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NEW ZEALAND PLANTS AND GARDENS

The Official Journal of the Royal New
Zealand Institute of Horticulture (Inc.)

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DECIDUOUS TREES

One can, I suppose, attribute to habit and a blindness to a particular type of beauty the fact that so many people, when selecting shrubs for a new garden, make the request ' . . . and I want them all to be evergreen.' This seems to indicate a perfect horror for a leafless tree.

True, a garden would possess a certain amount of bareness were it not for its camellias, rhododendrons, grevilleas and other evergreen shrubs, but the unrelieved dullness of the persistent hard green assumed in winter by so many evergreens can spoil the charm of a garden. The lichened bark of oak, walnut or beech has a beauty of its own and the contour of the bare branches seen against a clear winter sky is an inspiration to fire the soul of any artist.

There is an attraction other than foliage, and the silver birches, the snake-barked maples, the red barked dogwood, the mahogany polished stems of *Prunus thibetica* retain their full beauty after the leaf fall. There are, of course, many gardeners of experience who fully realise these facts and make good use of deciduous trees and shrubs to form many a delightful winter garden picture — daffodils or polyanthus in bold drifts among silver birches, a colony of *Cyclamen ibericum* nestling at the base of a giant oak, yellow crocuses defying the winter weather amid the red stems of *Acer palmatum* 'Seigan.' Then, in the spring, there is that wonderful freshness of newly grown foliage whose charm can never stale.

As shade trees, those that lose their leaves in winter are unrivalled. They provide shade when it is wanted in summer and, in winter there are no leaves to prevent the rain from reaching the plants below. The fallen leaves also provide that mould, whose value is known to all growers of hardy shrubs.

One of the arts of gardening is to achieve a balance in planting between deciduous and evergreen shrubs, valuing each in accord with its merits and without any prejudice for either.

— G. A. R. PHILLIPS,

Editor

VARIATIONS IN THE NEW ZEALAND BUSH

M. C. GUDEX, M.A., M.Sc. (Hamilton).

After examining the native bush for many years in all parts of New Zealand except Hawke's Bay, I am now attempting to describe some important variations in what is often regarded as a uniform and even a monotonous forest.

Before discussing the variations, however, we must consider the normal or basic composition of the native bush of the lowlands and hills (but not mountains) from Auckland to the Bluff. This is generally classed as 'sub-tropical rain forest,' because of the following features which are found in their extreme form in Westland: the density of the vegetation; the abundance and the variety of fungi, lichens, mosses, ferns, lianes, and perching plants; trees with extensive buttresses, e.g., Pukatea and Kahikatea; trees bearing blossoms on branches and trunks instead of on twigs and soft shoots, e.g., Kohekohe, Mapau, Toro and Mahoe.

There are two types of sub-tropical rain forest — the mixed and the beech forests — but as the latter is not typical of the New Zealand bush, it will receive only passing notice in this article.

The Usual Components

Here are the usual components of the mixed rain forest:—

1. Liverworts, fungi, lichens and mosses on the ground and even on the fronds of ferns and on the foliage, trunks and branches of trees and shrubs.
2. A grass, *Microlaena avenacea*, called 'Lush Rice Grass' or 'Oat Grass,' with its broad leaves and its flower stalks which reach a height of 3 to 4 feet; it provides a valuable food for farm animals.
3. Sedges:
 - (a) Several species of 'Cutty Grass' (*Carex*), especially *C. dissita* and *C. testacea*.
 - (b) Various species of 'Hooked Sedge' (*Uncinia*), such as *U. australis* and *U. riparia*.
4. Ferns:
 - (a) Terrestrial. Several species of 'Hard Fern' (*Blechnum*), especially *B. discolor*, fronds green above and grey beneath; *B. procerum*, the most common fern in New Zealand; *B. fluviatile*, the 'Greek Fern'; *Asplenium bulbiferum*, the 'Hen and Chickens' fern, with plantlets on the fronds; *A. lucidum*, with thick, shining fronds; *Cyclosorus penniger*, the 'Stream Polypody'; *Leptopteris hymenophylloides*, the single 'Crape Fern'; *Polystichum hispidum*, the 'Hairy Shield Fern,' and various filmy ferns, especially *Hymenophyllum demissum*.
 - (b) Tree-like *Dicksonia squarrosa*, the Wheki, with slender trunk, bearing short black lengths of old fronds; *Cyathea dealbata*,

the 'Silver Fern'; *C. smithi*, with soft fronds, which afterwards drape the trunk instead of falling off and breaking at their base.

- (c) Climbing. *Polypodium diversifolium* (now *Microsorium diversifolium*), the 'Common Polypody,' with some strap-like and some pinnate fronds; various filmy ferns such as *Hymenophyllum demissum*, *H. sanguinolentum*, *H. dilatatum*.
- (d) Perching. *Asplenium falcatum* (syn. *adiantoides*), *A. lucidum*, *A. flaccidum*, the 'Drooping Spleenwort.'

5. Lianes, climbers and scramblers:

Ripogonum scandens, the 'Supple Jack'; *Clematis indivisa*; *Parsonia* of two species with scented white flowers followed by long cylindrical capsules or pods; *Rubus*, the 'Lawyer,' especially *R. australis* and *R. squarrosus*, with prickly leaves and stems; *Metrosideros hypericifolia* (syn. *diffusa*), a Rata with red flowers; *Muehlenbeckia australis*, the Pohuehue.

NOTE: *Parsonia*, *Rubus* and *Muehlenbeckia* are found mostly on the outer portions of the forest.

6. Lowly herbs:

Pratia angulata, with white lobelia-like flowers followed by purple berries; *Ranunculus hirtus*, the 'Hairy Buttercup' and *Nertera depressa*, with red berries.

7. Perching Plants: Orchids such as *Earina mucronata*, with glossy leaves and scented white flowers; *Dendrobium cunninghami* a shrubby orchid with scented white flowers; *Astelia cunninghami* and *Collospermum hastatum*, flax-like bushes with masses of round red berries on erect or drooping spikes.

8. Shrubs, especially on the outskirts or in the more open parts of the forest: several species of *Coprosma*, especially *C. rotundifolia*, described by Cockayne as 'that most common plant of forest undergrowth,' *C. rhamnoides*, *C. robusta* and *C. lucida* (both called Karamu); *Melicope simplex*, a shrub with the leaf-blade jointed on the flat leaf-stalk; *Schefflera digitata*, Pate, with 5 to 8 soft leaflets in a leaf.

9. Trees:

Dacrydium cupressinum, the Rimu and one of the most beautiful conifers in the world:

Podocarpus dacrydioides, Kahikatea or 'White Pine', especially common in badly drained stations, where it forms almost pure stands; *P. ferrugineus* (Miro); *P. spicatus* (Matai); *P. totara* (Totara) prefers well drained soil; *P. halli*, a small Totara with large leaves; *Pittosporum tenuifolium* (Kohuhu); *Nothopanax arboreum*, 'Five-Finger'; *Pseudopanax crassifolium*, 'Lancewood'; *Aristolelia serrata*, Makomako, 'Wineberry', the most common new

growth in burnt or cut-over bush; *Carpodetus serratus*, Putaputa-weta, 'Marble Leaf'; *Meliclytus ramiflorus* (Mahoe); *Suttonia australis* (Mapau).

Some Variations

(a) The Kauri Forest:

The most noticeable divergence from the normal mixed bush is the Kauri forest proper in North Auckland.

Its chief features are:—

Kauri trees in groves, many specimens with a girth of 20 feet, but in Waipoua forest there are Tane Mahuta 43½ feet and Te Matua Ngahere 55 feet in circumference at mid-point of trunk. *Ackama rosaefolia* (Makamaka); *Phebalium nudum* (Mairehau), a shrub with scented foliage and white flowers; *Dicksonia lanata*, (Woolly Tree-Fern); *Beilschmiedia tarairi* ('Taraire) often dominant; *Metrosideros albiflora*, a climbing Rata with rather large leaves and white flowers; *Astelia trinervia* 'Kauri Grass', but really a member of the lily family; *Gahnia xanthocarpa*, a giant sedge or 'Cutty-Grass' often forming a jungle.

(b) The forests between North Cape and the Waikato contain certain species which find their southern limit on a line passing through Kawhia and East Cape, roughly 38° S. lat. Examples are:—

Weinmannia sylvicola ('Tawhero), replaced south of the line by *W. racemosa* (Kamahi); *Ixerba brexioides* ('Tawari) with beautiful serrated leaves and white flowers which are so striking that they were given the special name Whakau by the Maoris; *Vitex lucens* ('Puriri), a tree which has flowers and ripe fruit at almost all seasons, and grows near the coast as far south as Cape Egmont; *Lygodium articulatum* (Mangemange) a fern which climbs trees to a height of 50 ft. by means of wiry stems which are really extensions of the mid-rib of the frond.

(c) A considerable number of plants extend from North Auckland to Nelson and Marlborough, but little further. It should be noted that Cook Strait is not as great a barrier as might be expected, and therefore appears to be, from a geological point of view, of recent origin. Here are some of those plants:—

Dysoxylum spectabile, the Kohekohe; *Beilschmiedia tawa*, the Tawa; *Olea lanceolata*, the 'White Maire'; *Eugenia maire*, the Maire Tawaki, a bog-inhabiting tree; *Coprosma grandifolia* or *australis*, the Kanono; *Myrtus bullata*, the Ramarama, with blistered leaves; *Geniostoma ligustrifolium*, the Hangehange; *Olearia cunninghami*, *Heketara*, with snowy white flowers; *Blechnum filiforme*, a species of 'hard fern' which has three types of fronds and often covers the forest floor and climbs trees to a height of 30 ft.

- (d) Some of the plants which occur on the mountains, but not in the low-lands, of the Auckland province are found almost at sea-level in Canterbury, Otago, Southland and Stewart Island.

Examples are: *Pseudowintera colorata*, the red-blotched Horopito or Pepper Tree; *Griselinia littoralis*, 'Broadleaf'; *Nothopanax colensoi*, a 'Five Finger' with three to five smooth, leathery leaflets in each leaf; *Phyllocladus alpinus*, Mountain Toatoa, a grey-green brother of the Tanekaha; *Coprosma foetidissima*, the Hupiro or foetid *Coprosma*, fully deserving both its Maori and its English names.

Varying Proportions

The frequency of many species varies according to latitude, altitude, rainfall, severity and number of frosts, prevailing wind, drainage, and depth and nature of soil, but sometimes it is dependent on unknown factors. Here are examples of abundance:—

Matai in small areas in the Waikato, in large areas in the Rotorua district, King Country, Wellington province, in parts of South Canterbury (Peel Forest, Geraldine, Raincliff, Hook), and in Southland.

Titoki in Auckland and Taranaki provinces.

Tanekaha in western parts of the Waikato.

Northern Rata (*Metrosideros robusta*) in Coromandel Peninsula, the Mamakus, Waitakereis, Taranaki and Feilding district.

Fuchsia excorticata in Canterbury, Otago, Southland.

'Lacebark' (*Hoheria angustifolia*) in Canterbury.

'Ribbonwood' (*Plagianthus betulinus*) and Tarata (*Pittosporum eugenioides*) in Canterbury and Southland.

Nothopanax colensoi, at Waikaremoana, in Tongariro National Park, Westland, Southland, and Stewart Island.

Carpodetus serratus (Putaputaweta) and Kowhai in Canterbury.

Beilschmiedia tawa (Tawa) in Auckland and Wellington provinces.

Metrosideros umbellata (Southern Rata) in Westland, Otago, Southland and Stewart Island.

Vitex lucens (Puriri) North Auckland and in Coromandel Peninsula.

Meliclytus lanceolatus, the Narrow-leaved Mahoe, in Southland.

Loranthus and *Tupeia*, a species of mistletoe in the Rotorua district, Canterbury and Southland.

Nikau in North Auckland, Coromandel Peninsula, Wellington province.

Tree Fern, *Hemitelia smithi*, in Waikato, Westland and Stewart Island.

Filmy Ferns in Auckland, Taranaki and Westland provinces, and Stewart Island.

Miniature Tree Fern, *Blechnum fraseri*, in Waipoua Forest and in the Waitakereis.

The Canterbury Bush

In the gullies and other sheltered parts of Banks Peninsula a number of plants find their most southerly habitat. Examples are Karaka, native passion-fruit (*Tetrapathaea tetrandra*), Nikau and Kawakawa.

From accounts by Laing, Cockayne, Martin and other botanists, and from my own observations, it is clear that the flora of Banks Peninsula closely resembles that of many parts of the North Island. In the early days of settlement, there was an abundance of filmy ferns, Rimu, Matai, Totara and other forest trees, shrubs and lianes.

A somewhat similar kind of forest, but without Nikau, Karaka, and Kawakawa occurred at Riccarton, Christchurch, but almost all of that has been destroyed except the Deans Bush reserve. The dominance of Kahikatea there indicates that the original condition was swampy, but the draining of the land for farming and later for building has altered all that. The present writer has been familiar with Deans Bush for over forty years, and is therefore able to note the changes that have taken place in that time. Many of the Matai ('Black Pine') and Kahikatea trees have died, owing to drainage and exposure to wind, but Pokaka trees and passion-vines are thriving.

There is another type of bush in the Canterbury foothills and gorges. This is characterised by the scarcity of filmy ferns, tree ferns and perching plants, by the small range of species of ground ferns, and by an abundance of 'Broadleaf', *Fuchsia*, 'Ribbonwood', and Kohuhu (*Pittosporum tenuifolium*).

In mid-Canterbury, as at Staveley and Alford Forest, and in North Canterbury, as in the Whiterock district, the mixed bush contains a fair proportion of beech, both *Nothofagus fusca* and *N. solanderi*. Often these trees are partially covered by the scarlet-flowered mistletoe, *Elytranthe*.

Induced Variations

Like many other primitive peoples, the Maoris often burnt parts of the forest to make clearings for their kumara and Taro. One of the first things noticed by Captain Cook and his officers on their arrival on the East Coast in October, 1769, was the number of fires to be seen in different parts of the country. Cook wrote: 'We daily saw smoke rising in clouds one behind another to a great distance.'

European settlers have followed that practice on a still larger scale in the last hundred years. As a result of such operations, some of our native bush is a second growth (even third or fourth), and the components are in altered proportions. As already mentioned, 'Wineberry' is one of the first newcomers. In the northern half of the North Island, Rewarewa establishes itself very quickly. Other plants that repopulate the land are Manuka, 'Five Finger,' 'Lancewood,' Kohuhu, Kamahi,

Karamu, and a number of ferns such as bracken, the Mamaku tree-fern, *Paesia*, the 'Pig Fern' and *Polystichum aculeatum*, the 'Prickly Shield Fern.'

The last-named often overruns many acres at the edge of broken-down bush because it is able to survive burning and is not relished by stock, Lawyer vines and *Muehlenbeckia* become almost dominant, sometimes forming an impenetrable barrier on the outskirts of the bush.

Nomenclature

In general the system of plant names used in this article is that of Cheesman's *Manual of the New Zealand Flora* (1925 edition), but, following certain recent recommendations, changes have been made in the case of some ferns, *Rubus*, *Astelia* and *Metrosideros*.

Bibliography

Readers who wish to make a serious study of the native bush should read as many as possible of the following books. Although some are out of print, copies may be seen in the better public libraries or else borrowed through the National Library Service, Wellington.

New Zealand Plants and Their Story, by L. Cockayne.

The Vegetation of New Zealand, by L. Cockayne.

The Trees of New Zealand, by L. Cockayne and Phillips Turner.

New Zealand Trees and Shrubs, by H. H. Allan.

Manual of the New Zealand Flora, by T. F. Cheeseman. (A new two volume edition is due for publication shortly).

Plants of New Zealand, by Laing and Blackwell. (Invaluable both to the student and the general reader).

Our New Zealand Trees and Flowers, by E. C. Richards.

Natural History of Canterbury, by a number of scientists, including Cockayne, Laing, Allan, Speight, Chilton, Archey, Foweraker, Jobberns and others.

New Zealand Ferns, by Dobbie, revised by Miss M. Crookes.

Book of Ferns, by Greta Stevenson.

New Zealand Native Plant Studies, by Davies. (A larger series of beautiful photographs and concise descriptions).

The Story of the Kauri, by A. H. Read.

The Waipoua Kauri Forest, by W. R. McGregor.

Flora of New Zealand, by W. Martin.

In addition to the above there are articles on botany in every volume of the *Transactions of the New Zealand Institute*, now called the Royal Society of New Zealand, and many technical articles are to be found in the *New Zealand Journal of Science and Technology*.

