 60 c. c. acetic acid per gallon of water, is said to encourage rooting. This is practised at Edinburgh but I have had no first hand experience in its use. Benches covered with fine gravel or coke breeze should occupy the remaining side of the warm house and both sides of the cool



Native Section—Christchurch Gardens.

house. A suitable house is one eight feet high by eleven feet wide. A path three feet wide runs down the centre and benches four feet wide occupy either side. Bottom and top ventilation are necessary.

Frames and plunging beds and beds capable of being protected by scrim in rough or sunny weather need to be situated near the houses. The potting shed and seed room can be built on to the entrance to the houses. Cuttings, when rooted in the case, are potted up into three-inch pots, using a sandy soil mixture and, when established in these pots, are gradually hardened off and planted in the nursery. The plants must not be allowed to become pot-bound as this prevents the trees from making a healthy root system within a reasonable time after being planted out. Some plants, e.g. Leguminous plants, Cytisus, etc., dislike root disturbance so should be grown on in pots until planted out in their permanent positions.

METHODS OF PROPAGATION:—In the first place there is the natural means of reproduction, that is by seed; then comes the artificial vegetative methods of reproduction, e.g. cuttings, root cuttings, layers, budding and grafting Very few trees and shrubs are provided with vegetative means of perpetuating themselves such as are possessed by herbaceous plants. Exceptions are Ulmus (by suckers), Rhododendrons, Salix, Fagus sylvatica (by layers), Amelanchier and Kerria japonica (by division).

The raising of trees and shrubs from seed, often a slow process, is sometimes the best and often the only method of reproduction. Sowing seed as soon as ripe generally gives the highest percentage and quickest germination. In fact, some seeds lose power of germination in a very short period, e.g. Rhododendron seeds. Others again take years to germinate, e.g. Davidia Vilmoriniana takes two years. On the other hand, I have known fresh seed of Populus to germinate in twenty-three hours.

Many seeds seem to take a specified time to germinate. The following is a case which happened with seeds of Euonymus Hamiltonianus, while in my charge. Seeds received from the United States Department of Agriculture sown 25/1/33 germinated on 4/4/34. Seeds of the same species from Dresden Botanic Gardens sown 5/5/33 germinated on 8/4/34 Both lots of seeds were sown in the same compost and placed in heat. Most seeds respond to heat, even our natives, e.g. Metrosideros tomentosa seed collected 5/6/35, sown 7/6/35, germinated on 18/6/35 in a temperature of 65 deg. F.

If seeds of temperate plants do not germinate in heat within two months the pots or boxes should be put in a shady corner outside, allowed to winter there, and after the weather has acted on them be moved back into heat in the spring. Many should germinate after these extremes of temperature.

Some seeds which germinate slowly should be stored in moist sand for a year; it saves ground and the labour of weeding, e.g. Ilex. Such seeds, or seeds of hardy trees grown in quantity, are

sown thinly in seed beds or wide drills in the open ground. With such seeds as Pinus radiata, I have found a twelve inch drill, made with a square mouthed shovel, preferable to a bed in that it can be protected and weeded more easily and wrenching of all plants is possible.

Protection from birds and shade will be necessary until the seeds germinate. Some seeds with a hard coat, e.g. Sophora, Acacia, and other legumes germinate quicker and better if soaked in hot water. Various methods are recommended for hastening or encouraging this type of seed, but I have found the above method to be the most simple and satisfactory. Unless the plants are badly overcrowded, it is a mistake to prick out the seedlings until they have made fairly firm growth and are easy to handle. Then they may be pricked out into boxes or potted up into three-inch pots.

CUTTINGS:—Stem cuttings may be of three types: Soft, half ripe, and hardwood cuttings.

Soft cuttings three inches to four inches long, obtained by taking short side shoots with a heel in early summer, can be rooted in a sand frame in a warm house in periods ranging from a few days to a few weeks. Plants of Fuchsia, Forsythia, Kerria, etc., rooted in this way form plants large enough to line out in the nursery that summer if the weather is not too dry.

Cuttings of half ripened wood are used to increase a wide range of shrubs during January and February. These cuttings are best taken about four inches long with a slight heel and inserted in the sand frame in the house or under a bell jar in a specially prepared shady border. I have seen cuttings of Ginkgo biloba rooted in six weeks, and Cornus Kousa var. chinensis, a rare plant, rooted in a few weeks in the case.

Erica cuttings, one and a half inches long, can be dibbled into sandy peat under a bell glass or in pots in a close frame in early autumn. I have obtained as many as forty-eight well rooted cuttings from a six inch pot by this method.

Cytisus, Berberis stenophylla, Cistus, etc., root readily from half ripened cuttings inserted in January in a cold frame, that has had some of the soil removed and replaced by clinker as drainage and a layer of sharp sand. Cuttings are dibbled in and the frame is kept well watered and close.

Cupressus, Juniperus and other evergreens will root in the frame in the house in late autumn.

It is surprising the number of plants that can be rooted from cuttings provided you obtain the right type of cutting at the right time.

With hardwood cuttings the best results are obtained from well ripened growths of the current season, about nine inches to twelve inches long preferably taken with a heel and lined out in rows in a semi-shaded part of the nursery. In New Zealand we can propagate many native and exotic shrubs by this method, e.g. Fuchsia, Hydrangea, Griselinia, Coprosma etc. Cuttings, the thickness of a lead pencil, usually give the best results but there are ex-

ceptions. On one occasion, I had to handle a number of plants of Prunus Padus required for experimental purposes. Difficulty had been experienced in propagating this tree and, as an experiment, pieces of wood from strong ripened "water shoots" three quarters of an inch in diameter were cut into twelve inch lengths and placed in the ground, the result being a 100 per cent. strike. May is the most successful month for hardwood cuttings.

