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Front Cover Picture:

Aciphylla colensoi var *maxima* (syn *A. scott thomsonii*) in a South Island mountain setting.
Photograph G. N. Bawden

The Origin of *Sophora* 'Gnome' and the Growth Habit of *Sophora* 'Earlygold'

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Introduction

In recent years there has been a proliferation of kowhai cultivars available from nurseries and garden centres; a count from the available literature reveals that eight forms have been given cultivar names (See Appendix 1 for a bibliographic checklist of *Sophora* cultivar names). These cultivars have been selected for early or late flowering, heavy flowering, and dwarf or weeping habit. New information on two cultivars is presented here; firstly, on the origin of *Sophora* 'Gnome' (Figure 1), and secondly, on the growth habit of *Sophora microphylla* 'Earlygold'.

The Origin of *Sophora* 'Gnome' Recorded History.

The known history of this cultivar has been documented by Mole (1970) and Godley (1984). It first appeared in cultivation in 1939 when Mr Walter Brockie planted two specimens at the entrance to the Cockayne Memorial Garden in the Christchurch Botanic Garden. These plants were given to the Garden by Mr Jack Baxter, who owned a New Zealand native plant nursery in Christchurch. Baxter obtained his stock from Ivory's Nursery at Rangiora which, in turn, was said to have obtained them from somewhere in Christchurch (Godley 1984), but the wild origin for the plants has never been established. The plant was not formally named and described until 1970 (Mole 1970). Mole's description notes that the stems arise in stool formation. Godley (1984) noted that *Sophora* 'Gnome' produces a lignotuber (a large woody swelling at the base of the first stem), usually more than half under ground, from which other stems arise. Godley (1984) concluded "The origin of our interesting cultivar is still a mystery".

Origin.

In the last year information has come to hand on the provenance of *Sophora* 'Gnome'. In 1970 Mr R.M. Greenwood, of Applied Biochemistry Division, DSIR, Palmerston North, visited Lord Howe Island where he collected seed of the local kowhai, *Sophora howinsula* (W.R.B. Oliver) P.S. Green. Greenwood distributed seed to Dr Eric Godley of Botany Division, DSIR at Lincoln, who was researching the inter-relationships and variation of New Zealand *Sophora* species, and to Mr Alan Esler, Botany Division, DSIR at Mount Albert, Auckland. Eight seeds were sown by Godley on 26 August 1970, which developed into healthy plants. Godley observed their leaf form and seedling growth to be like *Sophora* 'Gnome' but differing in the leaflet apices which are



Figure 1. *Sophora* 'Gnome' in flower at the Auckland Botanic Garden, Manurewa, during September 1989. (Photo. M Baldwin).

retuse in *Sophora* 'Gnome' and apiculate in the Lord Howe Island plants (Dr. E.J. Godley pers. comm.). Further comparison of *Sophora howinsula* to other forms of *Sophora*, including the cultivar 'Gnome', were not feasible until these plants matured and flowered.

For the next 19 years these plants grew at the Botany Division, DSIR experimental garden at Lincoln with the accession number G9314. During this time the plant numbers reduced from eight to three (four plants died and were discarded on 25 July 1977 and another on 8 September 1982). The remaining three plants matured, forming a distinctive stout and clumpy growth habit.

In September 1989, during a routine gardens inventory, three distinctly different kowhai were noticed. At first appearance these plants looked like *Sophora* 'Gnome': they had a distinctive lignotuber (Figure 2), short and stucky branches, larger than normal calices and petals, and a distinctive leaf fall at flowering time, which coincided with that of 'Gnome'. It is evident these three plants from Greenwood's Lord Howe seeds have characteristics very similar to *Sophora* 'Gnome'. These similarities suggest that the original stock of *Sophora* 'Gnome' came from Lord Howe Island. However, not all of the plants from Greenwood's seeds produced a lignotuber; a single plant grown

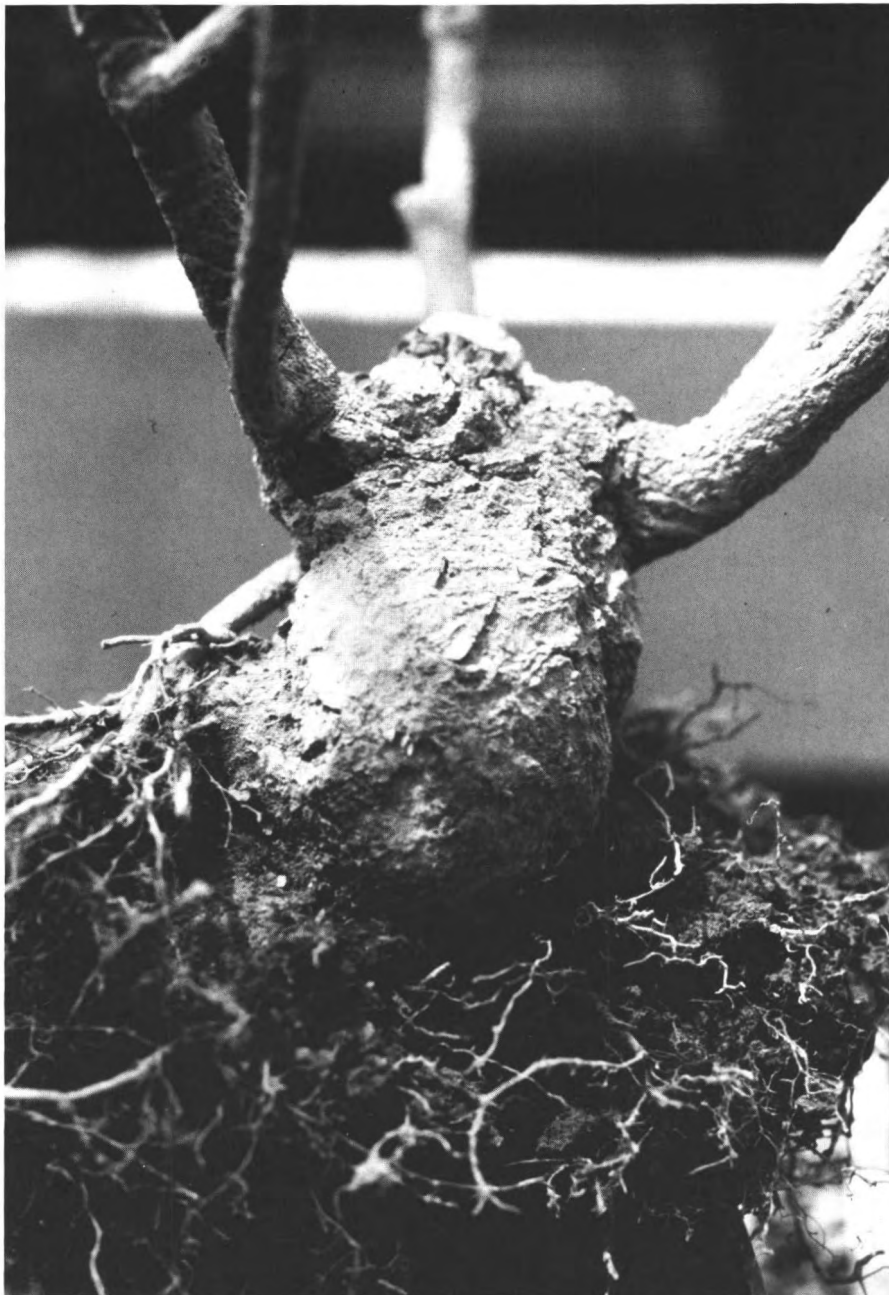


Figure 2. A distinctive lignotuber from a 20 year old plant of the Lord Howe Island kowhai growing at DSIR Lincoln. (Photo. P.B. Heenan).

by Esler lacks a lignotuber and has the upright growth form, more typical of *Sophora tetraptera*.

Given this interpretation, how did the original stock of *Sophora* 'Gnome' come to Christchurch, as few New Zealand botanists have visited Lord Howe Island?

One of the more significant visits to Lord Howe was that of W.R.B. Oliver who, from November 1913, spent ten months there studying the flora and fauna. Oliver is known to have lived in Christchurch (Salmon 1958; Pitt 1982) and was sponsored on the Lord Howe Island expedition by the Philosophical Institute of Canterbury (Oliver 1917) so it seems possible that he either brought or sent seed of the Lord Howe kowhai to Christchurch. This found its way to Ivory's Nursery in Rangiora and thence, via Baxter, to the Christchurch Botanic Garden in 1939.

Baxter (1928) wrote a short article in "Christchurch City Beautiful" on *Sophora*. Here, reference was made to the three New Zealand species, but no mention was made of any off-shore island forms. Apparently, in 1928 Baxter was not aware of the Lord Howe variety. Another early writer in "Christchurch City Beautiful" was Treadwell (1931), who wrote on the off-shore island forms of kowhai, but he made no reference to the plants from Lord Howe Island nor to forms with the habit of *Sophora* 'Gnome'.

Correct Nomenclature.

Today, the Lord Howe variety is widely cultivated in New Zealand and is known as *Sophora tetraptera* 'Gnome'. A later, and therefore synonymous, cultivar name is *Sophora tetraptera* 'Otari Gnome' (Harrison 1974). The information

presented here indicates that the placement of 'Gnome' as a cultivar of *Sophora tetraptera* is incorrect and that it should be placed under *Sophora howinsula* (W.R.B. Oliver) P.S. Green as follows:

Sophora howinsula 'Gnome'
(R. Mole, *Journal of the R.N.Z.I.H. N.S.* Vol. 2(1), 22-24 [1970] as *Sophora tetraptera* 'Gnome').

Syn. Sophora tetraptera 'Otari Gnome' (R.E. Harrison, *The Handbook of Trees and Shrubs* [1974]).

Because *Sophora howinsula* is endemic to Lord Howe Island which is Australian territory, this cultivar should now be regarded as an Australian native plant.

The Growth Habit of *Sophora microphylla* 'Earlygold' Selection.

This kowhai cultivar is a recent selection, having been released in 1986. Dr Eric Godley received the original seed from Mr B. Bell who collected it on Stephens Island in 1962. The seed was sown on 16 May 1962 and given the reference number "62/6" (the sixth line of *Sophora* seed Godley germinated in 1962; the experimental garden accession number is G5636).

From the seeds that germinated, three plants were grown on and planted in the long term experimental plots. By 1984 only two plants remained and in 1987 a further plant was removed to reduce overcrowding.

On 25 November 1975 Mr W.R. Boyce and Mr J. Goldie of Levin Horticultural Research Centre visited DSIR Lincoln and obtained cuttings of 17 different kowhai plants, of known provenance, from Godley's extensive collection. This material was used in assessing the horticultural potential of various forms of *Sophora* from throughout New Zealand and overseas. It included single collections of *S. tetraptera*, *S. prostrata*, a Chilean and a Chatham Island form of *S. microphylla* and 13 collections of *S. microphylla* from New Zealand.

Further material of these collections was dispatched to Levin on 26 January 1977 and 5 December 1977. Three forms were identified as being particularly suitable for amenity horticulture; these were selections of *S. microphylla* and were given the cultivar names 'Earlygold', 'Goldies Mantle' and 'Goldilocks' (information on the origin of each cultivar is given in Appendix 1).