BAMBOOS FOR NEW ZEALAND GARDENSHARALD E. ISAACHSEN (*Oratia*).**(1) Non-Spreading Kinds**

Bamboos, in their varied species, have many uses. They provide admirable plant supports and, in the East, they are used to make furniture, ladders, houses and many other things. Their succulent rhizome tips and blanched sprouts are used for culinary purposes either in the raw state or cooked. According to McClure the leaves possess chlorophyll in every cell and protein four or five times greater than the best grass hay. For this reason they provide food for cattle. The sheaths that enclose the embryo leaves possess a silica with the lasting qualities of glass and has the effect of doubling the humus production.

By virtue of their rapid growth and willowy stems not liable to be broken by high winds, bamboos are eminently suitable for wind breaks. They have the advantage of not producing thick, spreading roots that rob the earth and cause damage to pathways, a nuisance that is common where poplars, pines, gums, willows and even kahikateas are grown.

The 1100 species offer a wide choice to suit any site, climate or purpose. They find their homes in the mountains of Japan where the snowfall in winter is the highest in the world. There are also species native to the Andes and others that grow at sea level and in equatorial regions. Their height range extends from pygmies of 6 inches to giants of 650 feet in Madagascar and the stems vary from $\frac{1}{8}$ inch to 26 inches in diameter.

In Auckland, with little attention, a giant bamboo will grow twice as quickly as a pine tree. My hedge of *Sinocalamus oldhami* averaged a growth of 5ft. 6in. each year compared with 3ft. growth in pines. With much care in cultivation we have obtained as much as 10ft. 6in. in growth in the first year of planting. As much as 6 or 7ft. per day has been known in Japan (Satow). With me, *Bambusa eutuldoides* grew 19in. in one night; *B. arundinacea* has been reported to have grown 3 feet in one day at Kew Gardens. In its first year with me *B. textilis* attained 13ft. and *B. ventricosa* grew to 16ft. In 5 years *Sinocalamus latiflorus* reached a height of 35ft., a width of 17ft., with 5in. culms. Bamboos respond to good and careful cultivation better than any other plant I know. They have been known to resist and survive tornados where other trees have been destroyed. This is because of their willowy and yielding character due to the presence in their stems of silica, the world's most elastic substance. Where bamboos are grown, and there have been many years' leaf fall to a good depth, there is a noticeable warmth in the atmosphere, the effect of the decomposing leaves being like that of a hotbed.

For binding soil, preventing erosion and slips, bamboos are invaluable and they will also dry out swampy ground. As hedges for the garden, large or small, they hold unique attractions. By virtue of their

density, caused by new shoots rising annually from the base of the plant, they form rabbit proof fences and protect plants from ground draughts. Also they are not liable, as are other trees, to damage by contact with lawn mower, hoe, spade or car. They have been known to spring upright again after a fallen tree has been removed. If, however, the mature stems suffer severe injury they die and growth continues from the next dormant bud. It is only if such a bud does not exist that the plant dies completely. Dried rootlets will not grow and a wound will not callus.

To control suckering species, each needs to be studied carefully and the depth of the sucker-trench determined; this will need to be cleaned out each autumn. It is useless to attempt control by cutting back to sharp snags or even firing as the plant will survive and continue to spread. It therefore follows that the sucker-trench is the only method of control. To encourage growth to spread in a certain direction spread manure over the ground where you wish the suckers to travel. The most rampant of these suckering species is *B. angulata* but, at the same time, it is quite easily forked out.

On two occasions, 40 and 70 years ago, in Oratia, bush fires and an annual rainfall of 100 ins. left only silicon-aluminium clay subsoil, a medium so poor that there were heavy losses in cattle; ridges grew little else than blackberry and sorrel for a period of 20 years. Yet when my hedge of *Sinocalamus oldhami* (Giant Bamboo) reached 12 feet in 2 years, it prevented the wind from burning up dead leaves and blowing them away. Humus was restored to the soil, cocksfoot appeared and grew over 6ft. high, hazel nuts bore crops at 4ft. and flowering shrubs grew and flourished.

As each species of bamboo had been given various local names, nomenclature became so chaotic that, in 1913, Mons. E. G. Camus published "Les Bambusees," illustrated by original and helpful drawings. This effectively dealt with the classification of the 513 species he was able to examine either by specimens, in books or Eastern travel. This is a work of great value and authority and I spent 3 years in making an English translation.

By 1946 about 28 species were under cultivation in various parts of New Zealand and special mention must be made of two important events. Mr. Hayward Wright, New Zealand's grandest pioneer nurseryman, had popularised *Sinocalamus oldhami* as a giant boundary hedge. *Bambusa multiplex* and *Phyllostchys aurea* were being used as subdivision hedges in citrus plantations. Professor McClure, of Lingnan University, China, had generously sent to New Zealand a fine collection of bamboos. The Department of Scientific Research enabled me to get in touch with the late Mr. R. O. Dalrymple, who kindly gave me the twelve species in this consignment, together with his own collection.

With this nucleus I started my collection of bamboos and today I cultivate 40 species. These were planted in ground so poor that pumpkins grew only 6in. and then died. Now I have asparagus that has never been manured but grows 7ft. high and an inch thick on this identical spot where bamboos grow 45ft. tall with 6in. diameter culms. For 4 years only I gave them water but no manure of any kind.

In this article I am dealing only with the non-spreading species of tufted habit as follows:—

Arundinaria gracilis: 15ft. tall, 1-3in. diam. Canes grey when young, pendulous when wet so that it is wise to plant away from paths. Needs partial shade, water and shelter such as in open woodland to develop long open branches and slender, bending canes. Rich soil is essential for good colour. If ill-treated it becomes sod-bound, goes to seed and dies out every 15 years.

Bambusa arundinacea: 60ft. tall, 6in. diameter. Needs food and full sun, heat and moisture. After developing into a huge willow clump for about 5 years, a single culm, 60ft. high and 6in. in diameter, rises from it. The leaves are a lovely, fresh emerald green expanding from rainbow sheaths. The flowers of this and other species are inconspicuous, like some grasses, and a dying plant expends all its energy into grass or grainlike seeds. The normal reproduction is by means of sprouts in summer, enclosed in sheaths that protect their brittle texture.

Bambusa gracillima: 7ft. tall, $\frac{1}{8}$ to $\frac{1}{4}$ inch in diameter. A graceful pendulous habit, bending to the earth. Leaves $\frac{1}{2}$ in. to 1in. by $\frac{1}{3}$ in., up to 12 at right angles to curving stems. Needs partial shade. Legend tells us this species came from Kuan Yam's temple, where she was known as daughter of the Emperor, whose palace was by the Great River, where icy floods and typhoons raged. She is said to have swum out in the flood and rescued sailors and warmed, clothed and fed them. Today no less than sixty shrines commemorate this 'Goddess of Mercy.'

Bambusa Wong Tsai: 8ft. tall, $\frac{1}{4}$ in. in diameter. Pendulous, similar to *B. gracillima* with leaves twice as large and much more hardy, withstanding up to 15 degrees of frost.

Bambusa Alphonse Karri: 10ft. tall, 1in. diameter. Canes yellow, irregularly striped with green with red blaze at nodes in summer. Requires warm climate.

Semiarundinaria fastuosa: 20ft. tall, 1in. in diameter. Of stately habit with lovely, glowing, neon radiant, green soft foliage. Requires ample shade and water in summer. Withstands cold temperatures. Sometimes known as 'Queen of Kew.' Should be planted in a position to the east or north-east where the sun will shine through the leaves.

Bambusa malingensis: 40ft. tall, 1 $\frac{1}{2}$ in. in diameter. Graceful, evenly tapered dark canes with extra long internodes, making excellent stakes

for beans, tomatoes and other plants. Fine dense clump for screen or shelter. Needs heat, but remarkably hardy. Leaves remain green throughout even in severe drought.

Dendrocalamus hookeri: 60ft. tall, 5½ in. at Kawau (minimum temperature 52° Fahr.) Very vigorous grower. Develops a clump, 12ft. wide at base, bare of branches for 30ft., then arching out to 90ft. width, bending to within 8ft. of ground. Requires warmth, shelter and water in summer to enable it to sprout early and harden by winter. In a century this species has been known to have produced a pile of humus 16ft. wide and 5ft. in depth, compared with only 3in. depth produced by pines in the same period. My young plant had originally only 3 canes ½ in. thick and only 4ft. high. But, with care and attention, it eventually grew to 35ft. with 2in. diameter canes.

Gigantochloa ni Vaialagi: Native of Malaya and Fiji, 30ft. tall, 3in. in diameter. Dark canes with glowing, radiant, neon green soft foliage. Graceful pendulous habit but not hardy.

Arundinaria falcata grows best in shade but does quite well in sun if watered. Both this and *Arundinaria gracilis* are found 10,000ft. up in the Himalayas but, unlike *A. gracilis*, this species has never produced seed or died here.

Sinocalamus latiflorus: 45ft. tall, 6in. in diameter. Has been known to grow 70ft. high, 16in. diameter. The best grower of the giant species I have under cultivation but dies out at centre leaving a space admirable for use as a summer house. Foliage and stems always healthy and green provided it is well watered during dry weather in summer to enable sprouts to reach their full height and harden by winter. Excellent species for binding soil around culvert pipes and for drying up boggy ground. Edible. Hardy and rapid grower.

Bambusa dissimulator ('Concealer'): 35ft. tall, 1½ in. in diameter in 5 years. Healthy, green, arching clump. Sheaths streaked purple, cream and emerald. Needs heat. The smooth canes used as stakes penetrate clay easily.

Bambusa ventricosa: 25ft. tall, 1½ in. in diameter. Arches out to 40ft. wide at top. With me, under drought conditions in a poor clay soil, it grew 16ft. in its first year. Medium sized fresh green, bent leaves. One of the best species for poor soil and for shelter under gum trees. Trims well. Very hardy, withstanding up to 15 degrees of frost.

Bambusa multiplex: 15/20ft. tall, ½ in. in diameter. Very graceful and arching. Makes excellent citrus shelter and is used as a common subdivision hedge in the tropics. Useful frost screen for such subjects as *Monstera*.

Sinocalamus oldhami: (according to Sir Edward Salisbury, Director of Kew Gardens, to whom I sent a flowering specimen for identification.) Miscalled *Bambusa vulgaris* in New Zealand. 45ft. tall 4½ in. in diameter. Forms upright, stiff, tall, narrow, rapid growing boundary

hedge. Edible and delicious if well grown and fed with complete manures. A tomato case of well blanched sprouts sold at the Auckland market for £3. A useful species for the Auckland Province to Rahunu in Taranaki.

Bambusa eutuldoides: 20ft. tall, 1in. in diameter. Great variation in canes. Green striped cream at base, top half green. Requires heat. After being given a bucket of water in February, my plant grew 19in. in a single night.

Bambusa tuldooides: 27ft. tall, 1in. in diameter. Graceful habit. tall and narrow. Rapid growth and hardy. Ideal for subdivision hedge to provide shelter and privacy.

Bambusa textilis: 20ft. tall, 1in. in diameter. A Chinese weaving bamboo. Very similar to, if not identical with *B. tuldooides*. With me it grew 13ft. in its first year, with only six hoeings. Ideal subdivision hedge.

JOHN BUCHANAN — 1819-1898

A Draughtsman Botanist

A. W. ANDERSON, A.H., R.I.H.(N.Z.), (Timaru).

We hear a great deal about automation these days and about changes of one kind or another turning men out of skilled employment. But that has been going on for a long time and if such changes had not cut his job from under his feet, while he was still young enough to be adaptable, it is very unlikely that John Buchanan would ever have left his native Scotland or have made a name for himself in the world of botany. He was born at Lavonside, Dumbarton in 1819, but little seems to be known about him or his family, except that he had a brother in Sydney who presented his books and herbarium to the Otago Museum after John's death in October, 1898. Much of his personal history has come to me from notes prepared by Dr. H. M. Skinner and left in the Hocken Library.

Young Buchanan was apprenticed as a pattern maker in the cotton print trade and on the completion of his apprenticeship moved to Glasgow. There he secured employment, painting on glass those land—and sea-scapes, and so on that appealed so much to the Victorians that they were set in panels for the decoration of saloons and staterooms of steamers, first class railway carriages and the like. This work was congenial and well-paid and everything seemed to be going very well when handwork was replaced by a mechanical process in the mid 40's, and he was out of a job.

John Buchanan arrived in Dunedin, after a dreary voyage lasting nine months, about the end of 1849. He was evidently one of those steady, hard-working young Scots who have a determination to 'get on.' He purchased ten acres of land near the head of the North East Valley,

and, having pitched his tent there, began to fell the bush and till his land. For the first few years he hired himself out, helping his neighbours in all the manual work of building a new settlement, and he must have been held in high regard because, although a single man, he was elected to both the school and roads boards.

His hobby was botany and he delighted to wander about the hills by himself and thought nothing of walking fifty miles a day. He began collecting plants and corresponding with Sir Joseph Hooker at Kew. The latter was always thankful for all the botanical material he could get hold of and he came to have such a high regard for Buchanan that, as Hector said many years later, Hooker advised him to 'Look out for a man called John Buchanan who sent home to the Herbarium at Kew the best collections that were received from Australasia.'

The Lure of Gold

Tales began to be told of the fabulous gold diggings in Australia and Buchanan joined in the rush, but he did not stay across the Tasman for very long and when he returned to Dunedin all he had gained was a knowledge of how to pan for gold. There had been vague rumours about the existence of gold in the interior of Otago since the beginning of the settlement and the Provincial Government had offered a reward of £1000 for a really worth-while discovery. The Maoris knew of its existence and called it wherro or the yellow stone, but they had no use for the metal. Soon after his return Buchanan was engaged as an assistant to Mr. A. Garvie, one of the Otago Government surveyors and it may be that he was the first man to pan gold in the province.

Garvie led a reconnaissance survey party through Central Otago in the summer of 1857-58 and later reported to the Chief Surveyor that his party had found traces of gold in many of the rivers and streams. He went on to report, 'the trials had all been made on the very surface, at such odd times as would not interrupt the proper work of the survey, by one of the party who had visited the Australian gold-fields,' and indicated that he believed that there might be 'sufficient quantities to make it probable that it would pay to work . . . with some wholesale system of washing, such as sluicing.'

The Chief Surveyor was not impressed, and as neither Garvie nor Buchanan made any effort to claim the reward the implications of this report went unheeded. But Vincent Pike, the historian of the Otago gold-fields, says, 'The person of Australian experience referred to by Mr. Garvie was John Buchanan, now resident in Dunedin. I cannot but regard this as the first practical demonstration of the mineral wealth of Otago. Early explorers had merely ascertained its existence, but here was sufficient evidence to have converted the most incredulous.'

But life was to take a new turn for Buchanan. Hector got into touch with him and the two men took to each other at once and there began a friendship that lasted until Buchanan's death in 1898. Buchanan

was immediately appointed to the 'nominal' position of botanist to the Otago Provincial Government; presumably the position was an honorary one. But it wasn't very long before he was appointed draughtsman and began to accompany Hector in his many adventurous journeys into the wilds of the province.

When Hector was appointed to take charge of the newly established Geological Survey Dept. for the central Government in 1866 he had little difficulty in persuading Buchanan to accompany him to Wellington as Draughtsman-Botanist in the new Department. This gave Buchanan a chance, that he was not slow to take, to explore many parts of the country including Mount Egmont, the North Auckland Peninsula and the Kaikoura Mountains.

His Botanical Work

Buchanan's place in the botany of his adopted country may be gauged by the fact that no fewer than four botanists honoured him by giving his name to a total of 10 of our native plants. Admittedly only a few of them are of any decorative value but that is more than compensated for by *Ranunculus buchanani*, the lovely white buttercup he found in South-Western Otago, where it is by no means uncommon in stony, well-drained places among the wet mountains between 4000 and 6000 feet. As beautiful in its own way as the better known *R. lyalli*, with which it hybridises freely in the country between Lake Whakatipu and Milford Sound, it is, as Cheeseman remarked 'a singular and beautiful plant.' Making attractive tufts of deeply-cut glaucous-green leaves that are more or less covered with long silky hairs, it sends up its flower-heads well above them to bear flowers, singly or two or three together, that are rather bigger than the best forms of *Anemone japonica*, much fuller in the petals, and of the purest white.

During his long life Buchanan made many contributions to the 'Transactions of the New Zealand Institute' as well as illustrating the earlier volumes. In all he described no fewer than 83 species and varieties but only 36 of them stood the test of time to be accepted by Cheeseman in the second edition of the Manual. I wondered about the wastage and as a test checked up on the 12 he dealt with in Vol. III.