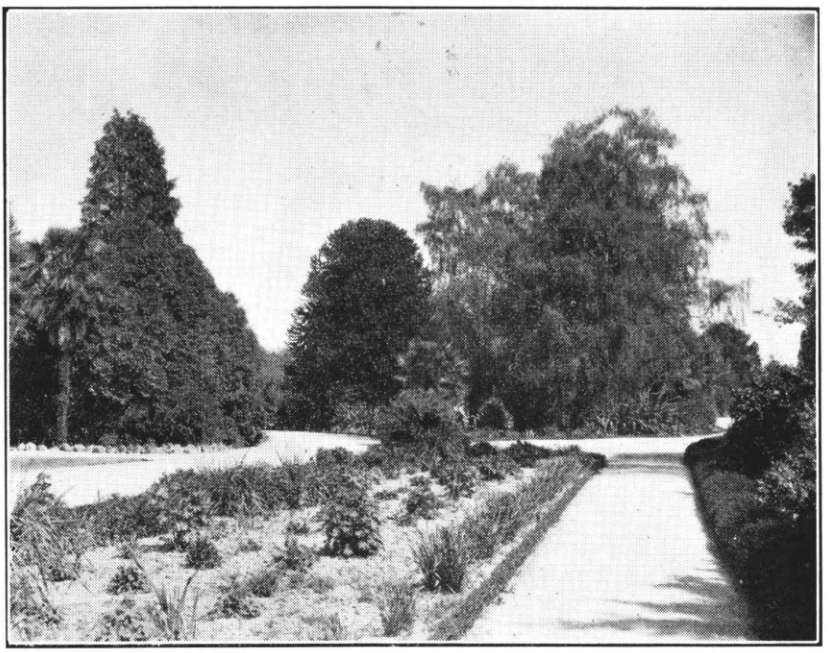
Root cuttings provide the most efficient means of propagating certain plants. Cut pieces of fleshy roots into lengths of one to three inches and insert in boxes or pots of sandy soil in bottom heat in August and September. Plants treated in this way include Romneya Coulteri, Choisya ternata, Clerodendron trichotomum, Ailanthus glandulosa, Paulownia imperialis. I have handled many plants of the beautiful blue flowered Daphne Genkwa rooted in this way.

LAYERING:—This provides a fairly quick method of obtaining large specimens of certain plants. If a number of plants are to be increased by layers, it is advisable to keep a special stool ground where stools can be planted and young shoots allowed to grow up. The best of these shoots are tongued, or merely twisted, and pegged down into prepared sandy soil. Care must be taken to stake the tips of the layered shoots in an upright position. All shoots more than two years old should be cut out. August and September are the best months for layering. Some layers may have rooted by the autumn but Rhododendrons and Magnolias are better left for two years. One of the best stool grounds I have had the opportunity of seeing was that of the London County Council at Aviary Hill. Plants layered there included Phillyrea rosmarinifolia, Exochorda grandiflora, Ostrya virginiana and Photinia serrulata.

BUDDING AND GRAFTING:—These methods must be adopted for certain plants. Budding is superior to grafting in that the wood is not cut and a closer union with the cambium is obtained. Roses will most probably be the commonest plants budded. Growers seem to have their own favourite stocks, usually a selected seedling. Rhododendrons are often more successful when budded than grafted. Other plants to be budded include Acers on Acer palmatum, Prunus on Prunus Avium, Pyrus on Pyrus Malus.

GRAFTING:—This should only be used as a last resort. Side grafting is the method most commonly used, apart from Rhododendrons, where saddle grafting is often adopted. A clean seedling stock, closely related to the scion should be used. For evergreens, it is an advantage to have the stock established in a pot and to carry out the operation in a warm house. Root grafting may be used to increase certain plants, e.g. Clematis and Paeony.

The nursery should be sheltered naturally or artificially by suitable hedges. These hedges will divide the ground into plots, intersected by frequent paths and a central roadway capable of taking a truck. The soil should be of a light rather than a heavy nature, to encourage a fibrous root system. One section of the ground



View in Christchurch Gardens.

should be trenched and manured each season and an herbaceous or a green crop taken off it that year.

Trees are lined out in rows, distances apart being regulated by the size of the plants. If a trench is taken out, see that the roots are distributed equally on either side of the line. All trees are better for being shifted at least once every two years. If not shifted, they must be wrenched. It is wise to mulch the surface before it becomes too dry in early summer, especially around Ericaceous plants.

Pruning requires attention, shortening back and gradually removing lower branches of deciduous trees in order to develop a strong leading shoot and evenly balanced head. Prune the shrubs for shape. Rhododendrons, Cytisus, etc., will require frequent pinching to develop a bushy habit and numerous flowering shoots. A good Rhododendron should be pinched so as to develop twenty to thirty flowering shoots by the time it is about two and a half feet high. See that there is a good water system throughout the nursery, with taps at frequent intervals. Pipe is eventually cheaper than hose.

Each lot of plants should be clearly labelled. When plants or seeds arrive, they should be entered up in a book kept for the purpose and all future labels given the entry number in this book and the name of the consignor as well as that of the plant.

ARRANGEMENT:—A system of planting is desirable. Trees and shrubs should be arranged in families and genera as far as possible. Arranged in this way, they are much easier to look after, give a more pleasing effect than they would do if the specimens are scattered about, individual plants are easier to find, and the collection is of greater educational value. For example, take the family Saxifragaceae containing the genera Hydrangea, Deutzia, Philadelphus, Ribes, and Escallonia. Each genus would be given a section and the species grown in groups in borders, or better still with decorative species, three or more plants in a bed surrounded by grass. With this arrangement the most suitable plants for garden decoration are seen at a glance. If a genus is a large one, it could be isolated from the others by a path or grass walk surrounding it, but, where possible, keep the members of each family together and surround the family by a path. This is the method adopted at Glasnevin Botanic Gardens Dublin. If the lay-out is going to be too formal I would give the botanical side second place, and the arboretum as a garden, first place. In an ideal arboretum about six trees of a species should be grown as decorative specimens and about twenty under forest conditions.