'Earlygold' is a selection of Stephens Island kowhai which, in its natural habitat, grows on "very steep cliffs, forming prostrate mats less than 1 m high, with long, wiry, trailing and twining branches, a single stem may reach up to 10 m in length" (Walls 1986).

The flowering season on Stephens Island is long, with flowers recorded as early as 10 April in 1970 and as late as late-September in 1969 (Godley and Smith 1977). In cultivation at DSIR Lincoln a plant flowered from 29 April 1970 to mid-August 1970 and from late April to late

September 1974 (Godley and Smith 1977). 'Earlygold' was introduced to horticulture because of its prostrate habit and early but long flowering season.

The Growth Form of 'Earlygold'.

Advertising and plant labels accompanying *Sophora microphylla* 'Earlygold' regularly refer to it as "a dwarf kowhai for smaller gardens". Likewise, articles in the horticultural literature describe it as "small growing to make a dense pyramidal shrub" (Redgrove 1986) and "[differing] from the usual seed-grown lines of *S. microphylla* available because of its dwarf habit" (Butcher and Bicknell 1986). By contrast, Metcalf (1987) observed that "this cultivar has not been grown long enough to completely assess all of its qualities and there is a suggestion that after 15 years or so it may start to lose its semi-dwarf habit and become more upright". Metcalf's observation is supported by the only plant remaining of Godley's original collection, now 29 years old. Although it cannot be confirmed this is the plant 'Earlygold' was vegetatively propagated from, kowhai from a given locality usually have a similar habit and show little diversity of form.

The plants raised from seed in 1962 (Figure 3) were observed to be "not divaricating, dense branching, very leafy, bark stringy and green underneath . . . [with a] tendency for lower branches to grow long and upright" (Godley unpublished notes, c. 1963). Walls (1986) also noted that seedlings "initially grow upright but on reaching a height of about 30 cm begin to spread and form bushes". It is apparent from these observations that seed-grown lines of the Stephens Island kowhai have a distinctly upright, instead of a divaricating juvenile growth form and subsequently develop into dense, bushy shrubs and then bushy trees.

Figure 4 diagrams the branch structure of the remaining mature plant at DSIR Lincoln. The plant growth described is likely to be representative of how all Stephens Island kowhai, including 'Earlygold', will grow in cultivation. Two distinct types of branches occur; these can be termed 'primary' and 'secondary' branches. The 'primary' branches originate between 17 and 45 cm above ground level (a.g.l.), making it difficult to distinguish a trunk. One 'primary' branch grows erect (a) forming the central trunk, and giving the tree its ultimate height of 5 m. Two other 'primary' branches (b,c) diverge at angles of 25 and 45 degrees respectively and provide the tree its distinctive spread. These 'primary' branches support two forms of 'secondary' branches. The first is upright, spreading and bushy growth (d) that is an extension of the 'primary' branch. The second is distinctive weeping growth (e, f) that originates directly from the older, bare wood of the 'primary' branches, in the lower half of the tree. There are, in turn, two forms of weeping branches. Firstly, those that originate below 1 m a.g.l. (e), grow 3-6 m in length, droop to the ground within 1.5 m of the

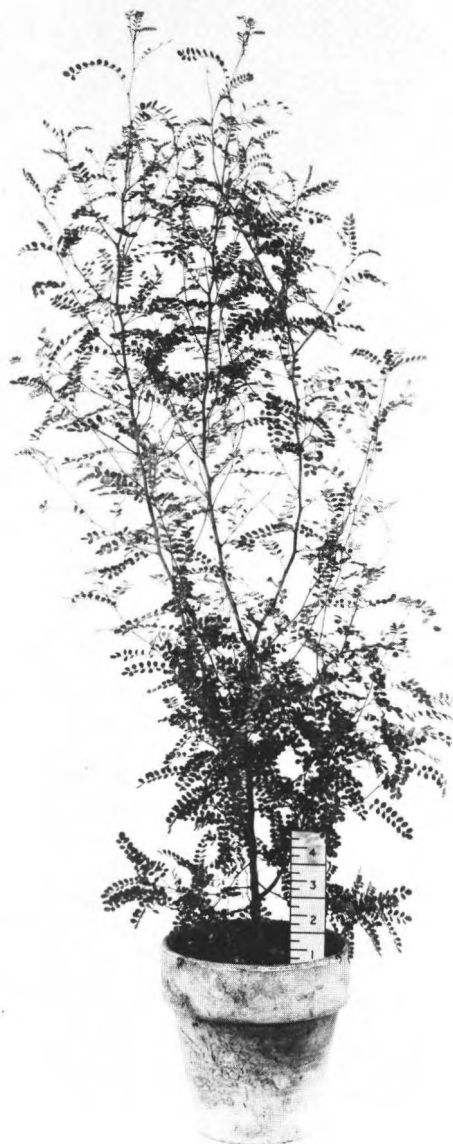


Figure 3. A 2 year 10 month old specimen of Stephens Island kowhai, raised from seed, with a distinctive upright habit. (Photo. C.J. Miles).

trunk, and grow along the surface of the ground, without rooting. Despite their length, their diameter rarely exceeds 5 cm. These prostrate branches form the low, dense canopy of foliage that gives the plant its wide, bushy appearance. The other form of 'secondary' branches originates 1-2.5 m a.g.l. (f) and, while distinctly weeping, grow to 1.5 m long and do not trail. The overall dimensions of this plant are 5 m high by 8-10 m wide.

Visually, the most significant feature of the plant illustrated is that it is well foliated from ground level which gives it a dense, bushy, thicket-like appearance. Redgrove (1986) and Butcher and Bicknell (1986) observed this shape, most likely on young plants, terming it "pyramidal".

Sophora microphylla 'Earlygold' was released commercially in 1986, so most plants in cultivation are less than 5 years old. However, during 1982, plants of *Sophora microphylla* "Stephens Island

form" were being sold at a Dunedin garden centre. In cultivation this plant appears to be very similar to 'Earlygold' and after 9 years one example is 2 m tall with a spread of 2.5 m. This figure is in keeping with growth rates documented for *Sophora microphylla* 'Earlygold' (Redgrove 1986; Butcher and Bicknell 1986). The overall dimensions, shape and habit remain in proportion as the Stephens Island kowhai matures; remaining broader than tall throughout its growth.

Conclusion.

The above descriptions indicate the growth form of the Stephens Island kowhai in cultivation is quite different from its growth form on Stephens Island and from other forms of *Sophora microphylla* in cultivation. Typically, *Sophora microphylla* develops into a small upright tree with a distinctive trunk and an erect primary branch structure. The secondary branches vary from erect to spreading to weeping,

and the foliage can be sparse or dense and bushy.

When compared with cultivated kowhais classed as dwarf or small growing, *Sophora* 'Earlygold' is a relatively quick growing plant with a bushy, spreading habit when mature. *Sophora prostrata*, a densely twiggy small shrub of the dry eastern areas of the South Island is the smallest of the cultivated kowhais. In cultivation *Sophora prostrata* forms a dense twiggy shrub about 1-2 m tall, but a specimen at the Christchurch Botanic Gardens growing in shade has formed a tall, open, straggly shrub up to 5.5 m tall. *Sophora howinsula* 'Gnome' is another cultivar widely grown as a dwarf. Mole (1970) gives the height of the tallest 25 year old plant at Otari Native Plant Museum as 1.4 m. Specimens at the Christchurch Botanic Gardens planted in 1939 are 3.8-4 m tall. The ultimate size and comparative growth rate of *Sophora* 'Earlygold' is greater than either of these so-called dwarf forms of kowhai.

From the evidence presented *Sophora microphylla* 'Earlygold' should not be described as a "dwarf" or "small" kowhai. Because of the dimensions it can attain it is not suitable for the small home garden. Its ideal landscape use would be as a tree for coastal amenity plantings, such as at the Esplanades of New Brighton in Christchurch, where it can spread and its dense, low growth would form excellent wind shelter. Also, because it is tolerant of sea spray, seasonal drought and growth in depleted soils on the Cook Strait Islands (Walls 1986) it is well suited to light, dry and sandy coastal soils.

This example illustrates the value of thoroughly trialling plants in various localities over a number of years so that when they are released commercially the accompanying information and advertising does not give misleading expectations of the plant.

APPENDIX 1

Checklist of *Sophora* Cultivars

This checklist of *Sophora* cultivars formerly or currently grown in New Zealand includes information on the author and place of publication of the name, a brief description and relevant synonyms. With the exception of *Sophora microphylla* 'Goldilocks', which is a selection of the Chilean kowhai, and *Sophora* 'Gnome', which is now regarded as being from Lord Howe Island, these cultivar names all refer to selections of endemic New Zealand plants.

Sophora howinsula 'Gnome'

(R. Mole, Journal of the R.N.Z.I.H. N.S. Vol. 2 [1] 22-24 [1970] as *Sophora tetraptera* 'Gnome').

Syn. *Sophora tetraptera* 'Otari Gnome' (R.E. Harrison, Trees and Shrubs for the Southern Hemisphere [1974]).

NOTES: Detailed botanical description given by Metcalf (1987). As discussed above this plant is now treated as a cultivar of *S. howinsula* and not *S. tetraptera*.

Sophora microphylla 'Chevalier' nom. illeg.

(H. Redgrove, New Zealand Gardener Vol. 42 [4] 30-31 [1986]).

Described as being "a specially bright and free flowering tree . . . [that] over the years has produced from seed an even line of trees having the same characteristics".

NOTES: As pointed out by Redgrove (1986) "it would . . . have been better to have propagated this form vegetatively" so that this cultivar referred to only one clone. Under the International Code of Nomenclature for Cultivated Plants 1980, Article 10, a cultivar name denotes an assemblage of plants which are clearly distinguished by any characters and which when reproduced retains its distinguishing characters. In cultivation plants grown as 'Chevalier' vary in their flowering time and density of foliage so this cultivar is

NOTES: See under *Sophora* 'Dragons Gold'.

In the published literature there is some confusion about the origin of 'Earlygold'. The New Zealand Plant Varieties Journal No. 12 (1982) in listing the application from the Levin Horticultural Research Centre for plant variety rights gives the breeders reference or temporary denomination as "Earlygold Stephen's Island 62/6"; 62/6 is the DSIR reference number so this indicates that this plant originated from Godley's collection at the DSIR. The full citation of the application is "Kowhai (*Sophora microphylla* Ait.) application number and date PV 3/18/6 1982-10-04 owner Horticultural Research Centre, MAF Breeders Reference or Temporary Denomination Earlygold Stephen's Island 62/6". In the New Zealand Plant Varieties Journal No. 17 (1984) the granting of



Figure 4. This diagrammatic representation of a 29 year old specimen of the Stephens Island kowhai, growing at DSIR Lincoln, shows the distinct low spreading and weeping branch habit. Letters are explained in the text.

not a uniform line. Therefore the cultivar name is illegitimate. The plants grown as 'Chevalier' were introduced by Mr B. Hago.

Sophora microphylla 'Dragons Gold'

(B.A. Jury, Horticulture in New Zealand Vol. 33, 11 [Spring, 1984]). Described as being "a very dense bush . . . evergreen and producing masses of gold flowers during the winter . . . the leaf form is small and dense".