The results were not without interest. His *Aristolelia erecta* and *Selliera fasciculatum* are now considered to be mere forms of *A. fruticosa* and *S. radicans* respectively while *Olearia cappilaris* is now merged in *O. arborea*. Something of the same sort happened to the two named varieties of *Claytonia australasica* but, I for one, would like to see his var. *racemosa*, with its clusters of up to 7 flowers, found on the Dun Mountain in Nelson, by H. H. Travers. Buchanan says that this 'very showy variety with its masses of pink flowers is worthy of cultivation.'

Cheeseman designated *Melicope mantelli* as no more than a variety, with the suggestion, now widely accepted, I believe, that it is a hybrid. *Cyperus gracilis* has long been found out as a South American plant

widely naturalised in this country and originally described in 1797, while *Isolepis globosa* proved to be widespread in Australia and South Africa whence it had been described in 1773. His remaining three, however, *Clematis afoliata*, *Coprosma serrata* and *Dichondra brevifolia* still enjoy the status of good species. It does look as if Buchanan must have been something of a splitter — and gardeners don't like splitters, if they are botanists. But strangely enough gardeners have no hesitation in bestowing names on garden forms for reasons that botanists are apt to consider too trivial.

The Indigenous Grasses

His most important contribution to the botany of this country was his 'Indigenous Grasses of New Zealand,' first published in parts in 1877-1880, which has the distinction of being the first botanical work to be produced in the Colony. It was ordered by the Government to fill a long-felt want of information about native grasses. Very little was known about their value as forage plants and it was thought that little more was likely to be discovered until a ready means of identification of the various species became available. But Buchanan has also the distinction of being the first to prepare a local Flora, his 'Sketch of the Botany of Otago' which has been described as a work of considerable merit, evidencing much laborious research. Prepared in the first instance for the Commissioners of the New Zealand Exhibition of 1865, it was not published until four years later when it appeared in the first volume of the 'Transactions.'

Here his special interest in grasses is already fore-shadowed. In a passage far too long to quote in full he deploras the stupidity of annually burning off the grass in dry country, pointing out that 'It is a fallacy to suppose that grass country requires repeated burning off to clear the surface excess of plants, as the old withered grass forms shelter to the young shoots, protecting them from parching winds, sun and frost.' One would think this would be obvious to everyone, but only a few of the more enlightened run-holders seem to realise its truth, as the arid hills in the central part of the South Island, from Marlborough to Otago testify.

'The Indigenous Grasses of New Zealand' is a large folio volume of nearly 200 pages and now very scarce. It is illustrated by 64 lithographic plates and contains botanical descriptions together with all the information that was known about the 87 spp. then known to grow in this country, along with details of distribution and forage value.

It is a wonderful achievement. In the Preface we are told, 'The whole of the illustrations have been drawn from nature by Mr. Buchanan. To insure accuracy of form, the specimens of the various grasses were lightly inked and faintly impressed on the prepared surface of the lithographic stone; but the details were filled in by hand, together with the enlarged drawings showing the anatomical characters of each species, all of which are from original microscopic dissections made by Mr. Buch-

anan, whose excellent botanical knowledge, combined with his skill as a draughtsman, peculiarly fitted him for the work.'

The descriptions were also his work although by their very nature many were compilations collected from the best authorities, but in many instances structural details have been furnished by Mr. Buchanan, which have not been previously published; and many of his remarks on the growth and value of the grasses, founded on experience acquired during twenty-seven years' residence in the Colony, possess great value. As I said, a wonderful achievement; few are the botanists who have been able to write and illustrate such comprehensive works.

A SOUTH AFRICAN HERBACEOUS BORDER

F. R. LONG, A.H., R.H.S. (South Africa)

The object in writing this article on herbaceous plants, indigenous to South Africa, is to bring to the notice of New Zealand gardeners a few little known but easily grown and attractive plants.

Let us imagine a wide border, say, 15 to 30 feet wide and anything up to 100 - 150 feet in length with a curved or waved front line. In the background in the wider parts, I would plant at say, 25 feet apart, a small flowering tree or two. *Dais cotinifolia*, with its pretty soft pink balls of flower; one, if not two, *Calodendron capense*, 'Cape Chestnut,' but this can be a big tree; then *Bauhinia galpini*, a low bush with brilliant orange scarlet flowers in late summer (easily grown from seed), and then, if obtainable, an *Alberta magna* that lovely almost poinsettia-like shrub that reaches 12 feet in height. These then would form the background of the herbaceous border proper. Now for the details of semi-permanent subjects and then finally some suggestions for temporary 'fillers' to carry over for a year or two awaiting the former to 'fill out.'

An attractive method of breaking down regularity in height, right along the border, is to plant a few taller subjects towards the front forming bays, say 20 feet in width. To bring this about, a few of that attractive 6 feet semi-hardwood bush, *Iboza riparia*, Misty Plume Bush, a native of the Eastern Transvaal and Natal now (July) in full flower with its clouds of soft pink flowers. This, grown to the shape and size of *Salvia van-houti*, can be propagated in a similar manner. The flowers suggest the plumes of tamarisk. Interspersed with this one and set out in the background, I would recommend the tall species of kniphofia or Torch Lily — *K. zuluandia* and *K. tucki*, plus *Galtonia candicans* (4 feet) and bold clumps of *watsonias*, viz. *W. beatricis*, *W. fourcadei*, *W. marginata*, all easily raised from seed, followed by the dwarfer species and hybrids of more Torch Lilies. These however are a subject to themselves. Then clumps of the so-called 'Cape Dagga' that gorgeous 3 to 4 ft. plant *Leonotus leonurus* or 'Lion's Tail' with brilliant orange red flowers, a common plant here in the Eastern Cape. I well remember it being introduced at Kew by the firm of Veitch and Sons about the year 1906 as a pot plant.

A very outstanding blue flowered plant growing to 5 feet is *Aristea capitata* with its bold spikes of deep blue, small crowded flowers over 24 inches of stalk not unlike a delphinium. These require damp or well watered conditions.

Another of the taller attractive plants is the white flower with a black eye, *Ornithogalum saundersiae*, one of the Chincherichees but this one flowers in January and February, has broader leaves and makes bold clumps 4 feet in height — a real beauty. Another is the Wild Foxglove, or *Ceratotheca triloba*, a rapid grower, 4 to 5 feet.

Coming to the still dwarfer herbaceous plants, there is the very useful and pretty *Sutera grandiflora*, with spikes to 3 feet or more. This is a constant flowerer in pale to deep mauve to blue. It is a common plant in the Transvaal and Swaziland hills but it was not until the late Mr. van Balen, Director of Parks, Johannesburg introduced it that it became popular in gardens. It is easily raised from seed and has become a great favourite.

The moreas or Tulp are attractive. There are many species. The flowers only last 24 hours but there is a continuous supply somewhat after the habit of the Day Lily or *Hemerocallis*. Moreas range from 4 inches to 5 feet. There are white, blue and yellow species *M. spathulata*, yellow, *M. tripetala*, pale blue, and *M. villosa*, Peacock Flower, blue with orange. *Kniphofia watsonia* and *morea* species are best left undisturbed for several years before dividing and transplanting.

A bold clump or two of the large flowered species of *Agapanthus*, *A. orientalis*, gives character in summer. And don't forget the dwarf one *A. campanulatus*, rather paler blue and later to flower.

Limonium (Statice) rosea is a favourite of mine with its pink, everlasting flowers. It is shrub-like. A plant which I established in my garden about 1935 is, believe it or not, still growing undisturbed. It comes from the coastal sand dunes north of Cape Town, round Saldana Bay. During the last war, it fell to my lot to establish an aerodrome in this area and the site was full of this rather rare but beautiful statice, so valuable in winter floral decorations. A sergeant in the construction gang gathered 2 sacks full of seed, I presume to please the Old Man (his O.C.!!). This was somewhat of an embarrassment in war time but I managed to distribute this huge quantity of seed to Botanic Gardens and to seedsmen. It readily comes from seed, sown in open sandy soil.

A dwarf blue autumn flowered plant easily grown is *Barleria obtusa*. This one seeds itself and makes a show when colour in the herbaceous border is becoming scarce. The bulbinellas, *B. floribunda* and *B. setosa* must not be overlooked with their spikes of yellow flowers. I notice that these are now grown for the cut flower trade, and they last well in water.

For the front line of the border, *Gazania*, *Arctotis* and *Dimorphotheca* (all composites or daisies) give colour over a long period. The

mahogany red flowered *Gazania pavonia*, interspersed with an orange species makes a striking splash of colour, easily increased from seed or by cuttings.

A biennial worth trying is *Anchusa capensis* (a dwarfer edition of *A. italica*). This seeds itself readily.

For a temporary carpet filler the annual *Dorotheanthus criniflorus*, Bokbaaiwygie is a beautiful dwarf *Mesembryanthemum*. Treat this one just like a *Portulacca*, in fact I call it the winter edition of the well known *Portulacca*. It can be broadcasted in February to flower in August. It can be transplanted in April. Its range of colours is fantastic and even in South Africa, always brings out exclamations of delight from the public! Bok Baai is to the north of Cape Town and is practically frost free.

Barborton daisies or *Gerbera jamesoni* must not be overlooked. These do not like disturbance and will remain in big clumps for several years. They like a rock garden but will thrive in any well drained soil in full sun. Many nurserymen specialise in these nowadays. There are doubles and singles, red, crimson, pink, salmon, white and yellows. The double soft salmon pink is particularly pleasing. They may be raised by seed which must be fresh and should be sown with the pointed base of each seed pressed into the soil. They may also be increased by division. The period of flowering is almost continuous and it makes a valuable marketable cut flower besides being a herbaceous border subject giving a big return for a minimum of trouble.

Every border should include a clump or two of *Strelitzia reginae*, Craneflower, and/or the sub-species *S. parvifolia* var. *junceae*. The former has a blade-like leaf like a canna but the leaf of the latter is spear shaped or juncus-like; the flowers are identical. *S. parvifolia* is rare and occurs only in two small areas (in the whole world) near Port Elizabeth.

There is a third species *S. augusta* which occurs in its millions right along the east coast to Zululand. This however is a tall 30-foot bold plant like a huge banana and has ink-blue and white flowers, hardly a subject for a herbaceous border, except in the background.

The two species first mentioned may be raised from seed. They are a long term subject but when once established will last 50 years or more undisturbed. In 1931 I planted out a few in an open space where they had little water and no attention. I returned in 1958 to find large clumps 3 to 4 feet high, in full flower over many months. They may be divided but the roots are large, soft tubers and they resent disturbance. For several years I planted 2000 seeds every season and still never had enough. It is such a valuable plant for public parks as, when once established, gives an excellent constant return for little work. A well drained ordinary soil is all that is necessary.

An idea for a big bold splash in the herbaceous border would be
(a) Groups of *Strelitzia reginae* or *S. parvifolia*, spaced 6 to 10 feet

apart; (b) A ground work or carpet of the Cape Blue Daisy *Aster capensis* (*Agatheia*; *Felicia*) also known as *A. rotundifolia*. There is another species, *Aster bergeriana*, equally as good.

These asters are raised by seed or cuttings, they last for several years, flower continuously, will stand clipping with shears down to 12 inches in height, are fairly hardy and certainly tough. They make a good edging or low hedge up to a height of 2 feet. They do not die down and are in flower almost continuously.

Another bold outstanding plant easily raised from seed is *Sutherlandia frutescens* known in South Africa as Kankerbos as it was credited in early Boer days as a cure for cancer. This plant has brilliant scarlet flowers with a black blob, grows well in sandy soil to a height of 4 to 6 feet and will last for several years.

There are many more attractive South African plants suitable for the herbaceous border but it would be impracticable to mention all of them. In the early stages of a new layout, do not overlook sowing of the so called Cape Daisies namely *Ursinia*, *Gazania*, *Venidium*, *Arctotis*, *Dimorphotheca*, etc. All these can be broadcast in March to flower in spring, most of them being annuals.

I have mentioned many species and the question at once arises can they be obtained in South Africa? The answer is, yes, from the National Botanic Gardens of South Africa, Kirstenbosch, Newlands, Cape Town, S.A. Ordinary membership (fee 30/- per annum) entitles one to 15 packets annually. Family membership (fee 50/- per annum) allows for 25 packets. Many people resident in New Zealand are already members of the Botanical Society.

RESULTS FROM MIST PROPAGATION SYSTEMS WITH COMMENTS ON THEIR MANAGEMENT

S. CHALLENGER (*Christchurch*)

INTRODUCTION:

The technique of plant propagation using "mist" (a fine water spray produced automatically over cuttings) is quite well known nowadays, and has been widely reported upon, both in New Zealand and overseas. (1, 2, 5, 6, 7.) Many of the references, however, deal only with the apparatus used in producing the mist, and too few are concerned with the actual management of a mist propagation unit. From the point of view of the practical horticulturist this aspect is very important, since he is concerned with day to day management long after deliberation on the choice of equipment is over. The purpose of this paper is to discuss results and to draw attention to some features of management which have emerged during a year's work with mist propagation in the Horticultural Department at Lincoln College.

Two independent systems of mist application are in use at the College. One is controlled by an electronic "leaf," the frequency of

water application being dependent upon the rate of evaporation from a sensitive surface, and so directly related to weather conditions. (4). The other system is controlled by a time clock, so that water application is made at regular intervals, independent of weather conditions. This control unit is normally turned off manually at night. Both systems are installed in a green house which, of necessity, also acts as an establishment house for potted cuttings which were rooted under the mist. Since the potted cuttings require some shade for their establishment, the cuttings being rooted do not obtain as much light as is desirable for maximum physiological efficiency under mist propagation. (3).

Nevertheless, results with soft and semi-ripe cuttings, using 138 species and varieties, and 12,000 cuttings, have been highly satisfactory. These results are summarised in *Table 1*. The two systems of mist application are not greatly dissimilar in their results and both methods have been included in this table without differentiation. Detailed trials on their relative efficiency are in progress. During the trials, reported bottom heat at approximately 68°F was used. Two rooting media were used — pumice and a 50/50 peat/sand mixture, the media used being recorded in most cases. The rooting period recorded is the interval between insertion and potting off, the latter time being chosen since it marks a definite practical stage in the handling of cuttings. The results are best discussed under the headings of advantages and disadvantages.

ADVANTAGES:

These may be summarised in the words LABOUR, EASE, and EFFICIENCY.

Labour for maintenance of cuttings is kept to an absolute minimum, and hand watering, which can be normally only carried out by an experienced worker, is completely avoided. The economy in Labour has gone a good way towards covering the cost of installation. If it is accepted that attention for hand watering would be required four times a day, and that five minutes would be needed on each occasion, then approximately 120 hours were saved during the year. To a nurseryman, this saving of approximately £36 a year on an installation cost of £84/10/- is worth consideration for labour economy alone, irrespective of propagation advantages.

Approximate installation costs for a unit 6ft. x 20ft:—

	£	s.	d.
24 Nozzles (Monarch H.261) @ £1/0/7 each	24	14	0
Electronic unit and leaf	14	8	6
Solenoid valve	8	0	0
Water connections (½ in. pipe, T's, caps, nipples and stopcock)	6	7	6
Pyrotenax heating cables (4.5 watts sq. ft.)	4	10	0
Thermostat	6	10	0
Electrical connections, including labour	8	0	0
Labour	12	0	0
Total	£84	10	0

The second advantage of mist propagation — ease — is reflected in the list of plants given below. Most of the plants are regarded as being moderately difficult, but the results quoted have been extracted from Table 1.

	%	days
<i>Adenandra uniflora</i>	85	70
<i>Camellia japonica</i> 'Double White'	100	148
<i>Chamaecyparis obtusa</i> <i>crippsi</i>	66	180
	96	249
<i>Daphne</i> x <i>burkwoodi</i>	56	77
<i>Desfontainea spinosa</i>	100	123
<i>Ilex aquifolium</i> <i>variegata</i>	78	229
<i>Magnolia soulangeana</i> <i>purpurea</i>	48	83
<i>Pieris japonica</i>	97	100
<i>Rhododendron ferrugineum</i>	77	75
<i>Rhododendron hippophaeoides</i>	88	77
<i>Rhododendron williamsianum</i>	91	124
<i>Taxus baccata</i> <i>fastigiata aurea</i>	87	258
<i>Thuja occidentalis</i> <i>erecta aurea</i>	73	149
<i>Thuja occidentalis</i> 'Rheingold'	93	99

Plants which root relatively easily may be turned over at a rapid rate under mist, and the list below includes those taking 30 days or less to be fit to pot with a percentage strike of 90% or above.

