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DOUBLE-CREPE FERN

On the Akatarawa Saddle.

—J. T. Salmon photo.

**JOURNAL OF THE ROYAL
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OF HORTICULTURE**

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JOURNAL OF THE ROYAL NEW ZEALAND INSTITUTE OF HORTICULTURE

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HISTORY OF TOBACCO-GROWING IN NEW ZEALAND

By Wm. C. HYDE

OF all the means available to soothe, cheer and stimulate the spirits of man, tobacco-smoking is probably the most popular. When properly grown and prepared, tobacco is a narcotic which is pleasant and soothing to excited and restless nerves. It contributes to goodwill, sociability and a reasonable attitude of mind. The nicotine it contains has important medicinal properties.

Tobacco has been grown in New Zealand from the earliest days of settlement, when the Maoris, particularly, were quick to recognise and appreciate its use. Their method was to air-cure the ripe leaves and assemble them neatly in short twists. These were then placed systematically in a narrow, long box made of thick, heavy timber. A close-fitting block of wood was placed on top and applied with great pressure by a strong iron screw-press which was attached. The culture and processing were chiefly in the hands of women who specialised in the work and gave it close attention. They were especially proud of the fact that their tobacco was free from any adulteration.

A few European settlers in different parts of the country have regularly grown tobacco leaf and made it up into plugs for their own use. What the tobacco has lacked in quality has been compensated for, in their estimation, by its strong aroma and flavour. Most smokers consume tobacco critically and appreciatively; the demand, therefore, is for high quality. This is obtained only by exercising care at every stage of production, in the choice and maintenance of a suitable seed strain, in the selecting of suitable land and climate, in the careful treatment of the crops in the field and during the curing process and, especially, in the conditions under which it is finally bulked down. No product is more sensitive to environment. None so easily spoiled by mismanagement.

EARLY ATTEMPTS AT COMMERCIAL GROWING

The growing of leaf on a commercial scale and the manufacture of tobacco are comparatively new industries in New Zealand. Commercial activity began near Hastings, where the well-drained, sandy loam, the fine summer climate and the good transport facilities, including a seaport, favoured the new project.

It was near Hastings that Mr. Gerhard Husheer, who had a wide experience in the tobacco industry overseas, started growing and manufacturing tobacco leaf for pipe smoking during the first ten years of this century. The product placed on the market by the National Tobacco Company was an air-cured brown cut tobacco of good body. All went well until about 1916 when wartime difficulties made reorganisation imperative.

About this time Nelson settlers showed interest in the commercial production of tobacco leaf. As they were accustomed to growing crops, such as fruit and hops, which required special treatment and careful processing, it was not surprising that they soon showed progress in tobacco leaf production. Mr.

C. C. Nash, of Hope, produced crops of air-cured brown leaf for pipe smoking of a size and quality that left no doubt about the possibilities of successful production in the district where suitable land and proper treatment were given to the work. Mr. Nash was appointed field supervisor of Nelson tobacco-growers growing leaf under contract to the National Tobacco Company in Napier. He occupies this position today.

At Harakeke in the Motueka district of Nelson Mr. C. E. Lowe in aiming at producing the silky leaf suitable for making cigarettes made extensive experiments with varieties of tobacco. He also experimented with various curing processes. Aided by knowledge gained from United States tobacco-growing, local growers made good progress, and it was at Harakeke that the first tobacco kiln in the district was built. The kiln was fully charged with leaf of uniform maturity; temperature and humidity were manipulated by means of a furnace and ventilators, so that in about six days curing was completed and the kiln drawn and recharged. Success in this work hinged very largely on the character of the tobacco seed sown. So important was this factor that Mr. Lowe paid particular attention to variety seed trials and to the careful selection of mother plants among those varieties which proved most suitable under local conditions. The consistent improvement of the seed strains thus produced was of the greatest value to the industry.

Mr. Lowe was then appointed local agent and demonstrator to tobacco growers in the Nelson district, producing tobacco leaf under contract to the W. D. and H. O. Wills Company, of Petone, Mr. J. W. S. Brodie being the manager.

GREAT BRITAIN GRANTS PREFERENTIAL DUTY

The attention given to tobacco crops by Nelson growers and the suitability of the climate and much of the land, led to manufacturers concentrating practically all contracts with growers in that locality. In the 1924-25 season, 300 acres were devoted to tobacco leaf production, and the crop was in the vicinity of a quarter-million pounds weight. At this time, Great Britain granted a preferential duty to Empire-grown tobacco leaf. This, together with the successful pioneering work done in Hawke's Bay and Nelson, led to a boom in tobacco leaf production in New Zealand. Many companies were formed for the production and manufacture of tobacco, chiefly in the Auckland province, and many farmers were anxious to grow it as a profitable sideline. The Department of Agriculture appointed Mr. C. E. Lowe Government Tobacco Instructor in 1926, and under Mr. J. A. Campbell, Director of the Horticulture Division, experiments were carried out in many districts. Instruction in grow-

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Harvesting lower leaves of tobacco in Nelson.

ing and curing tobacco leaf was given in response to numerous enquiries. New growers were advised that only high-grade tobacco leaf was saleable and that until their land and climate were proved suitable, and until they had gained experience in manipulation, only experimental areas should be grown.

As the demand of local manufacturers of smoking tobacco was likely to be exceeded, the export of tobacco leaf to Great Britain was considered, and in 1926, to assist in establishing an export trade, the Government guaranteed growers of approved tobacco leaf, an average gross price of 2/3 a pound on open market in London for first-grade leaf and 1/4 a pound for second-grade leaf. The first experimental shipment of seven hundredweight was exported in July, 1927. Best bright leaf sold in London at 2/2 a pound and best air-cured at 1/6 a pound. The report stated: "As a whole these tobaccos compare favourably with other colonial tobaccos and more closely approximate American leaf than the majority of them."

Substantial local demand meant that a further trial export shipment was not made until 1930, when 42 bales were sent to London. Grown in new districts by farmers with little experience with the crop, the consignment was made up of lower grade tobacco. This prompted serious consideration being given to "standard grades" for New Zealand tobacco leaf. The responsibility for drawing up a standard was left to a committee consisting of Messrs. R. W. Gracey, of W. D. and H. O. Wills Co., C. E. Lowe and W. C. Hyde, of the Horticulture Division of the Department of Agriculture. In Wellington they graded out a full range of local tobacco leaf, which was inspected by all interested parties. When final agreement was reached, the grades were described in terms that were embodied in regulations gazetted in 1931 under the Products Export Act, 1908. Three sets of these "standard grades" were placed in bond in different parts of the country and were in use for many years.

ADEQUATE TECHNICAL STAFFS WERE NOT AVAILABLE

Tobacco-growing in the Auckland Province made rapid progress during 1932 and 1933. Six or more companies had been floated there to grow and manufacture tobacco, most of them on quite an ambitious scale. Because the

industry was new and the country's population comparatively small adequate technical staffs were not available. Despite excellent organisation in many respects, other companies failed to make progress. By amalgamating, some continued for a while, until about 1939, they all found tobacco leaf manufacture for critical smokers an unprofitable enterprise. Some excellent tobacco leaf was grown and cured, but in many cases, owing to lack of appreciation of its sensitive character, the leaf was spoiled because of unsuitable storage.

The interest in tobacco-growing led many farmers to plant the crop without first making arrangements for its disposal. This class increased to such an extent that by 1933 the total area in tobacco was 3,154 acres. The manufacturing companies then told growers at the beginning of the season that only contract leaf would be purchased. This had the effect of reducing the acreage the following season by about 600 acres. In the Motueka district, where four-fifths of the crop was grown, not only did a dry season follow but a hail storm in December damaged a considerable acreage of leaf. This was followed by an equally damaging frost in January. There was further reduction in 1935, chiefly through a number of companies in Auckland closing down. In addition, a consignment of 80,000 pounds of tobacco leaf was conditioned, graded, packed and exported under the supervision of Tobacco Instructor Lowe. The tobacco which arrived in London in good order created a favourable impression. A request was made for further supplies. As the prices realised were considered satisfactory, a consignment of about the same size was forwarded in October, 1936. This, too, arrived in good condition and brought prices which were considered very satisfactory. The 1937 tobacco crop was 3,776 acres, the largest acreage then planted in New Zealand. The export consignment in October of that year was rather smaller than previ-



Tobacco plants bagged to prevent insects from visiting the flowers and cross-pollinating them.

ously and the prices realised were slightly lower.

Planting tobacco for export was now a recognised practice. The acreage of tobacco for export increased in the following year, although the general total was smaller. Tobacco was grown chiefly in the Nelson province, where there were 700 growers averaging three to five acres each. Some growers planted as much as ten acres. There were about 150 leaf-curing kilns in this district. Between August and October, 1938, 171,995 pounds (202 tierces) were shipped to London. Most of this consignment, which was more than double any previous seasonal shipment, was conditioned in the Proctor machine at Motueka which had been officially opened in July, 1938.

SOME SHIPMENTS DAMAGED BY SALT WATER

The first of these shipments, consisting of 49 tierces, arrived in good condition and brought satisfactory prices. The remaining two shipments arrived in London damaged by salt water. Insurance was recovered. Nearly all this damaged tobacco arrived back in New Zealand in July, 1939. When inspected in Wellington the condition of the tobacco leaf varied widely between good, fair and tainted. A small quantity only had to be destroyed.

Reporting on the occurrence the London agent recommended that "tobacco on the ship should be given best facilities for ventilation, and dunnage should be used freely. Incidents in transport indicate these tierces are too heavy."

About this time the various Tobacco Growers' Associations in the Nelson district combined in a Federation, appointing Mr. F. O. Hamilton, of Nelson, president, and Mr. N. I. Lewis, secretary. In November, 1939, Mr. Lowe retired from the Department of Agriculture where for thirteen years he had served as Tobacco Instructor. War having broken out in Europe and manpower and shipping space restricted, the export of tobacco was discontinued. In the circumstances there was a ready local demand for available supplies. Since then the crop has been stabilised at about 3,000 acres per annum, nearly all of which has been grown in the Nelson province.

As previously stated, the custom has been for growers of tobacco leaf to make an acreage contract with a manufacturer. A supervisor appointed by the manufacturer, advises and directs growers. He also determines the suitability of contractors and their land. In the early 1930's, however, the success of the industry led farmers in many districts to plant trial crops. Subsequently, uncontrolled production gave rise to many difficulties that seriously handicapped the industry. For instance, some small manufacturers gave no contracts and bought up surplus leaf at a low price—sometimes at one-third of the contract price paid by other firms. The "Regulations for the Grading of New Zealand Tobacco Leaf" approved in 1931 assisted in meeting this problem. Something more was needed, however, to maintain satisfactory standards of quality and price. This need was met by the "Tobacco-Growing Industries Act, 1935," under which a Tobacco Board was established to control production and marketing. The Board consisted of four growers' representatives, and four representing the manufacturers, the chairman being a Government nominee. Besides promoting the sale of tobacco leaf here and overseas, the board issues licenses to growers and warrants for the sale and purchase of raw tobacco leaf.

TOBACCO RESEARCH STATION AT RIWAKA

In 1937 the Board established a tobacco research station at Riwaka. Many problems arising from the production and curing of tobacco leaf of high quality under local conditions have been dealt with successfully, to the great advantage of growers, manufacturers and consumers. In this work the Cawthron Institute in Nelson has generously co-operated, especially in soil surveys of the Nelson district, which show clearly the areas of land favouring production of tobacco leaf. Since the war started production has been limited but some expansion may now be expected as more labour and materials become available.

OBITUARY

**Mr. Thomas Waugh,
N.D.H. (N.Z.)**

ONE of the outstanding figures in horticulture in New Zealand during the past 40 years, Mr. Thomas Waugh, sen., of Lower Hutt, died at Wellington on August 23, 1945, at the age of 78.

Not only was he a keen student of horticulture and a successful nurseryman, but he devoted unlimited time to the promotion of several national horticultural bodies, to which he gave active and loyal support up to the time of his death. He was one of the small group which brought into being the New Zealand Horticultural Trades' Association, and the record of its achievements and its present-day strength are in many respects a reflection of the personal interest and guidance which he gave to its affairs. He was a member of its executive committee for the past 38 years and served as its president for nine years. He was one of the original members of the New Zealand Institute of Horticulture, as it was then known, and played no small part in the founding of the organisation. Since that date he served the institute with the greatest of loyalty on its executive council and took the keenest interest in its activities.

In 1926 he founded the New Zealand Florists' Telegraphic Exchange, being elected its first president and filling this position until his death.

Mr. Waugh first worked in the gardens at Invercargill, where his father was director of parks and gardens. In 1885 he went to Scotland and joined the firm of Drummond and Son, Stirling. Shortly afterwards he was transferred to the palace gardens of the Duke of Buccleuch, where he remained for three years and a half before going to the Royal Horticultural Society's Experimental Gardens at Chiswick, where he held the position of foreman until his return to New Zealand in 1893.

By his association with leading horticulturists he received an insight into the highest forms of garden culture. Upon his return to New Zealand Mr. Waugh was appointed manager of H. C. Gibbons and Company's nurseries in Lower Hutt, but resigned in 1896 to start business on his own account, several years later purchasing the Gibbons business.

The splendid shows staged in Wellington over a number of years owed much of their success to Mr. Waugh. He was noted for the willingness with which he gave advice; his work was his hobby and he made it possible for many others to make it their hobby also.



The late Mr. T. Waugh.

CREST OR EMBLEM FOR INSTITUTE

Designs for a crest or emblem for the institute to be used on all its stationery and published material is receiving consideration, and sketches for a suitable design are invited from any interested member. A cash trophy of £1/1/-, donated by Mr. W. K. Dallas, will be paid to the person submitting the winning design. Designs must reach the secretary not later than November 30 next.

SNOW DAMAGE IN CHRISTCHURCH BOTANIC GARDENS

By W. B. BROCKIE, Christchurch

SCENES of devastation everywhere! That well describes the Christchurch Botanic Gardens after the great snowfall of July 14, 1945. In the very early hours of the morning, and following a day characterised by a north-westerly gale with bursts up to 90 miles per hour, began the heaviest snowfall in the history of Christchurch. The wind had abated in the late afternoon and, changing to the south-west, brought rain which gradually merged into a snowfall. When the snow ceased, a foot of it had fallen. Every bush, almost every tree in the gardens, had its branches bent low with the weight of snow. In some places the noise of splintering wood and the crash of falling trees and great branches must have been terrific.