Outstanding plants of decorative value can be massed, e.g. a bed of twelve plants of Forsythia intermedia var. spectabilis, or as individual specimens, e.g. Fagus sylvatica var. purpurea at a suitable spot on the lawn. Pyrus and Prunus, which flower before leaves appear, are better grouped with a background of dark evergreens. It may be necessary to plant trees among beds and borders

of dwarf shrubs to give height to the group, e.g. Arbutus Menziesii in a border of species of Erica and dwarf Rhododendrons. Other decorative features can be arranged by the planting of beds, bold groups, or by making special gardens of genera producing particularly fine flowers, fruit or foliage in that district. In Wellington for instance, features could be made of:—Hydrangea hortensis varieties in beds, or in groups in moist valleys. Fuchsia, Cistus, Cytisus, in beds or borders. Erica in gardens and borders, the plants being on their own or associated with Rhododendrons and Camellias. Advantage could be made, of the way Erica arborea naturalises itself, to establish a large area of it and then to plant through it large drifts of Erica melanthera. Plant Rhododendrons in dells, preferably in the shade of deciduous trees. The planting of Betula alba and Fuchsia excorticata through them would also serve the same purpose, as well as showing off the coloured bark of these trees in the winter time. Azaleas should be planted in beds in grass to form an Azalea garden. Magnolias as specimen plants fit into this garden. Plant a formal garden of hybrid bush Roses also a wild Rose garden where ramblers, climbers and Rosa species are planted in groups and allowed to grow until they cover the ground and old tree stumps, etc., placed there for their support. With Foliage Plants the colour effect provided by leaves, bark or berries in autumn and winter, and young leaves in spring, must also play a part in the grouping arrangements. Plants with variegated or coloured foliage can be grouped or used in a foliage bed. Such a bed could contain Prunus cerasifera var. Pissardii, Acer Negundo variegatum, Rhus cotinus, Myrtus Ralphii, Ligustrum ovalifolium aureum, Senecio Greyii, Abutilon Savitzei, Coprosma Baueri variegata. Another foliage effect could be produced with a bed of Prunus cerasifera var. Pissardii and Coprosma Williamsii variegata as a ground work. A Bamboo Garden is also of interest as well as of use for providing stakes. Certain monocotyledons, groups of Yucca gloriosa, Phormium tenax, Cordyline australis, Phoenix canariensis, Trachycarpus excelsus, could be used together to provide a tropical effect.

ECONOMIC SECTION:—One or more borders devoted to trees and shrubs capable of providing products of economic value is of educational use. Such borders could include Aleurites Fordii (Tung Oil), Juglans regia (Fruit and Oil), Olea europaea (Olive Oil), Prunus Amygdalus (Almond Oil), Pinus pinaster (Turpentine), Lavendula officinalis (Perfume), Eucommia ulmoides (Gutta percha), Acacia dealbata (bark for tanning), Agathis australis (Wood and Gum), Phormium tenax (Fibre), Acer saccharum (Sugar), Punica granatum (Pomegranate), Coprosma areolata (Dye for wool). Trees of timber value planted throughout the grounds could have their uses noted on the labels.

NATIVE SECTION:—A large section would be given over to native plants. Sections could be given over to some of the large genera, Olearia, Senecio, Veronica, and another to native conifera. The natives could be made even more interesting by the arrangement

of beds showing parents and hybrids, e.g. Myrtus bullata, Myrtus obcordata, and intermediate hybrids.

As well as a native section, there should be an Australian section with its sub-sections for Acacia, Eucalyptus, Hakea, Grevillea, etc. In the general arrangement the habit of a tree must also be considered, e.g. trees of weeping habit are useful for associating with water or for forming specimens on lawns. Hills and valleys can be accentuated by planting tall trees on the ridges, e.g. Pinus radiata, and dwarf shrubs in the valleys.

PLANTING:—When planting, keep in mind the size the tree should reach upon maturity and space the permanent trees accordingly. Intermediate trees may be planted for immediate effect, provided they can be removed later. Dig a hole three feet wide by three feet deep and, where possible, replace any poor sub soil with loam and leaf mould. Drainage may require attention. Fill the hole to within nine inches of the top, making it firm as you fill in, then leave the soil to settle for a week or so, provided there is no danger of the hole being flooded. When planting, do not cover the stem any deeper than it has been in the nursery rows. If the tree has to be staked, place the stake in position before covering the roots. Make the soil firm by tramping and, where possible, complete the operation by allowing the hose to run slowly to settle the soil, particularly with big trees. Successful planting also depends upon keeping the roots moist while out of the soil, and saving as many fibrous roots as possible. Cut any broken roots with a sharp knife. It may be necessary to reduce the branches in sympathy with the damaged roots. Evergreens, of course, must be transplanted with a ball. Frequent transplanting makes for a fibrous root system; all soil without roots must be forked away and the plant lifted with a compact mass of roots holding the ball together. Generally speaking, deciduous trees can be transplanted any time from leaf fall to the bursting of the buds, and evergreens in autumn or spring. The most suitable time varies with local climatic conditions.

AFTER CARE:—Keep a circle of cultivated ground around the tree for the first few years. Mulch in summer to keep the roots cool and moist. Equal parts leaf mould and well rotted stable manure make an ideal mulch for most things. Ericaceous plants prefer leaf mould. Where leaf mould and manure are not available, grass cuttings, spent hops, etc. can be used. Watch stakes and ties and do not allow ties to become too tight or the tree and stake to rub.

SHRUBBERIES:—Trench the ground. Place the shrubs alternatively, grouping three or more plants of the same species. The advantages of massing shrubs in this manner are that an immediate and more striking effect is produced and that the shrubbery is easier to keep in order. As these shrubs grow and cover the ground, they can either be thinned out or, if labour for this work is not available, each group can be allowed to grow together and form one bush without the border becoming neglected looking or the general outline being lost.

PRUNING:—Pruning is a neglected art in the majority of gardens but an arboretum should show the advantages derived from judicious pruning. In New Zealand, particularly in exposed areas, deciduous trees which form tall noble specimens in Europe, tend to develop into bushy trees with no clearly defined main stem. The lateral shoots develop at the expense of the more exposed leader. This fault could be corrected to a large extent by shortening back and gradually removing the lower laterals, also any rival leading shoots. A tree with one stem can sway more freely in a gale than a tree with several. One or more of these is liable to be torn away at the forks, perhaps previously weakened by moisture and humus material gathering there. Deciduous trees should have lower branches removed by degrees until one-third of the stem is clear of branches. Make all cuts parallel with the branch or stem as the case may be. The cambium layer is then able to form a callus over the wound. Paint all wounds with some antiseptic substance such as coal tar. All dead, decaying or misplaced branches should also be removed. With evergreen trees and shrubs, this is very often the only pruning required. This work may be carried out any time between late summer and mid-winter.

