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Edited under the authority of the Executive
Council of the Institute.

EXAMINATIONS

Examinations for the following are conducted by the Institute:—

- 1. Junior Certificate in Horticulture.**
- 2. Intermediate Certificate in Horticulture.**
- 3. Diploma in Horticulture.**
- 4. Seedsman's National Certificate.**
- 5. National Certificate in Florists' Art.**

Examination Papers

Sets of examination papers used at the last six examinations in horticulture are obtainable on application for sixpence per examination set.

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Wellington.

Journal of the Royal New Zealand Institute of Horticulture

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WELLINGTON, SEPTEMBER, 1940.

No. 2.
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Science Steps Into the Garden

(By J. W. Matthews).

Gardening as a hobby, and horticulture as an occupation, have one great advantage in common: you can learn as much or as little as you like and still gain a great deal of satisfaction from your efforts. If you start your gardening career with the determination to rest satisfied when you have acquired the art of growing carrots and cabbages in your back garden, and a lawn in the front of the house plus a border of annuals, and having gone so far, feel no urge to delve deeper into the mysteries of life, you are perhaps to be envied. There are people, I am told, who find joy in doing the most commonplace things, and are happy to leave the investigation of deeper problems to more curious souls. This article is not for such people, but for that section of the gardening public which is ever seeking new and better ways of growing plants.

Gardening for the enthusiast was a fairly complicated game even before science seriously took an interest in it. We begin by acquiring knowledge on how to prepare the soil, plant, propagate, and cure the ills of our plants, and derive great pleasure from blundering along and eventually achieving success—generally without knowing why—by the good old method of trial and error. It was a thrilling game until science took a hand. Now we know why things happen—or do not happen—in the garden. Science can give a reason—or at least an explanation—and what is the result? We who believed we enjoyed gardening because we loved the soil, or preferred to get back to Nature—in reality because we thought we liked to return to the simpler pleasures of life, now find that our hobby has become a tyrant—albeit a fascinating one. But fortunately it is not necessary for the enterprising gardener to become an authority on such diverse yet allied sciences as chemistry, biology, physics, genetics, bacteriology and microbiology. Men who specialize in each of these branches of science are working continuously on set problems, and all we—the laymen gardeners—have to do is to avail ourselves of this new knowledge to become better gardeners.

Of course, it is more than probable that, as you acquire this newly-discovered wisdom, you will suddenly find yourself sidetracked on to some fascinating tangent. You will possibly develop theories you will want to test out—if so, all the better for you, and perhaps all to the good for gardeners and horticulture in general. Whatever the results, you will learn at least one thing—a more intense joy of life.

MAGIC VITAMINS.

Now let us look at some of this new knowledge that has been revealed by modern science. First, let us examine what the Americans have been calling the “New Garden Magic,” otherwise Vitamin B1 (thiamin chloride) which is alleged to have caused a veritable revolution in the United States at least. At the outset it is interesting to note that what is really new about Vitamin B1 is that man has discovered it, as this vitamin has been produced in the leaves of most chlorophyll plants since plants first appeared on the surface of the earth. However, when popular magazines, with circulations running into millions, start to “boost” this “miraculous substance,” which is claimed to produce five-inch rosebuds, daffodils bigger than salad plates and day lilies with seven foot flower stems, and advertisements from a dozen and more chemical manufacturers offer the magic-working power at a dollar a bottle, one gets interested in spite of his conservatism. Like a great many others, I investigated Vitamin B1 and this is what I have found:

Vitamin B1 was isolated and the formula worked out by the Californian Institute of Technology. The results of initial tests were so amazingly successful—and were so efficiently publicized—that numerous new business sprang up overnight to supply the demand. In poor, overworked, undernourished or unbalanced soils, Vitamin B1 gives an amazing fillip to plant growth. On soils of medium quality, i.e., reasonably well supplied with available plant foods, the results are not so noticeable, and on soils rich in natural plant foods, the effects are often not apparent at all. In short, Vitamin B1, in addition to all other vitamins, is essential to healthy plant growth. If we do not supply the raw materials to enable the plant to draw its requirements from the soil, we must use the cart-before-the-horse method of applying it synthetically. The moral is: if your soil is adequately supplied with a well-balanced humus such as can easily be prepared by the Indore Process, it contains the raw materials and the right environment for the microbial life to prepare all the vitamins necessary for healthy plant life. If you deprive your soil of humus materials, you have to apply the essentials of growth in some synthetic form. In my opinion, the discovery of the stimulating effects of Vitamin B1 is of great importance in showing us how deficient a great percentage of garden soils is in essential food elements—and that is where the greatest value of the discovery lies.

HEALTH BEGINS IN THE SOIL.

This question of vitamins brings us to another phase of modern investigation: the fact that man, through his unintelligent use of the soil, is gradually starving himself out of existence. A sweeping statement perhaps, but capable of scientific confirmation for all that. Not one, but several investigators, have emphasized that if man persists in his present practices, in a matter of a hundred years or so much of the earth's fertility will have been superseded by deserts, barren hillsides and sterile dust-bowls. In the meantime, man's constitution will have been undermined by malnutrition, and deficiency diseases will prove the scourge of civilisation. This subject requires the scope of a book, but in view of its paramount importance I have prepared the following very brief outline:

A cardinal law of nature is that we must return to the soil what we take from it, a rule that most civilized nations, through greed or ignorance, have almost always ignored. We can't go on taking toll of the soil, season after season, ignoring the Law of Return, unless we are prepared to eventually abandon each plot of soil as we exhaust it and move on to another area of virgin land. That is just what the American pioneers did, and you see the result to-day in abandoned farms, man-made deserts and dust-bowls, nation-wide erosion and areas where plant diseases are so rife that cropping has proved uneconomical.

A fundamental truth not generally recognized is that man lives on life. Man lives, in the main, on animals, the products of animals, and plant life. Animals live on plant life. Plants live on plants that have been broken down and "processed" into plant food by microbial life. That is, in the main. There are, of course, mineral salts and "trace elements" that are essential to the well-being of all living organisms. That is the cycle that must not be interrupted—life deriving life from life. If the cycle is interrupted at any point, something goes wrong and we have malnutrition, disease, sterility and death.