NOTES: Very similar to *Sophora* 'Earlygold'. Should these two cultivars prove to be indistinguishable the earliest validly published name, *Sophora* 'Dragons Gold', takes precedence. This cultivar is a selection of the Stephens Island kowhai.

Sophora microphylla 'Earlygold'

(S.M. Butcher and R.A. Bicknell, Hort. Science Vol. 21 [5] 1253 [1986]). Described as having "pinnately compound leaves . . . about 95 mm long x 20 mm wide when mature and [having] 20-30 leaflets. The flowers have a lemon-yellow corolla with a green calyx and are produced in a loose raceme. Flowers about 25 mm across and 40 mm long".

plant selectors rights is made and the plant varieties application number PV 3/18/6 is given. This number corresponds with that listed in the New Zealand Plant Varieties Journal No. 12 (1982) where the origin is given as "62/6". Clearly, the plant that was granted plant variety rights originated from Godley's collection. However, in the publication that validates the cultivar name (Butcher and Bicknell 1986) there is no reference to the plant having been given to the Levin Horticultural Research Centre by Dr Godley from his collection at DSIR Lincoln. Here the origin is given as "a seedling selection . . . selected from individually marked tree . . . (on Stephens Island)". It appears possible that the Levin Horticultural Research Centre registered for plant variety rights a plant they obtained from DSIR but then later released plants that originated from their own collection on Stephens Island; consequently two separate clones may be involved here.

Sophora microphylla 'Goldies Mantle'

(H. Redgrove, New Zealand Gardener Vol. 42 [4] 30-31 [1986]).

Described as having "graceful pendulous

branches sweeping down with bright golden flowers in clusters”.

NOTES: This cultivar was released by the Levin Horticultural Research Centre. They obtained their original cutting material from Dr Godley of Botany Division DSIR on 25 November 1975. On the 26 October 1976 they had 9 rooted plants. The collectors reference for these plants is 61/12 and the plants originated from Ohingaiti. The cultivar name ‘Ohingaiti’ listed by Metcalf (1987) may be a synonym of ‘Goldies Mantle’.

***Sophora microphylla* ‘Goldilocks’**

(H. Redgrove, New Zealand Gardener Vol. 42 [4] 30-31 [1986]).

Described as having “abundant flowers which are a rich golden yellow on dark flower spurs . . . erect growing and commencing to flower in the first or second year after planting”.

NOTES: This cultivar was released by the Levin Horticultural Research Centre which obtained original cutting material from Dr Godley of Botany Division DSIR on 25 November 1975. On the 26 October 1976 they had 12 rooted plants. The DSIR Botany Institute experimental gardens accession number for these plants is G2068/17. The plants grown at the Botany Division DSIR were introduced to cultivation by Godley from seed collected at Chepu on Chiloe Island, Chile, while on the 1958/59 Royal Society of New Zealand Expedition to South America.

***Sophora microphylla* ‘Ohingaiti’**

(L.J. Metcalf, The Cultivation of New Zealand Trees and Shrubs, 309 [1987]).

NOTES: Metcalf (1987) states this cultivar was released by the Levin Horticultural Research Centre. However, S.M. Butcher (pers. comm.) has confirmed that the Levin Horticultural Research Centre has released only 3 cultivars of *Sophora microphylla*, ‘Earlygold’, ‘Goldies Mantle’ and ‘Goldilocks’. It is likely that this cultivar is a synonym of ‘Goldies Mantle’ which was original collected at

Ohingaiti, Wellington Land District.

***Sophora microphylla* ‘Te Atatu Gold’**

(Anon., Commercial Horticulture, 18 [December 1989]).

Described as being a selection of *Sophora microphylla* ‘Chevalier’ that “has a good upright habit, grew about 3 m high, flowered consistently and was a rather special gold colour. The flower clusters are good size. It flowers early and evenly over the tree . . .”.

***Sophora prostrata* ‘Little Baby’ nom. illeg.**

(H. Redgrove, New Zealand Gardener Vol. 42) [4] 30-31 [1986]).

Described by Metcalf (1987) as being no different from the usual form of *Sophora prostrata*.

***Sophora tetraptera* ‘Grandiflora’ nom. illeg.**

(Nairn and Sons Nurs. cat. [1906/07]).

NOTES: As Metcalf (1987) has pointed out this plant “is nothing more than a typical form of the species and consequently the epithet ‘Grandiflora’ should be dropped”.

***Sophora tetraptera* ‘Kiwi Gold’ Hort.**

NOTES: This cultivar name does not appear to have been published. Plants were available at Christchurch garden centres during 1990 as *Sophora* ‘Kiwi Gold’. Plants have not been seen in flower but it may prove to be nothing more than a typical form of the species.

***Sophora* ‘Treadwellii’ nom. illeg.**

(Nairn’s Nurseries Ltd. [undated catalogue] as *Sophora* ‘Tredwellii’).

NOTES: This name is a horticultural synonym of *Sophora microphylla* var. *longicarinata* (Allan 1961).

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I have been helped in this work by notes and observations made by Dr Eric Godley and his assistant Ms Diane Smith.

I thank Dr Allan Fife, Dr Phil Garnock-Jones, Dr Godley and Dr Warwick Harris for their comments and criticism of the draft manuscript and Sabrina Malcolm for drawing Figure 4. Dr Andy Thomson and Mr Ron Scarlet provided biographic information on Dr W.R.B. Oliver.

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Salvias at the Auckland Regional Botanic Gardens

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A salvia collection has been building up at the Auckland Regional Botanic Gardens for a number of years. It was relocated to a new site in October 1990 to consolidate and expand further. The new site receives plenty of sun, has a wooden fence on the southern and western sides for shelter from prevailing winds, and it is readily accessible to the public.

The soil, a heavy clay, has been improved by the addition of pumice and horse manure. The border is approximately 55 metres long and 5 metres wide, with plenty of room for expansion as required. We have since extended the border this winter, in anticipation of new additions from seed sown in Spring 1991.

Salvias were first suggested as a suitable plant group for a formal collection by the Herb Federation of New Zealand because of the number already being grown at the Gardens. An initial 12 Salvias were first grouped in April 1988. Since that time seeds and plants have been donated or purchased from overseas and New Zealand sources, especially from Herb Federation members.

The collection now includes around 100 salvias ranging from annuals and biennials through herbaceous perennials to shrubby species reaching three metres in height. They also vary widely in their flower colour, foliage, texture and fragrance.

The collection is extremely popular with the public who are interested in the variation within the genus as well as being attracted by the colour the flowers provide for most of the year. The peak flowering period is in late autumn when few other plants are in flower. Many salvias have subsequently been introduced into other areas of the Gardens.

Comprehensive plant records are kept, including a photographic record, and voucher specimens are being sent to the Auckland Institute and Museum Herbarium.

An advisory leaflet entitled "Salvias for Auckland Gardens" has been compiled by the Garden's Perennial Plant Evaluation Panel. This recommends 20 salvia species and cultivars which have proven to be especially suitable for ornamental use.

Salvias from North, Central and South America, and southern Africa have performed particularly well to date. They appear to be far more tolerant of Auckland's high winter rainfall and typical heavy soils than many European and Asian species. Many of the American species are particularly showy garden plants.

Promising New Introductions

The following new introductions are

especially promising as ornamentals:

Salvia amplexicaulis is an attractive herbaceous perennial about which information is scarce. It reaches 70cm high by 40cm wide. Lilac-coloured flowers appear on stems which arise from a basal rosette in flushes from early summer through to late autumn. It tolerates heavy soils and requires staking.

S. aurita Thunb. from Southern Africa occurs naturally from the East Cape to Transvaal, where it grows on streambanks (Goldblatt and Bond, 1984). It is a straggling to erect perennial reaching 45cm high by 50cm wide. It is somewhat woody at the base with pale blue flowers which fade. It is tolerant of heavy soils and it flowers in flushes from early summer until late autumn.

S. Azurea Lam. var. *grandiflora* Benth. (syn. *S. azurea* var. *pitcherii* Torr. and Benth.; *S. pitcherii* Torr. and Benth.) (Bailey and Bailey, 1976) is commonly known as glue sage or azure sage, and is native to the more western part of South Carolina, Florida and Texas range. It is finer than *S. azurea* with more blooms which are larger.

S. "Bluebird" is a plant that was brought into New Zealand by Ross King around 1981 as "bright blue salvia, many flowers, 5-6 ft, from the Oaxaca region (of Mexico) where the mountainsides are covered in blooming sages" (Hudson, 1981). I have dubbed it "Bluebird" until it is correctly identified. It is a magnificent sight when smothered in tiny flowers from Autumn onwards, peaking in mid-winter. It reaches about three metres high when staked and has been undamaged by frost. Information on the true identity of this selection would be welcome.

S. 'Burning Embers' (syn *S. 'Alan's Maroon'*) is a brittle, upright bush which resembles *S. splendens* in habit but is taller. Calyces are blood-red as are the corollas, which have scarlet lips. It tolerates shade but not heavy frost.

S. coccinea Juss. ex Murr. (Texas sage, scarlet sage) (Bailey and Bailey, 1976) is native to Southern Carolina, Florida, Texas and tropical America (Everett, 1981). This is a very showy bushy perennial to one metre tall which bears masses of scarlet flowers from late spring onwards, flowering through winter if frosts permit. They are easily grown from seed and self-sown seedlings often appear. The collection has recently obtained a two-toned form which is probably 'Bicolor'. A very attractive white-flowered cultivar is apparently also available. *S. coccinea* has been used in the Garden's summer perennial displays.

S. forskahlei L. is native to Bulgaria, Thrace and the Black Sea coastline of Turkey (Synge, 1969). This is a herbaceous

perennial to one metre tall sending up, from within the large hairy basal leaves, inflorescences of purple flowers with white throats, which are attractive to bees, butterflies and evidently hummingbirds (Clebsch, 1990). This species has been added to the Garden's Rock Garden plantings.

S. guaranitica St. Hil, ex Benth. (syn *S. ambigens* Briq.) (Bailey and Bailey, 1976) (syn *S. coerulea* Benth.) (Synge, 1969). This is an upright perennial with tuberous roots. It bears beautiful royal blue tubular flowers which the bumblebees love, over glossy heartshaped leaves. It flowers from January to June peaking in late February to early May. It is native to Brazil, Paraguay and Argentina (Bailey and Bailey, 1976).

S. hydrangea is an attractive low-growing herbaceous perennial about which information is scarce. It has potential as a cottage or rock garden plant. It bears pink flowers from January through to early May.

S. moorcroftiana Wall. is native to northwestern Himalaya (Synge, 1969). This is a herbaceous perennial with attractive leaves, hairy above and white-woolly below. It reaches 60cm when carrying its pale pink flowers from late spring until early summer. It tolerates Auckland's wet winters.

S. repens Burchell ex Benth. is a southern African perennial (Goldblatt and Bond, 1984). It is commonly known as creeping sage or small sage (Roberts, 1990). It bears pale blue flowers for long periods on 45cm tall plants. It suckers, and tolerates wet soils.

S. scabra L.f. is also native to southern Africa (Goldblatt and Bond, 1984) and tolerates heavy soils well. It has a low shrubby habit, bears flushes of lilac-coloured tubular flowers and responds well to being clipped.