The time of pruning flowering shrubs depends upon the season of flowering and divides deciduous shrubs roughly into two groups: (1) Those that flower on the wood of the current season. (2) Those that flower on wood of the previous season's growth. Those in the first group, e.g. Buddleia variabilis, Hydrangea paniculata, are pruned back to about two buds in autumn or winter. The plants in group two may be divided into two sections: (a) Those that flower in the early spring, e.g. Forsythia intermedia var. spectabilis and Prunus triloba, are pruned back to two buds immediately after the flowering season which is over before growth really commences. Section (b) includes those shrubs which flower in early summer when a fair amount of growth has been made. After flowering, the old flowering shoots and weak wood should be thinned out and the young growth allowed to develop and ripen, e.g. Philadelphus, Deutzia and Hydrangea. Pruning with Rhododendrons, consists in removing the old flower heads before seed develops. I know of one nursery firm that picks off every flower head not required for seed from forty acres of Rhododendrons. Shrubs required to make strong flowering wood each year need feeding with liquid manure during the growing period, e.g. Roses.

Each plant or group of plants is more interesting when clearly labelled with the botanical name, common name and habitat.

PLANT BREEDING:—Plant breeding plays an interesting part in the work of the arboretum. Hybrid plants of merit may be raised between species, and in a few cases, genera. Fine new forms of Cytisus, Berberis and Rhododendron have been raised by cross pollination. It is an advantage to have the plant to be pollinated, under glass. Remove the anthers as early as possible. Wait until the stigma is in a receptive condition, then transfer pollen during

the brightest part of the day, when the pollen is dry and will transfer readily. It was my privilege to have plants of Rhododendron Griersonianum in my charge while they were pollinated with pollen from other Rhododendron species including Azaleas. Unfortunately the crosses with the Azaleas did not take, but quantities of seed formed as a result of some of the other crosses. Selection of seedlings and increasing of "Sports" arising on shrubs also play a part in the raising of new shrubs and trees.

The hand list of trees and shrubs hardy at Kew enumerates 6,300 species and varieties. In New Zealand we can grow most of these plants plus a host of temperate and sub-tropical species. Possibly with sufficient vision and money New Zealand could develop the most complete collection of trees and shrubs in the world.

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Manual of New Zealand Flora.—Cheeseman
Australian Plants.—Guilfoyle.

NOTE:—The foregoing was written as a Thesis for the Institute's Diploma in Horticulture when the writer tied as Cockayne Gold Medallist at the November 1935 Examination with Mr M. J. O'Sullivan, B.Sc. of Auckland, whose Thesis was published in the March, 1936, Journal.

EXAMINATION PAPERS, NOVEMBER, 1936.

JUNIOR EXAMINATION (Syllabus No. 1.)

HORTICULTURAL BOTANY.

(Time allowed—Three Hours).

Note.—SIX ONLY of the following questions are to be answered, including No. 8, which is compulsory:—

Use diagrams to illustrate your answers when you can do so.

1. What is a fruit? Briefly describe any five fruits, to illustrate your definition. Mention a few species in which the fruit is of special ornamental value.
2. Define the terms: Corm, bulb, tuber, rhizome and stolon. What is their significance in horticulture?
3. Describe the processes of starch formation and utilization by a normal green plant.
4. Describe the structure, location and function of cambium, and its importance in connection with budding and grafting.
5. What are "waste products" in plant nutrition? How does the plant get rid of them? What further significance have they for plant life?
6. Give an account of the different ways in which pollination occurs in nature.
7. Define the terms: selfing, cross fertilization, segregation, hybrid, pure line. How would you set about raising a new garden sort of wallflower?
8. Describe in technical language the specimen supplied by the Supervisor.

JUNIOR EXAMINATION (Syllabus No. 1.)

PRINCIPLES OF PLANT PROTECTION.

(Time allowed—Three Hours).

Note:—SIX ONLY of the following questions are to be answered.

Use diagrams freely.

1. How would you combat white-fly in the glasshouse?
2. Describe a process of chemical disinfection of seeds.
3. Give an account of the morphology and developmental cycle of an aphid parasite of plants.
4. What fungicides would you employ for control of tomato leaf-mould and rose-mildew? Give methods of preparation of each.
5. Outline the means by which fungous diseases spread from host plant to host plant.
6. Outline the life history of the common mushroom, indicating those conditions most favourable to its growth.
7. Detail the preparation of bordeaux mixture; what is meant by the term "Instant Bordeaux?"
8. Describe the practice of steam disinfection of soils in situ for the control of eelworm.

INTERMEDIATE EXAMINATION. (Syllabus No. 2.)
PRINCIPLES OF HORTICULTURE.
(Time allowed—Three Hours.)

Note:—SIX ONLY of the following questions are to be answered.

1. Analyses of soils are classed as Mechanical, Biological and Chemical. What practical use is a knowledge of these to the cultivator?
2. Water is held in the soil by gravitational, capillary and hygroscopic action. What do these terms mean and how can they be influenced to the advantage of the horticulturist?
3. What are the essentials for successful grafting of (a) outside deciduous trees and (b) evergreens under glass?
4. What are the several advantages of green manuring? Recommend some green crops.
5. Why is nitrogen in cultivated lands nearly always below the optimum requirements of plants? Explain this and state at least three methods by which the deficiency can be made good.
6. How are new varieties of plants raised? What do you understand by "Mendelism?"
7. What are "virus" diseases: how are they transmitted and what is the method of control?
8. Apart from the suppression of weeds, why is hosing so beneficial to plants?

INTERMEDIATE EXAMINATION. (Syllabus No. 2.)
PRACTICE OF HORTICULTURE.
(Time allowed—Three Hours, including Special Subject.)

Note.—THREE ONLY of the following questions are to be answered, also THREE ONLY of the questions on the Special Subject nominated.

1. What materials are required for mixing composts for seed boxes and potting? When and how should they be prepared?
2. Specify some of the more important details in glasshouse construction.
3. What are the different ways of making a hot-bed to raise seedlings in early spring?
4. Describe the methods of harvesting, treatment, storage, and planting of any two kinds of bulbs.
5. Describe the pruning, with a view to obtaining the best results, of any two of the following:—A camellia hedge, a wistaria, an espalier pear or peach.
6. What do you know about any two of the following and their use in horticulture:—Nicotine, pyrethrum and derris?