The very basis of plant and animal well-being is in the soil, or rather in the humus-making materials which should be in the soil. This is so important—and so little appreciated—that I quote the following definition of humus by Dr. Waksman, from his monumental work, "Humus":

"In humus is concentrated the major part of the organic and inorganic forms of nitrogen on this planet, as well as a large part of the phosphorus, potassium, sodium, calcium, magnesium and iron. Many other elements, rarer constituents of the soil, are concentrated in humus. These are the trace elements such as boron . . . Micro-organisms influence the cycle of humus in nature by (1) bringing about its formation from plant and animal residues; (2) continuously transforming humus under favourable conditions and finally decomposing it, or 'mineralising' it; (3) their own cell substance

contributes directly as a source of humus. . . . Without microorganisms the continued existence of life upon this earth, as we know it, would have disappeared long ago, since most of the available elements of plant growth would have been stored away in the form of inanimate plant and animal residues."

We also know that there are other elements in humus in such minute quantities that they have defied detection. But we know that they are there because humus has the power to correct soil-sickness, plant deficiency diseases and retarded growth in a manner not accounted for by the known constituents of humus. Incidentally, humus is the greatest single factor in the prevention of erosion, but that is another story.

Investigations carried out under the most exacting scientific conditions have shown that plants grown on soil deficient in humus suffer from deficiency diseases, that animals fed exclusively on such plants develop deficiency diseases, and that, when such animals are fed the following season on plants grown in soil containing balanced humus, they have completely regained their health. Space will not permit a recital of the many conclusive reports of this nature which are now on record. The foregoing should be sufficient to cause some deep thinking, especially when the remedy is so absurdly simple—the use of a well-balanced compost made up of all available plant and animal residues, plus lime and wood ash. Such a compost, properly aerated, will ensure the microbial army doing the work of decomposition and "conditioning." And that brings us to another amazing phase of natural science—the part played by unseen billions of workers in the soil.

UNSEEN WORKERS IN THE SOIL.

The scientific world is gradually coming to the belief that the majority of "plant foods" which we put into the soil are inert substances so far as plants are concerned until they have undergone treatment by one or other of the innumerable families of microorganisms which often work in relays, one group taking up the partly-prepared food elements where another group knocks off. A recital of this amazing underground activity would necessitate much more space than this article permits, but one example is quoted. Plants obtain their supplies of nitrogen through biological agencies. Nitrifying bacteria, microscopic organisms which live freely in the soil, can be counted by the million in a thimbleful of humus (if you have a sufficiently powerful microscope). They "fix" nitrogen and make it available to plants. In nitrogenous plants such as the broom, small tumor-like nodules are formed on the roots by nitrogen-fixing bacteria known as *Bacterium radiclecola*, which live in a state of symbiosis with the plant, supplying it with nitrogen in exchange for sugars and possibly other substances. Talking of symbiosis (state of partnership between plant and so-called parasite), there is the fungus known as *Mycorrhiza*, which plays an important

role in the health of many native trees and most forest trees, but that too, must be treated as another story. The point to be remembered is that all these beneficial lower organisms fail to function without humus, which is their natural and essential environment.

ARTIFICIAL MUTATION.

On rare occasions Nature side-steps the slow process of evolution and gives us a distinct variation in a single generation. Such a phenomenon is known as a mutant or "sport" and it sometimes presents us with variations not possible of attainment by orthodox methods of plant breeding. But science has now discovered two methods by which man can cause mutations to occur (1) by means of certain drugs and (2) by subjecting seed to X-Ray treatment. The drug method is now in fairly general use throughout the world, although it is still in an experimental stage. Colchicine, a drug extracted from the well-known Autumn Crocus is the medium now in general use for the production of these artificial mutations. The drug, in solutions as weak as .02 per cent., is sprayed on to growing plants, or used as a dipping medium for seed. The first results are generally disappointing, as seedlings and plants become distorted in many ways, a big percentage die, but a very small percentage usually survives the treatment, and of the survivors perhaps 1 in 10 is an interesting variation, but of course the percentage of interesting novelties worthy of introduction is considerably less.

Now what does colchicine do to a plant or seed to bring about a distinct "break" in form, colour, size or period of flowering? Most horticulturists know that all living things are composed of cells and that each cell contains a number of chromosomes. These minute chromosomes contain genes, mysterious microscopic units which determine hereditary characteristics and have the power of passing them on to succeeding generations. The number of chromosomes in each cell of a living being is exactly the same. For example, every cell in the human body has 48 chromosomes. Growth is brought about by cell division and every time a cell multiplies itself the set of chromosomes also divides, so that each cell is identical. In nature, perhaps once in a million times, something goes wrong in this paradox of increase by division, the chromosomes doubling themselves while the cell which holds them fails to divide. Then something happens—something we call mutation—and the result can be almost anything in the way of variation, and the variation remains "fixed" in future generations unless mutation occurs again. Colchicine is one of the drugs that brings about the doubling of chromosomes while preventing splitting of the cell. One United States firm of seedsmen already has a new patented marigold on the market which has been "created" by means of colchicine. There are several other chemical substances which have been found to exert a similar influence to colchicine, and no doubt others will be discovered as investigations continue. Those who wish to experiment and find difficulty in obtaining colchicine should try nicotine sulphate in varying strengths.

X-RAY MAGIC.

The General Electric Company of the United States employs a number of physicists whose job it is to find new uses for electrical apparatus. A group of these experimentalists have been endeavouring to extend the uses of X-Ray, and not without success. Among the many interesting discoveries recorded are a number of particular interest to horticulture. They have found that mutation can be brought about by treating seed with X-Ray and it is claimed that new varieties of narcissi have been developed by exposing bulbs to X-Ray. Many freaks have been introduced which indicate the possibilities of X-Ray in creating new varieties of plants. Grapefruit, they claim, two inches high have burst into bloom at the age of five weeks!

OTHER INTERESTING DISCOVERIES.

Space will not permit a review of the many other interesting discoveries of recent times. There are the hormones which induce difficult subjects to root readily, the growing of plants without soil, the amazing discoveries of the effects of various colours on plant growth, new and fool-proof methods of raising seedlings. These, and other subjects, I hope to discuss in a later issue of the Journal.

HORTICULTURAL TRAINING AND EXAMINATIONS.

It was approved by the Institute's Executive Council last year that an annual article on Horticultural Education should be published in the September Journal and the first of these appeared in the September, 1939, issue.