S. x sylvestris L. (syn. *S. nemorosa* L.r. x *S. pratensis* L.) (Bailey and Bailey, 1976) is a very attractive perennial growing up to 75cm tall and bearing beautiful deep violet-blue flowers in flushes throughout the year including winter. It tolerates heavy soils.

S. taraxicifolia Coss. is from Morocco (Synge, 1969). This is a herbaceous perennial with grey dandelion-shaped leaves in a rosette, sending up pale pink flowers. It is a petite plant particularly suitable for a rock garden. It may succumb to excessively wet conditions.

S. verticillata L. (lilac sage) comes from southern and eastern Europe to Asia (Bailey and Bailey, 1976). A herbaceous perennial with velvety leaves, it combines attractively with the tiny lilac flowers carried in whorls. These appear from late

November to early April, peaking in summer. It will frequently self-sow. At the Botanic Gardens it is included in a bed of interesting foliage plants for this summer's perennial display.

S. virgata Jacq. (Synge, 1969). A lot of confusion surrounds this name. Some books list it as a synonym of *S. superba* but in my experience the two appear to be quite different. It is a long-flowering herbaceous perennial bearing attractive spires of violet flowers in flushes throughout the year.

Outstanding Salvias

Outstanding salvias that have been grown reliably for many years include:

S. 'Black Night' is an upright shrubby perennial with brittle stems, and corollas and calyces that are deep purple, almost black.

S. elegans Vahl. (syn *S. rutlians* Carriere) (Bailey and Bailey, 1976). The pineapple sage is a well-known plant which produces an abundance of red tubular



Fig. 1. *Salvia coccinea*.

flowers which are very popular with bees. It may flower all year round in a warm corner of the garden, usually peaking in autumn. The foliage has a distinctive pineapple fragrance. Eventual height is about 1.6 metres.

S. grahamii Benth. (Bailey, 1958) may be synonymous with *S. microphylla* var. *neurepia*. It is a twiggy shrub up to two metres which carries red flowers above attractive foliage for most of the year.

S. involucrata 'Bethellii' (Synge, 1969) is a showy perennial which grows to about 1.2 metres, is woody at the base and is commonly known as rosy-leaf sage. It flowers from early December until late July, peaking for 25 weeks. It may require staking in windy situations. The flowers,

buds and the puffy bracts which enclose them are all rich pink.

S. leucantha Car. (Mexican bush sage) is a shrub native to Mexico (Bailey and Bailey, 1976) which bears pale lilac flowers within velvety sprays of violet calyces. They appear from summer until early winter on woody stems which bear narrow grey-green leaves with white undersides. It requires staking and full sun.

S. mexicana L. is another native to Mexico (Bailey and Bailey, 1976). Sometimes it is known as chia by the Indians, who ate the seeds for sustenance (Cozart, c. 1985). It is an autumn-flowering perennial species which has purple flowers that contrast attractively with lime green calyces. It is a brittle plant growing to 1.5 metre. Birds enjoy the seeds.

S. uliginosa Benth. (bog sage) is a herbaceous perennial native to South America (Bailey and Bailey, 1976). It bears masses of azure blue flowers from early December to mid-May, peaking for eleven weeks. It reaches a height of two metres and should be cut to ground level for the winter. It is tolerant of heavy soils, as the name suggests. It requires staking.

Uncertain Origins

There are also a number of salvias which apparently have been grown in New Zealand in the past. I would like to hear from anyone with further information on the following:

R.E. Harrison's "Bulbs and Perennials" (1963) mentions *S. azurea* and also a cultivar called 'Summer Skies', "recently" introduced from Europe, which finishes flowering a month before *S. azurea* commences blooming.

A specimen of *S. runcinata* is held at the Auckland Institute and Museum Herbarium. It was collected by K. Wood at Takatu Point Reserve in Rodney County in 1957.

S. barbatus has formerly been grown in New Zealand. George Rainey used to grow it, and sell from his Auckland nursery. It is evidently a shrubby species with blue flowers and fairly large roundish leaves. It must be around in an old garden somewhere.

I would like to hear from anyone who is growing a dark purple-flowered form of *S. canariensis* which was grown by M. Reed at his home in Meadowbank, Auckland.

Also, there is a *Salvia* available by the name of *S. 'Red Dragon'*. It is an attractive perennial, woody at the base, with flowers 5 cm long which are covered in dense velvety red hairs. I had thought it to be *S. gesneriiflora* but I now understand that species grows much taller. It has similar flowers but softer, hairier foliage than *S. 'Red Dragon'*. 'Red Dragon' was evidently a name that Parva Plants Nursery gave the plant.

S. 'Black Knight' has a similar background. Parva Plants also introduced this plant and possibly named it.

S. 'Burning Embers' is a name that was possibly given by Palmers Nursery, when they grew it in the 1940s and 1950s.

Later it appeared in gardens around Auckland, when the late Hugh Redgrove gave it the name 'Alan's Maroon' (Redgrove, 1989) as he was unable to locate a correct name at the time. I am still looking for printed confirmation of the name 'Burning Embers'.

There is another perennial *Salvia* available in NZ which bears scarlet flowers 5 cm long in winter and spring. They are less hairy than those of *S. 'Red Dragon'*, and even brighter in colour. The foliage is larger and paler green. The plant is taller than *S. 'Red Dragon'*, is woody at the base and suffers frost damage. It tolerates shade and dry conditions. It seems to fit the descriptions of *S. fulgens* but *S. fulgens* flowers in late summer (Synge, 1969).

Other Salvia Collections

Another salvia collection is held at Marshwood Gardens, in Invercargill. The two collections complement each other. The differences in soil, site and climate allow a wider range of plants to be grown between the two collections. Duplication of material is a safeguard against its loss. It is also invaluable for collection holders to be able to correspond, compare notes and swap plants with others who also share a special enthusiasm for that group of plants.

A salvia collection is held in Britain by:

Mr. and Mrs P Vlasto
Wyke End
20 Belle Vue Road, Weymouth
Dorset UK DT9-8RY, England.

The Herb Society of Victoria, Australia has also established a salvia collection, held in the gardens of a number of members. Contact people are:

Miss Helen Fallshaw
15 Marina Parade
Mentone, Vic. 3194, Australia

Mr L R (Ray) Boatman
35 Terry Avenue
Belgrave, Vic 3160, Australia.

Some sources of salvia seed:

Southwestern Native Seeds
PO Box 50503
Tucson
Arizona 85703
USA

Chiltern Seeds
Bortree Stile
Ulveston
Cumbria LA12 7PB
England

Thompson & Morgan
London Road
Ipswich
Suffolk
England IP2 OBA

Kings Seeds
PO Box 19-084
Avondale
Auckland, NZ

J L Hudson, Seedsman
Ethnobotanical Catalogue of Seeds
PO Box 1058
Redwood City
California, 94064
USA

The RHS Garden, Wisley
Woking
Surrey
GU 23 6QB
England

The salvia collection at the Auckland Regional Botanic Gardens is one of a number of National Reference Collections of generic plants initiated and promoted by the Herb Federation of New Zealand. All available species and most cultivars are to be included in these generic collection whether they are herbal or not.

These objectives are supported by the RNZIH with its broader concept of a NZ Plant Collections Scheme which aims to co-ordinate the establishment of a series of plant collections throughout the country.

The scheme is to set standards, encourage collectors, publicise collections and help with access to plants and information.

The holding of collections of plants at the Regional Botanic Gardens fits into its role as a focal centre for the study and enjoyment of plants in the Auckland region. This includes the dissemination of plant material and information and educating the public about plants that are suitable for growing in the region. The holding of the *Salvia* collection has contributed to the character and interest of the Gardens.

The leaflet "Salvias for Auckland Gardens" is available from the Information Centre of the Gardens.

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Etiolation to Improve the Rooting of Cuttings

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Excluding light from shoots to encourage rooting is a usual practice in plant propagation. The most common cloning methods, e.g. layering, stooling, and cuttings, involve keeping light from that part of the plant the propagator hopes will form roots.

The procedure of etiolation, which involves growing plants in the dark, has created much interest in recent years as it appears to increase the rooting percentage of cuttings, particularly with species which are difficult to root. One of the earliest reports of etiolation being used as a cutting propagation method is that of Reid (1923). Reid credits L.B. Stewart, Royal Botanic Garden, Edinburgh, with the discovery that etiolation improved the rooting of cuttings.

The proper definition of etiolation is the development of plants or plant parts in the absence of light. Etiolation can cause such changes as small unexpanded leaves, elongated shoots, and a lack of chlorophyll in leaves, giving a yellowish or whitish colour. The term etiolation, however, when used by the plant propagator also refers to forcing new shoot growth under conditions of heavy shade.

The basic etiolation process involves shading a stock plant at bud break so it forms etiolated shoots that can be used as cuttings. These cuttings have been

shown to root more readily than those from shoots grown under normal light.

There are five stages that make up the etiolation process: etiolation of stock plant; inspection during etiolation; greening up, banding, and propagation (Fig. 1). The simplest way to etiolate a stock plant, either growing in the field or in a greenhouse, is to place a wooden frame covered with black polythene over the plant at bud break so that the plant is kept in darkness.

It was once thought that to successfully etiolate a plant total light exclusion was necessary, but research has proved this to be incorrect. Scientists at the East Malling Research Station, UK, tested a range of shading and found no decrease in rooting percentage, with up to 20% transmission of light. Even 70% shade promoted rooting to levels 25% greater than that of light grown controls.

The shade frame is left in place until the etiolated shoots reach a suitable size for cuttings. The time required varies between plants and the size of cuttings needed. For example, the apple rootstock, Malling IX, is covered for about four weeks and by this time the shoots are approximately 100mm long.

Regular inspections of the covered stock plant must be made as pests and diseases can thrive in the warm humid conditions

created by the shade structure. The incidence of pests and diseases can be reduced by improving the ventilation under the shade frame. Small slits can be made in each end wall and then covered by a further piece of polythene arranged to exclude light but not air.

When the etiolated shoots have reached a suitable size for propagation the shade frame can be removed to allow the shoots to green-up. To prevent the succulent new etiolated shoots from getting scorched by the sun, the shade frame must be removed in steps. The best way to do this is to slowly lift up the polythene from the bottom of the shade frame over a period of two weeks, by which time the shoots will have regained colour.

Applying bands to newly etiolated shoots before they are allowed to green-up is carried out on some plant species. This involves wrapping black adhesive tape, or more commonly in recent years, "Velcro", around that part of the shoot that is to become the cutting base. The band, once fitted, allows the shoot to green-up while the stem or shoot base retains its etiolated state and thus will give improved rooting. With longer shoots, when only a few nodes and leaves are needed for each cutting, several bands per shoot can be used.