<i>Abutilon</i> x <i>hybridum</i>	<i>Forsythia</i> 'Beatrix Farrand'
<i>Abutilon megapotamicum</i>	<i>Hedera helix</i> 'Chicago'
<i>Buddleia davidi</i>	<i>Lonicera nitida aurea</i>
<i>Buddleia salviifolia</i>	<i>Phygelius capensis</i>
<i>Calluna vulgaris aurea</i>	<i>Pilea cadierei</i>
<i>Choisya ternata</i>	<i>Tradescantia flumiensis</i> , variegated
<i>Erica vagans alba</i>	<i>Viburnum tinus lucidum</i>
<i>Erica vagans</i> 'Mrs. D. F. Maxwell'	<i>Zebrina pendula</i>
<i>Euonymus radicans</i>	
<i>Fuchsia</i> varieties	

The efficiency of mist propagation may be judged by the average percentage strike over the whole list of plants given. With 138 species and varieties, using 12,008 cuttings, the overall rooting was 8,968, giving a percentage strike of 74.6%. It is doubtful if this figure can be bettered under hand-watering techniques.

DISADVANTAGES

These may be summarised in the words COST, MANAGEMENT, and TRANSPLANTING.

The initial expense of a mist propagation system may deter potential purchasers when compared with the costs per square foot of a set of cold frames. If propagation is already carried out in a propagation house, mist may appear as an additional unnecessary expense. However, it has been pointed out that the reduction in costs of producing cuttings, as well as increased efficiency and ease of rooting more than counter the argument of cost of installation as a disadvantage of mist propagation.

If the investment of a mist propagation system is made, however, efficient management is essential to obtain maximum output and the

cheapest overhead cost. Plants vary greatly in the time they take to root, and the mixing of slow and quick rooting species in the propagating bed is probably the worst form of management. Unrooted cuttings are disturbed when their rooted neighbours are lifted, and when further cuttings are inserted odd rows here and there have to be filled. In our experience a mist propagation unit managed carefully is capable of an annual turnover of between three and four times its capacity at any one time, and in the case of quicker rooting plants, a six or sevenfold turnover is possible. The management would be a very tricky affair, however, unless attention were paid to the rooting periods and association of the different plants in the bed. In Table 2 the plants with which we have had experience are grouped according to the time they take to root sufficient to pot. Management is considerably easier when cuttings from plants within the same group only are inserted in proximity. If, for example, 1000 cuttings from plants within group 1 are inserted in sequence in a bed within two or three days of each other, the whole batch could also be lifted and potted together, freeing the area of propagating bed for further use as a unit. The supervision required to ensure that potting of cuttings was not delayed, and the bed occupied unnecessarily, would be much less than where the same quantity of cuttings were inserted in ten different places on ten different days. Rooted cuttings would cost less to produce due to reduction in supervision cost, and to reduction in cost for propagation unit overheads due to the reduced period of occupation. It is my considered opinion that a unit for which the price is quoted, serving a propagating bed area of 120 sq. ft. is capable of producing 25,000 rooted cuttings a year from a range of slow, medium and quick rooting species if the unit is managed efficiently.

A definite disadvantage of propagation under mist is that rooted cuttings may be soft and require a period of hardening off after potting if undue losses are not to occur. Few examples appear to be quoted in the literature. (5). Different species have characteristic reactions to removal from the mist. Plants which produce soft terminal growth when rooted, such as *Plumbago capensis*, wilt readily, and often die off at ground level. Although they do not normally produce much new terminal growth after rooting, South African heaths and *Micromyrtus microphylla* are difficult to establish. Plants which do not produce new growth immediately upon rooting, such as *Pieris japonica* or *Griselinia*, and those in which new growth is relatively 'hard,' such as *Euonymus japonicus* and the hebes, are much easier to establish, and present no special difficulties. Most evergreen conifers may also be established readily, but the only deciduous conifer propagated — *Metasequoia* — was not easy to establish without hardening off.

The gradual acclimatisation to drier conditions which constitutes the process of hardening off may be achieved in several ways. The simplest method is to use a frame to contain the potted cuttings, and plastic sheet draped over a simple frame of 8in. boards has been

found excellent. The sheet is folded back for increasing periods each succeeding day. A second method is to have a subsidiary mist unit which will apply gradually reduced quantities of mist. Electronic controls are available which will do this, mist being still applied when the leaf dries off, but in reduced amounts. (1). A second mist unit has to be purchased to operate this method, of course. A third, and untried, method would be to use as the striking medium the first rooting medium and eliminate potting off entirely. There are obvious disadvantages, such the suitability of a growing compost for propagation, and the space wasted from propagation failures, but there are also advantages in the scheme. If wood veneer frames were placed in position in the propagating bed and filled in bulk before the insertion of cuttings, production costs would be reduced, compared with potting, root damage would be less, and quicker acclimatisation would be possible. The method would involve acceptance of the grouping technique suggested above, and also a modification of the mist layout into a series of small beds, but still controlled by a single leaf and solenoid. The main pipeline would supply series of nozzles at right-angles to itself, each series of nozzles supplying a bed of cuttings from plants within a single group. Inserted together and rooted together, the water supply for the individual bed could then be turned off, the cuttings hardened under a plastic sheet, and if necessary, the series of nozzles and the subsidiary pipe upon which they are mounted removed and transferred to a further bed to be profitably used.

OTHER ASPECTS

Propagation under mist greatly increases the period during which cuttings may be taken, and consequently reduces the pressure on propagation facilities. However, it definitely does not replace the skill of the propagator in judging the best period for taking cuttings, and several examples from *Table 1* illustrate this point very clearly. In these examples the normal trend is found, with winter struck cuttings having a reduced strike, and requiring longer to root than summer struck cuttings.

	Date Inserted	% Rooted	Days
<i>Abutilon x hybridum</i>	30/8/57	98	83
	8/1/58	100	23
<i>Aucuba japonica variegata</i>	6/7/57	82	74
		18	138
	12/2/58	100	36
	26/3/58	100	40
<i>Calluna vulgaris aurea</i>	5/7/57	97	76
	8/1/58	91	30
<i>Erica verticillata</i>	7/7/57	85	79
	11/2/58	92	64
	27/2/58	90	50
<i>Euonymus japonicus marginatus</i>	10/9/57	80	105
	6/1/58	86	38

<i>Leptospermum scoparium</i> 'Red Damask'	3/7/57	45	141
	8/1/58	74	43
	14/2/58	73	35
<i>Lonicera nitida aurea</i>	20/9/57	88	95
	6/1/58	100	24
<i>Olearia gunniana</i> 'Blue Gem'	6/7/57	74	74
	31/12/57	85	33

Quite a number of plants gave remarkably good results when propagated from very soft wood, and this is a method well worth trying with plants considered difficult to root from cuttings. *Magnolia soulangeana purpurea* is an example. However, not all plants respond and in the examples given below softwood cuttings gave poor results or were a failure.

*Coprosma williamsi variegata**
Daphne cneorum
Erica melanthera
*Erica nivalis peziza**
Erica verticillata
Garrya elliptica

All plants except those starred (which were not tried) gave good results at other seasons.

A few plants known to be difficult to root were not improved under mist and these included *Chamaecyparis obtusa nana gracilis*, *Libocedrus plumosa*, and *Pittosporum tenuifolium garnetti* and *purpureum*.

The use of rooting hormones was treated as a routine measure whether the plant being struck was considered easy or difficult, the aim being to hasten rooting and obtain a quicker turnover. Efficient handling of potted cuttings is essential in managing a mist propagation unit. Unavailability of pot standing space can throw the sequence of handling operations out of gear, and smooth running ensures that the potentialities of the system are exploited to the full.

SUMMARY

For the nurseryman, mist application offers distinct advantages in increasing the range, speed and general efficiency of propagation by cuttings. Hardening off of rooted cuttings is required, and efficient management is considered essential to obtain results at lowest cost.

ACKNOWLEDGMENTS

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Giant Passion Vines in Remnant of Bush at Kaipiki, near Hamilton.

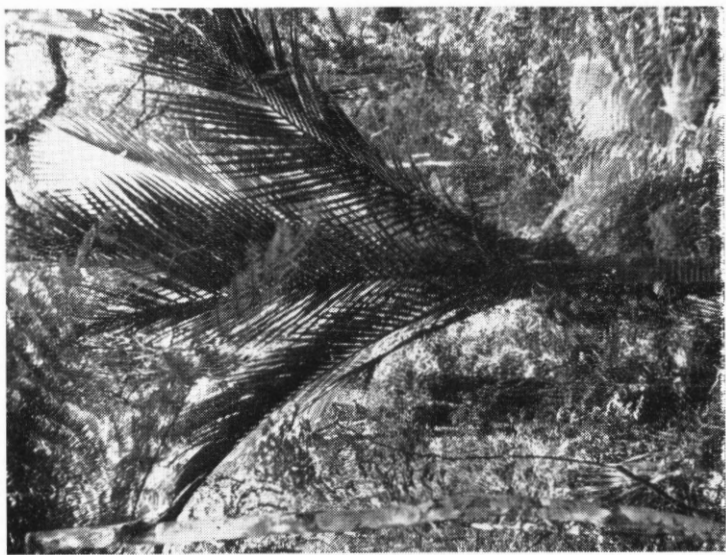
(See Page 2).

(Photo by M. C. Gidex)



Grove of Kauris in Trouson Park, Northland.
(See Page 4.)

(Photo by M. C. Gudex)



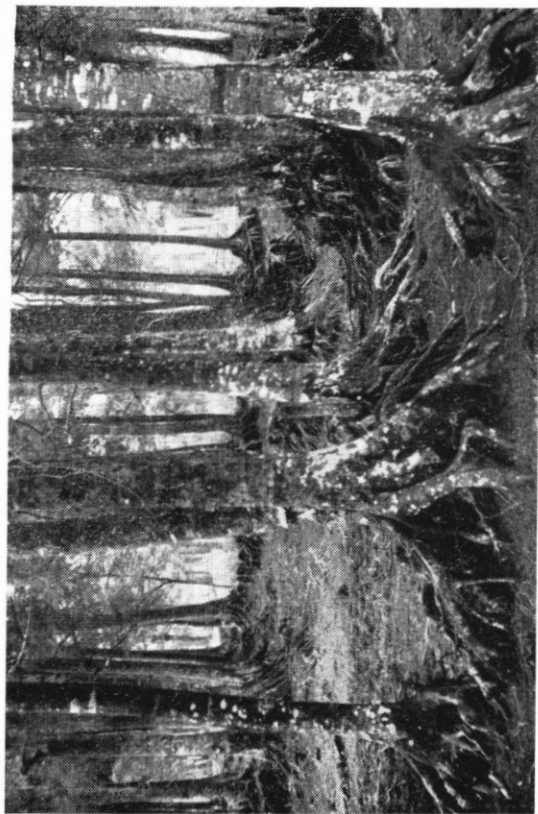
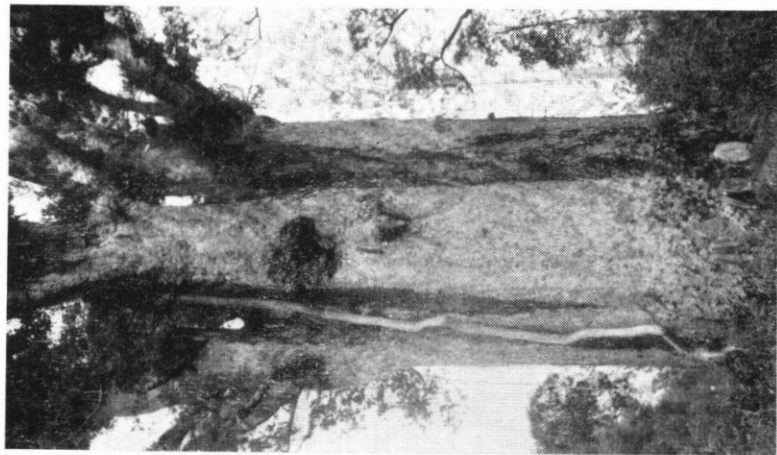
*Nikau Palm in Bush at Maungatutari,
Waikato. (See Page 5).*

(Photo by M. C. Gudex)

*Te Matua Nghare, 60ft. in
girth, Wiapoua Forest.
(Note three men at base.)*

(See Page 4.)

(Photo by M. C. Gudex)

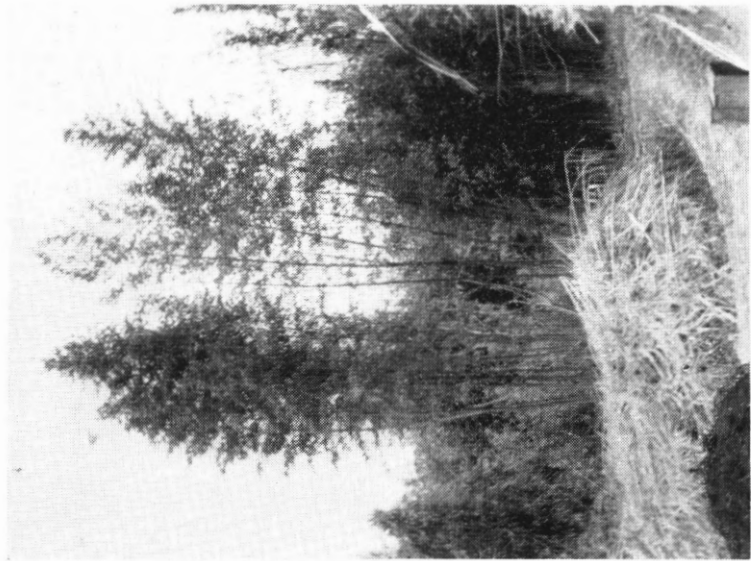


*Kahikatea Bush at Gordonton, near Hamilton.
(See Page 3).
(Photo by M. C. Gudex)*



Mahonia lomariifolia growing in a Paraparautama garden. (see Page 39.)

(Photo by P. C. Lewis)



Phyllostachys marliacea in trial rose (see Page 9.)

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TABLE 1.

NAME	INSERTED		POTTED		ROOTING		COMMENTS (See Key)
	Date	No.	Date	No.	%	Days	
<i>Abelia floribunda</i> - - -	28/2/58	28	25/8/58	24	86	178	P*
<i>Abelia schumanni</i> - - -	12/2/58	45	21/3/58	37	82	37	P
<i>Abutilon x hybridum</i> - - -	30/8/57	57	21/11/57	56	98	83	P
	8/1/58	54	31/1/58	54	100	23	P
<i>Abutilon megapotamicum</i> -	18/2/58	42	18/3/58	42	100	28	P
	21/4/58	25	26/7/58	25	100	96	P*
<i>Abutilon x sawitzii</i> - - -	20/3/58	20	5/5/58	19	95	46	P
<i>Adenandra uniflora</i> - - -	12/12/57	13	20/2/58	11	85	70	P/S
<i>Aucuba japonica picta</i> - - -	6/7/57	25	18/9/57	4	16	74	P/S
			21/11/57	16	64	138	
<i>Aucuba japonica variegata</i> -	6/7/57	17	18/9/57	14	82	74	P/S
			21/11/57	3	18	138	
	12/2/58	97	20/3/58	97	100	36	P/S
	26/3/58	23	5/5/58	23	100	40	P/S
<i>Azalea indica</i> - - - -	6/1/58	77	21/3/58	76	99	74	P/S
<i>Azalea obtusum amoenum</i> -	5/9/57	27	24/12/57	101	97	110	F.H. P/S*
	19/10/57	77				65	F.H. P/S
	15/4/58	103	25/8/58	61	59	132	P/S*
<i>Azalea obtusum 'White Kurume'</i>	5/9/57	36	24/12/57	221	94	110	F.H.* P/S
	19/10/57	199				65	F.H. better than P
<i>Azara microphylla</i> - - -	8/1/58	54	17/7/58	10	18	190	P
<i>Beaufortia sparsa</i> - - -	12/3/58	7	18/8/58	2	29	159	P/S
	21/3/58	56	18/8/58	24	43	150	P/S
<i>Begonia rex</i> (leaves) - - -	31/10/57	—	27/12/57	—	—	58	P/S
<i>Boronia megastigma</i> - - -	7/1/58	317	20/2/58	152	48	44	P/S
			25/8/58	49	15	230	*
<i>Buddleia davidii</i> - - - -	10/1/58	53	2/2/58	53	100	23	P
<i>Buddleia salvifolia</i> - - -	31/12/57	55	28/1/58	55	100	28	P
<i>Buzus sempervirens argentea</i> -	10/1/58	60	17/3/58	59	98	66	P/S
<i>Calluna vulgaris aurea</i> - - -	9/7/57	35	23/9/57	34	97	76	P/S better than P
	8/1/58	123	7/2/58	112	91	30	P/S
<i>Calluna vulgaris 'H. E. Beale'</i>	10/7/57	470	18/9/57	451	96	70	P
<i>Camellia japonica 'Double White'</i>	24/10/57	14	2/1/58	2	14	70	P/S
			21/3/58	12	86	148	
<i>Caryopteris mastacanthus</i> -	31/12/57	71	28/1/58	62	88	28	P
<i>Ceanothus x 'Gloire de Versailles'</i>	20/3/58	20	27/7/58	20	100	129	*
<i>Ceanothus x 'Marie Simon'</i> -	24/4/58	35	19/8/58	22	63	117	P*
<i>Ceanothus x 'veitchianus'</i> - -	29/11/57	59	4/2/58	42	71	67	
<i>Ceratostigma wilmottianum</i>	14/10/57	60	24/12/57	51	85	71	F.H.