The main idea of the article is to keep students informed of any alterations or points of interest in connection with the Scheme of Training and Examination, which may have arisen since publication of the previous article.

CIRCULARS TO STUDENTS: These circulars comprise (a) "Information for the guidance of students," which deals with Application for Registration, Requirement of Employment in an Approved Garden, Classes at Technical Schools and Text-Books; (b) "Supplementary Information" covers further Text-Books; Education Department's Subjects for the Institute's Junior Examination; Application for Examination to be made three months prior to the Examination with advice of Examination Centre, accompanied by Fee; and Information re submission of Diaries and Extracts; (c) Hints as to the keeping of Horticultural Students' Diaries. In this connection it should be noted that an Exercise Book, about 8 x 10 somewhat over 100 pages, with stiff or semi-stiff covers and rulings similar to foolscap with red line margin, is recommended; (d) gives a specimen of a week's diary entries and (e) the Rules regarding the use of capital letters in the names of plants.

ORAL AND PRACTICAL TESTS: The Syllabus provides that each examination shall include oral and practical tests and, commencing with the 1940 Examination, separate marks are to be awarded at all centres for each test.

Under the heading of Thesis (Page 6) the Syllabus reads:—

THESIS: "Every candidate for the Diploma shall submit a thesis dealing concisely with a Special Subject or with some portion of a Special Subject."

It is suggested that a better thesis could be written from a portion than from the whole title of any one of the subjects from (a) to (h) under Section 2 Syllabus No. II.

The thesis should not be too lengthy but it should be long enough to display the candidate's knowledge of his subject. A most important point is the choice of headings. Once the candidate has these of a subject of which he has knowledge and interest in, the rest should not be difficult.

AMENDMENT TO SCHEME since September, 1939 is:—Page 4 under Syllabus No. 1 substitute for second paragraph:—"General Experimental Science and Chemistry.—These subjects as they are prescribed for the Public Service Entrance Examination, conducted by the Education Department. The Examining Board may, for the purposes of this paragraph, recognize equivalent examinations."

It will be noted that the subject of Agriculture has now been omitted. Obviously, this does not affect any student who can produce a certificate that he commenced the study of Agriculture prior to the passing of the amendment.

LECTURES FOR AND BY TRAINEES: Reference was made in the April, 1940, Journal, to the Syllabus, for 1940, of lectures in Horticulture arranged by the Canterbury District Council and also to a class, since the beginning of last year conducted by Mr. L. W. Delf, M.A., Honorary Secretary of the Taranaki District Council, in preparation mainly of students for the Institute's Examinations with special reference to plant protection, general botany, classification and ecology.

The following is extracted from the August Monthly Report of the Director of the Botanic Gardens, Christchurch:—"During the winter, the trainees, along with apprentices from the City Reserves Department, formed themselves into a Mutual Improvement Club, meeting on Saturday mornings at the Director's house, and each trainee delivered at least one lecture."

Trainees are called upon to give lectures on subjects they are conversant with. After delivery, the lecturer requests someone to criticize the construction, material presented and method of presentation. The lecturer then nominates a seconder who undertakes to bring out the favourable points in the lecture, adding any information he may have regarding the subject matter.

It is undoubtedly an excellent idea to call upon individual trainees for talks, criticism and appreciation. Apart from the gain in knowledge to the lecturer and to his audience, the art of fluent and natural public speaking is a valuable acquirement. Apart from this, there is the social side which must make for better understanding all round. Wherever the idea first originated, it was indeed a happy one.

CAMPBELL MEMORIAL AWARD: Mr. J. W. Goodwin, winner of the J. A. Campbell Memorial Award, 1939, as mentioned in the April, 1940, Journal has chosen "Trees and Shrubs Hardy in the British Isles" by Bean and this has been approved by the Executive Council."

JOURNAL AND MEMBERSHIP: It was agreed by the Executive Council last year that all students should be placed on the free mailing list for the Journal until the Intermediate Examination is passed. Thereafter, it is suggested that such students should become financial members of the Institute. As the financial year ends on the 30th September, it is now an opportune time for all prospective Diploma students and Diploma-holders to join up by forwarding the annual subscription of 12/6 to the Dominion Secretary.

It is pointed out that the holder of the Diploma or Intermediate Certificate, by joining up with the membership of the Institute is, at the same time, increasing the standing and value of the Diploma or Intermediate Certificate held by him.



HISTORIC TREES.
Norfolk Island Pines at Brooklands, New Plymouth.

HISTORIC TREES IN NEW ZEALAND.

(By H. H. Allan, Honorary Botanist).

Since the last issue of the Journal, further information has come to hand, and is given below. A most interesting ceremony took place on 7th August last in the Auckland Domain. On the site of Potatau te Wherowhero's cottage, his great grand-daughter Princess Te Puea Herangi, planted a totara in his memory.

Alas, one of the Seymour Oaks (No. 78) was felled on 1st July, 1940. The Nelson paper comments: "Slow in growing and long in life the veteran seemed unwilling to go. The workmen were well behind their estimate that they would finish the job by dark, and the dusk of the mid-winter day had long since fallen when the final blow of the axe set the top, bare branches etched against the night sky shivering, and on the area of land it had shaded these many years the tree crashed to rest." Ave atque Vale! But could it not have been spared?

AUCKLAND.

123. Pohutukawa; a well-known giant near the landing place, Waiheke Island.
124. Pohutukawa Avenue of 38 trees on Port Whangarei Road, planted July 18th, 1940, to commemorate men who had served as members of the Whangarei Harbour Board.
125. Red Gum, at Oroua Bay, Waiuku, planted in 1836 by the Rev. James Hamlin, when he established the Mission Station there. Owing to the action of the sea, the roots are now exposed and the existence of the tree is threatened. The seed was brought from Sydney The Franklin County Council is enquiring into means of preserving this link with the introduction of Christianity.

BAY OF PLENTY.

126. Olive; a very old tree on Whale Island (Motu Tahora).

POVERTY BAY.

127. Oak; large tree at Manutuke, reputed to be 100 years old, planted by Capt. W. Harris at his trading station.
128. Bluegums on old Mission Station at Waereanga-a-hika.

TARANAKI.