When etiolated shoots are banded the shoots are usually left to harden and green-

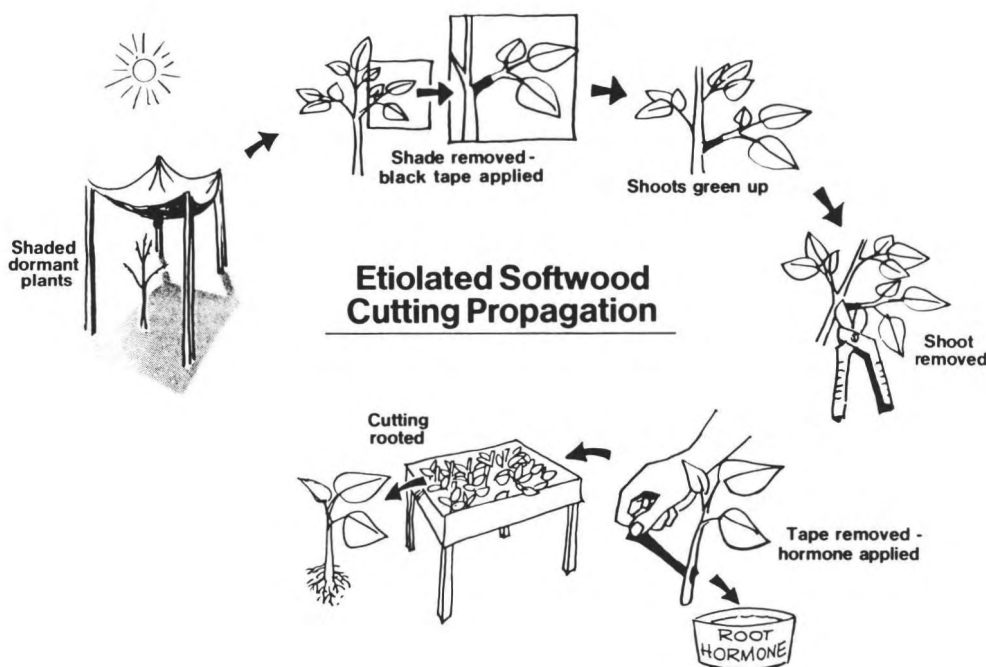


Figure 1. A graphic representation of the stock plant etiolation method (Bassuk et al. 1985)

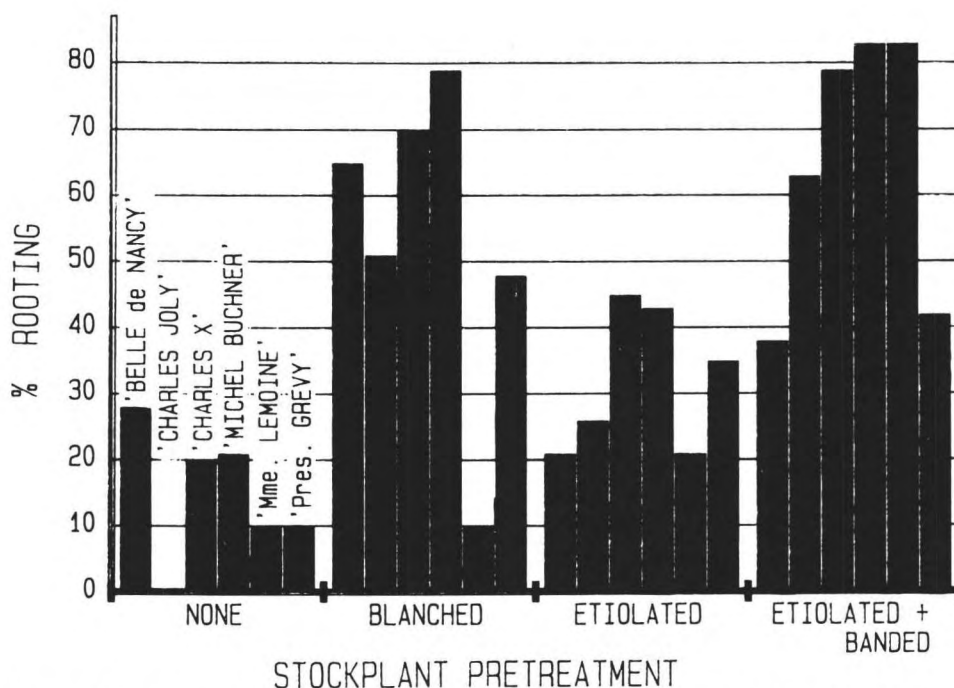


Figure 2. Effect of etiolation and banding pre-treatment on the rooting response of lilac cuttings (Davis et al. 1988)

up for six weeks before cuttings are taken.

Banding greatly increases rooting percentage of some plants, e.g. *Syringa vulgaris* cultivars and *Fagus sylvatica*, but for others the benefit is small, e.g. *Pinus strobus*. Banding may be also carried out on shoots that have developed in the light, and this is called blanching. The difference between etiolation and blanching lies in whether the shoot gets any light at all. With etiolation, shoots grow in the dark; with blanching, shoots grow in the light at first but are then either placed entirely in the dark or only part namely the shoot base as with banding.

The positive effect of etiolation and banding pre-treatments on the rooting response of six lilac cultivars is shown in Fig. 2. With the etiolated treatment, stock plants were grown in 99% shade before cuttings were taken. Bands were applied after two weeks to the light grown blanching treatment, and the dark grown, etiolated and banded treatment. The bands were left in place for four weeks prior to taking cuttings. Light grown unbanded cuttings served as the control. (Davis, Haissig and Shankhla, 1988).

Etiolated cuttings are most commonly propagated in a greenhouse under mist because of their softness and shading may be required if light levels are too high. A bottom heat temperature of 20°C is usually adequate for propagation.

Etiolated material can be very sensitive to root-promoting chemicals. For example, some plant species may require levels as low as 250ppm indolebutyric acid (IBA), although most species are treated with 2,500ppm IBA applied as a 50% alcohol quick dip. Plants that are banded using

“Velcro” can have root-promoting chemicals applied to the stem via the band. To apply, the “Velcro” bands are pressed into a layer of powdered chemical in a dish, and then pushed onto the stem. Adding chemicals through the band gets the rooting process under way while the shoot greens-up, and causes the banded section of the stem to become swollen or callused before the band is removed. With some plant species, e.g. *Carpinus betulus*, roots can form under the band, giving a rooted shoot even before the shoot is removed from the stock plant.

A problem many researchers have attempted to solve is how etiolation affects rooting. The most obvious changes that are evident with etiolated shoots are related to their physical appearance. Etiolated shoots, unlike shoots grown under normal light, have a chlorotic appearance due to a lack of chlorophyll, increased internode length, and decreased mechanical strength of stem tissue. While we can see the effects of etiolation on plant shoots, the reason it improves the rooting percentages of these shoots is very vague. One theory put forward by Herman and Hess (1963), and Kawase (1965), was that etiolated tissue had higher auxin activity compared to tissue grown under normal light. More recent reports, e.g. Tillbury (1974), and Kawase and Matsui (1980), disagree with this theory.

Another theory is that etiolated shoots have thinner cell walls and lack the continuous fibre sheath found in light grown tissues, making them easier to propagate. Many other researchers disagree with this theory.

It is obvious that more research is needed before we will know how etiolation

improves the rooting of cuttings. At the present time propagators can continue to make use of the etiolation effect on otherwise difficult to propagate plants without fully understanding the physiological basis of the process.

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A History of the Nursery Catalogue Collection, DSIR Library, Mt Albert

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(Based on a paper delivered at the Annual Conference, RNZIH, May 1991.)

Over a period of years a collection of nursery catalogues has been assembled by the DSIR Library, Mt Albert Research Centre. The author's particular interest in the topic was first stimulated by noting correspondence between former DSIR pomologists containing references to early nursery catalogues. Letters between Dr Don McKenzie, Havelock North Research Orchard and Mr Bert Farmer, Mt Albert Research Centre included photocopies of apple variety lists from catalogues held in the Turnbull Library.

Many of these lists were undated and did not contain any bibliographic information to identify the year of publication, but they are the basis of the collection which was started by the DSIR Library at Mt Albert. Bert Farmer had also collected many catalogues during the forty years he worked for the DSIR as a stonefruit pomologist, and these are now in the collection.

The catalogues of Bert Farmer were mainly from New Zealand nurseries, but since the 1980s we have also collected items from overseas nurseries, particularly the USA, United Kingdom, Australia and Japan.

The Catalogues

The collection contains over 1000 items and has grown rapidly over the last 10 years since 1981. The earliest catalogue in the collection is from David Hay and Son's Montpellier Nurseries, Auckland, dated 1875. I decided to try and obtain a better representation of specialist horticultural catalogues, by writing to individual nurseries listed in gardening magazines held in the DSIR Mt Albert Library. I received an excellent response and many nurseries now send catalogues each year.

In order to obtain a broader public awareness of the collection, I wrote letters to various NZ horticultural magazines and also to the *NZ Women's Weekly*. The latter journal wanted to do a story on the collection which was duly published in March 1987. Boxes of catalogues flooded in from all over New Zealand, and I am still receiving letters to this day. For example, one arrived several weeks ago from a reader in Thames who was going through back copies and thought I might be interested in the catalogues she has. We certainly are interested in such contacts.

Not all the items which arrived have yet been sorted. Many duplicates of items held were received but we also obtained some valuable catalogues, particularly of nurseries in the Auckland area.



Figure 1: A horse drawn pump illustrated in a Red Bluff Orchard catalogue. 1909/1910

Three of particular local interest are:

1. General Catalogue of 1935-36, from Bella Vista Nursery, Herne Bay, Auckland, J. Johnston and Son (Proprietors).
2. W. Meckle and Son's 1939-40 Catalogue from New Lynn, Auckland.
3. W.E. Lippiatt 1926 Catalogue of Roses from Otahuhu, Auckland.

How did I know if we were the only holders of a catalogue? The answer is I did not, and so it was decided to try and stimulate interest in creating a Union List of catalogues held in New Zealand. I wrote an article published in *Library Life* 1987 suggesting the setting up of a Union Catalogue of the items held in libraries throughout NZ. The Union list would be housed at the National Library, Wellington and would give all New Zealanders access to the holders of Nursery catalogues via their own library.

The idea was accepted by the libraries holding catalogues and I thought also by the National Library, but my first and only posting of records to the National Library came back to me via the DSIR Library Centre with a note attached saying the items were "too specialised" for the National Library Union Catalogue.

I think the collection of this type of material is important to horticultural historians and plant breeders alike so that the introduction and breeding of plant species can be traced in New Zealand.

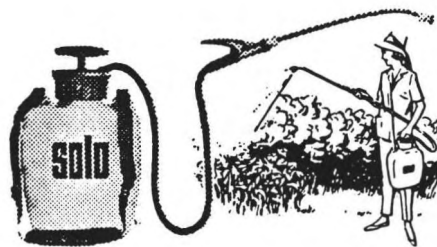
While nurseries are primarily businesses set up to sell plants, and the cultivars named do not always correspond to the label, the information on species cultivated and cultivars offered for sale give us a deeper insight into the purchasing of plant material by the New Zealand gardener, an insight that cannot be gained from any other source. It is possible to determine which long-lived plants were purchased by looking at gardens but for perennials and annuals it only by looking at the catalogues that we can see which plants were available for sale during a particular period.

Interesting Features from the Collection

There are items which are of general interest in these catalogues. For example, a Red Bluff Orchard catalogue of 1909/10 shows a horse drawn spray pumping machine, needing one man to pump while two others spray the fruit trees (Fig. 1). Notice the lack of protective clothing for both man and horse.

From the 1960s we have several catalogues which tend to specialise in equipment for the grower e.g., E. C. Geiger Catalogue, 1967 (Fig. 2). This is a hand-held spray pump suitable for "ladies". The 1960s also seemed to introduce a period giving the client better information about foliage, height or colour of flowers.