The gardens were a sorry sight when daylight arrived, and one wonders if a bombing raid could have done more damage—trees with jagged branch stumps; broken limbs hanging dejectedly everywhere, some of them high up, but mostly with their branch tips buried beneath a white avalanche. Here an old spreading holm oak that had given pleasant shade in the heat of many summers lay stricken, its massive limbs prostrate and radiating from the short trunk like the broken spokes of a wheel around its hub; there an Atlas cedar that had presented on all sides a great, unbroken, spire-topped wall of sombre green had almost a third of its branches on one side torn away, revealing a multitude of dead twigs adhering to the brown-barked inner structure.



Cedar of Lebanon (*Cedrus libani*) on front lawn.
Photo taken July 17, 1945.

DAMAGE IN SHRUBBERIES

But it was in the shrubberies that the greatest confusion reigned, and especially in the New Zealand native section. Paths intersecting here and there give access through it, but on the morning of the snowfall they were blocked from end to end with a jumble of snagging and broken branches. Kowhais, olearias, senecios, nothopanax, tainui, and coprosmas have in many cases been completely ruined.

Inside the museum gate at Rolleston Avenue a double-flowered hawthorn had most of its top broken off. Near to it on the front lawn a healthy young specimen of *Maytenus chilensis* appeared as if it had been blasted by hand grenades. A full-grown deodar had lost one large branch, but this old warrior had stood up to much punishment in the past and still retains his dignity. Further over on the front lawn an ancient Cedar of Lebanon had all the branches on its eastern side spread over the lawn beneath. Piles of branches lay below the clump of *Pinus pinaster* on the pine mound, yet the pines themselves appeared little affected by their loss.

On the archery lawn a Japanese larch is now only a framework of its former self, a strawberry tree has a very splintered appearance; almost every large branch of the old cork oak has suffered damage, but mostly in the upper half. Opposite the sun-dial, a 60ft.-high *Maytenus chilensis* suffered a great deal of minor damage; other trees stood up well here; the giant sequoias, a Western hemlock, and European deciduous trees are unaffected. In the border south-west of the archery lawn the fine old specimen of New Zealand black beech suffered serious damage, all of the large limbs on one side being broken. The collection of Japanese maples near it were badly torn about.

THE OLD NATIVE SECTION

The old native section was a scene of desolation, with splintered branches lying all over the place. On the small lawn, west of the archery lawn, one of the finest trees in the gardens, an Atlas cedar, was stripped of a third of its branches on the north side. Near it a fine specimen of *Juniperus phoenicea* was completely ruined. Gums nearby lost many branches, as well as a venerable Monterey cypress close to Cunningham House. The only specimen of *Araucaria cunninghamii* at the north end of the the Australian border was pollarded, and a bare stump projects above the lower branches. Opposite the door of Townend House the old, spreading holm oak lies prostrate.

At the tea kiosk two very large branches fell from the great *Pinus radiata*, but most lamentable of all in this area is that the beautiful specimen of *Quercus rhombica* in the children's playground was very badly damaged. This lovely tree, with its enchanting fiery halo in spring, is not now a perfect sphere; four of the main branches on the western side and a number of smaller ones are broken, leaving a wide gap. Other trees in this area have been denuded of many of their branches, notably an Atlas cedar, but this applied to a large number of trees throughout the gardens.

West of the rose garden a specimen of *Pinus patula* is in very bad shape. All of the branches on one side are broken, and the *Cedrus atlantica var. glauca* near to it also presents a forlorn appearance.

One large lower limb of the Albert Edward oak, planted 82 years ago, snapped off close to the trunk, but fortunately this does not spoil the shape of the tree.

One wonders how many years will pass before the scars inflicted by the snowstorm will disappear. One might justifiably believe that the gardens will have a haggard look for a very long time, until one remembers the magical healing influence of new growth—young branches take the place of broken ones and new trees replace those that have been uprooted. The axe, the saw, and the tar brush have already worked wonders in removing the harsher effects of the devastation.

NATIVE PLANTS IN A SMALL GARDEN

By E. O. PETERSEN

GARDENERS give many reasons for not making greater use of native plants; some say they are too drab and drear, others that they are not bright and showy. However, perhaps the most remarkable excuse offered is that they are too difficult—and this in the country where they have been evolved to meet particular climatic and soil conditions.

The trend in modern gardening is towards novelty. Much time and money are spent in securing and maintaining certain conditions for outlandish plants with, in many instances, indifferent results. This is to be deplored, but writers on gardening even as early as the seventeenth century were equally concerned about this tendency. I have found that the introduced plants fit in well with the native ones, not only as a background or as hedges to provide much-needed shelter, but as inter-mixed plantings.

In my own garden I have a very mixed border sheltered by a fine hedge of *Acacia verticillata*, in which are planted many native shrubs among a few imported ones. The largest native is a twelve-foot high mako-mako (*Aristolelia racemosa*, or maybe *A. Colensoi*) which has grown from a small seedling to its present height in seven years. So far it has not flowered, but it is a fine ornamental. During its first three years the under surfaces of the leaves were reddish, but as they are now entirely green, I am not sure of the specific name. For this I must wait until the tree flowers. This shrub or small tree deserves a place in every garden, if only for its name—for it is named after Aristotle.

BUSHES WITH DISTINCTIVE FOLIAGE

Specimens of *Senecio Greyi* on each side of this tree, stand nearly four feet high and are fully as much across. These are finely shaped, well-rounded bushes with distinctive grey-green foliage. The name, *Greyi*, of course refers to the man after whom the shrub is named, and not to the colour of the leaves.

It is a pity that this most adaptable plant lacks an easy sounding, popular name, for if it were better known it would be a shrub favoured for a wide variety of situations. This shrub is a great favourite of mine, and several hundred cuttings are each year planted out under tall trees, in sheltered borders, on open exposed corners, alongside sunny walls (and shady ones, too) and in rich soil, ordinary soil and almost pure clay. Those in ordinary to poor soil in open situations form the best and most compact bushes of the typical rounded form, but in any of the conditions mentioned the plant does really well.

While in very rich soil the plants grow loose and open, they flower profusely and their bloom lasts longer in moderately good soil and in a sheltered sunny position. As in over-rich soil, leaves are liable to be attacked by mildew and brown off, regular annual cutting back is demanded. So, if you are planting one of these *Senecios*, choose an open position with ordinary average soil, and do not use any manure.

Senecio Greyi is native to the Cook Strait area, and Cheeseman says: "Faces of cliffs from the Pahau River to Cape Palliser, rare and local." The shrub grows in the small remnant of native bush (the catchment area) about the two dams that supply the hospital, and some old bushes are seven or eight feet high. During the flowering period, from December to February, the bushes are a dense mass of little yellow daisies about one inch across, and one does not need to be a botanist to realise that here is a plant closely related to groundsel. Hence the name *Senecio*. If you are familiar with ragwort, which is *Senecio jacobaea*, you will know the type of flowers to expect on your *Senecio Greyi*.

MAGNIFICENT SPECIMEN BUSH

Next to the *Senecio* in my shrubbery border is a variegated box—a six-inch

cutting seven years ago, but now a rounded bush about thirty inches high, and a *Coprosma*, which, I understand, is of the species *robusta*. Five years ago it was taken from the bush as a seedling about a foot high; it now stands nearly seven feet. It would be a good pyramidal shape if it were not restricted by a tall golden ake-ake growing too closely alongside. This ake-ake was grown from seed six years ago and has not been trimmed. It is really a magnificent specimen bush over eight feet high. Ake-ake, so well known as a hedge plant and so easily grown from cuttings, scarcely needs special reference here. I mention them in the hope that others may be induced to plant one or two as specimen shrubs.

The ake-ake was formerly known as *Olearia Forsteri*, but is now *O. paniculata* though Forster, in 1776, named it *Shawia paniculata*. I have yet to hear why Forster's name was dropped. When raised from seed, the plant has a much better root system than if raised from a cutting, and I have found that seedlings may be safely transplanted in any season.

In front of my specimen ake-ake is a pink hydrangea, and then appears a *Viburnum fragrans*—a plant that has proved difficult in my garden. They die out, seemingly from some root trouble, when about four feet high. Just behind the *Viburnum* is a native fuchsia, which each year has been cut down by the frost. Seven years ago it was a bush four feet high. Today it is still the same. It acts rather like an herbaceous perennial, dying almost to the ground each winter and arising anew each spring. It has not flowered since being transported from the bush, but as the surrounding shrubs grow taller it may obtain the apparently necessary shelter and do much better.

Fuchsia excorticata has a sentimental interest to me. My grandfather's garden had as its centrepiece a great specimen nearly forty feet high, with massive trunk and widely spreading branches, and the garden really was built around this fine tree.

BAMBOOS PROVIDE SHELTER

Alongside my fuchsia is a ten-foot-high lancewood—unfortunately not quite straight—and in front of this again stand three large clumps of flax. Here the border is sheltered from the north-westerly winds by a hedge of tall bamboos, in front of which is a row of hydrangeas, a cabbage tree, a strong and vigorous Nikau and another lancewood. This lancewood (*Pseudopanax*), a small seedling six years ago, is now about as thick as a shovel handle and twelve feet high. It is perfectly straight and shows no sign of adopting the adult form, being still a stiff stem with downward hanging narrow leaves up to two feet long.

Every year we are able to get a few, only three or four, seedlings that come from a fine adult lancewood specimen with compact rounded top on a strong and stout trunk twenty feet high. These seedlings do not grow near the parent tree, but are invariably found more than thirty yards away on the southern side of a tall, manuka bush fence. This fence stands between the tree and the cold clay bank where the seedlings are found, and the seed can only be dropped there by birds. This occurs so regularly that we have come to expect them, and they are always lifted and transplanted into more favourable positions.

By way of contrast the front of this border is planted with various introduced plants—lilies, pelargoniums, gerberas, aquilegias, polyanthus, saxifrage, Shasta daisies, irises and so on, and should this article appear merely as a catalogue of the plants in my garden, I must explain that I am endeavouring to show how well native and exotic plants combine to make an interesting display, and how, by a striking dissimilarity, they set each other off in a remarkable manner. A further illustration of this is apparent from my window as I write—an immense escallonia, the large-leaved kind, fronted by a fine ake-ake. The escallonia is fifteen feet high and more than forty feet around, and its dark green leaves and bright red flowers set off the pale green of the

ake-ake surprisingly well, so well in fact that the ake-ake with this dark background looks a much better and more interesting plant than others situated amongst lighter and other shades of green.

CABBAGE TREES HAVE APPEAL

In my garden I make much use of cabbage trees in the younger stages. These are outstanding objects, especially up till the time when they are about four feet high. I have some in a long bed with pansies and matricaria at their feet, and although cabbage trees in the adult state are not much favoured—the dead and fallen leaves are very untidy—there are many pleasing comments about my casual grouping.

Yet a well-developed cabbage tree, tall and strongly branched, can be a striking object in the landscape, and I think there is no tree more typical of New Zealand flora than this. We raise quite a number each year from seed, and always plant them out, so that there can be no real objection to them.

Some other native plants in my garden are worthy of mention. The first, and you may know this as a weed, is *Cotula dioica*. True, it is a weed, yet it makes a surprisingly good pot plant for a hanging basket, and a small piece takes little time to fill a six-inch pot and form long, trailing stems. This little creeping weed grows in our bowling green, and some members have suggested that it be encouraged, for with the regular mowing it forms a smooth, ever-green carpet. It bears many very small groundsel-like flower heads, and is sometimes referred to as Westport weed. It should not be confused with the really serious Onchunga weed, often seen on golf fairways.

Another plant is the shrub *Olearia virgata*, the "twiggy Olearia," which grows wild in our district. Under the heavy battering of the prevailing wind it gives the impression of being a useful hedge plant. Often mistaken for manuka, its leaves are, however, more sparse and slightly larger and also a trifle lighter in shade of green than manuka and it makes a more compact specimen shrub. Of twenty cuttings put in during late July fourteen struck, and now, two years later, several in my garden are over two feet high. This shrub stands hard trimming to size and shape, and if spaced two feet apart and kept closely clipped should make a useful hedge in wind-swept situations.

My pohutukawa with roses, kowhai with rhododendron, rata with erythrina (coral-tree) and broadleaf with *buddleja* I need mention only in passing. To conclude, if in doubt, always plant a native tree or shrub, and do not hesitate to put in plenty when making mixed plantings.

N.Z. FLOWERS FOR BRITAIN

TOWARDS the end of 1944 there was a breeze in British horticultural circles over a published statement that a bomber plane was bringing cut flowers from New Zealand with a view to exploring the possibilities of opening up a trade in this type of produce between New Zealand and Great Britain.

The general secretary of the British Growers' Union, Mr. J. J. Jackson, published a letter in the trade press protesting against the proposed action, and stated he would take steps to have the matter raised in the House of Commons.

A reply was promptly published by Mr. S. Mansell directing attention to the fact that the flowers were a gift to the Queen and no commercial trade was sought. Apparently the London newspapers had put in the suggestion relative to trade, and this was regretted.

—"Seed and Nursery Trader."

PEACE MEMORIAL GARDENS

By D. C. MACKENZIE

During recent years there has been a strong feeling by some New Zealanders that war memorials to be erected in memory of those who fell in the Second World War should be more appreciative and aesthetic than columns of marble and stone.

IN recent months an International Peace Garden Association has been formed in Canada, one of the founders being Mr. Henry J. Moore, C.M.H., A.H.R.S., of Ontario. In a letter dated June 7 Mr. Moore states: "As a result of the establishing of the International Peace Garden on the Canadian-U.S.A. boundary, other gardens are projected for international frontiers and for boundaries of provinces and States. These are likely to be memorials to world peace, and to be known as Peace or Goodwill Gardens. We have started a movement to organise a World Federation of Horticulture with a view to promoting better relationships between the people of all nations and in some way help to bring about peace and goodwill on earth.

"We have now an International Peace Garden Association and are prepared to work with any organisation interested in the same ideals. . . . We would like to have New Zealand join up with us in some way, also South Africa, Australia, and other parts of the British Commonwealth. The United States is already with us and all other countries will be contacted in time; that is, when the world has regained its equilibrium."

The International Peace Garden was helped and guided in its inception by the National Association of Gardeners, which, prior to the formation of the Royal Horticultural Society of Canada, fulfilled many of those functions which are at present carried out by the Royal New Zealand Institute of Horticulture in this Dominion. Now, due to the perseverance and vision of the gardening enthusiasts of that great continent, the garden is established.

Along the international boundary line in the Turtle Mountains the gardens cover an area of 2,200 acres, 880 acres of which are in the territory of the United States. Here are scenic lakes, valleys, hills, flowers, wild fruits, and foliage, forming a natural beauty spot on the features of the great Western Prairies. This garden project called for five million dollars—one million being used to develop the garden, and four million dollars being set aside as an endowment to perpetuate its maintenance.