129. Norfolk Island Pines; two trees planted by the late Capt. King, probably in 1850. One is 101ft., the other 112ft. high. Brooklands, New Plymouth.
130. Pohutukawa; corner of Cameron and Leach Streets, New Plymouth. Now a fine specimen, brought from Kawhia, and planted by Thomas Inch in 1874, on land presented by Chas. Swanson.
131. Karaka; a magnificent specimen, fruiting freely, in Brooklands, New Plymouth.
132. Japanese Yew; a large tree in St. Mary's Churchyard, New Plymouth, planted by Archdeacon Lovett in 1870. Remarkable for its high spread and the varying autumn colouring.



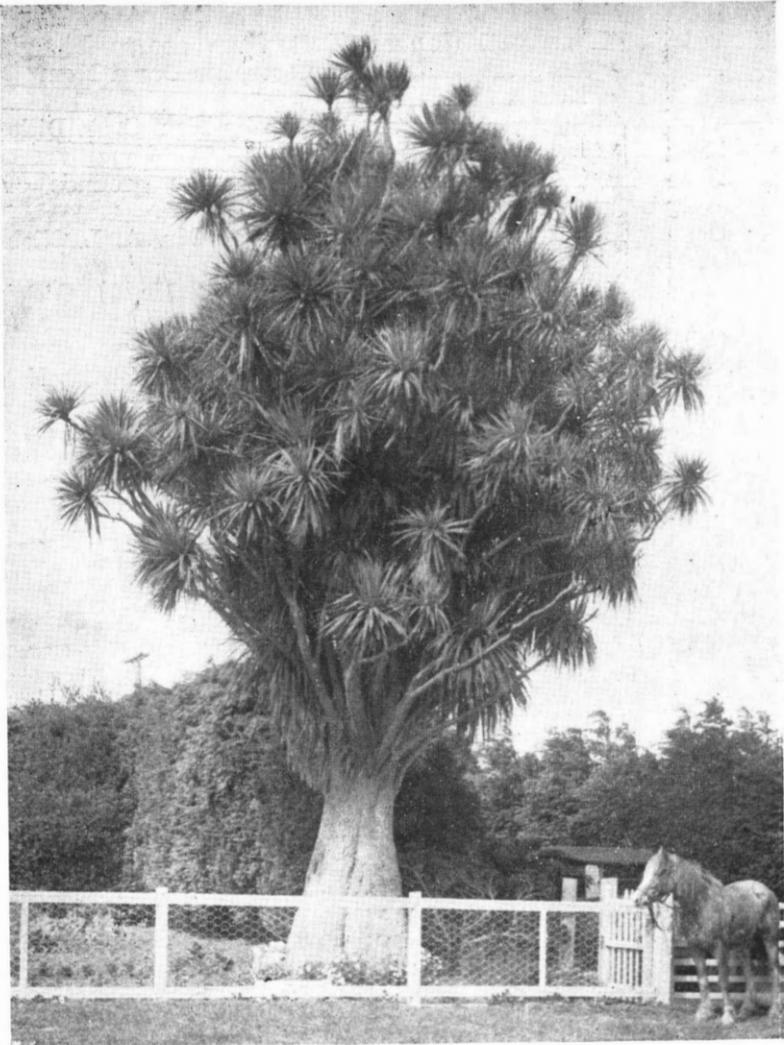
HISTORIC TREES.

Pohutukawa. Corner of Leach Street and Cameron Street, New Plymouth.
Land presented to Borough Council by C. Swanson, Esq.

133. Crown of Thorns (*Crataegus crus-galli*); a Glastonbury thorn, planted by Archdeacon Lovett. The tradition is that the original Glastonbury thorn grew when St. Joseph of Arimathea stuck his staff in the ground, and the shrub at St. Mary's is a cutting.
134. Rimus; several good specimens in Burgess Park, New Plymouth.
135. *Cordyline australis*; a wonderful specimen growing in the grounds of Mr. J. C. Lobb, Westown. Probably removed there by the Maoris several generations before the white occupation. Its trunk is in perfect condition, appears solid, and is very well branched. The circumference at one foot from the ground is 15ft. Mr. Peter Elliot was the first settler, and he preserved this fine cabbage tree.
136. Coral tree; a fine specimen, planted by Robert Snell, 70 years ago, near the site of a blockhouse. This tree is at the corner of Ridge Lane and John Street, New Plymouth.
137. Norfolk Island Pines; four fine specimens in the grounds of the New Plymouth Girls' High School, planted by Mr. Reynolds, who had a hop garden there many years ago.
138. Norfolk Island Pines; two fine specimens in the grounds of the Roman Catholic Convent, New Plymouth, said to have been planted by Mrs. W. Honeyfield, a daughter of Dicky Barrett, in the early days.
139. Norfolk Island Pine, claimed to be the first planted in New Plymouth, in the garden of Mrs. Hoskin, corner of Young and Dawson Streets. Planted 90 years ago by Mr. John Knight.

WELLINGTON.

140. Pohutukawa; at corner of Rata and Oroua Streets, Eastbourne. The first Anzac Memorial. Planted by the Mayor of Eastbourne (the late Mr. J. P. Kelly) as a memorial to the landing, on Arbor Day, 1915, only 2½ months after the landing.
141. Kauri Tree, in Nikau Street, Muritai. Planted by Mr. J. W. Heenan in August, 1919, as a memorial to the late H. Marsden, killed at Passchendaele.
142. Kauri Tree, in Nikau Street, Muritai. Planted by Mr. J. W. Heenan in June, 1920, as a memorial to the late Hugh Girdlestone, killed 1916.
143. Oak; from an acorn planted on the banks of the Hutt River in 1843, by J. H. Percy, and transplanted to the Percy home-stand, where it developed a 60ft. spread. It was cut down in 1926, the stump removed and exposed to the weather for 3 months, and planted again in front of the old mill at the end of Mill Road, Petone. Had recently to be removed, during the formation of the new road, and is now in the Percy garden,



HISTORIC TREES.
Cordyline australis in the grounds of Mr J. C. Lobb,
Westtown, New Plymouth.

NELSON.