HAND SPRAYERS



A 2 1/2 gallon capacity, side hand sprayer which has all the features of the knapsack sprayer. A translucent tank with gauge lever for spray material. Large filler cap with screen. Shoulder strap for easy carrying. Completely made of plastic with spraying wand and shut off valve. Also can be used for growth retardants which are very corrosive.\$27.95

Double Nozzle 5.50
50" Extension 6.50

Figure 2: A hand-held pump suitable for ladies. E. C. Geiger catalogue. 1967

Fig. 3 is from a Duncan and Davies 1960 Catalogue. Catalogues also tended to display vases of flowers.

From Stark Brothers Fruit Trees, Roses and Shrubs Catalogue, 1970 there is evidence of the sales technique of a "sprat to catch a mackerel" e.g. "Special" 99c for a fruit tree, shrub or rose (Fig. 4).

Into the 1970s and 1980s the catalogues have become much more sophisticated as they are often selling to buyers who are overseas. For example, Komachien

Co. Fruit Trees 1990/91 Catalogue is of Japanese Nashi fruit (Fig. 5). There is emphasis on the product of the species, i.e., the fruit rather than showing the shape or size of a particular fruit tree or shrub.

Another interesting catalogue is from Glen Saint Mary Nurseries Co., Florida 1918 which used many colour photos including one of pecan nut varieties (Fig. 6). This catalogue was previously owned by H. R. Wright a prominent nurseryman

Shrubs and Trees with Variegated Foliage

- | | |
|---|--|
| <ul style="list-style-type: none"> ACER NEGUNDO ARGENTEO VARIEGATUM ACER NEGUNDO ELEGANTISSIMUM AUCUBA JAPONICA CROTONOIDES AUCUBA JAPONICA VARIEGATA BUDDLEIA DAVIDII VARIEGATA CAMELIA JAPONICA FRANCOIS WLOT *COPROSMA WILLIAMSII VARIEGATA DIERVILLA FLORIDA VARIEGATA DURANTA PLUMIERI VARIEGATA EUONYMUS JAPONICUS VARIEGATUS FATSIEDERA LIZEI VARIEGATA *GRISELINIA LITTORALIS VARIEGATA *HOHERIA POPULNEA ALBA VARIEGATA *HOHERIA POPULNEA AUREA VARIEGATA HYPERICUM MOSERIANUM TRICOLOR LIGUSTRUM LUCIDUM TRICOLOR LIGUSTRUM OVALIFOLIUM ELEGANTISSIMUM LIRIODENDRON TULIPIFERA AUREO MARGINATUM | <ul style="list-style-type: none"> *MACROPIPER EXCELSUM VARIEGATUM *METROSIDEROS TOMENTOSA VARIEGATA *PHORMIUM COLENSOI TRICOLOR *PHORMIUM TENAX VARIEGATA *PISONIA BRUNNONIANA VARIEGATA *PITTIOSPORUM EUGENIOIDES VARIEGATUM *PITTIOSPORUM EUGENIOIDES VARIEGATUM MINIMUM *PITTIOSPORUM RALPHII VARIEGATUM *PITTIOSPORUM TENUIFOLIUM SAUNDERSII *PITTIOSPORUM TENUIFOLIUM GARNETTII *PITTIOSPORUM TENUIFOLIUM ROTUNDIFOLIUM THUYA VERVANEANA *VERONICA ANDERSONII VARIEGATA *VERONICA CARNEA VARIEGATA *VERONICA SPECIOSA VARIEGATA |
|---|--|

Shrubs and Trees with Purplish Foliage

- | | |
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| <ul style="list-style-type: none"> ACER PALMATUM ATROPURPUREUM ACER PALMATUM DISSECTUM ATROPURPUREUM ACER PALMATUM HILLIERI ACER PALMATUM NIGRUM ACER PALMATUM SEPTEMLOBUM RUBRUM ACER PALMATUM SUMINAGASHI ACER PLATANOIDES SCHWEDLERI BERBERIS THUNBERGII ATROPURPUREA BERBERIS THUNBERGII ATROPURPUREA SUPERBA *BRACHYGLOTTIS RANGIORA PURPUREA CATALPA HYBRIDA PURPUREA *CORDYLINE AUSTRALIS PURPUREA *CORDYLINE BANKSII PURPUREA DIERVILLA FLORIDA PURPUREA *DODONAEA VISCOSA PURPUREA FAGUS SYLVATICA PURPUREA | <ul style="list-style-type: none"> FAGUS SYLVATICA RIVERSII *FUCHSIA EXCORTICATA PURPUREA MALUS ALDENHAMENSIS MALUS ELEYI MALUS LEMOINEI MALUS PROFUSION MALUS SIR H. RHODES *MYRTUS OBOCORTATA PURPUREA *MYRTUS RALPHII PURPUREA *PHORMIUM TENAX PURPUREUM *PHORMIUM TENAX RUBRUM *PITTIOSPORUM TENUIFOLIUM PURPUREUM PRUNUS PERSICA HIAWATHA PRUNUS CERASIFERA MOSERI PRUNUS CERASIFERA NIGRA PRUNUS CERASIFERA THUNDERCLOUD *PSEUDOPANAX DISCOLOR *PSEUDOPANAX LESSONII PURPUREUM RHUS COTINUS ATROPURPUREA *WEINMANNIA RACEMOSA PURPUREA |
|--|--|

Shrubs and Trees with Golden Foliage

- | | |
|---|---|
| <ul style="list-style-type: none"> ACER JAPONICUM AUREUM ACER PALMATUM AUREUM CALLUNA VULGARIS AUREA CATALPA BIGNONIOIDES AUREA CEDRUS DEODARA AUREA CHAMAECYPARIS LAWSONIANA B. D. EDGINTON CHAMAECYPARIS LAWSONIANA CHINGII CHAMAECYPARIS LAWSONIANA MINIMA AUREA | <ul style="list-style-type: none"> CHAMAECYPARIS LAWSONIANA MOERHEIMII CHAMAECYPARIS LAWSONIANA STEWARTII CHAMAECYPARIS OBTUSA CRIPPSII CHAMAECYPARIS OBTUSA KOJOLCOHIBA CHAMAECYPARIS OBTUSA NANA AUREA CHAMAECYPARIS OBTUSA TETRAGONA AUREA |
|---|---|

Figure 3: Specialist detail of foliage or flowers. Duncan and Davies Nurseries catalogue. 1960

from Avondale, Auckland.

There are many nurseries who specialise in one type of plant, and as a result of overseas visits by Dr Keith Hammett, DSIR plant breeder, we have a particularly good collection of dahlia, carnation, sweet pea, chrysanthemum and Japanese melon specialist catalogues. Many of these catalogues are photocopies, because the originals remain in the collection of nurseries Dr Hammett visited while overseas.

Making Use of the Catalogue Collection

In the past ten years the collection has been extensively used by DSIR plant breeders and historians from throughout New Zealand, to compile histories on specialist horticultural types.

For example, Margaret McClure used the collection in 1987 to help with writing her history of Birkenhead which from 1840-1940 was an orchard growing district of Auckland, famous for its strawberries.

Again, Dr Ross Ferguson has published several articles on early New Zealand plant breeders with particular reference to kiwifruit introductions into New Zealand.

Collections of nursery catalogues are, of course, only one type of resource for information about plant introduction. Information is also available from periodicals such as *NZ Fruitgrower and Apiarist*, *Orchardist of New Zealand* and *The Guide* — Horticultural Division, MAF. There are also scientific files both in DSIR and Ministry of Agriculture and Fisheries which contain much valuable information. Personnel files detail the history of some of our well known past staff members and their work. All these complement the information found in the nursery catalogues.

Where should the collection go from here? The DSIR library at Mt Albert no longer has the resources to spend a large amount of time on cataloguing new items for the collection. Voluntary help with the collection from any member of the Institute with library cataloguing experience would be very welcome.

Where to next?

Robert Nairn summarised the early history of horticulture in NZ in his 1932 Banks Lecture, and Mr Charlie Challenger published an article in 1981 describing nursery catalogues as overlooked archival material and gave details of some nineteenth century catalogues held in various collections throughout NZ. Allen Hale wrote *Pioneer Nurserymen of NZ* published in 1955. These books and articles mention horticultural catalogues from several NZ library collections, mostly pre-1920 items, but since then the attempts to record collections have been limited.

We need a co-ordinated national effort to document, preferably on computer, the holdings of these collections so that the material can be more easily accessed by the potential users of the collections. Fortunately arrangements have been

Special 30-Day Introductory Offer

Standard Fruit Trees.
With Every 5 Standard Fruit Trees you buy (Any Variety), you may select 1 of the following 3-4 ft. STANDARD FRUIT TREES for ONLY 99c Extra.

Cat. No.	Variety
237	Stark Splendor Apple
46	Stark Elberta Queen Peach
48	Stark Early Elberta Peach
142	Starking Delicious Pear
34	Bartlett Pear
125	Stanley Prune

Dwarf Fruit Trees.
With Every 5 Dwarf Fruit Trees you buy (Any Variety of DOUBLE DWARF Apple, DWARF Apple, Peach, Pear and Cherry), you may select 1 of the following DWARF FRUIT TREES for ONLY 99c Extra.

Cat. No.	Variety
305	Stark Earliest Apple
328	Stark Summer-Glo Apple
323	Golden Jubilee Peach
325	Stark Elberta Queen Peach
320	Anjou Pear

Stark Roses.
With Every 5 Stark Rose Bushes you buy (Any Variety of Hybrid Tea, Floribunda Climber, etc.), you may select 1 of the following Rose Bushes for ONLY 99c Extra.

Cat. No.	Variety
713	Mrs. Luther Burbank—True Rose-Pink Hybrid Tea Rose
735	Forty-Niner—Bi-Color Red and Gold Hybrid Tea Rose
729	Peach—Golden Pink Hybrid Tea Rose
732	St. Exupery—Blue, Red and Silver Hybrid Tea Rose
769	Stark Fireflame—Fairy Red Floribunda Rose
750	Fashion—Coral brushed with Gold Floribunda Rose

Stark Shrubs.
With Every 5 Stark Shrubs you buy (Any Variety), you may select 1 of the following Shrubs for ONLY 99c Extra.

Cat. No.	Variety
546	President Grey Lilac
581	Red Flowering Quince
574	Red Weigela
532	Showy Border Forsythia
538	Fortune Forsythia
509	Froebel Spirea

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Follow these easy steps

- 1 Select the Stark varieties you want and use a regular order blank.
- 2 For each 5 trees, shrubs or roses you order at the regular catalog price you may select—from the list at left—an extra variety and pay only 99c.
- 3 Write your 99c selection on the order blank and show the price as 99c in the price column.
- 4 Hurry! This offer ends in 30 days.
- 5 To qualify for this special price your order must total \$15 or more.

Figure 4. Enticement of sales by offering "Specials". Stark Bros. catalogue. 1970



ごあいさつ

毎度格別のお引立てを賜わり厚く御礼申し上げます。弊社は創業以来「品種正確な優良苗木」を主題に従業員一同自家生産に励んでまいりました。現在弊社の採種、台木から本苗迄の一貫した自家生産高比率体制は、全国でも有効に立っております。

本年も新品目、新品種の優良苗木が生育しています。早期予約にて優良苗木の確保をお勧め致します。よろしく倍旧のお引立てをお願い致します。

Figure 5. Catalogue displays of plant products attract customers. Nashi Fruit. Komachien Co. Fruit Tree Catalogue. 1990 / 1991.

possible to record our DSIR nursery catalogue collection on computer.