The Civilian Conservation Corps has been actively engaged in the development of the United States Section and among the larger projects completed are a great dam creating an artificial lake, a park drive and road system, bridges, fences, amphitheatre, an "overlook shelter," two picnic areas, a large lodge building with its lounge, dining-room, and kitchen, and tourist cabins.

On the boundary line of the two nations stands a cairn built of native stones, which bears the following pledge of peace sworn by the two nations: "To God in His Glory, we two nations dedicate this Garden and pledge ourselves that as long as men shall live we will not take up arms against one another."

New Zealanders will shortly be asked to conceive methods of perpetuating the memory of those 9,000 soldiers, sailors, and airmen who lost their lives. Memorial Peace Gardens should surely engage the imagination and attention of the public. If each city, borough, and county in New Zealand set aside an area of land for development as a Peace Garden, it would greatly add to horticultural development and appreciation.

The scope of this scheme is almost unlimited. Memorial avenues and plants grown in those countries where the 2nd N.Z.E.F. has seen service could be included. The scheme would demand the craftsmanship and vision of our finest gardeners, to create gardens of which we may truly be proud and which will be appreciated and will give peace and enjoyment to this generation and to generations to come.

Cultivation of the Xerophytes

By A. J. HODGES

THE primary classification of all plant life is under three headings:—

- (a) **HYDROPHYTES**.—Plants which require an abnormal amount of moisture and which therefore are found growing either under water or in water but not totally submerged or in bogland.
- (b) **MESOPHYTES**.—The large "middle class" of plants, trees and shrubs which grow under "normal" conditions.
- (c) **XEROPHYTES** (pronounced Zerophytes).—Better known as "Succulents" and which might be referred to as the "Camels" of the vegetable kingdom.

There is no abrupt boundary line between these three types of vegetation, and many border-line cases occur; for instance, the common geranium is a near-succulent. It is the true "xerophytes," however, which are described in this article. Xerophytes can be sub-divided. There are "halophytes," for instance, which grow in soil heavily impregnated with mineral salts, such as sodium, calcium, magnesium and potassium. Normal plant life could not extract sufficient moisture under these conditions owing to the mineral salts held in suspension. After the Napier earthquake several species of the genus *salicornia* were noted growing on the mud flats. This type of plant is one of the first species to appear on saline land recovered from the sea. Many are palatable as a vegetable, and the ashes of one variety are used in making a soap because of the high yield of soda.

From this point all "xerophytes" will be referred to as "succulents."

No plant can exist without moisture, but "succulents" have adapted themselves to prolonged periods of drought. They can absorb moisture rapidly in various ways, and can conserve this moisture against evaporation by various means. "Succulents" are considered to be one of the most specialised and fascinating forms of plant life.

GEOGRAPHICAL LOCATION

Succulents are found from the equator to the sub-polar regions under the following climatic conditions:—

(a) **SEMI-DESERT REGIONS** where rain is infrequent, but where heavy dews occur at night after the scorching heat of the day. Soldiers who have experienced the desert at night will appreciate this point. At Luderitz Bay, South-west Africa, the soil temperature is from 120 deg. to 140 deg. F. or more at mid-day, with an air temperature of 100 deg. F. which falls to 32 deg. F. at night. The relative humidity readings are 10 to 20 per cent. in the day and 100 per cent (heavy dew) at night. The yearly rainfall in this region is three-quarters to one inch. Many rare succulents abound in this region, and such types can be grown in a "cold" glasshouse where watering can be strictly controlled.

(b) **HIGH MOUNTAINS** (in any latitude) where the high winds and sunlight in the rarefied atmosphere increase the drying effect and where precipitation of moisture is less than in lower zones. In short, these conditions are strictly comparable for plant life to the semi-desert conditions experienced in some regions at lower altitudes. The *Sempervivums* which are found in the rock niches of the mountains in Europe are a good illustration of succulent plants under these conditions.

SUB-CLASSIFICATIONS

Succulents are classified under four main headings:—

(a) **LEAF**, in which the leaves are the succulent part of the plant and which act as the moisture-storage members. These so-called leaves are consequently very thick and may be oval or round in cross-section.

(b) **STALK**, wherein the stalk of the plant is thick and succulent. If there are no leaves it may be columnar like some of the species of cacti and *Euphorbias*.

(c) **ROOT**, where the plant has a very much thickened portion of the root system like a potato or parsnip. This thickened portion of the root system acts as the moisture-storage organ which is protected from the direct rays of the sun.

(d) **FULL**. A "full succulent" is a plant which has neither leaves nor stalks, but is simply a "lump of plant" which imitates the formations of rocks, or stones as in some of the *Mesembryanthemums*. This class of plant illustrates in a most fascinating manner Nature's wonderful power of adaptation and mimicry in order to survive. No amateur should try growing full succulents before he has gained experience with the less succulent types, as he is likely to kill them through over-watering, which causes rot to set in rapidly.

Combination Types.—Succulents which combine the features of the first two or three types are common.

Generic Origin.—Succulents may comprise all members of a genus such as the cactus family, of which there are over 2,000 known species, or may, on the other hand, be isolated succulent members of an otherwise non-succulent family. There are some 15 families containing one or more succulent members and numbering thousands of genera.

Convergence.—The influence of climatic conditions causes succulents, which are widely separated in both generic origin and geographical habitat, to have forms so similar that both amateur and expert can be misled as to their generic origin, until they are seen to flower.

Succulent Societies.—There is a trite saying that, "All cacti are succulents, but all succulents are NOT cacti." In America 2,500 people attended the first meeting of the Cactus and Succulent Society, attracted by the great variety and form of this class of vegetation. The title of this society, of course, signifies cacti and other succulents. In Holland, a biscuit firm gave a book on succulent culture in return for coupons—a form of advertising which appealed to the public. Men also toured the streets with glasshouses on wheels, selling succulent plants which people often gave as birthday presents, so great is the interest of the European people in these plants. Many war refugees from European countries, who are now in New Zealand, are eager to obtain succulent plants and thereby recapture earlier pleasures and memories of home.

This type of plant can be posted across the world (without soil) and come to no harm if kept dry. This leads to international friendship and the subsidiary hobby of stamp exchange. Dish gardens which delight the eye and which thrive in the dry atmosphere of a room can be made up for invalids. Prizes in this form are novelties much appreciated.

A cynic once said that the "disease" called "cactisitis" is incurable, so the reader of this article is now forewarned!

THE PROBLEM PATCH

In many gardens there is a "problem patch" of dry ground; it may be facing north under the eaves of the house where even geraniums struggle to grow or on a hot sunny bank. These are ideal locations for your succulent garden, provided you have good drainage, which is absolutely essential. Rocks and porous soil can be introduced to assist drainage. Such a succulent garden was built in one day in Christchurch on the north side of a house where previously nothing would grow. This garden became an object of interest and joy to the owner. The borders of a sloping path facing north which served as the approach to a house on the western hills in the Hutt Valley was converted into a succulent garden which very much improved the property. A distinct novelty, it harmonised with the rest of the garden.

PLANT CHOICE

There are literally thousands of succulent plants from which to choose, but care from the climatic aspect should be exercised in the choice for outside growth. Remember the more succulent the plant the less frost it will stand. Some rare succulents from arid regions had a 90 per cent. moisture-content, and would literally burst if frozen, since ice occupies more space than its equivalent amount of water. Those who fancy this hobby and cultivate the rarer and most fascinating species in an unheated glasshouse or sun porch should note that a large number of the smaller species can be housed in very small space.

ADAPTATIONS

The following adaptations are peculiar to various types of succulent plants:

Absorption of Moisture

- (a) Deep roots which strike down to underground water supplies on hillsides.
- (b) Shallow, wide-spreading root systems in relation to the size of the plant, which rapidly absorb moisture after the rare desert showers and transfer this to the water-storage organs within the plant. The root system here has no water-storage faculty.
- (c) Air roots which absorb moisture from the air, but which will function like any other roots if planted in the ground.
- (d) Vescicula hairs which absorb dew.
- (e) Cupped leaves which catch and absorb pools of moisture.
- (f) The transpiration process is in direct contrast to that of "normal" plants; the stomata or pores are practically closed during the heat of the day to conserve moisture, but they are wide open at night to receive the heavy dew.

Conservation of Moisture

- (a) A much-thickened epidermis or cuticle on the leaves (if any) and plant generally.
- (b) Adpressed sessile leaves which open out only when moisture is present in the air. *Haworthia Rheinwardtii* is a good example of this feature.
- (c) Farinosa (powder) or wax on the leaves or plant, which is beautiful and varies in colour from pure white to pink or amethyst, or, with wax, from flour white to grey-blue. The hotter the sun the more farinosa or wax is formed according to the type of plant concerned. These plants literally powder their faces. The common *Cotyledon orbiculata* is a good example of this white powder formation, but there is a variety called *Cotyledon undulata* which has the added attraction of a real "permanent wave" on the leaves. This variety will not stand frost and where frosts occur should be grown inside as a pot plant.
- (d) Reduced surface area, spherical in form. It should be noted that a sphere has the least surface area for a given bulk.
- (e) A literal sunshade of "hairs" over the plant as illustrated by the cactus *Cephalocereus senilis*, commonly referred to as "the old man."
- (f) Reduced stomata or pores as compared with "normal" plants.

Sun.—Some succulents grow in well-drained positions under larger plants and therefore get only "passing sun." These would burn badly if planted in "full sun" positions. The *Gasterias* and *Haworthias* belong to this type of plant. There is another type which shrinks into the dry hot soil in its natural habitat during summer, leaving only the tips of the plant above ground. These tips are fitted with "frosted glass windows" to take the glare out of the sun's rays and convey it into the plant. The green substance known as chlorophyll, missing at these tips, is replaced by calcium-oxalate crystals. This is well illustrated in the genus *Fenestraria*. On the other hand, some of the *Haworthias* have "clear

glass" windows through which one can see right into the plant and note the "veins." This is Nature's provision for rapidly obtaining the benefit of "passing sun" under other plants.

Mimicry (camouflage).—Some of the "full succulents" from Africa imitate pebbles and rocks as protection against birds and browsing animals. In some cases explorers have only discovered new species while resting on what appeared to be rocks or pebbles or when these plants were in flower. This group is represented by *Mesembryanthemum* species (which used to be classed as species of *Pleiospilos*, *Lithop*, *Titanopsis*, etc.).

Armour.—With the cactus tribes there is little need to mention the spine and glochid system. Other succulents have spikes both straight and curved.

Protection.—Further protection against animals is illustrated by the poisonous juice or sap in some species of *Euphorbias* or the obnoxious odours exuded by some cacti when bruised.

Propagation.—In parts of Africa, such as Abyssinia, the climate is too hot for bees to live and pollinate the flowers. Nature here has developed the group of plants which are said to have carrion flowers and which belong to the *Asclepiadaceae* family. Representative genera are *Heurnia*, *Stapelia*, *Hoodia*, *Tavaresia*, *Pectinaria*, etc. The flowers are five-pointed stars. The upper surface of the petals is hairy and is marked like the skin of an animal. During the hot part of the day a putrid smell is given off, and this effectually deceives the flies, which "blow" the flowers and thus perform the function normally done by bees. These plants are quite interesting and pretty; the smell is not objectionable in a large glasshouse provided only a few flowers are out at the same time. There are other method of propagation by Nature, such as "adventitious plants" or bulbils which form along the edges of leaves, grow air roots, and then fall off on to the soil, where they rapidly take hold. This is seen in the genus *Bryophyllum*. Other methods of propagation are by seeds, root off-shoots, cuttings, leaves, and by grafting.

Nomenclature.—The scientific names, which have a definite meaning in either Latin or Greek and also apply internationally, should be learnt. "Common names" lead to common mistakes. Too many people assume that any thickened, spiny plant is a cactus, and a well-known newspaper once referred to *Agaves* as cactus plants. Others have referred to them as American aloes. Here is the relative generic and geographical position of these three species of succulents:—

Generic Groups:	Family Group:	Natural Habitat:
<i>Agave</i>	<i>Amaryllidaceae</i>	America (Mexico, etc.),
<i>Aloe</i>	<i>Liliaceae</i>	Africa.
<i>Cactus (Melocactus,</i> <i>Cereus, etc.)</i>	<i>Cactaceae</i>	American Continent and adjacent islands. Canada to Patagonia and no- where else.

WHAT IS A CACTUS?

Cacti are divided into three tribes, 125 genera, 2,000 species (known to date) and hundreds of "forms," hybrids, varieties and so on, so why try to place "other succulents" into this already crowded group?

To be classed a cactus a plant must conform to all the following six rules:—

- (1) It must be a succulent, although the degree of succulence can and does vary widely.
- (2) It must be a dicotyledon, i.e., have two cotyledon leaves in the seedling stage.
- (3) It must be a perennial plant, not an annual or biennial.
- (4) The ovary must be below the insertion of the petals or sepals.
- (5) The seed pod must be a single cell, i.e., have no division (these are usually filled with jelly and numerous seeds).

- (6) It must have spine cushions or "aeroles" (technical term) even if there are no spines in the adult plant.

Note: Thorns (roses) form straight out of the stalk and have no "aerole" at the base.

The genus *cactaceae* is a subject in itself and can be only briefly referred to in a general article on "succulents." This is probably the finest living and complete example of plant evolution and adaptation in order to survive.

ENDEMIC SPECIES

Many monotypic types of cacti and other succulents peculiar to some area of the earth's surface, while allied to like species, are unique. This tends to prove the process of evolution since they were cut off for centuries from allied species. Valleys high up in the Andes to which birds could not carry seeds typify these isolated areas.

CRISTATE AND MONSTROSE FORMS

Succulents are prone to develop formation of cristate or monstrose growths, which is considered to make the specimen more valuable. The "mechanics" of this phenomenon are known, but the exact cause is not. Readers are recommended to read the excellent article on "The Evolution of Cultivated Plants," by O. H. Frankel in Vol. 8, No. 1, page 27, June, 1938, of this journal before continuing.

Cristate forms grow like a cockscomb or fan, and are sometimes referred to as "fasciations" from the Latin "*fascia*," a band or fillet.

Monstrose forms grow like coral, i.e., in knobs.

In scientific terms it can be stated that:—

- (a) A normal plant has two axes of symmetry;
- (b) A Cristate plant has only one axis of symmetry; and
- (c) A monstrose plant has no axis of symmetry.

All plants, like animals, are made up of cells. In each cell is a nucleus which contains a group of thread-like bodies called chromosomes (visible only with a most powerful microscope). Individual units called genes are arranged along the chromosomes in a lineal series like beads on a string. These govern the mechanical heredity of a plant and are not much larger than a molecule. Remove one of these genes and you have a new form of plant. Bombardment by X-rays or cosmic rays has been known to produce this effect, but the percentage of such changes appears to be erratic.