144. Oak, at Upper Moutere, planted near main road by Mr. Heine about 1853.
145. Gums, at Upper Moutere, planted by J. C. Kelling, J.P., about 1856.
146. Oaks, at Beaucroft, Waimea West, from acorns brought to Nelson by the great botanical explorer, Sir David Monro, who arrived in Nelson in 1842.
147. Weeping Willow, planted at Enstone by Hon. C. A. Dillon in 1842.
148. Beach Pine, a magnificent specimen in the grounds of St. Mary's Presbytery, Nelson.
149. Canary Island Pine, in the grounds of Mr. A. L. Nicholls, Stoke.
150. Californian Redwood, at the residence of Mr. H. O'Beirne, Wakapuaka; planted some 80 years ago by the late Mr. A. S. Collins, is now over 150 feet in height.
151. Wellingtonia; a fine row of five trees at Hardy Street, Nelson, in grounds of Government Buildings.

VEGETABLE AND FLOWER SEED PRODUCTION IN NEW ZEALAND.

The following remit from the Canterbury District Council was passed at the 1939 Conference:—"That the time has arrived for the establishment in New Zealand of the commercial production of vegetable and flower seeds."

Owing to the prolonged illness of Mr. W. K. Dallas, Convener of the Special Committee set up to investigate this matter, the Committee's report as appended had to be held over until the 1940 Conference.

"The Sub-committee set up at the Annual Conference (1939) of the Royal New Zealand Institute of Horticulture (Inc.) held at New Plymouth has made a careful examination of matters relative to the production upon a commercial basis of vegetable and flower seeds in New Zealand.

We wish to report as follows:—

In New Zealand large and increasing quantities of vegetable and flower seeds are being produced as well as farm seeds which include rape, kale, chou moellier, mustard, also grass and clover seeds. The annual value of the grass and clover seed exported is in the vicinity of £250,000.

In vegetables, all or the major portion of the Dominion's requirements of peas, beans (broad, French and runner), parsnip, onion, pumpkin, marrow and squash, are being produced within the country.

Of flower seeds a fair quantity is also produced, including Sweet Peas, Asters, Delphiniums, Nemesis, Nasturtiums, Marigolds, Polyanthus, Poppies, Primula, Phlox, Salvias, Carnations, Cineraria, Freesias, Lupins, Ranunculus and Anemones.

Of the seed produced, and after supplying our own requirements, the under-mentioned quantities were exported from the Dominion in 1938:—

Kind of Seed.	Weight of Seed.	Value (£ N.Z.)
All grasses & clovers	45,610 cwt.	£233,372
Linseed	229 cwt.	309
Other agricultural seeds	—	5,642

This figure includes vegetable and flower seeds, which are not separately recorded, but does not include peas for seed and feeding purposes. There is no separate figure available of garden peas exported, as these are included in the figure of approximately £125,000, being the total value of peas exported.

It is generally recognized that the factors of paramount importance in the advancement of horticulture are the use of seeds of good quality and of proved merit, and the production of new and improved strains of the plants upon which our welfare depends.

In so far as horticultural seeds are concerned, the Dominion is most concerned under present emergency conditions in increasing

its production of vegetable seeds with the ultimate object of supplying the demand of the people for vegetables. In the event of a stoppage of supplies of seeds from overseas, the country should be prepared to meet the position and set about raising seed, firstly to supply our needs, and secondly to export any surplus.

To maintain good seed stocks, the best cultural practices must be employed and the holding kept free of weeds; disease and pests must be kept under control; the plants must be carefully rogued to eliminate weakly plants and those not true to type; the seed must be produced under a system of certification; the greatest care must be exercised to prevent cross pollination occurring; in harvesting at the right time and in the curing and subsequent storage of the seed.

While we are of the opinion that much of the seed available is of a quality comparable with that produced overseas, those engaged in seed raising must use every effort to maintain and improve the varieties of the strains of each, particularly in respect of purity, germination and vitality.

There are difficulties to be encountered in commercial seed production, which is a business requiring special knowledge. No one should enter into it on a large scale without making full enquiry and studying the difficulties which will be met with. Some of these are:—

(1) **COMPARATIVELY LIMITED DEMAND FOR SEED IN DOMINION AT PRESENT:** In New Zealand we have a population of only a little over a million, whereas North America has about 140 millions, and Europe a much higher population still. In either of these countries if a grower has a heavy crop, possibly twice his normal requirements, he can almost dispose of the same even if at a slight loss. In New Zealand, however, the cost of production would be so much higher, and when there was a surplus it would have to be sold either to Europe or to America at far less than cost price, or else it could not be sold at all. With the exception of a few main lines, the quantities used in New Zealand are very small. There is, however, a possibility when once commercial seed production is established, and the standard of the country's seeds recognized, of a larger export trade being developed to Australia, South Africa and South America.

(2) **UNCERTAINTY OF YIELDS:** Another problem is the uncertainty of seed crops and the question of shortages and surpluses in New Zealand-grown crops. Many seeds do not hold their germination satisfactorily beyond one year. It is quite common in some seasons to plant sufficient to yield, say, one ton of seed, and get from 20 per cent. to 50 per cent. crop; and it is also common to get twice or even three times as much as expected or needed for the small demand existing in New Zealand.

(3) **COST OF PRODUCTION:** In New Zealand the cost of labour is a great deal higher than in other producing countries, as will be seen from the following details:—

In Hungary and Austria men are paid 1/2 per day of 12 hours, and women 9d. per day of 12 hours (less than half for twelve hours than the wages paid in New Zealand for one hour).

In Yugoslavia, Rumania, Bulgaria, wages are very similar. In Morocco the wages are even less than in Hungary.

In Italy and Germany the wages are higher than the above countries, but far less than in New Zealand.

The greater part of the seeds imported from Great Britain are grown in these countries.

Seed production is not likely to prosper in the Dominion unless the cost of production in relation to the wholesale price brings the producer a reasonable margin of profit. It is probably correct to state that at present such a margin does not exist.

Under present conditions the position in many lines is that producers of New Zealand-grown seeds cannot compete against imported. To enable them successfully to compete with seed from overseas an extremely high duty would require to be placed upon imported seeds with a guarantee that the duty would not be reduced without giving sufficient warning notice to growers (say two years' notice).

We find, however, that if and where strains of new varieties and/or improved strains can be produced they have been able to create in time a market at prices higher than normal. This applies to quite a number of strains of flower as well as vegetable seeds. In the absence of any duty this appears to us as offering one of the best chances of increasing the production of seeds in New Zealand.