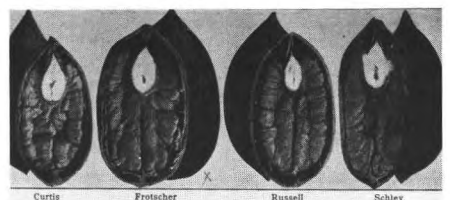
Can the Royal NZ Institute of Horticulture help to extend this to a national system?

Acknowledgements

Thanks are due to Evelyn Rayner for typing the manuscript, Mavis Lessiter for taking the photographs and Dr Keith Hammett and Dr Ross Ferguson for their comments, suggestions and ideas for this paper.

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VARIETIES OF PECANS DESCRIBED

Curtis. A medium-sized Pecan, with bright, shell, marked with a few purplish specks; rounded at base, pointed at the apex; very thin; cracking quality excellent; light yellow, plump, full; rich, sweet, nutty; quality best. A desirable variety.

Frotscher. A large, oblong nut, 1 1/4 to 1 1/2 in length, bright yellowish brown in color; few purplish, black markings; shell very cracking easily. Kernel large, easily re- full of good quality. Tree a vigorous r, of spreading habit with scaly bark; leaves crops and can always be depended upon high-flavored nuts.

Russell. A medium- or large-sized nut, 1 1/2 inches long, oval and pointed; grayish with numerous small, purplish black spots. Shell thin, of excellent cracking quality; plump and of good quality.

Schley. Size medium to large, 1 1/2 to 1 3/4 long, oblong, somewhat flattened; light brown with a few small markings of purplish brown; shell thin, separating eas from the kernel; kernel full, plump, bright color; flavor rich, nutty; quality best.

Stuart. Nuts large to very large, 1 1/4 to 1 1/2 inches long; oblong; brownish shell; strong marked with dark color. Shell of medium thickness and of very good cracking quality; kernel full, plump, bright-colored. Best quality flavor rich and sweet. Heavy bearer.

Success. Size large, oblong, tapering to the apex. Color reddish brown; purplish markings shell thin, cracking quality good; partitions thin; kernel large, full, plump, yellow; flavor sweet quality very good. The tree is a good grower.

Teche. Size medium to large, oblong; grayish brown in color with a few dark streaks; light and apex rounded; shell medium, crack quality good; kernel full, plump; quality good.

Van Deman. Large to very large, from 1 1/4 to 1 1/2 inches long, rather slender, pointed at the ends. Color reddish brown, with purplish brown markings. Shell of medium thickness; crack quality excellent. Kernel plump, bright, sweet



Figure 6. Pecans. Glen Saint Mary Nurseries Co., Florida. 1918

Book Reviews

A New Zealand Handbook of Bulbs and Perennials. Edited by Hugh Redgrove. Godwit Press, Auckland, N.Z., 1991. ISBN 0-908877-02-1.

This is a revised, updated and expanded version of the 1953 publication *The Handbook of Bulbs and Perennials for the Southern Hemisphere*. Dedicated to the gardening public of New Zealand, it was compiled by Hugh Redgrove and an impressive list of fellow contributors, each with a wealth of experience and a delight in growing these plants in New Zealand.

It aims to provide a reliable guide to the identification, selection, cultivation, and propagation of over 350 genera of bulbs and perennials. In fact, it includes in alphabetical order, 382 genera, numerous species and cultivars, and 433 colour illustrations — considerably more than the 250 genera and 246 illustrations (mostly black and white) of the 1953 handbook.

There is also an excellent index, cross-referenced for genera, synonyms and common names. This is invaluable, especially for those of us who find difficulty in remembering recent name changes. It is to be hoped that all gardeners, nurserymen, garden centres and writers will use the correct current botanical names, as listed in this handbook.

So much has changed since 1953. Gardening is now the number one hobby, often closely associated with the use of flowers and foliage in floral arrangements. Ornamental horticulture is more professional, providing employment and export revenue from cut flowers, foliage, bulbs and plants. Garden centres have developed as well as specialist nurseries, with an increasing emphasis on perennials and bulbs.

New introductions, selections and hybrids as well as old favourites from both Northern and Southern hemispheres are grown in New Zealand gardens. It must have been hard for the editor to decide where to draw the line. In the handbook, small plants are limited to those which are conveniently grown at the front of a border. Larger plants include some sub-shrubs which are commonly grown with perennials in New Zealand gardens. 'Bulbs' include corms, tubers and rhizomes (ill-defined in the glossary) as well as true bulbs.

The sub-title 'Bulbs and Perennials A to Z' is apt. Each genus is easy to find, especially with the index.

The family and common name is below each heading. For all but a few less important genera, the number of species and natural distribution is followed by descriptions of major or representative species and cultivars (including many excellent New Zealand bred cultivars). The distinguishing features are described, as noted by an observant, practical gardener, not a botanist.

Height in centimetres and inches, season of flowering, and cultural details follow. Appropriate depth and distance of planting of bulbs is included.

It is interesting to note the connection between conditions in the country of origin, and advice on site selection and culture in our gardens; similarly between root structure and seasonal root growth, and advice on how and when to transplant and divide perennials successfully. Some comments on attractive plant associations are included.

The text throughout is concise and clear, with a great deal of sound practical information presented in a most readable form. Considerable space is devoted to some genera such as *Iris*, *Narcissus*, *Lilium*, *Gladiolus*, *Dahlia*, *Carnation* and *Dendranthema* (*Chrysanthemum*!) in which the modern classification of the various groups as well as the species are included.

The greatly expanded sections on *Hosta*, *Primula* and some other genera reflect Hugh Redgrove's enthusiasm for these plants, and his wish for other New Zealand gardeners to share his pleasure in growing them.

Illustrations.

A colour photograph alongside the name and description helps greatly to identify and remember a plant. In this handbook there are great number of excellent illustrations alongside the text, as well as a few attractive garden scenes. The quality is not consistently good, but anyone who has tried to make a photographic record of flowering plants knows the difficulties.

In spite of the considerable improvement in cameras, film and reproduction techniques in recent years, some colours, notably blues and reds, are not always true. The plant, light or weather may not be perfect. It requires a lot of patience, knowledge and luck to be at the right place at the right time to photograph a plant at its peak of perfection. One can always hope to improve . . . next year! With such a diversity of plants — some a few centimetres, some over a metre high, the selection of illustrations from available photographs could not have been easy. Most of them demonstrate clearly the flowering characteristics of each genus of perennials and bulbs and in some cases the diversity of species and groups within the genus. That is a real achievement. The less successful illustrations could well be replaced in future editions.

Names and photographs of cultivars often date a reference book, but when they are outstanding they add to interest. I would like to see, for example, pictures of a bunch of New Zealand bred cultivars of *Nerine*, and of *Zantedeschia*, which in both cases are better than any overseas cultivars — as are the New Zealand bred cultivars of the *dahlia* and *carnation* which are well illustrated. Pests and Diseases.

These are mentioned only as they affect the routine culture and propagation of plants. Reading such comments as "Aphis chew . . .", "eelworms are almost microscopic" — and the recommendations

for hot water treatment in a home garden, it is obvious that gardeners should look elsewhere for information on the identification and control of pests and diseases. Revision by specialists is recommended for future editions of the handbook.

There are a number of errors in the spelling of botanical names in the book. Some grammatical errors were noted and also obvious mistakes in conversions between centimetres and inches.

More serious, however, is the mislabelling of photographs and users of the book need to note those.

P. 24 Top left is *Arisarum vulgare* not *Arisaema candidissimum*.

Bottom — the white flower is *Arisaema candidissimum* not *A. praecox*.

P.43 Top left is *Urceolina peruviana* not *Bravoa graminiflora*.

P.59 Top right is *Chionodoxa luciliae* not *C. sardensis*.

P.215 *Ornithogalum saundersiae* not *O. arabicum*.

Others which are doubtful according to the text descriptions are :-

P.28 *Arum maculatum*, P.67 *Crinum x posoelli*, P.83 *Dendianthema* 'Yellow Noon', P.89 *Digitalis mertonensis*, P.254 *Scabiosa columbaria*.

It would have been better to delay publication to allow thorough checking of the text, illustrations and captions, but no doubt there was a desire and maybe some pressure to print this long-awaited book as soon as possible. Corrections should be made before reprinting.

In the mean time, I shall be using this handbook frequently as a guide to the current nomenclature, identification, selection and more successful cultivation of bulbs and perennials. Already I have a list of more plants which I want to grow.

Joy Ames

The Rhododendron Growers Handbook for New Zealanders by Margaret Tapley. David Bateman Ltd., Auckland, NZ. 1991. ISBN 1-86953-067-5.

The latest addition to the excellent 'Growers Handbook' range, 'Rhododendrons of New Zealanders' should find a ready market in a country where books specifically written for our conditions are rare.

Margaret Tapley has covered almost every aspect of rhododendron growing extremely well. Some of the material comes from her other book 'Rhododendrons in New Zealand', but is much more comprehensive. Details such as general care and attention, pests and diseases, propagation, companion plants and container growing are all well covered. Errors are relatively minor and some only an interpretation of different growing conditions. Mrs Tapley mentions the changes in rhododendron nomenclature using the Cullen and Chamberlain Edinburgh system. However that system has superseded classification in series

and sub-series, she states, and we now classify in sections and sub-sections.

The bulk of the book is devoted to descriptive lists of plants grouped together for colour, size, hardiness or flowering times. These are quite comprehensive and inevitably there is some repetition as varieties find themselves in two or three sections, usually with the same description. Occasionally this is changed slightly, but confusion then sets in, e.g. 'Seven Stars' is listed as being 0.9 m, mid-season flowering, white with pink flush and with shiny dark leaves, or 1.2 m, late mid-season, light pink flowers and with dull green leaves. I also found the use of sizes expressed either in centimetres or as a fraction of a metre irritating as there was no consistency with this. In fact the sizes given generally would be my major criticism as they bear no relation to plants that I know under the same name.

Two small colour sections are included and these are quite good representations of the plants portrayed. Line drawings of planting and propagation methods are very clear and concise which is more than I can say for the odd shapes that head every chapter. If they are to represent the rhododendron species described in the chapter then they should at least look like the real thing.

This small book is good value for money and should be on all rhododendron growers' book shelves because it answers so many of the questions that are frequently posed. Used in conjunction with a good rhododendron catalogue, you should not go too far wrong in planning and planting a superb rhododendron garden.

Graham Smith

The Renaissance Garden in Britain by John Anthony. 1991. 96pp. Shire Garden History series, No 4. ISBN 0-7478-0130-4.

The English Rococo Garden by Michael Symes. 1991. 72pp. Shire Garden History series, No 5. ISBN 0-7478-0129-0.

Shire Publications Ltd, Cromwell House, Church St., Princes Risborough, Buckinghamshire HP17 9AJ, U.K.