FLOWERS

Although some succulents are grown mostly for the foliage or plant formation effects, there are on the other hand thousands with most attractive and brilliant flowers, such as the well-known "Livingstone Daisies," or *Dorotheanthus*, a sub-genus of the *Mesembryanthemum* group.

The following divergence occurs in succulent plant flowers:—

Diurnal or nocturnal, lasting or fleeting, brilliant or dull, sessile or stalked, regular or zygomorphic, very large or minute, scented or non-scented.

The writer had a strange experience while potting a shipment of succulents by electric light. All the nocturnal flowers shut up in protest against the electric light, a strange reversal of the normal "law" of flowers.

HABITS

There are all types of succulent plants to choose from according to space available and effects required. A rapid survey is as follows: Miniature to huge, procumbent, caespitose, shrubby, globular, columnar, tree-like, vining, easy of cultivation, or rare and difficult in our climate and requiring special knowledge and experience.

SOIL

All succulents demand a well-drained, porous soil. Stagnant moisture is fatal to them. Mixtures vary slightly for different types, but may contain any or all of the following ingredients: Turf mould, leaf mould, sand, grit, broken brick nodules, lime mortar, broken oyster-shells. Some types with white "hairs" can do with 25 per cent. lime in the soil as the plants require this for the formation of these "hairs."

GENERA

Space will not permit more than passing reference to some of the genera included in succulents other than cacti. Here is an abridged list:—

Common Succulents—

Aeonium, Agave, Aloe, Bryophyllus, Cotyledon, Crassula, Echeveria, Euphorbia, Gasteria, Haworthia, Kalanchoe, Mesembryanthemum group (80 tribes, including Delosperma, Faucaria, Glottiphyllum, Oscularia), Othoma, Portulacaria, Rochea, Ruschia, Rosularia, Sedum, Sempervivum.

Rare Succulents—

Anacampteros, Bowiea, Bulbine, Ceropegia, Duvalia, Echidnopsis, Greenovia, Hoodia, Heurnia, Mesembryanthemum (including Argyroderma, Conophytum, Fenestraria, Stomatium, Titanopsis, Lithops, Pleiospilos), Pachyphytum, Pectinaria, Senecio, Tavaresia.

USES

Generally, succulents should be grown separately from ordinary types of plants both for appearance and for the special conditions required. They may be used for outside or inside culture under glass, rock gardens, bowls or pots, edible fruits, medicinal properties, vegetables (mostly used by natives), and saving of life in arid desert conditions.

GENERAL TREATMENT

Far more succulents have been killed by over-watering than by drought. A winter period of rest when plants are allowed to dry out and shrink induces better flowering in the summer. Cuttings should be allowed to callous well before planting, otherwise they are prone to rot. Never be in a hurry to plant cuttings like "ordinary" plants. A cactus cutting was once left in a hot water cupboard for over a month where it had been forgotten; it was found to have grown a fine crop of "air roots" at the cut end ready for planting out and showed little signs of shrinkage.

LITERATURE

With all due respect to nurserymen and gardeners, little is known about this special branch of horticulture without access to specialised literature. However, numerous books by experts are available, in addition to reliable magazines issued by succulent societies.

WHERE TO OBTAIN PLANTS

While the more common succulents may be obtained by exchange between friends there are specialised dealers in the rarer succulents both in this country and abroad. Further information on literature and dealers can be supplied to those interested by the society, P.O. Box 33, Lower Hutt.

VALUE OF TREES IN PREVENTING SOIL EROSION

MICHAEL TERRY, writing in the "Christian Science Monitor" about Australia's dust bowls and what has been done to check erosion, states that at Broken Hill the proprietary has brought about a remarkable transformation to what was a desolate township. In 1936 the Zinc Corporation set an example rapidly followed by other companies.

About three and a quarter square miles of eaten-out, blown-out ground was fenced off to exclude stock and rabbits. Now a belt of trees and shrubs from a quarter to half a mile wide surrounds nearly all the town, and streets have trees growing lustily. From a barren, wind-swept place, Broken Hill has become a place of beauty and civic pride.

Eighteen varieties of eucalyptus, 13 varieties of wattles and many other species have been established quickly. Red gums have in five years grown into trees 20 feet high.

But best of all have been cuttings of tamarisk from California, which, besides providing hundreds of cuttings for further planting, have grown into trees 30 feet high. No artificial aids have been used except to fence off the plantation. Dumps at the mines have been planted, too, and one has been levelled off for a playing field.

GARDEN PEA VARIETIES

By R. A. CALDER, Agronomy Division, Dept. of Scientific and Industrial Research, Lincoln.

THE garden pea has been known and cultivated for centuries; its domestication is so ancient that its wild prototype has never been discovered, either because it no longer exists or because, in its evolution, the modern pea has become dissimilar to its ancestor of several thousand years ago. It was cultivated to some extent by all the ancient civilisations but, as it prefers a cool, temperate climate, became particularly prominent when introduced to Northern Europe; because the ripe seeds may be dried and stored for long periods, there is little doubt that, in medieval times, before the introduction of the potato, dried peas formed not only one of the chief sources of winter food for people of these northern latitudes, but also, as during recent years, a prominent article in the diet of armies, navies, and commercial shipping. It was an early food resource of Britain, and throughout the centuries has maintained in that country a position of high importance as a garden vegetable, due, no doubt, to its palatability and high nutritive value.

From historical records it is not possible to obtain an exact description of the garden pea as it appeared in early times, but it is possible that it resembled somewhat the field pea of today. Early English writers mention several kinds, of which the Rouncevals, the Hotspurs, and the Sugar or Edible podded peas seem the more important; these, apparently, were in the main tall-growing types, producing seed which was either white, yellow, blue, green, grey, or spotted in colour and presumably round in form. The wrinkled varieties did not come into prominence until after Knight began his breeding work in 1787; he produced several wrinkled varieties which on account of their rich, sweet, tender flesh and great productiveness became the most popular table peas in gardens and markets. Some of his varieties are still used, and they have been the foundation breeding stock, for most modern pea varieties. Succeeding Knight many famous plant-breeders in England, notably Dr. McLean and Thomas Laxton, directed their attentions to the breeding of peas and numerous improved forms were introduced; for the last 50 years, however, the main source of new varieties has been the breeding grounds of several English seed firms who have distributed their stocks to all parts of the world.

The garden pea is peculiar in that it shows a very considerable range of diversity in nearly all its characters. The vines may be dwarf, half-dwarf, or tall; the foliage may be slender or robust and light green, medium green, or dark green in colour; the flower is white, the pods may be straight or curved, pointed or blunt at the end, and range from 2in. to 8in. in length; the seed may be smooth, wrinkled or dimpled, and creamy-yellow or bluish green in colour; and maturity may be early, mid-season, or late. This remarkable range of characteristics is due, no doubt, to the pronounced tendency the plant has to produce mutant forms, and has enabled breeders to develop many distinct varieties; Hedrich in his publication "Vegetables of New York" lists over 1,000, of which, however, 350 are now out of cultivation. The great variety of types and forms displayed has always rendered it difficult to draw up a simple and straight-forward classification, but an English system, prepared recently, is as follows:—

I. Early peas.

A. Dwarf: 15-30in.

1. Seed wrinkled.

- a. Gem group: Little Gem, English Wonder, Witham Wonder, Kelvedon Wonder (William Massey), America Wonder, Little Marvel, William Hurst.
- b. Large-podded group: Pioneer, Laxtonian, Hundredfold, Peter Pan, Laxton's Progress, Blue Bantam.

2. Seeds round or dimpled: Eight Weeks, Meteor, Unique.
 B. Tall: 30-48in.
 1. Seed wrinkled: Gradus, Bedford Champion.
 2. Seed round or dimpled: Earliest of All, Alaska, Early Bird, Blue Bird, The Clucas, Pilot, British Lion, Blue Prussian.

II. Mid-season peas.

- A. Dwarf: 12-36in.
 1. Seed wrinkled.
 a. Daisy group: Daisy, Giant Stride, Onward, Greatcrop.
 b. Senator group: Senator, Union Jack, President.
 c. Stratagem group: Stratagem, Dwarf Defiance.
 d. Lincoln group: Lincoln (Greenfeast), Charles the First, Delicette.
 2. Seed round or dimpled. Harrison's Glory, Unica.
 B. Tall: 36-60in.
 1. Seed wrinkled.
 a. Telephone group: Alderman, Duke of Albany, Quite Content, The V.C., Admiral Beatty.

III. Late peas.

- Tall: 42-45in.
 Seed wrinkled: Ne plus ultra, Autocrat.

In New Zealand garden peas are grown either in the home or market garden for domestic consumption or in the field for canning at the green-pea stage or for seed for export purposes. Representatives of most of the groups indicated above are cultivated, but mainly for the export trade, and only comparatively few find their way into the home garden.

For several years the Agronomy Division of the Department of Scientific and Industrial Research has been concerned, both at Palmerston North and at Lincoln, with the production of re-selected stocks of garden-pea seed, and during this period a considerable number of varieties has been under observation. It is not possible to give here a detailed description of the complete range of varieties examined, and all that can be offered is a more or less general account of the main groups.

EARLY DWARF—GEM GROUP

Little Gem, English Wonder, Witham Wonder, Kelvedon Wonder (William Massey), American Wonder, Little Marvel, William Hurst.

This group includes some of the most popular early varieties, which are characterised by their short, compact habit of growth, earliness, fair cropping ability, and excellent flavour. They are valuable varieties for the home garden, but when grown for seed in the field they tend to be less adaptable than some of the mid-season varieties; several of them are used in the canning industry.

Under trial conditions the most prominent was Kelvedon Wonder, known in New Zealand as William Massey, which is recommended as being one of the best early varieties. It grows to a height of approximately 2ft., has dark green foliage, commences to flower at the 9th to 10th node, and bears single pods which first become filled in approximately 70 to 75 days after planting; the pods themselves are dark-green, medium sized, straight, and pointed, with from 6 to 8 peas per pod; the seed is wrinkled and medium green in colour. The yield is fair to good depending on soil and climatic conditions.

EARLY DWARF—LARGE-PODDED GROUP

Pioneer, Laxtonian, Hundredfold, Peter Pan, Laxton's Progress, Blue Bantam.

This group also includes some very popular early varieties which tend to resemble one another in many characteristics. They are all early dwarf forms, growing to a height of approximately 2ft., are fairly robust, and produce large, attractive, well-filled pods and peas of good quality; they are valuable home garden and canning peas.

Pioneer is a popular representative and performed quite well in trials. It grows to a height of about 2ft., and is sturdy and vigorous in growth, with yellowish-green foliage, and commences to flower at the 9th to 10th node.

It bears single pods which first become filled in from 75 to 80 days after planting; the pods themselves are long, broad, and straight, with rounded ends and medium yellow-green in colour, with from 6 to 8 peas per pod; the seed is wrinkled and yellowish-green and the yield is fair to good.

EARLY TALL—SEED WRINKLED

Gradus, Bedford Champion.

The only member of this group which has been grown is Gradus. It is a tall early variety growing to a height of about 5ft., with rather slender stems and abundant foliage, and commences to flower at the 9th to 10th node; it bears mainly single pods, which first become filled in about 75 to 80 days after planting; the pods are long, straight, or slightly curved, with rounded ends and with 7 to 8 peas per pod; the seed is wrinkled and yellow-green in colour; yields are fair to good. It is very popular as a tall early variety in England, but is not grown to any great extent in New Zealand; has a tendency to produce tare-leaved plants.

EARLY TALL—SEED ROUND OR DIMPLED

Earliest of All, Alaska, Early Bird, Blue Bird, The Clucas, Pilot, British Lion, Blue Prussian.

This is a group which is not grown to any extent in New Zealand apart from the variety Blue Prussian, which in this country is classed and grown as a field pea. In England, however, several of the varieties are considered to possess great commercial value because of their special suitability for early sowing, and some of them are the earliest peas grown for market, the pods first becoming filled in from 65 to 70 days after planting. They are round-seeded types and are therefore not as sweet as the wrinkled forms, but some, particularly Alaska, are grown extensively for canning purposes.

MID-SEASON DWARF—DAISY GROUP

Daisy, Giant Stride, Onward, Greatcrop.

This is a small but important group including such well-known varieties as Daisy and Onward. Of these two Onward has become increasingly popular during recent years and must be considered as one of the best mid-season varieties for the home garden. It grows to a height of from 3 to 3½ft., the foliage is sturdy and vigorous and of a medium green colour with a yellowish tinge, and it commences to flower at about the 13th node; it bears both single and double pods, which first become filled in from 80 to 85 days after planting; the pods are of medium length, broad, medium green in colour, and blunt ended, and the peas are large with 7 to 8 peas per pod; the seed is wrinkled and olive-green in colour, and the cropping power is good. One disadvantage of the variety is its tendency to produce tare-leaved plants.

MID-SEASON DWARF—SENATOR GROUP

Senator, Union Jack, President.

This is another small group, the varieties of which tend to resemble one another very closely in most features other than colour; Union Jack and President are regarded as being late, dark-podded Senators.

In the trial plots Senator grew to a height of 3ft. 9in.; the stems were slender, the foliage abundant and medium to dark green in colour, and flowering commenced at the 12th or 13th node; the pods were borne mainly in pairs and first became filled in approximately 80 days after planting; the pods were long, light green in colour, curved, and pointed, with 6 to 7 peas per pod; the seed was wrinkled and green and the yield was good. Two bad features were the pale colour of the pods and a tendency for the skin of ripe seed to split.

MID-SEASON DWARF—STRATAGEM GROUP

Stratagem, Dwarf Defiance.

Stratagem and Dwarf Defiance, which are very similar to one another, are the main varieties in this group, and in the trial plots were regarded as

being late rather than mid-season types. Stratagem grew to a height of approximately 3ft., and the foliage was vigorous, abundant, and dark green in colour; flowering commenced at the 13th to 14th node. The pods were born singly or in pairs and first became filled in from 90 to 95 days after planting; the pods were long, straight, broad, dark green in colour, and rounded at the end, with 7 to 8 peas per pod; the seed was large, wrinkled, and green. The yields were good and the variety can be recommended as a satisfactory mid-season to late variety.

MID-SEASON DWARF—LINCOLN GROUP

Lincoln (Greenfeast), Charles the First, Delicatesse.

This is probably the most important group for New Zealand conditions, for it includes the variety Lincoln, known also as Greenfeast, which is so popular and does so remarkably well in this country both in the field and in home and market gardens. It is a popular canning variety, as are also Charles the First and Delicatesse.