NAME	INSERTED		POTTED		ROOTING		COMMENT (See Key)
	Date	No.	Date	No.	%	Days	
<i>Chamaecyparis</i> varieties:							
<i>lawsoniana allumi</i> - -	7/7/57	44	3/12/57	10	23	149	
<i>lawsoniana ellwoodi</i> -	16/4/58	67	17/7/58	63	94	92	P/S
<i>lawsoniana minima</i> - -	16/4/58	60	24/8/58	41	68	130	P/S
<i>lawsoniana potteni</i> - -	17/4/58	120	19/8/58	105	87	124	P/S
<i>lawsoniana thrandtensis</i> <i>caesia</i>	7/7/57	20	3/12/57	9	45	149	P/S
	7/7/57	20	3/12/57	4	20	149	Coarse P
	7/7/57	20	3/12/57	1	5	149	Fine P
<i>C. obtusa crippi</i> - - -	19/11/57	160	20/2/58	53	33	93	P*
			29/3/58	52	33	130	P*
			26/7/58	48	30	249	P*
	18/4/58	120	19/8/58	35	29	122	P/S Balance re-inserted
<i>C. obtusa nana gracilis</i> - -	6/7/57	24	2/12/57	1	4	148	
			21/3/58	4	16.5	257	
			24/4/58	3	12.5	291	
<i>C. pisifera plumosa aurea</i> -	19/4/58	60	19/8/58	49	82	122	P/S
<i>C. thyoides ericoides</i> - - -	11/7/57	75	24/9/57	59	79	65	
			3/12/57	15	20	135	
<i>Choisya ternata</i> - - -	7/1/58	70	31/1/58	69	99	24	P
	19/3/58	40	15/7/58	40	100	127	P*
<i>Cissus antarctica</i> - - -	1/9/57	2	24/12/57	2	100	114	P/S
<i>Cistus x pulverulentus</i> (= 'Sunset')	18/2/58	50	18/3/58	16	32	28	P*
			11/4/58	6	12	52	P*
			16/7/58	17	34	148	P*
<i>Cistus x purpureus</i> - - -	19/3/58	60	26/7/58	24	40	138	*
	22/4/58	20	19/8/58	13	65	119	P*
<i>Clematis montana rubens</i> -	26/2/58	60	24/4/58	44	73	57	P*
<i>Coleonema pulchrum</i> - - -	6/1/58	56	20/2/58	26	46	35	P/S
			21/3/58	10	18	64	P/S
			27/3/58	20	36	72	P/S
<i>Convolvulus cneorum</i> - -	10/2/58	43	29/3/58	40	93	47	P
	14/4/58	34	26/7/58	33	98	103	*
<i>Coprosma williamsi variegata</i> -	6/1/58	30	17/3/58	8	27	70	P Rotting off too soft?
<i>Correa speciosa</i> - - - -	14/4/58	80	17/7/58	48	60	94	P*
<i>Cotoneaster dammeri</i> - - -	25/4/58	10	20/8/58	10	100	117	P*
	2/5/58	40	20/8/58	40	100	110	P*
<i>Cotoneaster horizontalis</i> -	7/1/58	80	11/2/58	70	87.5	35	
<i>Daboecia cantabrica</i> - -	8/1/58	59	14/2/58	35	59	39	P/S
			26/3/58	23	38	79	P/S
<i>Daphne x burkwoodi</i> - - -	31/12/57	73	18/3/58	41	56	77	P/S Rotting off—too soft
	22/4/58	55	20/8/58	22	40	120	P/S
<i>Daphne cneorum</i> - - - -	31/12/57	80	18/3/58	17	21	77	P/S Rotting off—too soft
	18/4/58	36	20/8/58	20	55	124	P/S
<i>Daphne odora</i> - - - -	1/10/57	23		0	Failure		Rotting off—too soft?
	16/2/58	60	18/3/58	39	65	32	P/S
			16/4/58	15	25	61	P/S
<i>Desfontainea spinosa</i> - -	26/3/58	42	27/7/58	42	100	123	P
	25/4/58	27	20/8/58	21	77	117	P
<i>Deutzia gracilis</i> - - - -	20/2/58	64	19/3/58	50	78	27	P
<i>Diervilla florida</i> - - - -	4/11/57	15	24/12/57	10	66	50	P
	11/1/58	55	27/2/58	48	87	47	P

RESULTS FROM MIST PROPAGATION

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NAME	INSERTED		POTTED		ROOTING		COMMENTS (See Key)		
	Date	No.	Date	No.	%	Days			
<i>Diervilla variegata</i> - - -	22/4/58	30	30/7/58	27	90	109	P*		
<i>Erica cruenta</i> - - - -	14/2/58	7	21/8/58	2	28	188	P/S*		
	21/3/58	110	21/8/58	54	49	153	P/S*		
	8/1/58	100	14/2/58	86	86	37	P/S		
<i>Erica x darleyensis</i> - - -	8/1/58	100	14/2/58	86	86	37	P/S		
<i>Erica glandulosa</i> - - -	28/3/58	100	21/8/58	100	100	146	P/S*		
<i>Erica linnaeoides</i> - - -	8/7/57	50	24/9/57	6	12	78			
			28/11/57	28	56	143			
			24/12/57	7	14	169			
			25/8/58	67	67	157	P/S*		
<i>Erica mammosa coccinea</i> -	8/7/57	90	24/12/57	30	33	169			
			14/2/58	118	21/8/58	32	27	188	P/S
			10/7/57	72	24/9/57	66	92	76	P/S
<i>Erica mediterranea</i> 'Rosslare'	10/7/57	72	24/9/57	66	92	76	P/S		
<i>Erica melanthera</i> (syn. <i>canaliculata</i>)	8/7/57	60	24/12/57	21	35	169			
			2/12/57	45	26/3/58	6	8	114	Rotting. Too soft. P/S
			7/1/58	23					
			28/2/58	150	21/8/58	50	33	174	P/S
<i>Erica nivalis peziza</i> - -	1/10/57	25		0	Failure		Rotting. Too soft.		
<i>Erica parkeri</i> - - - -	8/7/57	64	24/12/57	16	25	169			
<i>Erica rubens</i> - - - -	8/7/57	50	24/9/57	37	74	78	P/S		
			27/8/57	35	21/11/57	35	100	86	P/S
			16/2/58	16	26/3/58	11	69	38	P/S
			28/3/58	120	21/8/58	120	100	146	P/S*
			8/1/58	104	7/2/58	94	90	30	P/S
<i>Erica vagans alba</i> - - -	8/1/58	104	7/2/58	94	90	30	P/S		
<i>Erica vagans</i> 'Mrs. D. F. Maxwell'	8/1/58	114	7/2/58	110	97	30	P/S		
<i>Erica verticillata</i> - - -	7/7/57	62	24/9/57	53	85	79			
			6/1/58	70	24/2/58	5	7	49	P/S Rotting —too soft.
			11/2/58	135	16/4/58	124	92	64	P/S
			27/2/58	100	18/4/58	90	90	50	P/S
<i>Escallonia x 'Glory of Donard'</i>	23/7/57	18	23/9/57	15	83	62	P		
<i>Euonymus japonicus</i> <i>marginatus</i>	10/9/57	5	24/12/57	4	80	105	P*		
			6/1/58	68	13/2/58	59	86	38	P
					17/3/58	5	7	70	P
<i>Euonymus japonicus variegata</i>	23/4/58	125	15/7/58	105	84	83	*		
<i>Euonymus radicans</i> - - -	20/7/57	4	13/8/57	4	100	24	P		
<i>Felicia angustifolia</i> - - -	31/12/57	72	11/2/58	38	53	42	P		
			28/3/58	22	30	87	P		
<i>Ficus radicans variegata</i> - -	24/4/58	35	21/8/58	35	100	119	P*		
<i>Forsythia x 'Beatrix Farrand'</i>	31/12/57	68	28/1/58	68	100	28	P		
			21/2/58	40	17/3/58	35	87.5	24	P
			16/8/57	75	12/9/57	28	36	27	P*
Fuchsia, mixed vars. - -	1/9/57	30	8/11/57	45	60	84	P*		
			11/11/57	28	93	72	P*		
			21/11/57	52	100	32	P		
			19/10/57	52					
			29/11/57	44	—	0	Failure		Soft. P/S
<i>Garrya elliptica</i> - - - -	31/12/57	18	—	0	Failure		Soft. P/S		
			25/2/58	53	21/8/58	31	58	177	Semi-ripe *
			14/4/58	57	21/8/58	47	82	129	Semi-ripe *
			6/1/58	70	18/3/58	58	83	71	P/S
			6/1/58	28	17/3/58	28	100	70	P
<i>Griselinia littoralis</i> - - -	7/1/58	77	4/3/58	42	54	56	P*		
<i>Griselinia variegata</i> - - -	7/1/58	77	15/7/58	30	40	189	P*		

NAME	INSERTED		POTTED		ROOTING		COMMENTS (See Key)
	Date	No.	Date	No.	%	Days	
<i>Hebe x andersoni variegata</i> -	12/10/57	50	21/11/57 24/12/57	28 18	56 36	40 73	P P
<i>Hebe hulkeana</i> - - - -	8/1/58	28	21/3/58	18	62	72	P/S
<i>Hebe speciosa</i> - - - -	28/2/58	60	5/5/58 27/7/58	35 16	58 27	66 149	P* P*
<i>Hedera helix</i> 'Chicago' - -	10/1/58	12	4/2/58	11	92	25	
<i>Hoheria populnea variegata</i> -	9/4/58	22	17/7/58	8	37	99	P/S
<i>Hypericum leschenaulti</i> - -	5/6/58	30	20/7/58	28	93	45	P
<i>Ilex aquifolium variegata</i> -	11/7/57	31	7/1/58	17	55	180	
	10/1/58	53	25/8/58	41	78	229	P/S*
<i>Isoloma erianthum</i> - - -	1/9/58	8	24/12/58	6	75	114	P/S
<i>Jasminum nudiflorum</i> - -	20/4/58	65	19/7/58	61	92	90	P/S*
<i>Jasminum polyanthum</i> - -	18/4/58	25	17/7/58	25	100	90	P/S*
<i>Juniperus chinensis aurea</i> -	7/7/57	72	3/12/57	24	33	149	
<i>Juniperus communis compressa</i>	4/7/57	36	3/12/57	23	64	152	
	26/2/58	100	25/8/58	95	95	180	P/S*
<i>Juniperus horizontalis</i> - -	17/4/58	60	16/7/58	28	46	100	P/S
<i>Leptospermum scoparium</i> <i>martini</i>	3/7/57	120	2/12/57	64	53	151	P/S
<i>Leptospermum scoparium</i> 'Red Damask'	3/7/58	96	21/11/58	42	45	141	
	8/1/58	55	20/2/58	41	74	43	P/S
	14/2/58	22	21/3/58	16	73	35	P/S
<i>Libocedrus plumosa</i> - - -	6/7/57	36	7/1/58	2	6	183	P
<i>Ligustrum ovalifolium aureum</i>			7/4/58	120	26	31	P*
	7/3/58	460	18/4/58	220	48	42	P*
			15/7/58	120	26	130	P*
<i>Lonicera nitida aurea</i> - -	20/9/57	85	24/12/57	75	88	95	P
	6/1/58	160	30/1/58	160	100	24	P
<i>Magnolia soulangeana purpurea</i>	5/1/58	100	27/2/58	28	28	53	P/S
			29/3/58	20	20	83	P/S
<i>Metasequoia glyptostroboides</i> -	6/1/58	50	26/3/58	2	4	75	P/S
			10/4/58	22	44	90	P/S
<i>Micromyrtus microphylla</i> -	28/10/57	48	20/2/58	24	33	80	P/S
	12/12/57	24				115	P/S
	11/1/58	33	26/3/58	33	52	36	P/S
	18/2/58	30				74	P/S
	23/4/58	85	18/8/58	72	85	117	P/S*
<i>Mimulus glutinosus puniceus</i> -	31/7/57	35	13/8/57	26	74	13	P F.H.
	31/8/57	27	24/9/57	20	74	24	P
<i>Mitraria coccinea</i> - - -	25/4/58	40	21/8/58	29	73	118	P
<i>Olearia gunniana</i> 'Blue Gem'	10/7/57	87	22/9/57	65	74	74	P better than P/S
	31/12/57	68	2/2/58	58	85	33	P
<i>Osmanthus delavayi</i> - - - -	1/8/57	19	24/12/57	9	47	145	
<i>Peperomia sandersi</i> - - -	24/4/58	12	21/8/58	11	91	119	P/S*
<i>Phelbalium billardieri</i> - - -	7/1/58	170	17/3/58	94	55	69	
	18/4/58	220	15/7/58	201	91	98	P/S*
<i>Photinia glabra rubens</i> - -	10/1/58	53	18/3/58	17	33	67	P
			25/8/58	28	53	227	*
<i>Phygelius capensis</i> - - -	7/1/58	45	31/1/58	45	100	24	P
<i>Pieris japonica</i> - - - -	4/8/57	30	21/11/57	29	97	109	P/S
	25/4/58	117	25/8/58	72	62	123	P/S
<i>Pilea cadierei</i> - - - -	1/9/57	5	20/9/57	5	100	19	P
	24/2/58	13	26/3/58	13	100	30	P/S
<i>Pittosporum tenuifolium</i> <i>garnetti</i>	14/12/57	100	16/7/58	15	15	214	* P

NAME	INSERTED		POTTED		ROOTING		COMMENTS (See Key)
	Date	No.	Date	No.	%	Days	
<i>Pittosporum tenuifolium</i>							
<i>purpureum</i>	14/12/57	60	16/7/58	25	42	214	* P
<i>Plumbago capensis</i> - - -	22/4/58	100	26/7/58	100	100	95	P/S *
<i>Prostanthera incisa</i> - - -	11/7/57	50	24/9/57	38	76	75	P
	20/2/58	128	5/5/58	100	78	74	P
<i>Prostanthera oppositifolia</i> -	11/7/57	100	24/9/57	55	55	75	P
<i>Rhododendron calostrotum</i> -	10/1/58	8	25/8/58	3	38	229	P/S *
<i>Rhododendron ferrugineum</i> -	10/1/58	18	26/3/58	14	77	75	P/S
<i>Rhododendron hippophaeoides</i> -	10/1/58	25	28/3/58	22	88	77	P/S
<i>Rhododendron keleticum</i> -	10/1/58	27	25/8/58	11	41	229	P/S *
<i>Rhododendron scabrifolium</i> -	10/1/58	27	25/8/58	22	82	229	P/S *
<i>Rhododendron tephropeplum</i> -	10/1/58	10	25/8/58	7	70	229	P/S *
<i>Rhododendron williamsianum</i> -	24/4/58	43	25/8/58	39	91	124	P/S *
Rose 'Baby Crimson' - - -	10/9/57	29	24/12/57	15	52	105	P/S
<i>Rosmarinus lavandulaceus</i>							
(syn. <i>prostratus</i>)	7/1/58	54	30/1/58	8	14	23	P
<i>Rosmarinus lavandulaceus</i> -	14/4/58	70	16/7/58	62	88	93	P*
<i>Rosmarinus officinalis</i> - - -	24/3/58	100	25/8/58	70	70	154	P*
<i>Sansevieria trifasciata</i> - - -	10/10/57	11	27/12/57	11	100	78	P/S
<i>Solanum jasminoides</i> - - -	17/3/58	20	27/7/58	19	95	132	*
<i>Taxus baccata fastigiata aurea</i>	6/7/57	90	2/12/57	15	17	149	
			7/1/58	3	3	185	
			21/3/58	61	67	258	
<i>Thryptomene saxicola</i> - -	20/2/58	50	26/3/58	19	38	34	P/S
<i>Thuja occidentalis erecta aurea</i>	7/7/57	30	3/12/57	22	73	149	
			29/3/58	4	13	265	
<i>Thuja occidentalis</i> 'Rheingold'	18/4/58	75	26/7/58	70	93	99	P/S
<i>Thuja occidentalis plicata aurea</i>	7/7/57	24	3/12/57	15	63	149	
<i>Tradescantia fluminensis</i>							
<i>variegata</i>	22/1/58	23	7/2/58	23	100	16	P
<i>Tropaeolum azureum</i> - - -	7/2/58	20	26/3/58	8	40	47	P/S
			30/7/58	8	40	173	*
<i>Viburnum x burkwoodi</i> - - -	7/1/58	102	27/2/58	48	48	51	P/S
			28/3/58	40	40	80	P/S
<i>Viburnum fragrans</i> - - -	7/1/58	73	20/2/58	40	52	44	P/S
			28/3/58	9	12	82	P/S
<i>Viburnum tinus lucidum</i> - - -	8/1/58	42	7/2/58	42	100	30	P
<i>Zebrina pendula</i> - - -	22/1/58	5	7/2/58	5	100	16	P

KEY TO COMMENTS:

P = Pumice.