(4) **NO DUTY UPON SEEDS IMPORTED INTO DOMINION:** There is no duty on seeds entering New Zealand, and therefore no protection whatsoever against foreign cheap labour competition and the resultant standard of living which could not possibly be visualized as applying to New Zealand. These countries are producing seeds from selected strains for English houses under their personal supervision at costs which New Zealand could not entertain. If a duty is considered, it would have to be so high that we are afraid there would be serious complaints from planters, both farmers and gardeners, if carried into full effect.

(5) **SOIL AND CLIMATE:** Parts of all the Continental countries mentioned have good land at less cost than that in New Zealand and good climates for growing seeds. In parts of the United States the cost of splendid land is much less than in the Dominion, and the climate is superior. They have four months in autumn of rainless and cloudless weather. Further, the crops can be irrigated just when required. It has yet to be demonstrated in respect to certain vegetable crops, such as broccoli and lettuce, that we have in this country soil and climatic conditions suitable for the commercial production of these seeds.

(6) **FREIGHT ON SEEDS:** The freight on most seeds (except mangold and beet) is low by comparison with their value. This enables the seeds to be sold at a somewhat lower price than would be the case if the freight rate were higher. The freight is cheap between European countries, and by reducing the price somewhat a surplus can usually be sold. In New Zealand, however, with the cost of production two or three times as high as in Europe, it would be practically impossible to quit such surpluses on account of high production costs. In years of shortage the balance of the Dominion's requirements would have to be imported and the buyers would have this extra cost to pay.

(7) **DESIRABLE THAT SEEDS SHOULD BE GROWN UNDER CONTRACT:** It is to be expected that a grower in normal times may experience some difficulty in arranging contracts until he has demonstrated his efficiency in seed raising, particularly of the more specialised seeds such as cabbage, broccoli, cauliflower, lettuce and numerous flower seeds. Under emergency conditions, however, should a shortage prevail, a person with an aptitude for the business, and who can produce quality seeds, may become established very quickly in the least difficult of the main lines to grow. On the other hand, however, it may be pointed out that during the last war, labour sufficiently skilled (or even unskilled) became almost or quite insufficient for peas, beans, mangolds and such other seeds as New Zealand already produces in quantity. If this war continues for a long period, suitable labour will almost certainly again be insufficient to meet the demand, so that there would be little, if any, advantage in establishing trials of newly-introduced varieties or in producing insufficient stocks of the proved ones.

(8) Any extensive production in New Zealand would be likely, under normal world conditions, to upset the arrangements between local seed merchants and those overseas which is very largely a reciprocal trade.

It is believed that any prejudice which exists against New Zealand-raised seeds could be gradually eliminated provided:—

- (1) That the quality of the seed is equally as good as or better than the seed the merchant has been in the habit of handling.
- (2) That a continuity of supply is assured from year to year.
- (3) That the buying and selling costs leave the merchant and retailer the margin of profit to which they are accustomed.

A further strong point in favour of New Zealand-grown seed is the fact that the germination and vitality of such seed are invariably better than that of imported seed, most of the latter being at least two seasons old before being sown by Dominion nurserymen or gardeners. This is particularly the case with parsnip and carrot seed.

(9) **SEED RAISING A SPECIALISED BUSINESS:** A person entering upon seed raising should possess a good knowledge of breeding practices. He should secure good seed stocks and maintain and constantly strive to improve his basic seed stock. He should properly isolate breeding and seed production fields where necessary, keep fields free of weeds by cultivation and eliminate plants not true to type by roguing; have an eye for selection, proper machinery and facilities for curing and storing seed. Precautions have to be taken to prevent undesirable crossing. This necessarily limits the number of varieties of any one species, and in some cases the number of species that can be grown with safety within a specified area.

(10) **GERMINATION:** The germinating vigour of fresh, locally-grown seed is a point always stressed, but it is not so generally realized that a merchant has to protect himself against possible seasonable shortages, and therefore must carry over a considerable quantity of seed from one season to the next. In New Zealand this would normally mean a carry over of 18 months and should any deterioration take place in the interval it would have to be remedied by the incorporation of the necessary quantity of fresh seed only six months old. This carry over would be inevitable because overseas orders are placed some two or three months before the completion of the New Zealand harvest.

The quantity of New Zealand-raised agricultural and horticultural seeds is on the increase, and the present European war will have the effect of further extending the area under seed crops.

New Zealand is already producing the bulk of its needs in rape and considerable quantities of chou moellier, kale, mangolds, parsnip, onion and some other seeds. A number of these are from Government certified strains.

It would appear obvious that, if New Zealand is to become self-supporting in vegetable seed production, then some guarantee should be given to the purchasers of such seed that it is true to name and type, so that buyers can purchase with confidence. Ultimately the objective should be to have all vegetable seeds grown under a scheme entailing Government certification, such as at present operating with onions, rape, potatoes, and other crops.

There is, however, quite a host of varieties of which the sale is not so large—not sufficient to make it worth while growing the small quantities required here. These varieties, however, are useful for special purposes or districts. There are probably a hundred or more of them.

We think you will agree with us that it would probably be better to concentrate upon the main varieties and endeavour to import the smaller quantities of other lines.

CANNING VEGETABLES IN NEW ZEALAND.

The Committee also considered this question, as it is somewhat closely related.

The kinds of vegetables most used for canning and preserving are peas and beans. The seeds for these are practically all being produced in New Zealand. We are of opinion that New Zealand could and should produce all or practically all of its own canned and preserved vegetables.

Thousands of pounds of New Zealand money are being sent overseas, mostly to America, Canada and Australia, for imported lines of these goods. The importations are valued approximately as follows:—

Items.	1937 (£ N.Z.)	1938 (£ N.Z.)
Canned peas	7,444	14,779
Baked beans, pork and beans	10,478	10,490
Other canned vegetables (excluding tomatoes)	3,240	14,565
	£21,162	£39,834

At Hastings, a really excellent asparagus is now being canned which is green in colour and practically equal to fresh. Canning of this crop can be much extended. We also feel quite confident that tomato juice, when its value and cheapness, as a pleasant drink before meals become known to the public, will sell wonderfully well. In America, almost everyone takes a fruit drink before one or two meals daily, and tomato juice is a favourite. A can containing about three glasses costs there retail about 5 cents (say, 3d.). Other canned vegetables which sell readily in America, especially in off seasons for fresh vegetables, are beet, spinach, carrot, peas and carrot, and mixed vegetables.