Greenfeast was introduced into commerce about 1908 and became well known in New Zealand about 1926; on account of its hardiness, heavy yields, and adaptability to a wide range of conditions it is now very widely cultivated. It grows to a height of from 3ft. to 3ft. 6in., the foliage is abundant and medium to dark green in colour; it commences to flower at the 13th to 14th node. The pods are borne mainly in pairs and first become filled in from 80 to 85 days after planting. The pods are medium to dark green in colour, long, slender, curved, and pointed at the end, with 8 to 9 peas per pod; the seed is wrinkled and creamish-green in colour. It can definitely be recommended as a mid-season dwarf variety for home gardens.

MID-SEASON DWARF—SEED ROUND OR DIMPLED

Harrison's Glory, Unica.

The varieties Harrison's Glory and Unica are dimpled-seeded varieties. They are commonly known as Marrowfats and are grown for the dried seeds, which are packeted or canned and sold as blue boiling peas. They are cultivated almost entirely as field peas and under good conditions give satisfactory yields.

MID-SEASON TALL—TELEPHONE GROUP

Alderman, Duke of Albany, Quite Content, The V.C., Admiral Beatty.

This is an important group of tall mid-season varieties, none of which, however, is particularly popular in New Zealand, possibly because of the type of the plant, which under good conditions will grow to a height of over 6ft. Most of the varieties possess large pods, the production of which is spread over a more extended period than is the case with shorter-growing varieties.

Alderman is a characteristic variety of the group, and in trial plots reached a height of nearly 6ft. The foliage was abundant and medium green in colour and flowering commenced at the 13th or 14th node. The pods were borne both singly and in pairs and first became filled in approximately 86 days after planting. The pods were long, straight or slightly curved, and rounded at the end, with 8 to 9 peas per pod; the seed was wrinkled and green and cropping ability was fair.

LATE TALL—SEED WRINKLED

Ne plus ultra, Autocrat.

The only variety in this group which has been studied is Autocrat, which is not grown to any extent in New Zealand. It grows to a height of approximately 4ft. and produces abundant dark green foliage. It commences to flower at the 20th to 21st node. The pods are borne mainly in pairs and first become filled 95 to 100 days after planting. The pods are of medium length, of a medium green colour, slightly curved, with blunt ends and with from 6 to 7 peas per pod; the seed is wrinkled and green and cropping power only fair; it was the latest variety examined.

Although New Zealand experiences quite a wide range of climatic conditions, the environment, generally, is of a cool temperate nature ideally suited for the optimum development of peas, and they are therefore a popular summer vegetable of most home gardens throughout the country. According to locality, one variety in any particular group may be preferred to another, but for most conditions the following series of varieties, in order of preference within the maturity groups, could be recommended.

Early: William Massey, Pioneer, Little Marvel.

Mid-season: Greenfeast, Onward, Greatcrop.

Mid-season to late: Stratagem or Dwarf Defiance.

DEVELOPMENT OF THE STOCK

By A. H. SHRUBSHALL, N.D.H. (N.Z.)

EASILY grown from seed, pleasing in fragrance, form and colours, the stock is one of our first favourites in the garden, the various types giving a range of flowering for many months of the year. Albeit, it is the double-flowered stock which has the appeal, the single-flowered plants seldom being favoured at all, yet a number of these always appear in a batch and only from the single-flowering plants can seed be obtained. Other double-flowering annuals and biennials do not entirely change pollen and seed-producing parts into petals, but the stock is either entirely double, the flowers incapable of producing seed, or single, normal in the natural number of petal, stamen and pistil parts. The producers of stock seed, therefore, aim constantly at increasing or maintaining the percentage of double-flowering plants produced by their strains. Gardeners attempt to discard, at the pricking-out or planting-out time, the seedlings judged to be single-flowering.

The name stock is a shortening of the earlier one, "stock gilliflower," which illustrates the flux of words in our language. The term "gilliflower" is known to be an English interpretation of the French "giroflée," and was originally applied only to the garden pink and carnation, which have a clove-like perfume. It can easily be appreciated how the name "gilliflower" became associated with a particular fragrance and how the term was also applied to other flowers of almost similar fragrance, especially the stock and wallflower. The word stock has a variety of meanings. In some instances it designates a quantity or number, in others a stem or sturdy habit of growth. It is conceivable that from either one of these meanings or a combination of both together with the fragrance of the flowers, emerged the name "stock gilliflower," for the inflorescence of the stock has a number of separate blooms placed around a central stem and the plants usually have what can be described as a sturdy or stocky habit of growth.

"GILLIFLOWER" USED IN THE WRITINGS OF CHAUCER

The period when the stock first became a favourite in English gardens has not to my knowledge been traced, but the term "gilliflower" was used in the writing of Chaucer, Spencer and Shakespeare referred to the pink and carnation. The assumption, therefore, is that the flower may have come into favour since the times of Spencer and Shakespeare, the double-flowered forms probably coming from the Continent.

The wild species from which the garden forms of the stock have been derived are botanically related to the wallflower, the cabbage and a host of other varied species collectively classified as the *Cruciferae*, the genus *Matthiola* being one of the smaller groups in this large natural order of plants. Horticultural and botanical authorities differ as to the number of genuine species of *Matthiola* which have contributed to the types and races of our garden stock. *Matthiola incana* and *M. sinicata*, however, seem to be definitely accepted by authorities, and as these species have a range of distribution over western Europe, the Mediterranean region and the Canary Islands, with considerable variation, the

natural fragrance no doubt first led to the plant being grown in gardens in more than one country. The present range of types of the garden stock, horticulturally classified into the ten-week, intermediate and Brompton sections, indicate the plastic character of the species from which they have been derived; indicate, too, that they are the result of a considerable period of selection by horticulturists.

Most popular are the annual or ten-week stocks, so called no doubt because of the short period in which they can be brought to flower from seed. This section has by some authorities been given specific rank as *Matthiola annua*, the accepted wild species being definitely biennial at least in duration. However, this quick-maturing type is of distinctly garden origin and is considered to have been derived from *Matthiola incana*. The ten-week stock, however, includes quite a number of strains, dwarf or taller in their habit of growth. For summer bedding purposes the larger-flowering dwarf ten-week stocks, growing 12 to 14 inches in height, is the best type, the sturdy habit of the strain making it most suitable for the purpose. A wide range of colours is also obtainable in this strain. Of the several taller strains of ten-week stocks, the Giant Perfection, growing 2ft. 6in., has a pyramidal branching habit and a good range of colours. Dresden Perpetual, or Cut and Come Again stocks, growing two feet, are a free-flowering, branching type excellent for cut-flower purposes and suitable for greenhouse as well as outdoor culture. A useful range of colours is also obtainable in this strain.

DISTINCT STRAINS PRODUCED IN EUROPE

European specialists have produced other distinct strains of these quick-flowering stocks, among which is the giant forcing ten-week stock which is non-branching and reaches between 2ft. and 2ft. 6in. Each plant produces one large flowering spike; this is for glasshouse culture. Another distinct strain of particular value for growing in pots under glass is the Lays-flowering dwarf pyramidal Forciry ten-week stock which grows about 8 inches with strong middle and lateral spikes of bloom.

Another class of popular quick-flowering stock growing 2ft. to 2ft. 6in. is known in different branches of the seed trade by the names beauty stocks, Giant Nice and mammoth-flowered ten-week. It seems to have originated in the South of France and gives a good range of colours, some of which have been named. Beauty of Nice, a delicate shade of flesh pink, one of these named varieties, received an Award of Merit from the Royal Horticultural Society in 1932. This strain of stock can be had in flower throughout the year by spring sowings for summer blooming and by early autumn sowings for winter and spring flowering under glass or outside where conditions are warm enough. Free flowering, these stocks are of particular value for cut flower purposes, but the growth habit scarcely suits them for bedding purposes.

For late summer and autumn flowering, the stock known as the intermediate has a special value and of this class a Scotch strain known as the East Lothian is well selected. This class grows about 18 inches with a sturdy bushy habit and where conditions permit blossoms freely well into early winter. While there is a useful range of colours in this class the percentage of double-flowering plants is not as high as the ten-week classes, but being hardier, plants from early summer sowings in reasonably favourable positions, will survive the winter and flower early in the spring. Brompton stocks are an old English type and particularly hardy. They take nine months or more, however, to reach the flowering stage and are treated as biennials, though plants will frequently survive for more than two seasons. This class of stock has a limited range of colours and grows to about 2 feet with a shrubby habit. Sown in early spring, plants will flower during the winter in sunny sheltered positions outside, but the percentage of double-flowered ones is not large. In both the intermediate and Brompton classes, there are varieties described as "wallflower leaved" which have smooth bright green foliage instead of the usual greyish kind.

SEED GERMINATES AT MODERATE TEMPERATURE

In the culture of all classes of stock well-drained conditions of soil are necessary; in the seedling stage stocks are very liable to damp off. A fibrous, sandy compost is best for raising them, care must be taken not to overwater and plenty of ventilation must be provided where raising under glass. The seed germinates at a moderate temperature and no more heat is necessary to raise the plants at any time, overmuch warmth causing weak, spindly growth. The flowering positions for planting out should be well dug and well manured and then made moderately firm; lime is also good for this plant. The taller-growing varieties generally will need the support of light stakes. A sunny situation is essential to success with all classes of stock.

Commercial production of stock seed is on a large scale, many European seed-growers giving special attention to this crop. War conditions, of course, dislocated the industry, but in due course we shall no doubt again have supplies from these sources. Erfurt, Germany, was an important production centre at one time, much of the best strains of seed being saved from plants grown in pots. The method was to place the pots on shelves in large green-houses, giving them water sufficient only to prevent them from dying. So cultivated, the seed was well ripened and, while not so prolific as from outdoor-grown plants, a high percentage of double-flowering plants was obtained.

In saving seed from plants growing in the open, the number of flowering spikes should be reduced to the principal and best secondary branches. On these not more than about a dozen pods should be left to develop. The pods in this way get well matured and the seed produces a high percentage of double-flowering plants. Well-saved stock seed should have a 90 to 95 per cent. germination and it holds vitality well. Some tests made in California between 1927 and 1932 showed a loss in vitality of less than 10 per cent. in the sixth year.

NOTES ON CAWTHRON INSTITUTE REPORT, 1944-45

THE following are extracts from the Cawthron Institute's report for 1944-1945:—

As the result of soil surveys of tobacco lands on the Waimea Plains, Nelson, an additional 7,000 acres of alluvial land in the Brightwater-Spring Grove sector was mapped. Some 1,400 acres were found texturally suited for flue-cured tobacco, but over one half of this acreage fell into class III, which would require irrigation in dry seasons.

Because of the wet season, the contrast between apple trees treated with 12lb. of dolomite per tree and untreated trees was outstanding. Ground dolomite has proved superior to either magnesium carbonate or magnesium sulphate in the control of magnesium deficiency.

Further study of the vitamin C content of Nelson apples showed that the Sturmer variety not only had the highest vitamin C content at time of picking, but also retained a higher proportion of the vitamin than other varieties after storage.

Continued studies of "cloud" and "hard core" in Nelson tomatoes revealed the effect of heavy watering in increasing the incidence of "cloud."

The beetle—*Chrysolina hyperici*—introduced to control St. John's wort, made very satisfactory progress in the Awatere Valley, Marlborough. Not only was the weed severely attacked by the beetle, but the insect multiplied greatly, and was extending rapidly from the original point of liberation.

"Garden Pests in New Zealand" is the title of a revision of Dr. David Miller's monograph which was originally published mainly as a text book for the Institute's students in horticulture desirous of taking its junior examination. Dr. Miller is Chief Entomologist to the Cawthron Institute, Nelson, and has written specially for New Zealand conditions and in language understandable to the amateur gardener. Messrs. Whitcombe and Tombs, Ltd., are the publishers.

Afforestation of Waste Lands and Reserves

The plea that the many areas of land throughout New Zealand that are below economical farming level should be planted in forest trees that would eventually produce marketable timber was made by Mr. P. Black, Superintendent of Parks, Palmerston North, at the conference of the Association of Parks Superintendents at Palmerston North during Horticulture Week, 1945. Not only lands under the control of public bodies should be so afforested, but also areas which were once farmed and have now reverted to fern, gorse, broom, lupin, and other volunteer growth and have become useless for agricultural or pastoral production.

FROM Wanganui southwards there is a vast area that is slowly being covered with lupins, fern, and other weedy growths, said Mr. Black. At one time the land was of second- or third-grade grazing value, and some of it is still being grazed, but a great deal is useless and is likely to remain so unless it is covered with forest trees that will suppress the weeds. This sand dune country once carried a fair covering of grass, but lupin, which flourishes amazingly on such soils, has taken possession. To clear it with heavy machinery and re-sow grass is not practicable because of the shifting nature of the sandy soil, and seeds of volunteer growth would quickly re-assert themselves if given a chance. It has been amply demonstrated that trees, particularly *Pinus insignis*, grow there remarkably well and in a few years suppress all other growths.

In addition to the lupin-infested land there are also vast areas of drifting sand dunes close to the sea front, but to bring these into productive forests the sand would first have to be stabilised by sand-binding plants.

It is not suggested that land that can be used for farming of any kind should be planted, but land which is not only being wasted but is also a menace to the district should be put to a better use than growing weeds. In addition to this very large area there are many smaller patches on creek banks and other precipitous places that would look better and be better if growing useful trees.

VALUE OF TIMBER IN RELATION TO ITS POSITION

A large proportion of New Zealand's population is in the southern part of the North Island from Wanganui to Wellington. The native timber trees that once covered a large part of what is now farm lands are no longer available for local building and industrial needs; the supplies are getting further and further away, and freight charges from the King Country and beyond add much to the cost of building and, incidentally, to the cost of living. The only remedy is the re-afforesting of all available land near the source of demand.

Such necessities as coal and minerals must be accepted where Nature has placed them, and freight and other charges to the point of use must be met. Native-grown timbers come under the same category, but planted forests can be so placed, if land is available, that the products will be near the source of demand.

QUALITY OF LAND SUITABLE FOR TIMBER PRODUCTION

Land of fair or even poor quality, provided it is well drained and has ample rainfall and suitable climate, will grow good timber, and in this country will grow it quickly. Much of the poorest hill country was once covered with heavy crops of the best of timber trees. Forests greatly increase the organic content of the soil and draw from a great depth the small mineral content required for their make-up; farm crops, on the other hand, lower the organic content and deplete the upper layer of soil of minerals.