P/S = 50/50 Peat/Sand.

* = Potting delayed — cuttings ready before date potted.

F.H. = From heat.

TABLE 2.

GROUPING OF SPECIES, ACCORDING TO PERIOD REQUIRED
FROM INSERTION TO POTTING
(Optimum season assumed)

Group 1—30 days or under

Abutilon x hybridum
Abutilon megapotamicum
Buddleia davidii
Buddleia salviafolia
Calluna vulgaris aurea

Calluna vulgaris 'H. E. Beale'
Caryopteris mastacanthus
Choisya ternata
Cotoneaster horizontalis
Deutzia gracilis

Erica vagans alba
Erica vagans 'Mrs. D. F. Maxwell'
Euonymus radicans
Forsythia x 'Beatrix Farrand'
Fuchsia varieties
Hedera helix 'Chicago'
Hypericum leschenaulti
Ligustrum ovalifolium aureum

Group 2—31 to 60 days

Abelia schumani
Abutilon x *sawitzii*
Aucuba japonica picta
Aucuba japonica variegata
Begonia rex
Boronia megastigma
Cistus x *pulverulenta*
Clematis montana rubens
Coleonema pulchrum
Convolvulus cneorum
Cotoneaster dammeri
Daboecia cantabrica
Daphne odora
Diervilla florida
Erica x *darleyensis*
Erica mediterranea 'Rosslare'
Escallonia x 'Glory of Donard'

Group 3—61 to 90 days

Abelia floribunda
Adenandra uniflora
Azalea indica
Azalea obtusum amoenum
Azalea obtusum 'White Kurume'
Buxus sempervirens argentea
Ceanothus x 'Gloire de Versailles'
Ceanothus x 'Marie Simon'
Ceanothus x *veitchianus*
Ceratostigma willmottianum
Chamaecyparis lawsoniana ellwoodii
Chamaecyparis thuyoides ericoides
Cissus antarctica
Cistus x *purpureus*
Coprosma williamsii variegata
Correa speciosa
Daphne x *burkwoodii*
Daphne cneorum
Diervilla florida variegata
Erica rubens
Erica verticillata

Group 4—91 days and above

Beaufortia sparsa
Chamaecyparis lawsoniana allumi
Chamaecyparis lawsoniana minima
Chamaecyparis lawsoniana potteni
Chamaecyparis lawsoniana
 thrandtensis caesia
Chamaecyparis obtusa crippsi

Lonicera nitida aurea
Mimulus glutinosus puniceus
Olearia gunniana 'Blue Gem'
Phygelius capensis
Pilea caderei
Tradescantia fluminensis
Viburnum tinus lucidum
Zebrina pendula

Euonymus japonicus marginatus
Euonymus japonicus variegata
Felicia angustifolia
Hebe x *andersonii variegata*
Leptospermum scoparium martini
Leptospermum scoparium
 'Red Damask'
Magnolia soulangeana purpurea
Plumbago capensis
Rosmarinus lavandulaceus
Rosmarinus officinalis
Solanum jasminoides
Thryptomene saxicola
Tropaeolum azureum
Viburnum x *burkwoodii*
Viburnum fragrans

Ficus radicans variegata
Griselinia littoralis
Griselinia littoralis variegata
Grevillea rosmarinifolia
Hebe hulkeana
Hebe speciosa
Jasminum nudiflorum
Jasminum polyanthum
Metasequoia glyptostroboides
Micromyrtus microphylla
Peperomia sandersi
Phebalium billardieri
Photinia glabra rubens
Prostanthera incisa
Prostanthera oppositifolia
Rhododendron ferrugineum
Rhododendron hippophaeoides
Rhododendron williamsianum
Rose 'Baby Crimson'
Sansevieria trifasciata
Thuja occidentalis 'Rheingold'

Chamaecyparis obtusa nana gracilis
Chamaecyparis pisifera plumosa
 aurea
Desfontainea spinosa
Erica cruenta
Erica glandulosa
Erica linnaeoides

<i>Erica mammosa coccinea</i>	<i>Osmanthus delavayi</i>
<i>Erica melanthera</i>	<i>Pieris japonica</i>
<i>Erica parkeri</i>	<i>Pittosporum tenuifolium garnetti</i>
<i>Garrya elliptica</i>	<i>Pittosporum tenuifolium purpureum</i>
<i>Hoheria populnea variegata</i>	<i>Rhododendron calostrotum</i>
<i>Ilex aquifolium variegata</i>	<i>Rhododendron keleticum</i>
<i>Isoloma erianthum</i>	<i>Rhododendron scabrifolium</i>
<i>Juniperus chinensis aurea</i>	<i>Rhododendron tephropeplum</i>
<i>Juniperus communis compressa</i>	<i>Taxus baccata fastigiata aurea</i>
<i>Libocedrus plumosa</i>	<i>Thuya occidentalis erecta aurea</i>
<i>Mitraria coccinea</i>	<i>Thuya plicata aurea</i>

ROSA CHINENSIS AND ROSA CHINENSIS MINIMA (I.)

NANCY STEEN (*Auckland*).

Gallica, damask and alba roses originated in Europe and the Middle East; but *Rosa chinensis* is a comparative newcomer to the western world. Its natural home is China where it holds an honoured place in the ancient history of that country. Plants must have arrived on the Continent early in the eighteenth century, because there is a dried specimen of *Rosa indica*, as it is alternately called, in the herbarium of the Dutch botanist, Gronovius, dated 1704. This can be seen today in the British Museum. Further brief mention is made of this rose in 1718; but early attempts to cultivate it could not have met with success, as no more was heard of it in England till 1789, when Sir Joseph Banks re-introduced the pink form into the country.

It is recorded that, as early as 1781, men of the Dutch East India Company managed to bring live plants back with them to Holland, where they were planted in the Botanical Gardens at Haarlem. These were all cultivated forms from gardens and nurseries in the vicinity of the Port of Canton, as early traders were not allowed into the interior of the country. It is to the great credit of the Dutch and British East India Companies that valuable plant introductions were carried successfully on those long sea voyages. At the beginning of the eighteenth century, botanical gardens were established at Singapore and Calcutta; and there, plants were rested and acclimatised for a time, before continuing on their long journey to Europe. The next resting spot was at Mauritius, on the island of Reunion, off the east coast of Africa. The China roses settled down so happily in this new island home that, in time, the inhabitants cultivated them extensively for use as attractive ever-blooming hedges. The scarlet 'Four Seasons Rose,' a form of *Rosa bifera* or the 'Autumn Damask,' had also arrived in Mauritius, having been carried down from Persia by Arab traders in their large sailing dhows. In time, these two plants united to form a new family of roses, the Bourbons, called after the Isle de Bourbon where the original plant was discovered growing in a hedgerow. 'Souvenir de la Malmaison,' so often referred to as 'Maiden's Blush' by older people, is a descendant of this rose, and its full, flat, blush pink flowers are a familiar sight in old gardens and cemeteries throughout the country.

The China Roses were known also as Bengal Roses, having been grown in India for some time before being shipped on to Europe. France and Italy knew and grew these roses prior to the time when first they were cultivated successfully in England; and, in those warm Mediterranean countries, they flourished and multiplied at such a rate, that there, also, they were used for hedges. However, in England, owing to the slender growth, it was thought, at first, that *Rosa chinensis* was far too delicate to survive out-of-doors, so the earliest plants were coddled and kept in glass houses, and generally pampered. Owing to the rarity and scarcity of this new rose, cuttings were sold for many guineas each, even in those far off days. Fortunately, some brave enthusiast decided to risk a plant outside in a warm and sheltered corner. To everyone's amazement, it was discovered that, far from being tender, *Rosa chinensis* was indestructibly hardy, and was soon to prove the mainstay of gardens all over the country, and that, in spite of the severity of the English winter. More marvellous still, as well as increasing rapidly, it flowered happily right through the year. Its fame spread quickly, and soon it became looked upon as a real garden treasure. It flourished and became so well loved throughout the British Isles, that, later, when people left those shores to settle in the colonies of Canada, Africa, Australia and New Zealand, they took with them seeds and potted plants of this small, wiry rose. Now, it is to be found in old gardens in all the temperate parts of the world — in many instances, bravely flowering in spite of years of neglect. This cheerful, small-flowered rose is smothered, for months on end, with myriads of white, pink, or red blooms.

China has produced many famous roses. *Bracteata*, the white flowered parent of 'Mermaid'; *multiflora*, forms of which came from the eastern seaboard of China, as well as from Japan and Korea, and later became the parents of some well known Rambler and Polyantha roses; *microphylla*, or 'Burr Rose'; *hugonis*, a delightful yellow species; *banksiae*, the white, as well as the better known yellow form; *odorata pseudo-indica* or Fortune's 'Double Yellow,' a very unusual climber; and not the least of them, though of quieter beauty, *Rosa chinensis* and *Rosa odorata indica*, two valuable perpetual flowering types which have been responsible for the production of most of the lovely modern roses of today.

Because of the difficulties encountered by Europeans in getting permission to explore the hinterland of China, the wild form of *Rosa indica* was not discovered as early as the double cultivated forms. Dr. A. Henry found it in 1885, growing in a gorge at Ichang, in Hupeh. It was climbing up through trees with the aid of its wicked hooked thorns. This tall shrub had solitary single red flowers, not the large flower sprays seen in the dwarfier forms from Chinese gardens.

During the Han dynasties, before the Christian era, ornamental shrubs, roses and flowers were cultivated so extensively that, in the end, not enough food was grown for the people, so a ban was placed on the growing of beautiful, but non-productive plants for a considerable length

of time. During this period, the history of the China roses was shrouded in mystery; but by 900 A.D., the double forms were being depicted on fans and screens, while in A.D. 965, the artist Huiang Ch'uan made delicate paintings on silk of the Old Blush China which are preserved to this day. This gives some indication of the love of the Chinese for one of their most modest looking roses. It cannot compare in size of bloom with some other of their native roses; but, in spite of this lack, it was, and still is, treasured, cultivated extensively, and held in very high esteem, throughout the country.

Four years after the introduction of the pink form of *Rosa chinensis* into England, a captain of one of the East India Company's ships discovered, in a Calcutta garden, a wiry stemmed form with double red flowers. When he was due to return home, he acquired a plant of this variety to present to a director of his company, Mr. Gilbert Slater. This keen gardener propagated it and gave it to his friends as the 'Bengal Rose.' Later, it was to be known as *Rosa chinensis* var. *semperflorens*, or Slater's 'Crimson China.' This variety arrived in Europe during the terrible days of the French Revolution, and, in a small and modest way, caused a revolution in the rose world. Wars or no wars, the breeding of roses went on in France and England; and Napoleon, at Josephine's request, allowed English growers free passage back and forth to France, to carry with them the latest plants for his Empress's garden at Malmaison.

French breeders produced, during those stirring days, over two hundred varieties all of which were derived from *Rosa chinensis*. Very few are listed today, as they cannot compare, in many ways, with the strong and large-flowered modern strains, though those that are grown still, are well worth a place in a border or quiet corner of the garden, if only to provide colour during the coldest days of winter.

It was the Chinese who developed the double garden forms, and we owe them a great debt because, without their painstaking work, we would not have had the hybrid chinas and hybrid teas of today. Their early horticulturalists also took a keen interest in selecting and perfecting miniature forms of the China rose which later were to become known as 'Fairy Roses.' Seeds from the smallest plants were collected and grown over the years until, in time, there emerged a true miniature—*Rosa chinensis minima*. From this dainty rose has come the host of delightful and perfect little bushes that are so popular today. They make excellent rock garden subjects and also lend themselves to pot culture.

Miss Mary Lawrance, who was honoured for her work on the Rose by having this tiny plant called after her, was one of the foremost painters of the rose in her day, and her book, published in 1799, is still considered a classic, as well as being extremely valuable. She was very particular about accuracy in her work, and always made up her own colours so as to be able to portray correctly the soft tones of the

old roses. In her book, she names the rose known today as *Rosa lauranciana*, *indica* var. *humilis*, whilst Redoute the French painter, calls a similar rose, *indica pumila*. These small roses also arrived in Mauritius at an early date, where they thrived equally as well as the larger growing 'Old Blush China.' From there they were brought to the Continent and later, to England. French breeders saw the possibilities inherent in *Rosa chinensis* var. *pumila* and soon many new forms appeared. These enjoyed great popularity from 1830 till the dwarf polyanthus put in their first appearance about 1870. No more work was done on these small roses for many years; but today they have regained their old popularity, with new and very charming varieties being listed each year. They come in bush, standard and climbing forms; but, to look their best, they must be used in rock gardens or very narrow, small borders where they are not overshadowed by large plants.

A fine pink form must have found its way, at an early date, to the Swiss village of Mauborget, where the inhabitants grew it as a pot plant. A Dr. Roulet discovered it on his travels and was so delighted with his unusual find, that he immediately got into touch with the late Monsieur Henri Correvon, who was then the expert on rock gardening at the Geneva Botanical Gardens. He left at once for Mauborget; but, to his distress, he discovered on his arrival at the village, that it had just been destroyed by fire. By great good fortune, the people of a neighbouring hamlet, Onnens, had potted plants of the rose he was seeking displayed in their windows; and they generously supplied Monsieur Correvon with cuttings. These he carried back to Geneva where they rooted with characteristic ease. The plant was then named *Rosa rouletti*, in honour of its discoverer. Now it is to be found growing in rock gardens all over the world. The perfect little double blooms are of a clear rose colour and early in the season, this compact plant of from 6 to 8 inches in height, is simply smothered in flowers. If the faded blooms are removed, it keeps on giving a good account of itself for many months, though later in the year, it is not as compact as it is in the spring. The semi-tropical climate of Auckland is inclined to force rock plants into too rapid growth, though hard conditions and not too much feeding, help to counteract this tendency. Some years ago, a plant of *Rosa rouletti* sported a crimson flower, so this stem was cultivated and a new rose evolved which is now known to us as 'Oakington Ruby.'

Jan de Vink of Holland and Pedro Dot of Spain have been particularly successful in their new originations. All of these little roses thrive in Auckland, some almost too well in a small rock garden, and make a gay display for many months of the year. They love a friable soil with a mulching of metal chips through which can be grown, as carpeters, some of the smaller campanulas, achilleas, dianthus, geraniums and scutellarias. The purple flowered *Dobrowskya tenella* is also useful in this respect. This shading of the soil appears to help them through the hottest months of the year. Varieties which have stood the test

of some years are 'Perla Rosa,' 'Perla de Monserat,' 'Cinderella Granada,' 'Perla del Alcanada,' 'Sweet Fairy,' 'Midget,' 'Peon,' 'Little Princess,' 'Pour Toi,' 'Twinkles,' 'Presumida' and 'China Doll,' as well as the two mentioned previously. On a 4 feet high rock wall, which backs a long and curving rock trough, two climbing forms of *chinensis minima* are very attractive. These are 'Perla Rosa' and 'Perla del Alcanada' — the former being a strong grower with rose pink flowers and the latter one having double crimson blooms. The small flowered fuchsias *pumila*, *thymifolia*, and 'Helene' can be grown in conjunction with these dainty climbers, as well as that native of New Zealand, *Fuchsia procumbens*, while rose and mauve aubrietias the rose-pink rock phlox 'Betty,' and white and purple forms of *Viola cornuta* are useful for draping over the edge of the rock trough. Planted closely together, these miniature China roses, in their climbing forms, make delightful low free-flowering hedges for the smaller garden so it can be seen that there are many positions in the gardens of today where these lovely little plants can be used effectively.