INTERMEDIATE EXAMINATION. (Syllabus No. 2.)
Special Subject: THE FLOWER GARDEN IN ALL ITS ASPECTS.
(Time allowed—Three Hours, including "Practice of Horticulture.")

Note.—THREE ONLY of the following questions are to be answered, also THREE ONLY from the paper on "Practice of Horticulture."

1. Describe the preparation, planting and management of a shrubbery border.

2. Give a list of plants for the shrubbery border, in any specified locality, which will be attractive during the autumn and winter months. Describe the principal features and use of each plant.
3. When and how may a herbaceous border be reconditioned and replanted? Describe the operation fully.
4. Foliage plants in the flower garden enhance the display. Describe the different ways in which they are used with most effect.
5. Give a list of bulbous flowering plants suited for land which dries out in summer; also a list of those suited to moist shaded conditions.
6. Make a selection of varieties and describe an arrangement for planting out most effectively any one of the following: Irises, roses, chrysanthemums, dahlias. Describe also the preparation of the land and planting.

INTERMEDIATE EXAMINATION. (Syllabus No. 2.)
Special Subject: NURSERY MANAGEMENT.
(Time allowed—Three Hours, including "Practice of Horticulture.")

Note.—THREE ONLY of the following questions are to be answered, also THREE ONLY from the paper on "Practice of Horticulture."

1. Describe your method of raising box seedlings, seed sowing, pricking out and hardening off?
2. Give names of five Conifers that are economically grafted and describe your method and time of grafting these.
3. Describe in detail the process of layering six kinds of plants of your own selection.
4. State how you would maintain the fertility of nursery-land, with special reference to "resting" period.
5. Select one of the three following kinds of fruit trees:—apple, cherry, or pear, and state how you would raise this from a stock to a two year tree.
6. Give names and brief descriptions of: nine sorts of newer roses, nine sorts of newer brooms and six sorts of newer hydrangeas.

INTERMEDIATE EXAMINATION. (Syllabus No. 2.)
Special Subject: GLASSHOUSE MANAGEMENT.
(Time allowed—Three Hours, including "Practice of Horticulture.")

Note.—THREE ONLY of the following questions are to be answered, also THREE ONLY from the paper on "Practice of Horticulture."

1. Describe what you would consider as an ideal propagating house and show by diagrams the arrangement of beds.
2. Describe how you would grow chrysanthemums up to the planting out stage, giving temperatures, dates and naming six early and six late flowering sorts.
3. Name six sorts of Liliums that can be profitably grown from seed and state age before flowering.

4. Select either Cyclamen or Begonias and describe fully your method of growing to flowering stage.
5. Give a list of twelve greenhouse plants suitable for house decoration, with a brief comment on each.
6. State suggested controls for green-fly, thripa, red spider and damping-off fungus.

INTERMEDIATE EXAMINATION. (Syllabus No. 2.)
Special Subject: VEGETABLE GARDENING.

(Time allowed—Three Hours, including "Practice of Horticulture.")

Note.—THREE ONLY of the following questions are to be answered, also THREE ONLY from the paper on "Practice of Horticulture."

1. What are the best conditions for the commercial production of crops of vegetables?
2. Describe the special characteristics of the following seeds: lettuce, cucumber, parsnip, onion, radish; and suitable conditions for their storage.
3. What is meant by "Certified Seed Potatoes?" Discuss their production and economic use.
4. Describe the various economical methods for raising tomato, celery and other seedlings in spring for planting outside. What special precautions are necessary in their operation?
5. What kinds of vegetables would be likely to receive most benefit from the application of lime to an acid soil? And which, supposing the land to be friable, would probably receive none?
6. How may a supply of lettuce be provided at all seasons?

INTERMEDIATE EXAMINATION. (Syllabus No. 2.)
Special Subject: THE SYSTEMATIC BOTANY OF ALL THE FAMILIES, AND THE LEADING GENERA, CONCERNED IN HORTICULTURE.

(Time allowed—Three Hours, including "Practice of Horticulture.")

Note.—THREE ONLY of the following questions are to be answered, also THREE ONLY from the paper "Practice of Horticulture." Illustrate your replies by sketches, where useful.

1. State the essential features of the Scrophulariaceae or the Solanaceae, and name five species of special horticultural value. Also briefly describe any one indigenous species.
2. Describe any member of the monocotyledons, and point out in what ways it differs from a dicotyledon.
3. What are the features distinguishing the following genera from one another: Ranunculus, Clematis, Delphinium? What are the characters they possess in common that place them in the Ranunculaceae? Mention a plant of horticultural value belonging to each genus.
4. Define the terms: Apetalous polypetalous, gamopetalous. Mention for each a family in which this condition prevails, and briefly describe a particular plant in each family.

5. Describe the various types of fruits found in the Rosaceae. What features do they possess in common?
6. What are the essential features of the Compositae? What special features are made use of in differentiating the various tribes? (You are not expected to show a knowledge of the actual tribal division). Describe any species of composite of horticultural value.

INTERMEDIATE EXAMINATION. (Syllabus No. 2.)

Special Subject: THE PRINCIPLES OF ECOLOGICAL BOTANY AND THEIR HORTICULTURAL APPLICATION.

(Time allowed—Three Hours, including "Practice of Horticulture.")

Note.—THREE ONLY of the following questions are to be answered, in addition to THREE ONLY from the paper on "Practice of Horticulture."

1. Show, with a discussion of particular species, how an exact knowledge of a wild plant's habitat is helpful in growing the plant successfully in a garden.
2. What is meant by the term "life-form"? Give examples of different life-forms among woody plants, and give a sketch plan of a small specimen plantation of trees and shrubs, naming the species used.
3. What are the main ecological principles to bear in mind when constructing either a rockery, a water garden, or a fernery? (Choose one only).
4. What do you understand by the term "association?" Describe any one association of wild plants, and discuss what light it throws on landscape-garden practice.
5. Plants, in relation to light, have been classified as "sun," "shade" and "indifferent." Give examples of plants of the different groups, and discuss the horticultural significance of such a classification.
6. What do you understand by the term "humus?" How is humus produced? What are the essential differences between a "heath" soil and a "bog" soil? Name some garden plants that require "heath" or "bog" conditions.

DIPLOMA EXAMINATION. (Syllabus No. 3.)