KINDS OF TREES TO PLANT

The question of the kinds of trees to plant has been given a great deal of thought and discussion, and a fair amount of experimental work has been undertaken in different districts, but it can fairly be said that the only tree that seems to adapt itself to all soils and conditions is the *insignis* pine. It grows quickly, stands the winds, and its timber is excellent for many purposes, particularly for case-making. *C. macrocarpa*, if grown in fairly loose and deep soils and under forest conditions, produces a lasting and easily worked timber not unlike totara. In some sheltered positions both redwoods and oregons do well and make rapid growth, but neither will tolerate the winds of the west coast. *Pinus sylvestris*, although not a fast grower, gives first-class timber. It grows very well on the poor, acid soils of the mountains of Scotland and is the chief tree used for afforesting there.

It has been said that too little attention has been given to the desirability of planting so-called hardwoods for the future supply of high-grade furniture timber and for other purposes. The finest hardwood timber is invariably that which has been collected from primeval forests, and the trees from which it is hewn are very old and very mature and their ages would be counted in centuries rather than in decades. This lapse of time between planting and cutting would not entirely debar their use, but it severely restricts their general acceptance as "crop" forest trees, and if planted at all they would have to be in specially-selected places rather than in general forests.

Native trees, too, are often suggested as being suitable, and the argument advanced in their favour is that no tree could possibly be more suited to the country than trees endemic to it. All our native timbers are collected from the wilds, and the ages of many of the giants may be up to 1,000 years. Furthermore, our timber trees are but part of our peculiarly-formed rain forests.

None of our New Zealand conifers (and all our popular timber trees belong to that group) is adapted to pure forest culture, for they are all, with the exception of totara, intolerant to sunlight in their juvenile state. It is doubtful whether any of our native timbers are of a size fit for milling under the age of 100 years. Some years ago a white pin 8ft. 9in. in diameter was blown down in the native reserve in Palmerston North, and its annual growth rings found to be 260.

The only way we are likely to retain in perpetuity a supply of our excellent native timbers is to reserve extensive areas of native bush and cut out millable-sized trees periodically—say once in 15 or 20 years—and at the same time maintain and encourage the development of younger growing stock in a manner similar to that adopted by the Indian Forest Service.

Our future planted forests should be of coniferous trees selected from countries of the Northern Hemisphere. There are many to choose from, but the work of selecting and testing is no small task. Money, skill, and particularly time are all required, and the work would have to be duplicated over many parts of the country.

ADVANTAGES OF LOCAL TIMBER SUPPLIES

Popular magazines and sometimes more reliable sources suggest that the coming age will be one of plastics. This, like the report of Mark Twain's death, may be a gross exaggeration, but there is a grain of truth in it, and the future holds great possibilities for the district with an ample supply of nearby raw materials from which organic synthetics are prepared.

Cellulose is the foundation basis of most, if not all, of the organic plastics, and soft woods are the cheapest source of cellulose. In fact, one could say that soft pine wood consists almost entirely of cellulose—"guaranteed pure silk" stockings are the products of the pine tree, a triumph for science as well as for human credulity.

One would not need to be a prophet to say that at no distant date every product of the forest, even to the bark and leaves, will be utilised in modern

industry, and the district with the enterprise and vision to build up its supply of raw material will get, and deserve, its reward. The structural value of raw timber will be enhanced, and it will be made resistant to both fungoid and insect destruction, as well as being made fireproof.

In certain parts of New Zealand, particularly in the Rotorua district, extensive forests have been established by the State and by private companies, and sawmilling and pulping mills are now in operation, but the distance from Rotorua to, say, Wellington imposes on the latter place a heavy burden of freight charges which could be eliminated if forests and operating mills were located in the southern end of the island.

Afforestation on a large or moderately large scale is primarily a task for some corporate body with the necessary powers to resume possession of poor or depleted lands or those infested with weeds. Catchment Boards have recently been set up in all parts of the country, and wide powers have been granted to them. Their chief function is to control rivers and streams and to take such action as will prevent further deterioration and to repair damage already done. They will have technical advisers representing the Departments of Forestry, Lands and Survey, Scientific and Industrial Research, and Agriculture. These boards will, therefore, have the powers and the necessary technical advice to enable them to undertake extensive planting schemes. Planting on the higher levels of the watersheds to prevent water erosion is imperative, and planting on the lower levels, particularly near the sea, is no less desirable to control wind erosion and at the same time create a national asset that will give ample recompense for the labour and cost incurred.

PINK DAFFODILS

THE following appeared in the Wellington "Evening Post," September 25:—
Daffodil Seedlings: At the Wellington Horticultural Society's Spring Show on September 19 daffodil seedlings staged in competition by Mr. A. H. Ahrens, of Homebush, Masterton, a well-known amateur raiser and exhibitor, constituted the most outstanding exhibit in the show, and they were certainly the main attraction to the public. The following notes have been given by the raiser for the information of daffodil-lovers who enjoyed the fine display.

Perhaps the two most outstanding flowers were *Militza* and one shown under Number 55/39, a. The former was bred from *Mozart* x a *Leedsii*, a lemon-coloured flower, a very rare shade in daffodils; seedling with a peculiar spotted cup, but of no value as a flower, parentage unknown. In this new break the flat cup is divided into segments, which made the flower look like a semi-double, which, of course, it is not. 55/39 is by *White Sentinel* x *Kaitawa*, a red and yellow seedling from a seedling yellow *Incomparabilis* x *Scarlet Queen*.

Zenobia, *Earani* and *Antium*, each with a white perianth of fine texture and all with nice coloured cups, ranging from apricot to brick red, were all out of the same seed pod, *Hermina* (*Mozart* x *Nevis*) x *Eurydice*, a bi-colour *Barrii* *Weena*, a fine bi-colour *Incomparabilis* with good, deep red colour in the cup was from *Hermina* x *Margaret H.*

An interesting vase of three jonquil hybrids included one from *Mozart* x *Jonquil-odoratus*, and two from *Sunstar* x *Jonquil-odoratus*, two on the stalk and slightly scented.

Ephesus from *Hermina* x *Kaitawa* was a very attractive bi-colour *Incomparabilis* with apricot edge to cup. *Rio Claro* from *Rio Tinto* x *King of Hearts* was a large yellow self. Two flowers out of the same seed pod bred from *Seraglio* x *Seedling* from *Kaitawa* x *Hades* were good blooms and highly coloured.

Barrii 40/39 were bred from *Mozart* x *Hades*. *Amory*, an early yellow shaded *Barrii*, had a very crinkly red and yellow cup and good, wide somewhat pointed segments. Parentage is unknown, but it was probably a *Mozart* cross.

The raiser concludes: "Incidentally I have found a certain amount of in-breeding is quite useful and gives good results providing you are working on a good strain."

Winter Berrying and Ornamental Foliaged Plants Suitable for the Small Garden

From an Address by M. J. BARNETT, F.R.H.S., N.D.H. (N.Z.), Christchurch.

AN intimate knowledge of Wellington's soil and climatic conditions—two dominant factors in the distribution, limiting, and general well-being of plant life—could be acquired only by experience, and Mr. Barnett, in an address on winter-berrying and ornamental foliageed plants suitable for the small garden, said he based his talk only on the knowledge of the occasional visitor. Nevertheless, the plants dealt with had been chosen with care and only after paying due regard to the general conditions prevailing in Wellington. All had been subjected to practical test in parks and reserves and private gardens of Christchurch under varying conditions of temperature and soil. Although the Christchurch climate might or might not be as boisterous or as mild as that of Wellington it was as changeable and as variable as the moods and caprices of Cleopatra. Its soils varied in composition and texture from stiff loams to very light sands, from peats to gravels, and from wet soils to dry soils. Christchurch had its seashores and its hills too. Some of the specimens exhibited had been grown on reasonably good soil and on arid rocky outcroppings at a height of 800ft. above sea level.

"Certain enthusiasts," said Mr. Barnett, "may claim that as our New Zealand shrubs flourish in and about Wellington, they should be given preference over all others. It cannot be denied that our flora is in many respects distinctive and has its virtues. By all means let it predominate under certain circumstances, but to plant our New Zealand shrubs to the exclusion of all else, particularly when that planting consists of the easier grown veronicas, olearias, and senecios, tends to cheapen their value and savours too much of insular prejudice.

"Let us endeavour to grow the best Nature has produced, no matter what part of the world it comes from. The average citizen who possesses a garden, even if it is only small, does not worry where a plant comes from so long as it thrives and fulfils his appreciation of the beautiful. A good plant takes up no more room in the garden than the cheap and ordinary one. Therefore, let us have the best that is obtainable.

BEAUTIFUL BROOMS

"Nature to some extent has given us a lead. Even your casual visitor must observe that on your windswept slopes where the soil is sparse and uninviting the common European broom has established itself even to the extent of becoming a menace. If it will thrive under adverse circumstances so will its progeny and affinities. Some of our most handsome flowering shrubs are the hybrid brooms which have been raised by the plant breeder, and also some of the broom species from other lands. Most nurserymen catalogue such well-known and beautiful kinds as *Cytisus Burkwoodii*, Lord Lambourne, Lilac Time, Lady Moore, Dallimiori, Donard Seedling, *præcox*, and several others varying in colour from cream to scarlet, and from mauve or lilac to crimson. These when in full bloom—and they are just as floriferous as the common broom of the hillsides—are really beautiful. However, they require pruning annually immediately after flowering to keep them shapely, and some are comparatively short lived. But there are some of the lesser-known types which are equally beautiful and do not require that annual pruning and which, given their proper environment, will thrive for many years. Such species and hybrids as *Cytisus Beanii*, *C. Kewensis*, *C. purpureus*, *C. humifusa*, *C. purgans*, and *C. sessilifolius*—are some of the best and are most suitable for the small garden, in open exposed situations, and for poor shallow soils. I have not the slightest hesitation in recommending them.

It might be asked, said Mr. Barnett, what had these to do with autumn tints and berry-bearing plants? None of them, with perhaps the exception of *C. purpureus*, came under the above heading, but they illustrated that no matter

how impossible or how uninviting a problem you might be confronted with in your garden, there were beautiful plants growing under similar conditions in some part of the world that would thrive equally well with you if given reasonable care.

"In selecting what are considered some of the best ornamental foliaged and fruiting shrubs," the speaker continued, "I have restricted the choice to those which are most suitable for the average small town garden under conditions such as those that prevail in Wellington. Such subjects as the *pyrus* and *crataegus* have purposely been omitted, for many of them, while excellent both for flower, fruit, and foliage, are more in the nature of small trees and are not suitable for exposed situations."

Arbutus unedo, the strawberry tree, had proved a most accommodating plant and succeeded in adverse conditions. When planted in well-cultivated soil the specimens made excellent growth, but it grew more sturdy and fruited much more prolifically when planted in exposed positions where it had to more or less fight for its existence. Being a winter-berrying subject it provided food for birds at a time when they were hard pressed to eke out an existence. Some might object to encouraging birds about the garden, but the amount of damage done was infinitesimal compared with the good they did. Insects were one of the gardener's worst pests; birds were their natural enemies and should not be discouraged.

BERBERIS FAMILY

The Berberis family offered some of the best of berry-bearing shrubs. Probably the best known was *Berberis Wilsonae*, named in honour of Mrs. Wilson, wife of the late Dr. Wilson, who made extensive plant collecting expeditions to China during 1904 and subsequent years. From this and other species several excellent hybrids such as Sparkler, Winter Cheer, and others had been raised by the plant breeder. It had been found that a single specimen did not fruit so abundantly as when two or more bushes were planted in proximity of one another. *Berberis Wilsonae*, if regularly trimmed, made a close, compact hedge, and in this respect was to be preferred for this purpose to the evergreen species *Berberis Darwinii*.

B. Thunbergii formed a compact, round-headed bush about 4ft. high. In the autumn its foliage took on bright attractive tints. Placed in the foreground of a shrubbery or against a background of evergreens it provided conspicuous colour at a time of the year when colour was lacking in the garden. The purple-leaved variety, *B. Thunbergii folius purpureus* was one of the best of the small coloured foliaged shrubs.

B. Sieboldii, although not conspicuous for its fruits, had proved one of the highly coloured foliaged shrubs of the genus. It is only a comparatively small specimen, but the leaves, which developed their autumn colouring late in the season, were particularly vivid.

B. Hookeri, growth 3 to 4ft., was practically an evergreen. The berries were blue-black and quite useful for indoor decorations.

B. aquifolium, or perhaps better known as Mahonia, is a large-leaved type and quite distinct in appearance from those already mentioned. The shining bronze-tinted foliage is always attractive and is frequently used by the florists for embellishing wreaths and bouquets. Because of its propensity for suckering, its tolerance of shade, and its dwarf habit, it had proved an excellent subject for mass planting under deciduous trees where in some instances it is even impossible to grow grass. If the plants showed any tendency towards legginess they should be cut back to within 6in. or so of the ground each year during October.

Other good berrying species were *B. Beanii*, *B. brevipaniculata*, *B. Prattii*, and *B. polyantha*.

THE COTONEASTERS

The Cotoneasters, said Mr. Barnett, had proved excellent plants, not only for their ornamental fruits and foliage, but also because of their ability to withstand

exposure and to thrive with the minimum amount of attention. Every nurseryman catalogued *C. Simonsii* and it was universally popular, but there were others of the genus which in some respects were even better than this species. *C. rotundifolia* was probably one of the best for the small garden. It grew to a height of approximately 4ft. and its large scarlet berries, which were borne in great profusion, were retained right through the winter and spring months. *C. amoena* is little known but is worthy of mention. It has grey-green foliage and attractive orange-scarlet fruits. For those who wanted bigger shrubs that would reach a height of 10ft. or so both *C. salicifolia floccosa* and *C. Heryana* would prove useful, being extraordinarily free and brightly-berried subjects and useful for providing shelter for less hardy subjects.

For prostrate shrubs that had proved useful for covering large boulders or for training over low walls *C. horizontalis*, *C. microphylla*, and *C. divaricata* are to be recommended. *C. horizontalis* is deciduous, and in the autumn and winter every branch and little twig was literally covered with bright scarlet berries. In the springtime the profusion of small pink flowers, loved of the bees, and the tender green young foliage made it equally attractive. Planted without support it grew flat on the ground, but given a position against a large rock, stone wall, or trellis, it grew flat against the upright surface without training. Recently nurserymen have made use of this shrub in another manner. By grafting it about 3ft. high on to the stock of one of the stronger and more upright cotoneasters excellent miniature weeping specimens could be obtained. Given their proper setting these weeping standards were particularly useful for embellishing small gardens and where space was restricted.

C. microphylla, on the other hand, is a true evergreen with dark green foliage which sets off to advantage the large bright crimson fruits. It is quite a good subject for covering clay banks. *C. divaricata* did not berry profusely, but provided it had sufficient moisture, it would ramble over stony faces. The comparatively large soft pink flowers with which the prostrate branches were studded in the springtime rendered it quite a useful shrub for the rock garden.