New Zealand has a good climate for producing these vegetables for canning and preserving, and we are informed that New Zealand seed firms have stocks of the most suitable strains for the purpose required, so that we are hopeful that, with encouragement and some publicity, this industry will show a very marked increase.

The war should aid them to extend materially.

It is generally recognized that the advancement of agriculture in any country is dependent upon the use of seed of good quality of proved varieties, and the production of new and improved strains of plants.

In this connection, it is pleasing to report that the interests of market gardeners, farmers and horticulturists generally in the Dominion are being satisfactorily catered for and protected.

Members of this Committee have had the opportunity of inspecting the trial grounds and the system of trials made by one of the leading wholesale seed firms in New Zealand. The trials of the

principal varieties of vegetable, farm and flower seeds are conducted in the open ground. As soon as the new seed arrives, a trial is sown. Another trial is sown in the following spring. By this means, the great majority of the seed sold by them is proved to be true and good, before delivery is made. In addition this firm procures and sows trials from all parts of the world alongside their own, so that a keen and constant survey for varieties of especial merit is maintained.

In addition to this, samples for trial are also sent to the Government for testing in five or six districts in New Zealand, so that the Departmental officers may also make their trials and know the quality of the seed being offered to farmers.

We are indebted to Mr. J. W. Hadfield, Director, Agronomy Division, for most helpful information supplied in compiling this report.

(Signed) :

W. K. DALLAS)	
GEO. COOPER)	
M. J. BARNETT)	
E. C. GIBBONS)	Members
N. W. YATES)	of Sub-
P. BLACK)	Committee.
J. A. McPHERSON)	

Wellington,
19th January, 1940."

LAVENDER.

The following circular letter has been dispatched to representative nurserymen, Parks Superintendents, leading Horticultural Societies and the Institute's District Councils:—

ROYAL N.Z. INSTITUTE OF HORTICULTURE (INC.).

P.O. Box 1237, Wellington,
24th Sept., 1940.

Dear Sir,

The Botany Division of the Plant Research Bureau, Department of Scientific and Industrial Research, has been asked to make enquiries as to the extent to which the true lavender, *Lavandula officinalis* is grown in New Zealand.

The following questions have been raised:—

- (a) Are any nurserymen carrying large stocks of the plant?
- (b) To what extent is it grown in private or public gardens in the district?

It is stated that British firms are very short stocked in lavender oil as Continental sources are closed. If sufficient material is available, a small amount could be distilled as a trial lot, and, further, an area could be planted up for larger scale tests.

The Institute would appreciate the forwarding direct of any information addressed:—

The Director,

Botany Division, Plant Research Bureau,
Department of Scientific and Industrial Research,
58 Bowen Street, Wellington, C.I.

TREE-LOVING SOLDIER.

The following letter to Mrs. Knox Gilmer, Wellington, is from a New Zealand soldier in England:—

14/7/40.

“Mrs. Knox Gilmer,
Dear Madam,

Some weeks ago, while on “Final Leave” and standing in Manners Street with two other lads, I saw you alight from a tram and addressed you with the remark, “Look after those trees while we are away.”

Since our arrival in this country, and it is a grand place, I'm more than ever a supporter of your “Tree Protection League” or whatever name you may call it. I forget for the moment.

The lanes and roads nearby our camp are beautiful—trees everywhere and barren spots are rare.

The train journey we had through this country was a revelation to most of us. We could hardly credit that such a thickly populated area could have so much afforestation.

My apologies for passing the remark, but keep on planting and protecting.”

INSTITUTE NOTES.

PERSONAL: Mr. F. S. Pope (President) was extended a hearty welcome at the recent Executive Meeting upon his return from leave.

Mr. B. P. Mansfield, Superintendent of the Invercargill City Reserves and Honorary Secretary of the Southland District Council, who was then in Trentham Camp, attended the July meeting.

At the August meeting, welcome was extended to Messrs. J. C. McDowall, Taranaki District Council and N. R. W. Thomas, Honorary Treasurer, Auckland District Council. Best wishes were directed by this meeting to be forwarded to Messrs. B. P. Mansfield and J. W. Kealy, Chairman of Auckland District Council, who were on the eve of proceeding overseas with the Third Echelon.

CONGRATULATIONS have been extended to Mr. Thomas Horton on his recent appointment as Superintendent of Parks and Reserves at New Plymouth. The recognition of his valuable services is well deserved and long overdue.

VISITS: The Dominion Secretary represented the Institute at the Wellington Beautifying Society's Arbor Day function and also at its Annual Meeting on the 12th August, where Dr. H. H. Allan, delivered an illustrated lecture on "Flowers of the Empire."

DISTRICT COUNCILS: Auckland: Mr. N. R. W. Thomas advised at the August Monthly Meeting that several meetings had been held recently in connection with the Whenuapai and Hobsonville Aerodromes. A letter had been received from the Hon. Minister of Public Works thanking the Council for its assistance with the tree planting schemes for these Aerodromes. The Department relied solely on the District Council's expert opinion in this matter.

Taranaki: The address at the monthly meeting on the 29th July was given by Mr. D. Elliott on "Recent Visits to English Gardens."

Canterbury: Meeting of District Council was held on the 10th July when, after the conclusion of the business, Mr. L. W. McCaskill gave a most interesting address on his recent visit to the United Kingdom, etc., and America, illustrated with lantern slides.

LODER CUP COMPETITION, 1940: The Loder Cup Committee has issued a circular requesting nominations for the year ending on the 30th November. Each nomination should be accompanied by a statement of the work accomplished by the nominee, together with any documentary or corroborative evidence thought desirable. Such statement should be verified by the certificate of the nominator.

CENTENNIAL TREE PLANTING: The following is an extract from the August Monthly Report of the Director of the Botanic Gardens, Christchurch:—"Acting in co-operation with the Hon. the Minister of Internal Affairs, your Board (Christchurch Domains) has made a valuable contribution to the above national effort. Two years ago

the Labour Department made the services of semi-fit men available for the growing of seedling trees already in the Board's nursery and for their distribution, through the Young Farmers' Clubs of New Zealand—the trees to be used for the planting of Domains, Public Parks and newly-formed Community Centres. Up to the end of August, a total of 2973 trees have been dispatched to 32 Young Farmers' Clubs throughout New Zealand."