THE PRINCIPLES AND PRACTICES OF HORTICULTURE.

(Time allowed—Three Hours.)

Note:—SIX ONLY of the following questions are to be answered.

1. How may plants be improved by seed selection? Illustrate your points by reference to trees and herbaceous plants.
2. Name the grasses used for sowing down sports grounds and lawns. Describe the character of each and the conditions under which it may be used to advantage.

3. Give a list of varieties of trees viz. apple, pear and stone fruits, suitable for a domestic orchard in the country.
   Select a particular locality and give reasons for your choice of varieties.
4. Sketch a plan of a glasshouse for any particular purpose and specify the details of construction.
5. Describe the mushroom plant, its propagation, and the conditions necessary for commercial cropping.
6. Write a short essay on the culture of begonias or chrysanthemums or dahlias.
7. Describe a few ornamental shrubs of recent introduction, making special reference to the time of flowering and the conditions most suitable for each.
8. What are the advantages of the vegetative propagation of plants? Describe an example of each method with special mention of any essential precautions.

DIPLOMA EXAMINATION. (Syllabus No. 3.)

Special Subject: HORTICULTURAL ENTOMOLOGY IN RESPECT OF THE COMMONER INSECT PESTS PRESENT IN NEW ZEALAND.

(Time allowed—Three Hours.)

Note:—SIX ONLY of the following questions are to be answered.

1. As a general principle, what sprays would you use to control the following: Moth caterpillars, leaf feeding beetles, aphids, and Thrips? Give reasons.
2. How would you distinguish between injury caused by "grass grub" (Odontria zealandica) and that caused by the "subterranean grass caterpillar" (Porina sp.) on lawns? Give a method of control in each case.
3. Give the life history of the "white butterfly" (Pieris rapae).
4. Give the life history of the Earwig and any suitable methods for its control.
5. Describe some of the important principles underlying pest control.
6. What are the chief points of difference between aphids and Thrips? Give an account of a species from one of these groups.
7. Describe some of the common pests of bulbs and give control measures.
8. Describe "tomato stem-borer injury" (Gnorimoschema plaesiosama) and suggest suitable methods of control.

REPORT OF EXAMINING BOARD FOR THE YEAR ENDED 30th SEPTEMBER, 1936.

BOARD MEETINGS: Five meetings of the Examining Board were held during the year.

FLORISTS AND SEEDSMEN: Although there was an insistent demand for Certificates for Florists and Seedsmen, a considerable number of those who were qualified to obtain such certificates, through experience and service, omitted to do so within the period prescribed. The Board, therefore, recommended to the Executive Council, some extension of time for lodging applications and approval of this resulted in a marked increase in the number of certificates issued.

GARDENING STUDENTS: Good work is now being carried out with students at all centres.

AUCKLAND: The Superintendent of Parks has forwarded the names of all junior gardeners.

HAWKES BAY: Several students have been enrolled from the Napier Gardens and at Hastings.

TARANAKI AND PALMERSTON NORTH: Three candidates from each of these districts sat for the recent examination.

WELLINGTON: The proposed extended provision of glass-house facilities at Wellington, as stressed by two deputations from the Executive Council, will no doubt increase the number of students.

NELSON AND MARLBOROUGH: Several students have enrolled from this district.

CANTERBURY: Excellent work is being carried out with students by Mr. McPherson and others and good evening classes are available at the Technical College for which an excellent syllabus was prepared by the local District Council.

OTAGO: Classes in practical horticulture are conducted by Mr. Tannock at the Botanic Gardens and it is hoped to provide for the theoretical side also.

SOUTHLAND: We are indebted to Mr. Mansfield for his excellent work with students, who are well catered for with practical work and evening classes at the Technical College.

CONGRATULATIONS: The Board Meeting on the 15th May, 1936, was adjourned whilst congratulations were extended by members to Mr. A. H. Cockayne on his promotion to the position of Director-General of Agriculture. Mr. Cockayne, in thanking the Chairman (Professor Kirk) and members, announced his intention of remaining on the Board but stated that he would be unable, in view of increased duties, to act as an Examiner. Mr. Cockayne has been Convenor of the Board's Examiners for many years and is greatly missed.

THANKS: The Board again records its thanks to Messrs. P. Black and W. Hyde and co-opted examiners for preparing the written tests and marking the examination papers, and also to all others who have assisted with the examination, including the examiners at centres and supervisors,

EXAMINATIONS: The following is a summary of the results of the November 1935 Examinations:—

Examination.	Complete Pass.	Partial Pass.	Failure.
Junior	5	6	—
Intermediate	2	3	—
Diploma	5	2	—

CERTIFICATES ISSUED: Appended is a list of Diplomas and Certificates issued, after examination, in addition to those shown in previous annual reports:—

Diploma in Horticulture	5
Intermediate Certificate in Horticulture	2
Junior Certificate in Horticulture	5
	12

TOTAL ISSUED TO DATE.

Diploma:	Without Examination	170
	Group C Examination	28
	Group B Examination	16
	Equivalent	1
Certificates:	Junior	29
	Intermediate	17
	Fruit-culture	1
	Florists	33
	Seedsmen	16
		311

List of Diplomas and Certificates granted under Section 4 of the New Zealand Institute of Horticulture Act, 1927, since the issue of the 1934-35 Annual Report:

DIPLOMA IN HORTICULTURE:

Bennett, Jonathan; Wellington.
Buxton, Trevor Sydney; Palmerston North.
Hamilton, William Maxwell; Wellington.
MacKenzie, John Gretton Carr; Hastings.
O'Sullivan, Maurice Justin; Auckland.

INTERMEDIATE CERTIFICATE IN HORTICULTURE:

Boothby, Milford Robert; Dannevirke.
Jollie, Francis John Edward; New Plymouth.

JUNIOR CERTIFICATE IN HORTICULTURE:

Baker, David; Invercargill.
Gilpin, Huia Gray; Christchurch.
MacKenzie, Dugald Carr; Christchurch.
Morgan, Alan Frederick; Timaru.
Silvester, Arthur John; Bulls.

INSTITUTE NOTES.

PERSONAL: At the December meeting of the Executive Council, resolutions of sympathy and of best wishes for speedy recovery, were directed to be conveyed to her Excellency, Lady Galway, and also to Mr. Peter Black, Palmerston North.