C. serotina is a moderately sized shrub whose clusters of scarlet fruits had made it quite popular. It had one failing—it seemed to be prone to attacks from the fire blight disease.

All of the cotoneasters are easily propagated by means of hard wood cuttings, and both these and the *Berberii* could be raised with little trouble from seed.

Celastrus scandens and *C. articulatus* are robust deciduous climbers which show to advantage when allowed to ramble at will over an old tree or rustic work. They had been used with success for screening the netting fences surrounding tennis courts, where they served the dual purpose of providing additional shelter as well as attractive fruits during the late autumn. These fruits or capsules are disposed in considerable numbers on the lateral branches, and when ripe burst open, displaying the scarlet seed or true fruit in the centre of the golden segments. Even when the scarlet portion had dropped the golden husk-like segments remained throughout the winter. For indoor decoration the sprays of golden and scarlet fruits were always admired, and if picked during May, when the capsules were just bursting, would last until one almost tired of the sight of them, or until the gradual accumulation of dust rendered them somewhat dingy.

The callistemons, or bottle brush shrubs, of Australia, because of their hardiness and brightly coloured inflorescences, were grown fairly extensively. There was one species, however, which should receive more popularity, and that was *C. hypericifolia*. Most of the other species were stiff and somewhat rigid in appearance, and when not in flower could not be termed attractive shrubs. *C. hypericifolia* was a more graceful and attractive subject than any of the others that the speaker had seen. During the colder months the foliage became prettily hued with rose and bronze tints, especially so where the bushes were grown in exposed situations.

Another good evergreen with coloured foliage is *Photinia glabra rosea*. The bright, warm, rose-coloured leaves which develop on the growing shoots were admired by everyone. Experience has demonstrated that if the bushes are grown in well-sheltered positions or where they did not get the maximum amount of light the leaves did not colour nearly so well as in more open situations. Regular pruning is necessary to induce a plentiful supply of fresh growths.

TWO NATIVES

Panax discolor, a New Zealand native, is another good shrub with bronze foliage the whole year round, but with the advent of colder weather the colour intensifies. Although it is reputed to grow to a height of 15ft. in its native habitat, it is somewhat slow in growth and succeeds even in exposed situations, two factors which make it worthy of a place in the small garden.

Another New Zealander, but in this case an herbaceous perennial, which had definite possibilities as a garden subject, particularly where colour during the winter was desired, is *Libertia ixioides*. The white flowers and golden fruits borne on stiff upright but slender stems are always admired. The bright straw-coloured, narrow leaves also add a distinctive touch of colour when most appreciated. When the crowns become too crowded the clumps should be lifted and the most vigorous portions replanted, at the same time taking the opportunity to rid the plant of all old and half-decayed foliage.

The *Pyracanthas* are among some of the brightest of autumn- and winter-berrying shrubs. They appear to succeed in and about Wellington. All are evergreens. The best species are *P. angustifolia* (orange-yellow fruits retained throughout the winter); *P. coccinea* (scarlet fruits); and *P. crenulata* and its variety *Rogersiana*, which have orange and yellow fruits. All are subject to the fire blight disease and resent hard pruning. If pruning is necessary, it should not be carried out during the late autumn, winter, or early spring.

Stranvaesia Davidiana is almost an evergreen. It sheds some of its foliage during the winter, but the foliage before falling colours reasonably well. The clusters of pendulous scarlet fruits are beautiful and remain on the branches almost through the winter. It has been found to berry more prolifically in exposed situations than when given the shelter of neighbouring shrubs which overshadow it.

A rather despised shrub but one most useful for winter effect in comparatively poor soils is *Symphoricarpus vulgaris* (*S. orbiculatus*), or the coral berry. In the summer the bushes have little value for ornamentation, but during the winter each little twig bears dense clusters of purplish red fruits. Planted in good, deep soils it does not berry so freely as when it is more or less starved in less kindly situations.

A really hardy low-growing shrub is the butcher's broom, *Ruscus aculeatus*. This interesting subject seemed to thrive in the most unpromising situations, even under trees and in draughty places. Generally it could not be considered an attractive shrub, but when well furnished with its large scarlet fruits placed in the centre of the so-called "leaf" it is very ornamental. Curiously enough the *Ruscus* is reputed to be unisexual, i.e., the male and female flowers are borne on separate plants; to obtain fruiting it was therefore necessary to have both sexes planted in proximity, but a good fruiting specimen was found growing in the garden of a Christchurch orchardist and offsets obtained from this plant have all developed the same fruiting habit, even where only single specimens have been planted. The old stems and foliage are very persistent, and each year these should be thinned out to allow plenty of room for air and light to penetrate to the younger growths. If left undisturbed, the bushes in time will become too dense and a real harbourage for dust and debris.

A close affinity to the *Ruscus* is *Danae laurus* (*Ruscus racemosa*), which is a slender, truly evergreen shrub. The semi-woody stems are very pliable, and the large so-called "leaves" are well placed, of a bright shining green, and perfectly smooth. For decorating large bowls in conjunction with berries they may be used to advantage. It also succeeds in shady positions.

As an ornamental and fruiting shrub or small tree the common holly (*Ilex aquifolium*) could not be overlooked. Complaints were not infrequently made that specimens would not berry as they should. Good fruiting specimens could be obtained by budding or grafting good types on to seedling stocks. The yellow-berried holly (*Ilex aquifolium fructu lutea*) and Lawson's holly (*Ilex Lawsoniana*) are also worth mention for their ornamental fruits. The latter has ornamental golden variegated foliage.

The speaker desired to mention only one cherry which was eminently suitable for the small garden, and that was *Prunus erecta*, or sometimes catalogued as *Prunus ama-no-gawa*. One world authority had stated that if his garden was only large enough for one small specimen he would plant *Prunus erecta*, and if large enough for two specimens he would plant two *Prunus erecta*. It was an upright fastigate cherry, in habit reminiscent of the Lombardy poplar, but did not in any way reach the height of that tree, and was ideal for a restricted space provided it was given reasonable shelter.

Brief mention was made of some winter-flowering shrubs, foremost among which were three heaths, *Erica carnea*, *E. Darleyensis*, and *E. Mediterranea*. All are perfectly hardy and tenacious plants; the two former are more or less prostrate, but the latter grew to a height of 4ft. *Fremontia Californica* and *F. Mexicana*, given a well-drained soil, a sheltered position, and full sun, will flower throughout the year. *Hamamelis mollis*, the witch hazel, succeeds in a deep rich soil. To be seen to advantage it should be planted against a background of some good evergreen.

HORTICULTURAL LITERATURE

THE list below contains references to some of the publications and bulletins which have been received by the secretary.

- The Maple Sugar Industry Act and Regulations—Ministry of Agriculture, Ottawa.
- Pruning, Thinning and Utilising Trees—Ministry of Agriculture, Ottawa.
- Size in Kieffer Pears—by G. H. Dickson, Horticultural Experiment Station, Vineland Station, Ontario.
- Soil Nitrates under Various Fertilisation and Green-Manure Cropping Systems—Horticultural Experiment Station, Ontario.
- The Chemical Composition of Maturing New York State Grapes—by Z. L. Kertesz, New York State Agricultural Experiment Station, Bulletin No. 274.
- Disease and Insect Control of Hops—by R. O. Magie, New York State Agricultural Experiment Station, Bulletin No. 708.
- The Bactericidal Action of Cabbage and other Vegetable Juices—by Carl S. Pederson and Paul Fisher, New York State Agricultural Experiment Station, Bulletin No. 273.
- Diseases of the Raspberry—by G. H. Berkeley and G. C. Chamberlain, Ontario.

ISSUES OF—

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| Nurserymen and Seedsmen. | The Journal of the Royal Horticultural Society. |
| The Gardeners' Chronicle. | The Seed and Nursery Trader. |
| The Fruit, Flower and Vegetable Trades Journal. | The National Horticultural Magazine. |
| The Horticultural Advertiser. | Forest and Bird. |
| The Orchardist of New Zealand. | N.Z. Journal of Agriculture. |
| The City Beautiful. | American Nurseryman. |
| The N.Z. Commercial Gardeners' Journal. | Trees. |
| The Market Growers' Journal. | |

ROYAL NEW ZEALAND INSTITUTE OF HORTICULTURE (INC.)

JUNIOR EXAMINATION (SYLLABUS No. 1), 1944

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.

All questions are of equal value unless otherwise stated.

1. Define the terms "fruit" and "seed"; describe (a) three different types of edible fruits, (b) three different types of ornamental fruits.
2. Describe three different types of climbing organs and indicate plants of horticultural value for each type.
3. What are the main elementary substances required by plants, and how does the plant obtain them?
4. What are "hybrids"? What is meant by "segregation." Of what value is a knowledge of these matters to the practical gardener?
5. Describe the chief features of the families *Ranunculaceae* and *Compositae*. Mention six plants of horticultural value in each family.
6. How would you sterilize soil for a small garden, using only apparatus readily available in an ordinary household?
7. What is compost? How is it prepared and used?
8. Describe in detail the botanical specimen supplied by the Supervisor.

PRINCIPLES OF PLANT PROTECTION

(Time allowed—Three hours.)

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

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

All questions are of equal value unless otherwise stated.

1. Outline the life history of an aphid and a red-mite.
2. Describe the chemical disinfection of soils.
3. Detail the mechanism of a cyclone spray nozzle.
4. Compare the life histories of a downy-mildew and a powdery-mildew.
5. Discuss hot-water treatment of bulbs and strawberry runners.
6. Compare lime sulphur with colloidal sulphur, giving uses of each.
7. How are plant viruses carried over from season to season?
8. Outline a spray programme for use in a peach orchard.

INTERMEDIATE EXAMINATION (SYLLABUS No. 2), 1944 PRINCIPLES OF HORTICULTURE

(Time allowed—Three hours)

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

All questions are of equal value unless otherwise stated.

1. Describe a few of the commoner mistakes in the making and use of what is commonly known as compost.
2. What are the advantages and disadvantages of light and heavy soils respectively for intensive cropping? How are they best maintained in a fertile state under those conditions.
3. Write a short essay on the relation of wind to plant growth. Include a list of food and decorative plants that are comparatively immune from its effects.
4. Write a short essay on weeds and their control in lawns or in land used for cropping.
5. What is the scientific meaning of mulching? Under what conditions is it beneficial and harmful?

6. There has been considerable discussion in scientific literature on the use and abuse of the operations of hoeing the land. Give your views as regards land under crop.
7. Write a short essay on the storage and economical use of garden seeds.
8. What is the particular value of chemical fertilizers? Under what conditions are they used to best advantage in horticultural practice?

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. All questions are of equal value unless otherwise stated.

1. Describe fully your method of dealing with new lateral growth on mature apple and peach trees at winter pruning.
2. What is the process of reconditioning an herbaceous border, including the season, method and replanting?
3. Detail the operations in preparing the land and sowing down a lawn, including treatment as far as the first cutting.
4. Write a short essay on Bordeaux mixture and its use as a spray in orchards and gardens.
5. Describe the methods of making hardwood cuttings, both deciduous and evergreen, and of planting them outside. State the season when the operation may be done successfully.
6. Set down the methods of storage of fruit and vegetables in fairly large quantities, in the absence of refrigeration. What kinds and varieties are most suitable? Give special attention to conditions.

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."

All questions are of equal value unless otherwise stated.

1. Write a short essay on the horticultural classification of daffodils *or* roses. Name two varieties of each class of outstanding merit for garden display.
2. Give a list of plants and suggestions regarding arrangement, etc., suited for a rock garden on a rather large scale, somewhat over-drained, and in a sunny, rather sheltered position.
3. Write a short essay on rhododendrons *or* hydrangeas *or* fuchsias and their use in the garden.
4. Design and specify a bed of annuals for summer display. Describe the method of raising the plants and also planting and treatment.
5. Give a list of herbaceous flowering perennials suited for a shaded shrubbery border, and also advice on arrangement and treatment.
6. Write a short essay on fragrant hardwood and herbaceous plants in the garden.

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."

All questions are of equal value unless otherwise stated.

1. Give your manure formula for (a) mixing with potting soil, and (b) subsequent feeding of pot plants.
2. Under what conditions and at what dates do you insert the following cuttings—camellias, rhododendrons, lemons, calceolarias and begonias.
3. Write a short essay on the advantages or disadvantages of sterilized soil.
4. Choose *one* of the following crops and give details of production: Begonias (from seed), freesias (from seed), boronias (from cuttings), and tulips.
5. For what purposes and by what method would you use electric heating?
6. When and how are rhododendrons grafted? State what treatment is required until union is complete.

Special Subject — LANDSCAPE 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."

All questions are of equal value unless otherwise stated.

1. What do you understand by "Unity" in reference to landscape designing?
2. Under what conditions would you suggest an architectural style in lay-out in preference to a natural one?
3. Name two books on landscape gardening that you have studied and discuss the merits of each.
4. Name six trees or shrubs that you would recommend for seaside planting and comment on each.
5. Show by diagram your method of forming a twelve-foot drive of (a) asphalt and (b) concrete.
6. What do you recommend as a general-purpose grass seed mixture for lawns and state the quantity required per square chain?

Special Subject — TREES AND SHRUBS TOGETHER WITH THEIR PROPAGATION AND USE 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 on "Practice of Horticulture."

1. Name some trees you would associate with rhododendrons and give your reasons for doing so.
2. Name ten trees or large shrubs conspicuous for their autumn-tinted foliage and describe the best method of propagation.
3. If the following failed to fruit or berry what would be the likely cause?

<i>Idesia polycarpa,</i>	<i>Aucuba japonica,</i>
<i>Ailanthus glandulosa,</i>	<i>Ruscus aculeatus.</i>

State how each is propagated.
4. Name and describe eight dwarf conifers. State how each is propagated and the conditions which suit it best.
5. Write a short essay on honey-producing native trees or shrubs which supply food for native birds.
6. Give a list of shrubs suitable for planting a well-drained border with a northern aspect. The border is twelve by one hundred feet and preference should be given to shrubs which will provide colour all the year round.

DIPLOMA EXAMINATION (SYLLABUS No. 3), 1944 PRINCIPLES AND PRACTICE OF HORTICULTURE

(Time allowed—Three hours.)

NOTE: SIX ONLY of the following questions are to be answered. All questions are of equal value unless otherwise stated.

Use diagrams to illustrate your answers when you can.

1. A municipality controls several parks, one of which has an area of fifteen acres and is established with cricket and football grounds, bowling green, croquet courts, hard tennis courts, equipped children's playground, shrub-berries, specimen trees, and flower garden, hedges and walks, and such buildings as pavilion, band rotunda, tool shed and conveniences.