One of the notable things about the larger forms of the China rose is that the light-looking new growth springs right from the central basal point to fan out at the top, making a triangular shaped plant. Another interesting feature is the fact that, whereas in the gallicas, damasks and albas the flowers tend to pale as they age, those of the China roses do the reverse — a pale pink bloom will turn rosy red on the second day and in some cases, a deep crimson. This is a great distinguishing feature as it is typical of all the pure forms of this rose; and even some of their hybrids, such as the Bourbon 'Madame Pierre Oger,' have a tendency to blush as they age. There are also three curiosities belonging to this plant family — *viridiflora*, the green rose; *mutabilis*, the changing rose; and *serratipetala*, with its fringed petals. These will be described more fully later. The dark and dwarfer forms of *Rosa chinensis* can stand and, in fact, benefit by harder pruning than is advisable in the case of the taller 'Old Blush China,' which only requires an occasional thinning out of old wood. Any further pruning can be done by first cutting flowers for the house. All like a well mulched and well aerated soil in Auckland, with a good watering once a week. Mildew is an enemy in this humid climate though an occasional dusting with flowers of sulphur helps to keep this in check. When these roses are found growing happily in neglected gardens and by the roadside, it is noticeable that they are naturally heavily shaded at their roots by grass, weeds and litter generally. This helps to conserve moisture in the ground around them, and so keep them healthy and in good heart.

Probably the most generally grown and most loved of all the China roses is the 'Old Blush,' which grows into an attractive 4 to 5 feet shrub. This is covered, for the greater part of the year, with dainty rose pink flowers in large sprays. As these deepen with age, there are many shades of pink, rose and light crimson to be seen on the one bush

at the same time — giving a chintz-like effect when combined with the green of the older leaves and the dark red-brown of the young shoots. The flowers have very little scent compared with other old roses; but they are useful for low bowls or mixed posies, particularly in the winter when flowers are scarce. Unfortunately, their weak flower stems make them droop too quickly in the hot weather to be very useful indoors. This free-blooming rose is a useful plant to space at intervals along a pink border as it consorts well with such plants as Aster 'Harrington's Pink,' *Brittonastrum mexicanum*, *Platycodon grandiflorus*, the large flowered rose pink penstemons as well as the dwarfed penstemon 'Evelyn,' and perennial phlox in shades of pink, rose, and red. Useful plants for edging such a border are *Veronica spicata rosea*, *Heuchera* 'Pink Beauty,' *Dianthus* in various shades of pink to red, and *Pulmonaria saccharata* with pinkish flowers and attractive spotted leaves. Miss Gertrude Jekyll, in her famous garden, grew bushes of 'Old Blush China' against a grey stone wall, interspersed with bushes of rosemary and lavender — the grey and pink tones making a charming colour combination. There is a taller semi-climbing form which Mrs. Keay speaks of in her book, 'Old Roses,' but this one is not so generally grown as the dwarfed form, which, by the way, was the one referred to by Thomas Moore as 'the last rose of summer.' When it was established that China roses were really tough and hardy in England, nurserymen and gardeners were, at one time, given to trying out these in a newly settled industrial area to see whether they would survive the effects of soot and fumes satisfactorily, before making large plantings of more expensive and newer roses. Nowadays, when roses are so easily obtained and so inexpensive, most people would try first and worry afterwards.

The 'Crimson China' or *Chinensis* var. *semperflorens* was introduced into England in 1792. This has semi-double crimson flowers with a hint of white at the base of the petals, dwarfed stature than 'Old Blush,' with darker reddish green foliage and very thin, wiry stems. One single form of the red was known as 'Miss Lowe's Variety,' and this was nearer to the true wild type — 'Crimson China' itself having been cultivated for centuries by the Chinese before arriving in Europe. Boursalt, Bourbon, noisette and tea roses have all been bred from this dwarf rose. As it is not a good subject for budding, and this is typical of all the China roses; 'Crimson China' is better grown from cuttings, as it does not sucker or become a nuisance in the garden. Treated in this manner, it will flourish for many years; but owing to its dwarf stature, needs to be planted in the front of a border, on a large rock garden, or used as a low growing hedge.

NOTES FROM THE CHRISTCHURCH BOTANIC GARDENS.

L. J. METCALF (*Assistant Curator*).

This spring has been rather a paradoxical one, for while it has been one of the driest on record the displays of flowering trees and shrubs, bulbs and bedding plants have been exceptionally fine. For at least 5 consecutive months rainfall has been below average, and September the second driest on record. A period of 38 days without rain was recorded from mid-August onward and with sunshine about 25 per cent. above normal, watering has had to be commenced unusually early. One of the reasons why the displays have been so good this year is the lack of high winds particularly the easterly which is so prevalent in Christchurch during this period of the year.

Watering is always a problem and such a season as is being experienced makes us realise just how favourably the Gardens are sited, situated as they are within a large U-bend of the Avon River, and the abundant water on three sides must make many other gardens envious. In addition to the normal reticulation system great use is being made of an auxiliary fire pump and one of the types of aluminium-alloy irrigation piping used on many farms. The type used in the Botanic Gardens is a 3-inch pipe perforated along its length with small holes and it delivers an estimated half inch of 'rain' per hour over a 50 feet wide strip. The advantages of this system over a hose and sprinkler are many, for not only is it now possible to water areas which previously relied on the natural rainfall, but areas which are given a good soaking do not need watering again for periods of up to three weeks. Also in areas so watered the benefit to the plants is most marked.

During the spring months one of the most interesting sections is the rock garden where a constant succession of choice things make their appearance from early August onward. Among the first plants to show through and flower is *Iris histrioides* a species of the *reticulata* group which flowers just a little earlier than *I. reticulata*. The flowers which are bright blue and ultramarine are produced before the leaves. Although it comes from Asia Minor and the Caucasus it does not seem to mind flowering in a shady position, possibly because later in the season it gets a good sun baking. Another very attractive *Iris* but one which does not flower till October is *I. lacustris*, a diminutive species which comes from the shores of the American Great Lakes. It spreads by a creeping rhizome and makes a broad patch only 3-4 inches high which is liberally studded with bright blue flowers.

Growing in another part of the rock garden is *Adonis amurensis* a useful plant which braves the inclemencies of the early spring to produce its golden yellow flowers without fail every August. *A. amurensis* is a member of the *Ranunculaceae* and as the specific name denotes comes from Amurland in far eastern Siberia. The golden yellow flowers are

produced on short stalks before the appearance of the leaves but with the production of the foliage the stalk lengthens until the whole plant is about a foot or 15 inches high. The ferny leaves are bronzy-green and quite attractive. One of the back-ground shrubs which is most outstanding is *Rhododendron mucronulatum* var. *acuminatum*, a deciduous species which comes from north China, Manchuria, Japan and Korea, and helps to brighten the rock garden in August. The bright mauve-pink flowers are about 2 inches across and freely produced at the ends of the branches. It is a fine shrub for early flower and could be more widely grown.

Here mention must be made of one or two species of *Trillium* or Wood Lily as the Americans call them. This is a genus which ranges from North America to the Himalayas and contains some beautiful although in this country little known plants. They are easy to grow providing they have a moist soil and are shaded at the root. One of the commonest is *Trillium sessile*, a North American species which grows 12 - 18 inches high and has smallish white or purple flowers sessile in the whorls of the leaves. *T. sessile* var. *californicum* is more attractive as the leaves are heavily spotted and the flowers are bright rose purple. Another large growing species is *T. ovatum* which has much rounder leaves and the white flower which is erect on a short pedicel changes to a deep rosy-pink with age. *T. rivale* is a small species from the mountains of Oregon and California and only grows about 6 inches high. The flowers are white, sometimes spotted pink, and are set off by the dark green leaves. An unknown species from Japan is not quite so attractive as the species mentioned, as its flower is pendant and not so easily seen.

The double-flowered Marsh Marigold, *Caltha palustris* var. *monstrosa-pleno* is an outstanding but little known plant which attracts a lot of attention when in flower. And lastly to finish off this brief list of some of the plants to be found in and around the rock garden are two species of *Mertensia*. The most beautiful is *M. virginica* which produces its blue-grey foliage and nodding heads of china-blue flowers in September and October. The only regret one might have about this plant is its fleeting nature for no sooner have the flowers faded than the foliage commences to die off and already by the end of October is becoming quite yellow. The dwarfer *M. primuloides* which comes from the high Himalayas is also a beautiful little plant which flowers for a longer period. It grows about 3 inches high and produces short racemes of flowers of a beautiful indigo-blue. Also this latter species is of easier cultivation and propagation.

NOTEWORTHY PLANTS

Mahonia lomariifolia

This semi-hardy shrub was introduced to cultivation by Major Lawrence Johnston, Hidcote, Gloucestershire who accompanied the late George Forrest to China in 1931. Seeds were collected near Teng-yueh in Yunnan in the spring of that year. Plants were raised from seed sown in Major Johnston's garden at Menton, France. It has received an Award of Merit (May 24th, 1938) and a First Class Certificate (October 24th, 1939) from the Royal Horticultural Society, London. This plant owes its specific name to the resemblance of its foliage to that of *Lomaria*.

Like other shrubs that are semi-hardy in Britain this shrub has acquitted itself admirably in New Zealand. The photograph in this issue was taken last winter in the Editor's garden and portrays a plant he brought from England in 1951. It is growing in loamy soil over a clay subsoil and beneath the shade of a large oak, where it appears to benefit from protection during the hottest days of summer. Its ornamental foliage is evergreen and growth is moderate, this particular shrub having attained a height of 8ft. in seven years. The flowers appear freely in July in clusters of twenty or more stems, each stem being approximately 9 inches in length. The flowering period does not exceed a month and the flowers are followed by green berries that change to a bright blue in spring.

I understand this shrub is under cultivation in the Botanic Gardens, Christchurch, where it is proving quite hardy. Instances have been known in England where plants have been cut to ground level by frost and yet have revived and grown satisfactorily. It is a desirable plant for any inland garden.

—G. A. R. Phillips, Paraparaumu.

CORRESPONDENCE

The Editor,
New Zealand Plants and Gardens.

Epiphytic Orchids

Dear Sir,—I read with pleasure and profit the article on pp. 342-5 of the September issue of the Journal, entitled 'N.Z. *Todea* Fibre and Orchid Growing.' Your contributor's main theme was to discuss suitable substitutes for this fibre, with the object of preventing despoliation of the dwindling natural stocks of the fine 'Prince of Wales' Feather' fern (*Todea*). One can only hope that orchid culturists will refrain from using both that fibre and the fibre of other native ferns mentioned in the article (*Polypodium*, *Asplenium*, and *Dicksonia*).

In developing this theme, your contributor makes one statement, almost incidentally as it were, which is of great interest to students of

indigenous vegetation; and I would be grateful if he would develop it further for their benefit. On p. 344, he states that some native orchids 'grow naturally' on *Pinus radiata* when it volunteers on to our native reserves. This, so far as I am aware, is the first and only record in print of such an occurrence. Neither this pine, nor any other introduced tree species in New Zealand, has ever been recorded as carrying native orchids naturally from seedling origin. One knows, of course, that a few native orchids (*Earina* spp. in particular) can be successfully transplanted on to trees in gardens, if bound on suitable trees with a good mass of the growing medium; and that they can also be grown and flowered for several seasons terrestrially. But your contributor's statement implies by the words 'grow naturally' that the orchids actually germinate *in situ* on *Pinus radiata*. Will he be good enough to furnish through your Journal full particulars of this most interesting phenomenon? One would like, for example, to know the species of the orchid concerned and its size and abundance in such situations; its height above the ground on its alien host and the size and apparent age of the *Pinus radiata*; and, if he is willing to reveal such information, the location and the date when the epiphytism was observed.

I would like, with your permission, to reciprocate in advance for such information, by stating that I have a personal record of a single instance where I saw masses of *Earina mucronata* in every crutch of a row of about a dozen Lombardy poplars, on the road between Otira and Kumara in Westland. The pollarding had been done years ago at about 15 feet from the ground and the trees when I saw them were 50 to 60 feet high. The whole appearance was extremely natural and the orchids were in full flower in December last year. At such a height from the ground the invasion of orchids could have been quite natural, and of course a pollard crutch is a classical site for epiphytism; but no one knew the history of the poplars, and it is possible that some forgotten enthusiast of long ago brought a ladder from the adjacent old homestead and actually transplanted orchid clumps into each poplar crutch. I have therefore not felt that the occurrence is a valid record of natural epiphytism; but such as it is, it is the only likely case I have encountered personally of that phenomenon on an adventive tree with a native orchid as epiphyte.

I trust that your contributor will accept it as a justification for my curiosity about his report.

C. M. SMITH, A.H.R.I.H.(N.Z.).

Wellington.

PUBLICATIONS RECEIVED

NEW ZEALAND GLADIOLUS COUNCIL'S BULLETIN, October, 1958.

Specialist societies occupy an important position in horticulture. By gathering together in one organisation the devotees, both professional and amateur, of one genus sound help and guidance is given to its future development. The publication annually of a year book or, periodically, of bulle-

tins, as in this instance, provides information, contributed by specialists, of the progress of a particular genus, the merits of new varieties and other valuable information. The bulletin under review contains the dates of flower shows where gladioli will be featured during the coming season, useful notes on cultivation by R. R. Martin, a valuable article on judging standards and a full report of the 1958 Annual Conference (Wanganui).

DISTRICT COUNCIL MEETINGS WELLINGTON

On Monday, 13th October, members of the Wellington District Council and the Wellington Horticultural Society held their monthly meeting at the large lecture hall, Public Library, Wellington, to hear Mr. G. A. R. Phillips deliver a lecture on 'Herbaceous Perennials.'

Until his arrival in New Zealand in 1951, Mr. Phillips had specialised in herbaceous perennials, especially delphiniums, over a period of thirty years and had exhibited at the leading British flower shows. In order to make his subject all-embracing, certain bulbs, corms and tubers were included under the heading of 'herbaceous.' The importance of colour mass for effect, the varied uses of the different habits of growth, borders with one frontage only and others that were described as 'island' borders, planting to eliminate flowerless gaps, the use of background, soil and general environment were fully dealt with. Some detail was given of plants for dry situations and others that were moisture lovers with special emphasis on the many lovely members of the primula family. The lecturer pointed out the true character of the Russell lupin and how George Russell had evolved, by crossing the best varieties available, the spreading shield-like hood in place of the flat closed hood that used to give a thinness to the spikes of the older kinds. This and many other interesting and important points were explained.

The lecture was illustrated by coloured photographs of the leading perennials, with some excellent examples of paeonies, projected on to the screen by means of an epidiascope, lent for the occasion by the Standard Vacuum Oil Company N.Z. Ltd., Wellington. The president Mrs. H. L. Bennett presided and a vote of thanks was proposed by Mrs. O. D. Du Pont.

WANGANUI

President's Annual Report, September, 1958:—

This, the tenth annual report of the Wanganui District Council of the Royal New Zealand Institute of Horticulture, marks a decade of horticultural education and appreciation of the beauties of this district and opportunities for those persons interested in gardening in any or all its phases. The District Council activities closely allied to those of the national organisation have been a means of securing speakers and seeing many plants from many parts of the world with all the advantages of modern visual aids. Wanganui is proud of its heritage of plants and planting accomplished by former residents and the varied activities of the Institute have, I am sure, added to display and range of plants as well as making our citizens conscious of our opportunities and of the beauty and interest in our midst.

As a further mark of progress the District Council executive and members have greatly assisted a most successful Floral Fair and acted as hosts to the Dominion Executive by having the thirty-fifth annual conference of the Institute held in Wanganui. The first occasion in which a conference of the Institute has been held here. To cater for this big programme several committees were set up and in every case their activities were most successful because of the time and energy expended without thought of reward. Through the willing assistance of members, funds were collected and help and material given so that the Dominion Council were not charged with any local expenses concerning

the conference. We were particularly fortunate in our nomination of Mr. W. Stevens to deliver the Banks Lecture. This commemorative lecture in honour of the first botanist to visit these shores takes pride of place at the annual conferences of the Institute and our lecturer and his address proved outstanding with both wide appeal and technical accuracy.

Very recently horticultural organisations were called on to stage a display in aid of funds for Remembrance. At the request of the Wanganui Horticultural Society the District Council contributed a very pleasing garden feature which created wide general interest. Mrs. Burnet and Mrs. Baddeley arranged a wonderful display in a natural setting, generously aided by Mr. W. Stevens, who contributed many specimens of new and outstanding plants all suitable for our conditions.

In August, Wanganui was favoured with a visit of some sixty camellia growers from all parts of the North Island and led by Col. Durrant from Tirau. The District Council were pleased to arrange a public meeting and provide a hall as an initial step in forming a branch of the New Zealand Camellia Society in Wanganui.

Naturally with such a full year's activity our membership has increased and we are still the third largest by membership of district councils of the Institute.

Because of illness I was unable to fulfill my obligations as President for some months, but my place was most capably filled by Mr. Whitehead to whom the executive and myself are most grateful.