EDUCATIONAL.—1936 EXAMINATIONS: A record number of candidates sat for this examination, viz., for Junior Certificate, ten, for Intermediate Certificate, twelve and for Diploma, four. Although only three candidates completed the Junior Examination, six obtained a partial pass. Nine candidates secured the Intermediate Certificate and three gained the Diploma in Horticulture.

The following is a record of the passes:—Junior Certificate: Messrs D. P. Reston (New Plymouth), G. J. Hicks and K. Garrick (Christchurch). Intermediate Certificate: Messrs. W. S. Watters (Auckland), G. H. Huthnance and J. Lewis (New Plymouth), G. Millson (Blenheim), H. G. Gilpin (Christchurch), L. J. Mitchell (Timaru), E. W. Campbell, G. A. R. Petrie and H. P. Thomas (Invercargill). Diploma: Messrs W. S. Fleming (Auckland), C. H. Cuff (Masterton) and R. W. Balch (Christchurch).

NATIONAL CERTIFICATES IN FLORISTS' ART have been granted to: Mrs C. M. Imrie and Miss G. Rattray (Auckland), Mrs M. Bird and Mr L. M. Theakstone (Napier), Mr C. K. Brown (Hastings), Mrs M. Bradfield and Miss C. M. J. Bradfield (Palmerston North), Mrs M. Smith (nee Naulls), and Miss M. C. E. Williams (Wellington), Mrs F. M. Horncastle (Nelson) Mrs M. H. Thompson and Mr W. S. Elsom (Christchurch), and Mrs C. Paterson and Miss M. M. Duncan (Dunedin).

SEEDSMEN'S CERTIFICATES have been granted to: Messrs K. R. Macdonald (Whangarei) and D. G. Overend (Christchurch).

SCHOOL OF HORTICULTURE: The Executive Council has decided unanimously to endorse the proposed scheme for the establishment of a School of Horticulture at Christchurch, as suggested by Mr J. A. McPherson, and to give its unqualified support thereto.

DISTRICT COUNCILS: AUCKLAND: In connection with the District Council's Waitakere Coronation Park Scheme, it is understood that a conference of local bodies, directly interested in this proposal, will be convened early in the New Year by the Mayor of Auckland. TARANAKI: Congratulations have been extended to this District Council for its enterprise in having rules prepared with the assistance of Mr Percy Thomson, Stratford. CANTERBURY: Continued assistance is being given towards the assurance of the success of National Horticultural Week. OTAGO: The annual meeting was held on the 9th December, 1936, when Conference, Educational and other matters were dealt with and increased interest was shown in this District Council's activities. SOUTHLAND: The annual report for

the year ended 30th September, 1936, shows continued activity in education, horticultural societies, tree planting and other matters included in the Institute's objects. Several new members have been enrolled.

NATIONAL HORTICULTURAL WEEK, 1937: Arrangements are well in hand for the various Conferences, which will be held in the Automobile Association's Buildings, 151 Worcester Street, Christchurch, and the Banks Lecture will also be delivered there. It is reported that applications for space at the National Flower Show are coming in well and that there is every prospect of a really fine display.

Oamaru Gardens.

REPORT OF THE EXECUTIVE COUNCIL FOR THE YEAR ENDED 30th SEPTEMBER, 1936.

The Institute's activities have been steadily carried on, notwithstanding the depression. It is hoped that improved economic conditions will result in increased membership.

EDUCATION: This is fully dealt with in the Examining Board's report. The members of the Board and its examiners are again thanked for their valued voluntary services which involve, in addition to expert knowledge, a great amount of time and trouble. During the period under review, a number of florists and seedsmen with service and experience took advantage of the opportunity of securing National Certificates.

JOURNAL: The Executive again desires to extend its thanks to the Editor of the Journal (Dr. W. R. B. Oliver) and also for contributions. In view of quarterly publication, an increase in these would be welcomed.

HONORARY BOTANIST: The Institute is indeed fortunate in having the services of Dr. H. H. Allan, of the Plant Research Station, Palmerston North, as its Honorary Botanist in succession to the late Dr. Leonard Cockayne.

TARANAKI DISTRICT COUNCIL: The warmest thanks of the Executive are extended to Mr. J. C. McDowall B.Sc., Hon. Secretary of this Council, for its formation, membership, etc., and for the great assistance given by Mr. T. Horton and other enthusiastic members. Thanks are also due to the members of the Executive Council who journeyed to New Plymouth and materially assisted the movement.

COCKAYNE GOLD MEDAL: Following on a remit from the Canterbury District Council, it was decided that, as a memorial to the late Dr. Leonard Cockayne, a gold medal should be presented annually to the best student in the Diploma Examination. As the merit of two candidates, viz. Messrs J. G. C. MacKenzie and M. J. O'Sullivan B.Sc., in the opinion of the Examining Board, appeared to be equal, two gold medals were awarded on this occasion.

NATIONAL CONFERENCE ON HORTICULTURE: The seventh National Conference on Horticulture was held at Auckland in March, 1936, when the annual meetings of the Institute, the New Zealand Horticultural Trades' Association, the Horticultural Seedsmen's Association of New Zealand and the Association of Parks and Reserves Superintendents, were held. The National Conferences were officially opened by the Hon. P. Webb and a civic welcome was extended to the delegates by Councillor (Miss) Melville, on behalf of his Worship the Mayor. The National Flower Show, which was held at Ellerslie Racecourse, followed the annual meetings. The

Show, which was officially opened by Lady Galway, was a fine display in a beautiful setting and concluded with a Floral Fete with a remarkable attendance. Delegates were hospitably entertained with pleasant outings, garden visits and social functions.

BANKS LECTURE: T. Waugh, Esq., of Lower Hutt, Wellington, delivered the Banks Lecture, his subject being "A Brief History of the Royal Horticultural Society" which was illustrated with lantern slides. The lecture was most interesting, the early history of R.H.S. providing a basis of comparison with that of the Institute.

CONGRATULATIONS: The hearty congratulations of the Institute were extended to Dr. W. R. B. Oliver on the award of the Hector Medal in Botany.

CONDOLENCE: The Institute has extended its sympathy to the relatives of Lord Wakehurst (Gerald Loder), donor of the Loder Cup and an Honorary (overseas) member, and of T. W. Kirk, a former Director of the Horticulture Division and an Honorary Fellow.