Give types, kinds and, where necessary, the size and make of the various tools and implements that you consider essential for the general maintenance of all sections of the park. If possible, give the present-day value of such equipment. Also state what materials should be kept on hand for the convenience of the park staff in attending to the duties involved. Some implements may be difficult to procure under present conditions but, nevertheless, should be included.

2. What would you consider the most successful and most economical means to adopt to prevent and control the following pests. Give your reasons for the use of such measures: (a) Fire blight on apple trees; (b) golden scale on oak trees; (c) rust on carnations; (d) brown patch or fusarium disease in lawns; (e) mildew on grape vines; (f) club root disease in brassica crops.
3. Describe what measures you would adopt to improve a stiff heavy loam, that is inclined to waterlog in the winter time, so as to render it suitable for the cultivation of good vegetable crops, including those kinds required for winter and spring use.
4. Describe the most successful and economical means of propagating the following subjects: (a) *Eucalyptus ficifolia*, (b) *Erica ventricosa* or similar species, (c) Dessert plum such as Satsuma. (d) Apple, Cox's Orange Pippin. (e) *Cupressus (Chamaecyparis) obtusa var. Crippsii*, (f) *Clematis Jackmanii*.
Where applicable, the name of the stock or the type of cutting used must be given. Details are to be stated as to when and how the propagation is done in each case, as well as any special precautions that are considered necessary.
5. Under what circumstances and in what quantities would you recommend the use of nitrate of soda? What are its advantages, and disadvantages, and what plants are particularly benefited by its use?
6. You are required to lay down a bowling green (standard size) on an area with a slope of one foot in fifteen feet and with existing soil consisting of twelve inches of good loam overlying a clay subsoil. Describe how you would proceed with the work of levelling and preparing the surface for sowing down in approved lawn grass. What mixture of grass seed would you recommend?
7. A garden is divided into two sections by a bank or terrace six feet in height and it is required to develop this terrace as a wall garden. How would you proceed with the work and what precautions would you take? Give a list of twelve plants suitable for such a situation.
8. State the principles governing the pruning of shrubs. When, how and why would you prune the following:—
(a) Loganberry, (b) Red currant, (c) Fruiting peach, (d) *Spiraea japonica* var. "Anthony Waterer," (e) *Olearia stellata*, (f) *Cytisus* Lord Lambourne or similar variety.

Special Subject — TREES AND SHRUBS TOGETHER WITH THEIR PROPAGATION AND USE IN HORTICULTURE

NOTE: SIX ONLY of the following questions are to be answered, including No. 4 which is compulsory. Candidates should illustrate their answers by diagrams where necessary.

All questions are of equal value unless otherwise stated.

1. Name and describe twelve indigenous trees and shrubs eminently suitable for seaside planting. State by what means they are best propagated.
2. Select eight trees you consider best for street planting. Give your reasons for the selection and briefly describe the habit of each. Describe means of propagation and, if by grafting or budding, name the stock to be used.
3. Write a short essay on "Tree Surgery and the Renovation of Old Trees."
4. Describe the following trees and shrubs and make reference to their hardness or otherwise, also the best means of propagation:
Eucalyptus erythrocorys, *Banksia coccinea*, *Beaufortia sparsa*, *Chamaelaucium uncinatum*, *Calythrix Fraseri*, *Crocea dentata*, *Templetonia retusa*, *Grevillea Wilsonii*, *Acacia pravissima*, *Telopea speciosissima*.
5. Name and describe six rhododendron species, also give the name of the species commonly used as a stock for grafting large-leaved hybrids. Briefly describe various methods and times of propagating.

6. What is the chief characteristic of the following trees and shrubs having coloured fruits or berries:
Ilex aquifolium, *Hippophae rhamnoides*, *Ruscus aculeatus*, *Skimmia japonica*,
Aucuba japonica, *Ailanthus glandulosa*.
7. Describe how, when and why you would prune the following trees and shrubs:
Buddleja globosa, *Ceratostigma Willmottianum*, *Spiraea japonica* var. "Anthony Waterer," *Spartium junceum*, *Prunus serrulata*, *Telopsea speciosissima*,
Magnolia conspicua, *Kerria japonica*.
8. Give the names of at least ten good conifers suitable for specimen planting on a large lawn, briefly describe them and the best means of propagation, also state conditions under which they thrive.

Special Subject — GLASSHOUSE MANAGEMENT

(Time allowed—Three hours.)

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

All questions are of equal value unless otherwise stated.

1. Detail your method of raising ferns from spores and explain how fertilization is effected.
2. Give your manure formula for:
(a) Mixing with potting soil, and
(b) Subsequent feeding of pot plants.
3. Under what conditions and at what dates do you insert the following cuttings:
Camellias, rhododendrons, lemons, calceolarias and begonias?
4. Write a short essay on the advantages and disadvantages of sterilized soil.
5. Choose *one* of the following crops and give details of production:—
Begonias (from seed), freesias (from seed), tulips, boronias (from cuttings).
6. For what purpose and by what method would you use electric heating?
7. When and how are rhododendrons grafted? State what treatment is required until union is complete.
8. What is the native country of each of the following plants:—
Stephanotis floribunda, *Fuchsia magellanica*, *Microkentia* (*Kentia*) *gracilis*,
Asparagus sprengeri, *Senecio* (*Cineraria*) *crucentus*, *Lapageria rosea*.

Special Subject — LANDSCAPE GARDENING

(Time allowed—Three hours.)

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

All questions are of equal value EXCEPT No. 1 WHICH IS COMPULSORY AND CARRIES DOUBLE MARKS.

1. Show by sketch plan how you would lay out a section of two chains frontage, level land, with dwelling approximately fifty feet square.
2. What do you understand by "Unity" in reference to landscape designing?
3. Under what conditions would you suggest an architectural style in lay-out in preference to a natural one?
4. Name two books on landscape gardening that you have studied and discuss the merits of each.
5. Name six trees or shrubs that you would recommend for seaside planting and comment on each.
6. How would you proceed to lay down an asphalt tennis court or a full-size bowling green?
7. Show by diagram your method of forming a twelve-foot drive of (a) asphalt and (b) concrete.
8. What do you recommend as a general-purpose grass seed mixture for lawns and state the quantity required per square chain?

GREY IS THE ROSE

WE are again indebted to Mrs. Knox Gilmer, Wellington, for the following extract from an article by Amy Porter, which appeared in "Colliers": "You cannot take it for granted, any longer, that roses are red and violets are blue. Violets, at the last report, were still more or less blue, but the newest rose isn't red, or any other regulation rose colour. It's grey—a soft lustrous grey, flushed with palest mauve pink at the centre. Its name is Grey Pearl, and you can grow it in your own garden, if you like, starting next spring.

"It seems that hybridisers—those men who interfere with Nature's plans—never have been satisfied with plain red roses and yellow roses and white roses. For years they have been trying to develop black roses and blue roses and even grey roses. . . .

"But it was not until 1939, when hybridiser Eugene S. Boerner was making one of his periodic tours of Europe's rose gardens, that the grey rose became a possibility. Boerner, head of research at the nurseries of the Jackson and Perkins Co., of Newark, New York, was visiting the greenhouses of the McGredy nursery in Ireland, when he saw a pitiful little seedling with a strange grey look about it. He examined it more closely and asked, 'How about selling me this one?' But the nurseryman protested, 'You wouldn't want that. That shouldn't be a rose at all, it isn't a rose colour.' Boerner said he would like to buy it all the same, and the nurseryman agreed. He stipulated, though, that it should not carry the McGredy name because he did not consider it a credit to the firm.

"Back in Newark, Boerner nursed the grey phenomenon along, budding it on to wild rose bushes in the greenhouse. The growth looked pretty scraggy the first year, and the new rose's form was a lot less than perfect. Boerner transplanted it to the outdoor experimental field, to see if it had the character to thrive without greenhouse pampering. He rejoiced when his grey pet not only lived through its first winter out of doors, but actually gained vigour and colour. Thereafter, each spring and autumn he increased the number of plants by budding.

"Charles Perkins, President of the Company, caught the hybridiser's enthusiasm for his find, and they decided that the time had come to have other growers to test it. They sent plants to 80 test stations scattered throughout the country and reports came back: 'Sturdy,' 'Disease resistant,' 'Grows well in the south,' 'Grows well in the north,' 'Excellent form.' As to colours, some testers said: 'Peculiar colour, would not sell here,' but others said: 'A distinguished novelty. Any rosarian would be glad to have it.'

"Encouraged, Jackson and Perkins developed 25,000 grey rose plants. They plan to put them on sale to the public and growers next spring.

"The grey rose is, of course, only one product of the continuous research of Jackson and Perkins. Each year the firm introduces three or four new rose varieties, and each represents from five to seven years' work and approximately 50,000 dollars' worth of research.

"Boerner's 1939 trip had other happy results. That summer, when it was clear that Europe was about to be engulfed in war, Boerner realised that the time of pretty flowers was about over. A few months later the Nazis proved him right by ploughing up the nurseries. So in Norway, France, Holland, Belgium, Spain, Italy, Switzerland, and Ireland, he bought every promising seedling that the growers showed him, gathering up more than 10,000 potential plants, many times his usual purchase.

"He fled through France just ahead of the Nazis, got passage on the Aquitania, and, although it was against the ship's rules, persuaded the chef to let him keep his oversize cargo of refugee roses in the refrigerator with the meat. Twice a day he inspected his treasures to make sure that the peat moss which protected them was moist and exactly the right degree of temperature.

"This year (1944) marks the debut of several spectacular roses, beside the Grey Pearl, from that cargo; the big bright red Mrs. Miniver from Lyons, France; the big yellow Mandalay from Grenoble; the thimble-sized pink Pinocchio from Germany; the full-bosomed coral-pink Waves and the golden yellow Fantasia from Belfast, Ireland."

Other roses illustrated in Colliers article are pink many-petalled Youth from Italy; most popular American yellow rose is Eclipse; lemon verbena fragrance is the outstanding characteristic of Nieve Parium up to 4in. diameter; Pink Panorama often achieves a 6in. diameter, and Dickson's Red, from Ireland, won awards in England and U.S.A. for sturdiness, fragrance, good colour, and form.

INSTITUTE NOTES

A CLEAR direction to the incoming executive council to conduct a searching examination of its functions and activities with the view to creating a service to horticulture in New Zealand more in keeping with that for which the institute was originally designed and for which it is eminently fitted was given at the annual conference of the institute in February last. This task of self-analysis was placed in the hands of a sub-committee in July, and its report to the executive is in broad agreement with the principles enunciated.

Summarising the committee's recommendations, it could be stated that it is in thorough agreement with the educational programme and particularly with the proposed revision of the syllabus and scheme of training for examinations upon which the examining board has been working for the past few months. It further visualises that the creation of a horticultural library of high standard and the establishment of scholarship grants could be useful future targets. The committee recommends the delegation to district councils of those functions which relate particularly to their provincial areas. Strong district councils actively engaged in their respective tasks and related to the Dominion executive in a tightly-linked structure is the ideal which should be sought. As the sphere of influence of the institute is very largely determined by its prestige, it is desirable that its central organisation should have suitable offices, if possible gathering around it in the same premises other national horticultural organisations with objects related to its own. This would not only have a "public relations" value, but would also assist in the desirable objective of co-ordinating the activities of all branches of horticulture, a function which was conceived very firmly when the institute was first formed. In order to give members a more personal interest in its activities, the sub-committee recommended that a monthly letter or bulletin should be circulated between the quarterly issues of the journal to keep members informed upon questions not suitable for publication in the official organ but useful and informative for their own requirements.

It is recommended that relationships with our "opposite numbers" in all the principal countries should be established. A technical information service, regular publicity relating to research material, encouragement for the publication of outstanding horticultural books by New Zealand authors, thesis competitions, and similar projects are among the targets which have been recommended by the sub-committee.

FORTHCOMING CONFERENCE

National Horticultural Week will be held in Timaru from February 5 to February 8, 1946, and a strong and enthusiastic local arrangements committee is at present carrying out the preparatory work for the series of conferences of the national horticultural bodies which are associated in this annual event. All members are urged to do their utmost to be present at the institute's conference which will be held on Thursday, February 6, and to join in the other activities associated with Horticultural Week.

As the bookings of the Timaru hotels will be fairly heavy, it is most essential that reservations be sought immediately from the secretary of the local arrangements committee, Mr. A. W. Anderson, P.O. Box 153, Timaru.

ROYAL NEW ZEALAND INSTITUTE OF HORTICULTURE (INC.)

OBJECTS

The objects of the Institute are as follows:—

1. To encourage, foster and improve every branch of horticulture.
2. To exercise all the powers and functions of a horticultural nomenclature and certificating board, including the making of decisions and reports in regard to the nomenclature of plants, and to issue, in the name of the Institute, certificates, medals or diplomas for novelties of merit or new varieties.
3. To assist and promote horticultural education in every way possible.
4. To promote legislation having for its objects the advancement or protection of horticulture.
5. To assist research work in connection with any or all branches of horticulture.
6. To endow or assist any chair, lectureship, or horticultural teaching in New Zealand, in colleges, universities or other educational institutions the Institute may decide upon.
7. To promote the interchange of horticultural knowledge and to co-operate with Governments, scientific or other societies or bodies, or persons in any part of the world who may be working along any or all of the lines covered by the objects of this Institute.
8. To undertake or assist in the introduction and acclimatisation of any fruit tree, flowering tree or plant, forest tree, seeds or other form of plant life which, in the opinion of the Institute, should be introduced.
9. To establish, assist or endow libraries, and to obtain by purchase, exchange, or otherwise, books, papers and other publications relating to any or all of the matters covered by the objects of the Institute.
10. To arrange for the carrying out of work of "bud selection," the testing of new varieties of trees, plants, vegetables and any and all things necessary to the better understanding of tree and plant life and the maintenance or improvement of the standard of such.
11. To arrange for the selection and breeding of any or all classes of trees and plants for testing, and for the supply of certificated propagating material to nurserymen and others on such terms as may be arranged.
12. To carry out, arrange for or assist any object or objects which, in the opinion of the Dominion Council or of the Executive, come within the scope of horticulture, in its widest sense (not excepting forestry or agriculture).

ROYAL NEW ZEALAND INSTITUTE OF HORTICULTURE (INC.)

MEMBERSHIP

Subscriptions for membership of the Institute are as follows:

Individuals: 12/6 per annum (including member's wife).

Juniors under age eighteen: 2/6 per annum.

Societies, local authorities and commercial houses: 21/- per annum.

JOURNAL

The Journal of the Royal New Zealand Institute is published quarterly and issued free to all members.

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 33, LOWER HUTT.

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