ARBOR DAY, 1940: At the August meeting, Mr. N. R. W. Thomas reported an attendance of 400 at the Auckland City celebration with planting in Centennial Avenue and Mr. J. C. McDowall advised school celebrations in Taranaki and widespread individual plantings.

The Officer in Charge of the Invercargill Reserves Department forwarded a programme of the proceedings for which congratulations were forwarded.

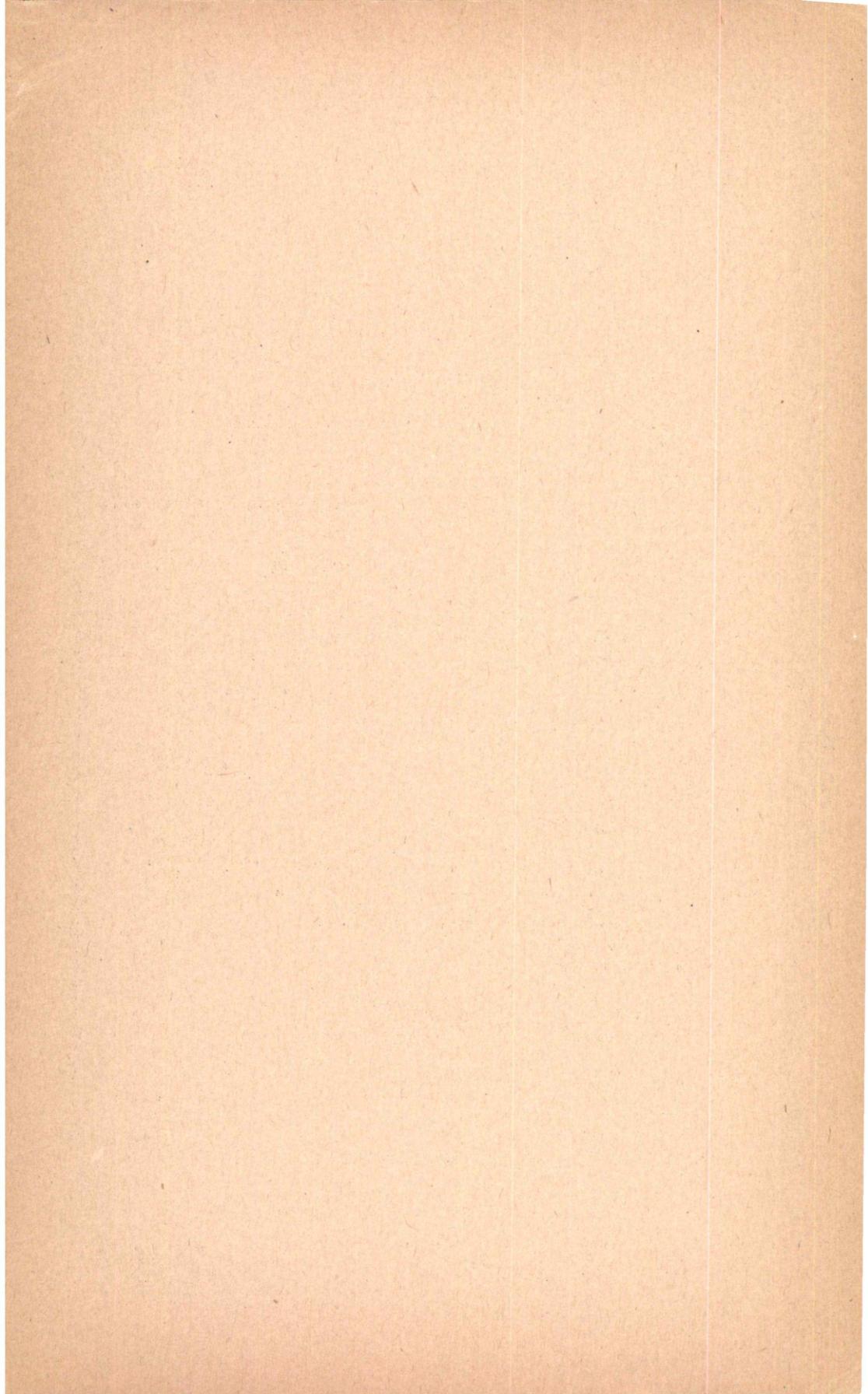
Mrs. Knox Gilmer considered that the most encouraging feature of Arbor Day is the number of children taking part and a suggestion was made by the Acting Chairman that mention of Arbor Day should be included in the curriculum for training colleges, etc.

In acknowledging advice of the matters mentioned in the preceding paragraph, the Director of Education has replied:—"At the Training Colleges the students receive instruction in agriculture and nature study which includes Arbor Day observances. In the second year of training, it is customary for a special study to be made of native flora."

AN HISTORIC ARBOR DAY CELEBRATION.

Under the inspiration of the late Mr. W. C. Nation, perhaps the first Arbor Day tree-planting in New Zealand was carried out on April 6th, 1892, in Greytown. In the evening, was held the "First Performance of the New Zealand Arbor Day Cantata, by Greytown children," including Mr. Nation's daughter, now Mrs. Annie E. Plimmer, of Levin, who forwarded this information together with a copy of the Cantata. The words were by the Rev. E. H. Wyatt, the music by Mr. M. R. Varnham, and the whole was appropriately dedicated to Sir George Grey.

"Speed, years, in your flight
 Into the vanish'd past!
 Yet shall the trees with foliage bright
 Bring beauty that shall last."



Royal 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. S. POPE, Esq., Wellington.

Hon. Editor: Dr. H. H. ALLAN, Department of Scientific and Industrial Research, Wellington.

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

Hon. Secretaries of Local District Councils:

Auckland: Noel Cutler, Golf Road, S.W.4.

Taranaki: L. W. Delph, M.A., Frankleigh Park, New Plymouth.

Canterbury: J. N. McLeod, 108 Paparoa Street, Christchurch.

South Canterbury: A. W. Anderson, Box 153, Timaru.

Otago: D. Tannock, 560 Castle Street, Dunedin.

Southland: K. I. Robertson, Box 44, Invercargill.

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,

Royal N.Z. Institute of Horticulture,

P.O. Box 1237, Wellington.

H. & P.C. Print.