FINANCE: The renewal of the Government Grant of £100 is deeply appreciated. The alteration of the end of the financial year to 30th September had the effect of including the bulk of members' subscriptions in last year's accounts but this has been offset by increased fees, mainly for Florists' and Seedsmen's Certificates.

Statement of Receipts and Payments for year ended 30th September, 1936.

RECEIPTS.

	£ s. d.	£ s. d.
To Post Office Savings Bank ..	230 8 8	
„ Bank of New Zealand	78 4 5	
„ Cash in Hand	2 7 10	
		311 0 11
„ Subscriptions—		
Individual Current	66 0 7	
„ Arrears	19 3 9	
		85 4 4
„ Societies Current		13 11 0
„ Examination Fees		164 17 0
„ Exchange		17 6
„ Journal		8 9
„ Publications		13 6
„ Government Grant		100 0 0
„ Post Office Savings Bank Interest		6 18 0
		£683 11 0

PAYMENTS.

	£ s. d.	£ s. d.
By Salary Dominion Secretary ..		128 18 4
„ Travelling Expenses „ ..		4 0 0
„ Allowance G. A. Green (deceased)		23 12 6
„ Capitation Fees (District Councils)		
Auckland	6 5 0	
Taranaki	4 12 9	
Canterbury	1 17 6	
Southland	1 19 3	
		14 14 6
„ Conference Advertising, etc. ..	2 15 0	
„ Printing	4 9 5	
„ Travelling Expenses	6 0 0	
		13 4 5
„ Publications Journal		60 12 3
„ Seed Industry Grant		8 14 1
„ Taranaki District Council Preliminary Expenses		2 19 4
„ Furniture		11 13 8
„ Auckland District Council Library		1 1 0
„ Cockayne Gold Medals (2) ..		2 15 0
„ Refund Examination Fees ..		2 2 0
„ Office Expenses:		
Cleaning	5 14 0	
Exchange	1 4 0	
Postages ..	19 6 9	
Printing and Stationery ..	14 9 6	
Rent and Light	31 10 6	
Telephone	15 7 0	
Sundries	11 14 6	
		99 6 3
„ Post Office Savings Bank ..		237 6 8
„ Bank of New Zealand		72 11 0
		£683 11 0

Income and Expenditure Account for year ended 30th September, 1936.

	£ s. d.	£ s. d.
To Conference Expenses: Printing ..	4 9 5	
Travelling Ex.	6 0 0	
Sundries ..	2 15 0	
		13 4 5
„ Capitation Fees:		
Auckland	5 7 6	
Canterbury	1 5 0	
Taranaki	4 12 9	
Southland	1 11 9	
		12 17 0
„ Dominion Secretary's Salary ..		119 6 8
„ „ Travelling Ex.		4 0 0
„ Publications		56 14 3
„ Depreciation		6 8 0
„ Expenses re New Plymouth District Council		2 19 4
„ Cockayne Memorial Medals ..		2 15 0
„ Donation Auckland Dist. Council Library		1 1 0
„ Examination Expenses		1 10 6
„ Office Expenses:		
Rent and Light	29 2 0	
Cleaning	5 14 0	
Printing and Stationery ..	14 9 6	
Postages	19 6 9	
Telephone	7 13 6	
Expenses	6 4 2	
Exchange	6 6	
Sundries	2 3 6	
		84 19 11
„ Excess of Income over Expenditure		24 6 1
		£330 2 2

	£ s. d.	£ s. d.	£ s. d.
By Subscriptions:			
Individual Current ..	34 17 4		
„ Arrears ..	19 3 9	54 1 1	
Affil. Fees Current ..		8 8 0	62 9 1
„ Examination Fees ..			160 13 0
„ State Subsidy ..			100 0 0
„ Interest P.O.S.B. ..			7 0 1
			£330 2 2

Balance Sheet as at 30th September, 1936.

LIABILITIES.				ASSETS.			
		£ s. d.	£ s. d.		£ s. d.	£ s. d.	
Sundry Creditors		10 4 0		Post Office Savings Bank	240 17 9		
Examination Fees in Suspense ..		4 4 0		Bank of New Zealand	72 11 0		
Subscriptions in Advance		36 6 3				313 8 9	
Endowment Fund		63 0 0		Office Furniture	38 8 0		
Accumulated Fund as at 30/9/35 ..	217 18 5			Less Depreciation	1 18 0		
Add Excess of Income over Expenditure	24 6 1					36 10 0	
		242 4 6		Awards of Merit	10 10 0		
				Less Depreciation	4 10 0		
						6 0 0	
		£355 18 9				£355 18 9	

G. S. NICOLL,
Treasurer.

I have examined the books, papers and vouchers of the Institute, and certify that in my opinion the attached statement of receipts and payments and income and expenditure account correctly set out the transactions, and the above Balance Sheet the position as at the 30th September, 1936, as disclosed thereby.

(Sgd.) J. L. ARCUS,
Hon. Auditor.

WELLINGTON, 15th December, 1936.

NEW ZEALAND INSTITUTE OF HORTICULTURE

(INCORPORATED.)

Patrons: Their Excellencies VISCOUNT GALWAY, Governor-General and LADY GALWAY.

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

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

Hon. Editor: Dr. W. R. B. OLIVER, Dominion Museum, Wellington.

Dominion Secretary: G. S. NICOLL, P.O. Box 1237, Wellington

Hon. Secretaries of Local District Councils:

Auckland: P. R. Parr.
Canterbury: J. N. McLeod, 108 Paparoa Street, Papanui, Chch.
Otago: Dennis H. Leigh, Botanic Gardens, Dunedin,
Southland: B. P. Mansfield, Box 51, Invercargill.
Taranaki: J. C. McDowall, B.Sc., Vivian Street, West, New Plymouth.

Membership:

Individuals: 12/6 per annum (including Member's wife).
Juniors under age eighteen: 2/6 per annum.
Societies, Firms, etc., 21/- per annum.

Journal (quarterly):

To Members: Free.

Examinations:

Examinations are held yearly in November.

Students desiring examination should make early application to

DOMINION SECRETARY,

N.Z. Institute of Horticulture,

P.O. Box 1237, Wellington.

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