Our programme organiser, Mrs. Chittick, has had a very busy year, but despite the many calls on her time has maintained the very high standard of programmes at our monthly meetings. At all times our members have been provided with ample horticultural interest. Mr. Whitehead opened the new season's programme with an interesting talk on soils, followed by slides of South Island alpine scenes supplied by Mr. H. Clapham. As usual, the November meeting took the form of a social evening. In February, Mr. Chittick and myself dealt with suggestions for spring display with the many species and varieties of bulbs. In March, Mr. Stevens addressed members on lines of the Banks Lecture for the benefit of those who were unable to be present at the Institute Conference. The April meeting was attended by one hundred and thirty persons when we were again favoured by an address by Mr. Chambers, of Havelock North. On this occasion, Mr. Chambers showed slides of the extensive journey in search of plant material he and Mrs. Chambers had made through Rhodesia and other parts of Africa. In May, a popular garden quiz was arranged with a panel of experts comprising Mr. Chittick, Mr. H. Parnell, Mr. Whitehead and Mr. Ginn, who capably dealt with many garden problems supplied by members. The June meeting was addressed by Mr. A. W. Hamilton, Deputy Director of the Horticultural Division. Mr. Hamilton with genuine horticultural interest had recorded many scenes of gardens, landscapes and places of historical importance during his visit to Canada and England. For the July meeting we again had the pleasure of hearing Mr. V. C. Davies, of New Plymouth, who so capably deals with plants of merit and recent introductions. The programme for August was a bigger and brighter Brains Trust with our capable panel of experts.

As usual, Mrs. Chittick arranged the Labour Week-end trip for members. This time the Manawatu and Rangitikei districts were visited. Although these are neighbouring localities our organiser had found much of new interest for the party fortunate to make the trip.

The monthly outings begun last year have been continued with increased interest and support. As well as visits to local gardens trips have been made to Hawera, Marton and the Parapara.

Arbor Day was not forgotten but weather conditions precluded members from actual planting; however, through the efforts of members, trees were don-

ated for the further planting of the city's Northern approach and attention given to the maintenance of those established last year.

As well as combining with the Wanganui Horticultural Society's display at the Spring Festival in September, displays were contributed to the November Rose Show and the Autumn Show. Thanks are due to Mrs. Burnet and Mrs. Baddeley for these displays so comprehensive and arranged in a pleasing and natural manner.

Special thanks are due to our capable treasurer, Mrs. A. C. Whitehead, who has handled all matters of finance involved in this busy year, including that of the Floral Fair and the various functions concerned with the conference of the Institute in February last.

Through the efforts of various members of the executive the attractiveness of the hall used for our monthly meetings has been enhanced by floral arrangements and the display of plants new or unusual. Thanks are due to the custodian for his special favours in setting up the hall and to the Association for the modern decor recently completed.

For some months Mrs. O. B. Hawken has been overseas visiting gardens and horticultural features in the United States and Canada. Before her departure, Mrs. Hawken arranged all the publicity for the Institute conference and Floral Fair activity with outstanding efficiency.

At the Institute conference, two members of the executive were recipients of Fellowships of the Institute, Mrs. A. MacLeod and Mr. F. Bethwaite. Both these members have given many years of horticultural service to our district.

NORTHERN WAIROA HORTICULTURE COUNCIL'S ANNUAL MEETING

The annual general meeting of the Northern Wairoa District Council of the New Zealand Institute of Horticulture was held in the Bandroom, Mr. C. C. McKavanagh presiding.

The president's report and the financial statement was read and adopted and the following officers were elected:—

Patron, Mr. W. L. Hughes; chairman, Mr. P. Walden; vice-chairman, Mr. H. W. Gaukrodger; secretary-treasurer, Mrs. J. L. Russell; committee, Messrs E. Robinson, L. Whalen, R. G. Sills, Mesdames R. G. Sills, G. Groome, G. Clements, W. Kirton, Miss P. Berry; honorary auditor, Mr. J. R. Alderson; delegates to Dominion conference, Mesdames E. K. Newby and Russell.

Arrangements regarding the proposed visit to the garden of Mr. and Mrs. R. Finch, Whangarei, were deferred until the October meeting.

Nominations for the award of fellowship of the Institute of Horticulture were sent to head office, Messrs P. Walden and McKavanagh being nominated by the Northern Wairoa Council.

Busy Year

In his annual report, Mr. McKavanagh stated that the past year had been an instructive one. There had been various able speakers dealing with many subjects, and several visits of interest had been made by Northern Wairoa members. In April a special committee was chosen to erect a pioneer's house and garden scene for display in the museum during Dargaville's Jubilee Week. Members of the Northern Wairoa District Council also combined with members of the Dargaville C.W.I. gardening circle in decorating the shop window of Mr. R. A. Powell, another feature of Jubilee Week. Appreciation was expressed to all members who had helped make these displays such a success.

A recent decision, Mr. McKavanagh continued, was that of having a written plant request and exchange. During the last few weeks members had combined with the Dargaville Borough Council in its tree-planting scheme and had assisted

in the actual planting of trees. Thanks were expressed to the secretary, auditor and committee for the efficient manner in which they had carried out their duties in the past year.

Mr. H. Gaukrodger was also thanked for his work in showing films and special thanks were expressed to the ladies who served supper and conducted the trading table. Mr. McKavanagh concluded by wishing the incoming officers and committee a successful year.

Address on Daffodils

At the conclusion of business, an address was given by Mrs. H. Lendrum whose subject was daffodils. On display was her outstanding collection of named varieties, including one hybridised by her father. The name given this specimen is 'Homai.'

Mr. Gaukrodger showed a film of the begonia gardens of Mr. Purdie, New Plymouth. The president expressed the thanks of members to Mrs. Lendrum and Mr. Gaukrodger for their contributions to the programme. Supper was served.

SOUTH TARANAKI

The four days' trip to Hawke's Bay for Blossom Week by members of the South Taranaki District Council of the Royal N.Z. Institute of Horticulture proved an outstanding occasion.

The 62 members of the party were all accommodated in Napier, and a shuttle service between Napier and Hastings was maintained.

With the considerable influx of visitors to Hastings, the ready co-operation of the Public Relations Officer, Mr. Ken Sparks, and the senior traffic officer, Mr. R. O. Wilkinson, contributed very materially to the success of the visit. On the Saturday over 80,000 persons were in Hastings, and the Traffic Department had to control over 20,000 motor vehicles. A number of special trains and fleets of buses converged on the city.

The South Taranakians had reserved one of the best stands in Hastings, and viewed the procession in comfort. The main procession was over a mile in length, and included over 70 excellent floats, over 20 bands and numerous teams of marching girls and special exhibits, humorous and artistic.

The Floral Festival, housed in the large Apple and Pear Board premises, was very good indeed. The outstanding item was an exhibit of cyclamen, polyanthus and camellias by Mr. A. Miller, of Taradale.

Thomas Cup Won

The Thomas Cup, for daffodils, was won by the South Taranaki president, Mrs. J. H. Anderson, Mangatoki.

Entertainments and games at Windsor Park proved interesting.

The Sunday was devoted to sight-seeing in the Napier area. The party visited the Look Out at the Bluff Hill reserve (recently made over by the military to the public), Anderson's Nurseries, where there are over 20 glass-houses, a commercial vineyard, the splendid private garden of Mr. A. Miller at Taradale and the city rose garden. Mr. Lennie, Superintendent of Parks and Reserves, acted as guide. In the Hastings area, the party was conducted by Mr. N. B. Fippard round features of interest, and the party was entertained by Mr. and Mrs. Miller and members of the Hastings Horticultural Society. The appreciative thanks of the visiting party were expressed by Mr. John Houston.

—HAWERA STAR, 17/9/58.

At a September meeting Mr. J. P. Salinger, Department of Agriculture, Wellington, addressed an audience of over 180 on his visit to the 15th International Horticultural Congress at Nice in April, 1958. This was the third conference held since World War II. and was attended by representatives from 41 countries. Mr. Salinger will be preparing a full report for publication in a later issue of this Journal.

WHANGAREI

Monthly meetings have been held regularly under the chairmanship of Mr. C. R. Ensor with Mrs. E. M. Sands (Secretary) and Mr. T. B. Lendrum (Editor of the monthly bulletin) in attendance.

At the July meeting of the Whangarei District Council, members learned, with sincere regret, of the death, at Auckland, of Mrs. Hilda Given, a Fellow of the R.N.Z.I.H. Mrs. Given was a foundation member of the Whangarei District Council and will sadly be missed from the meetings. She was a knowledgeable and practical horticulturalist who loved to share her love of a garden with all who were interested similarly.

The speaker for the month was Mr. J. S. Say who spoke on 'The Cultivation and Care of House Plants.' Some of the more important points mentioned were the importance of studying a plant's requirements in the matters of light, temperature, moisture and drainage, the correct soil mixture (7 parts of soil, 2 parts organic compost and 2 parts of river sand), the proper plant food (6 parts superphosphate, 4 parts sulphate of ammonia, 1 part of potash). Broadly speaking 1½ ozs. of this plant food can be used with a bushel of soil mixture. Measuring by volume, 2 parts of loam, 1 part leafmould or peat, 1 part coarse river grit is a good seed mixture, to which can be added 1½ ozs. superphosphate and ¼ oz. garden lime. The whole mixture should be put through a ½ inch sieve before being used. Drainage, firmness of soil, sowing of large and small seeds evenly, depth to sow, daily treatment and handling of seedlings were other interesting and important items dealt with. Mrs. R. S. Finch gave some interesting hints on the cultivation of kurume azaleas, and Miss Pitney handled a number of questions posed by members.

At the August meeting Mr. R. H. Allan gave an address on daffodils. Referring by name to varieties that were grown 27 years ago, emphasis was placed on the great improvements that have since taken place, both in the quality of the flowers and the length of the flowering season, which now extended from the second week of July until the end of October. The time of planting, depth and distance for the bulbs, suitable fertilisers (bone flour, bone dust and basic slag), combatting the narcissus fly, time for lifting were dealt with at length. The address terminated with details of some recommended varieties from the various divisions. A specimen table was organised by Mrs. F. A. Lees, assisted by Mrs. Dunsford and others. A question and answer service for members was handled by Miss Pitney.

'The Kitchen Garden' was the title of an interesting and informative talk given by Mr. R. L. Thornton at the September meeting. A firm believer in the use of compost, Mr. Thornton emphasised its value in producing nutritious vegetables. A plot sixty feet by 40 feet should provide vegetables all the year round for the average family. Feijoas were recommended for shelter. Full sun, good drainage, eighteen inches of good soil, the introduction of compost into the top layer, rotation of crop and the culture of certain vegetables were dealt with. The substitution of polythene for glass in a garden frame was recommended where glass was not available. The speaker answered numerous questions at the close of his address. A question and answer service was handled by Miss Pitney. Mrs. M. M. Martin wrote emphasising the beauty of two native shrubs in September and October, viz. *Pomaderris elliptica* (Golden Tainui) that grows well in clay banks between Waiwera and Orewa, and *Hebe diosmaefolia* with bright green leaves and corymbs of mauve flowers up to 4 feet. Both shrubs may be propagated by cuttings.

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OFFICIAL ANNOUNCEMENT

ROYAL NEW ZEALAND INSTITUTE OF HORTICULTURE INC.

THIRTY-SIXTH ANNUAL MEETING AND CONFERENCE OF DELEGATES

NOTICE IS HEREBY GIVEN that the THIRTY-SIXTH ANNUAL MEETING and CONFERENCE OF DELEGATES of the Royal New Zealand Institute of Horticulture Inc. will be held in the CENTENNIAL HALL, TIMARU, on THURSDAY, 12th FEBRUARY, 1959, commencing at 9.30 a.m.

K. J. LEMMON,
Dominion Secretary.

1959 BANKS LECTURE

The 1959 BANKS LECTURE will be delivered in the CENTENNIAL HALL, TIMARU, on THURSDAY, 12th FEBRUARY, at 8 p.m. The Lecturer will be Mr. A. W. ANDERSON, A.H.R.I.H.(N.Z.), of Timaru, and his subject will be 'THE BOTANICAL EXPLORATION OF CANTERBURY.'

Members and delegates from affiliated organisations are specially invited to attend both of these annual functions. The South Canterbury District Council has a full programme of events of distinct horticultural interest arranged for the period covering the Conference.

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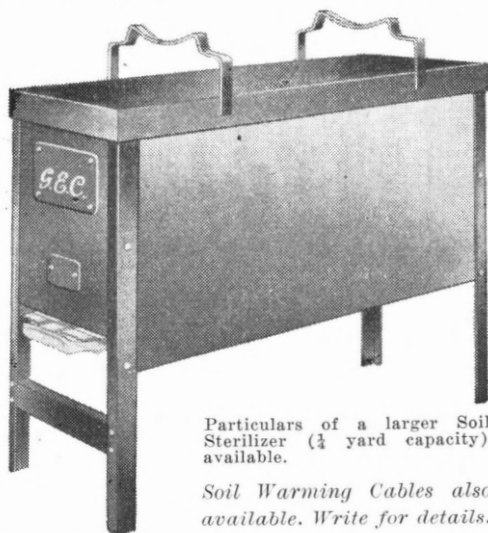
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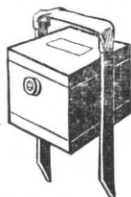
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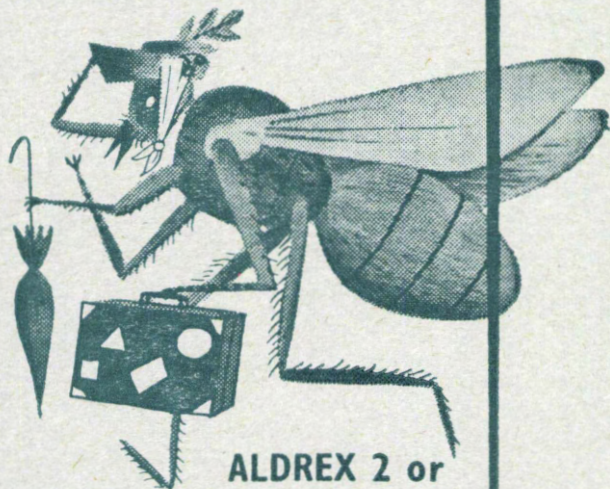
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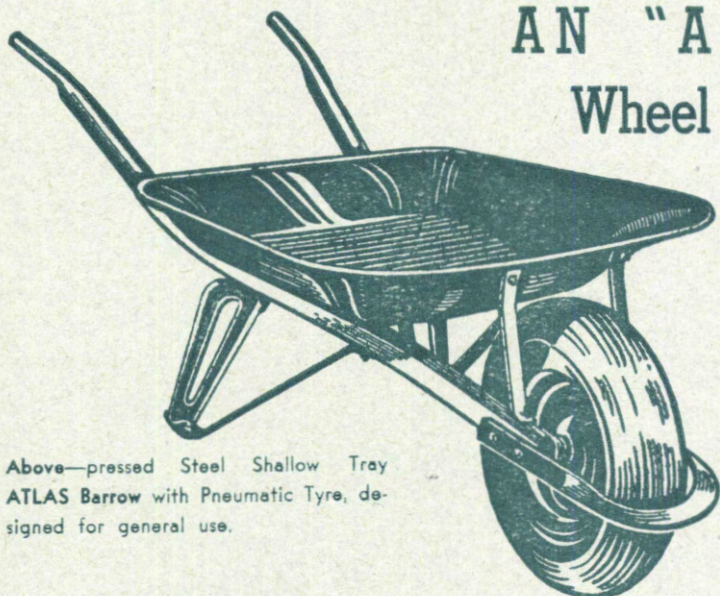
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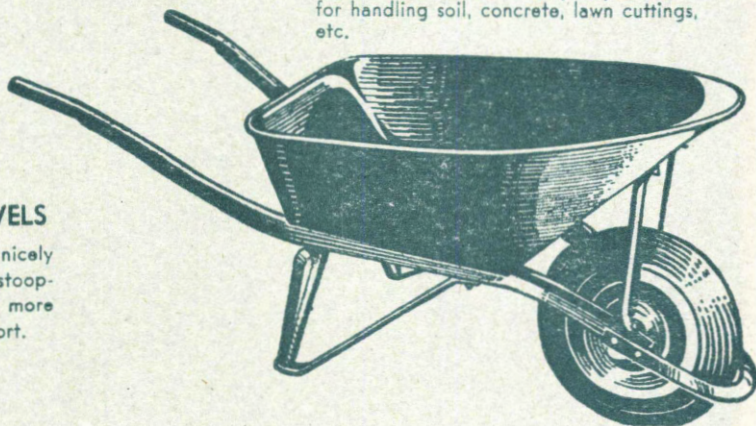
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