On opening the first of these attractive booklets, a small postcard fell out explaining what fields Shire Publications aim to cover and asking me to send for more details of my special interests. I could have ticked boxes on Garden History, Farming Bygones, Industrial Archaeology, Architecture and ten other topics, but in fact I knew quite a lot about their range already, having been adding Shire publications to my bookshelves since 1980, especially from their Archaeology and more recently their Garden History series. Their purpose, as somewhat understated on the postcard, is to produce "inexpensive books about unusual aspects of our heritage".

To their credit, Shire publications are affordable even when converted to New Zealand currency, yet they show no indication of having cut costs in illustrations, which are a good mix of colour and monochrome, nor in the choice of authors, who are all well-known and

respected figures in their fields. Although written about British topics, many are nevertheless relevant to New Zealanders whose gardening styles, farming equipment and domestic artefacts were heavily influenced by British prototypes.

The first of the Garden History series, *Restoring Period Gardens*, was written by John Harvey, a meticulous researcher into plant introductions, expert on Mediaeval gardens, and stickler for authenticity in garden restoration. It was followed by Ruth Duthie's *Florists' Flowers and Societies*, and Miles Hadfield's *The English Landscape Garden*. John Anthony's booklet now covers the two centuries of gardening before the 18th century landscape movement swept away the accumulated riches of garden ornaments and ornamental gardens in the name of idealised Nature. Ironically Anthony is himself a landscape architect and town planner, but his approach to landscape is quite clearly qualified by a strong sense of history, unlike the 'mancapers' of the 18th century.

Assuming no prior knowledge of European history in his readers, Anthony begins by explaining what the Renaissance was, its origins in Italy in the late 13th century, and how it progressively affected house and garden design as it moved through Europe, reaching Britain in the 16th century. Although we now know that Roman gardens were not exclusively of formal geometric shapes, it was the Renaissance interpretation of classical antiquity that was influential in imposing human arrangements of space, more often seen inside habitations, on the natural worlds adjacent to the house. Thus galleries reproduced corridors, rectangular enclosures simulated rooms, with hedges and fences as their walls, knots replaced carpets, and fountains, sundials, and sculptures provided outdoor furniture.

Anthony illustrates how this extension of human patterning grew in complexity from early Tudor gardens in which Renaissance features were blended with earlier Mediaeval fashions (such as arbours, mounts, and turf-covered banks), to the final immense grandeur of Williamite gardens still reflected in the fountains, avenues, and long canal at Hampton Court. Skilfully weaving in the separate threads of the birth of botany as a scientific study, and the impact of plant introductions from the Americas, the eastern Mediterranean and eventually the Far East, Anthony describes the famous gardens of each royal era and the designers and gardeners who created them. Despite the sense of national pride which emerged in Elizabethan times and subsequently fluctuated according to foreign relations, people who commissioned gardens over the 16th-17th century usually looked to France or Italy for inspiration or actually employed foreign designers.

From Italy, the Huguenot Salomon de Caus and his brother Isaac brought the "hydraulic wonders" of Italian

Renaissance gardens to England, as well as the mannerist pre-occupation with grottoes. Arcades and Italianate terracing proved ideal for sloping sites, providing opportunities for the display of marble statues acquired from Italy. For flat location, highly embroidered parterres, incorporated in a unified symmetrical overall design, were the trademark of French designers such as André and Gabriel Mollet and André Le Nôtre. It is significant that the French word 'parterre' replaced 'knot', the Tudor term of English derivation, in English garden writing from the Jacobean period. These grand Renaissance gardens were not simply designed to impress or be fashionable. Many were created as an allegory, using themes from Classical mythology, cosmology or the Bible.

There was a developing interest in plants for their own sake. First evident in William Turner's *Herbal* of 1568 and Thomas Hyull's *Gardeners' Labyrinth* (1571), it can be traced through Gerard's plagiarised but popular *Herbal* of 1598, Bacon's famous essay on gardens, and the practical garden books of Lawson (1618), Parkinson (1629), Evelyn (1664) and Rea (1665). These books provided information for the educated middle classes and smaller landowners whose aspirations included a productive vegetable garden and orchard as well as popular and novelty flowers, medicinal and culinary herbs. As Anthony points out, the simple rectangular enclosures which were so appropriate for their gardening needs, remained in use "long after their grander brethren had been 'landscaped' by the fashionable practitioners of the landscape garden school of design" (p. 61).

Anthony has covered all the important aspects of British Renaissance gardening in this booklet, giving a balanced picture of the trends in fashion over two centuries. Readers with a taste for garden history will be keen to follow up the suggestions for further reading. Unfortunately there was no space for Anthony to describe the recent research in which other members of the British Garden History Society have been engaged, and which is reported in their *Journal*. This involves archaeology, archival research, palaeontology and other methods of revealing the past layout and contents of gardens.

In contrast, Michael Symes draws directly from articles published in *Garden History*, *Journal of Garden History*, and *Country Life*, giving references to these and to the major books relevant to his theme, the English rococo garden. Dealing with a much shorter period (1730s-1770s), Symes is able to devote more attention to particular gardens which exemplify the movement, especially Painswick and Hampton Court House, and the rococo forerunners Belcombe Court and Carshalton House. He is also fortunate to have the benefit of recent intensive research into the influential garden designers Thomas Wright and Sanderson Miller, and the garden artist Thomas Robins. Reproductions of some of Robins'

distinctive watercolours, originally painted for the owners of the gardens over the period 1747-1766, are scattered through Symes' book; all bear sinuous but balanced borders of wild flowers, tendrils and leaves, butterflies, shells, and birds which, Symes argues, reflect the rococo spirit of the gardens themselves.

What exactly is meant by the term 'rococo'? I have the impression that this question is quite hotly debated among garden historians. The garden designers themselves would not have recognised the word. First used by art historians in the 1840s, it has been applied to particular English gardens only in the past twenty years. Since it is used in practice, says Symes, it needs to be defined. As he presents it, there are two manifestations of rococo that have to be dealt with separately: rococo gardens *per se*, and rococo elements within larger, non-rococo gardens. It is not difficult assembling a list of rococo features from Symes' booklet: they include the use of curving asymmetric serpentine paths and waterways; flower and shrub borders planted in tiered and naturalistic formations; rocks and shells used to make decorative patterns in grottoes, cascades and arches; painted lead statues; Chinese pavilions and bridges; simple Gothic temples and towers (usually featuring the ogee pointed curve); mock castle and ecclesiastical ruins; sham bridges; and rustic hermitages. These elements are not always rococo since they emerged at different periods and from several traditions, but in the three decades from 1740 to 1770 they came together "as an expression of the something new, a freedom of style and a sense of experiment that link it to the freeing of the English garden from centuries of formality" (p. 7).

Many other descriptive terms are applied by Symes to the English rococo gardens of this period: they possess "innate smallness" (p. 6), "exuberance" (p. 15), "fanciful naturalness" (p. 16), intricacy (p. 26), "surprise, irregularity and illusion" (p. 56), and whimsy (p. 57). Given that smallness is not quantified and that many of the other epithets are personal value judgements, it is hardly surprising that Symes admits that exact definition of what makes a rococo garden is not possible. At the outset he had to concede that the "subject is beset by contradictions and confusions, and it might even be argued that the label serves no useful purpose" (p. 4). But to dismiss the distinctiveness of these combinations of rococo features is to perpetuate the undue influence over English garden history of 'Capability' Brown and the landscape movement. In fact, Brown's arena was the country estate

of the wealthy aristocrat, while over the same period as Brown was active, the rococo approach thrived among the lesser gentry and middle classes. Often executed by amateurs, it has more to offer the social historian as a guide to mid-18th century fashions and philosophies, than the individualistic vision of Brown. We owe a considerable debt to Michael Symes for this first attempt to set the record straight in a booklet designed for a wide readership.

Helen M Leach

New Zealand Native Shrubs and Climbers, by John Smith-Dodsworth. 1991, David Bateman Ltd., Auckland, NZ. ISBN 1-86953-069-1. \$79.95.

The practical value of any botany book depends on what has gone before. Floras and taxonomic papers have laid the foundations for more readable plant books. These popular books, embellished in different ways, give descriptions and distributions, and there the narrative usually stops. For many people, identification is a satisfying end in itself, but should be the starting point for understanding how plants live their interesting lives. Perhaps we should not blame the writers of popular books for these shortcomings, for where are they to get ecological and other information beyond their own experience? A well-intended series under the general title "Biological flora of New Zealand" gathering together all that was known about individual species began in the *New Zealand Journal of Botany* in 1966, but soon conservation issues took more of the time of field botanists, a significant diversion from basic field research. If you think that taxonomy has fared better, consider the hundreds of New Zealand plants that have no adequate names. This is the present state of botanical research in this country, and not a strong base for downstream publications.

Also gone before are many other identification books, particularly about woody plants. It must be difficult for another author to break into this well-worked field with most forms of embellishment already exploited. Then there is the problem of giving even treatment when some of the species are well known and others hardly at all.

Well, how does John Smith-Dodsworth present his "New Zealand native shrubs and climbers"? The introduction defines a shrub as well as anybody can, runs through some morphological terms, and makes a summary of shrub and climber habitats. It might have been appropriate to put the appended glossary and locality

maps here too. The plants are treated by families in alphabetical order. The main features of each family and genus are given briefly and simply. Species notes give description, distribution and habitat with a ring of personal experience about them. A degree of acquaintance with most of the 380 or so species is evident from the black and white photos with the text, and colour plates in a separate, cross-referenced, central section. Many photos show the plant in its natural setting, others are "twig shots". The species that are not illustrated are described briefly.

The author's claim to have covered all the shrubs and climbers must be a good selling point. In the foreword to this book, Tony Druce says that this is the first to concentrate solely on the shrubs and climbers, and he comments that the completeness comes as close as possible to the ideal at the present time. The scrutiny by Tony Druce and Rhys Gardner is some assurance of accuracy and clear presentation.

The introduction seems to be adequate preparation for venturing on the main text, but on the first page of the next section the reader meets such terms as receptacle, strobili and dioecious. They are explained in the glossary at the back. However, introduction and glossary aren't going to help the amateur botanist stumbling through this awkward statement: "It is one of only 2 species of fuchsia to have erect trioecious flowers which are of 5 forms; male, producing pollen and having either short or long styles, and with inoperative stigmas; female, having anthers without pollen and either short or long styles, and with functional stigmas; and perfect flowers, having pollen and operative long stigmas". The glossary does not define trioecious, and such terms are properly applied to a taxonomic unit, not to flowers.

The pictures are variable in quality because the sun did not always shine at the right time, and some species were not easy to photograph, e.g. *Scandia geniculata* growing on *Coprosma propinqua*. However, there is a degree of excellence that few plant photographers achieve.

While "Trees and shrubs of New Zealand" by Poole and Adams, in my view, is the most valuable book of its kind in this country, John Smith-Dodsworth's book has a place. If you require colour to aid your identifications, this is the book for you, but you will have to pay nearly three times as much for it. This is a splendid book and I will be using it to identify plants in some of the larger genera.

Alan Esler

Assembling and Cataloguing a Pelargonium Collection

Rita Oliver

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Pelargoniums are a widely grown, universally admired group of plants with a long established place in most gardens and in most countries. Their popularity comes from not only the spectacular brightness of the blooms, but also the long flowering period and the range of different attractive forms available. Pelargoniums are an ideal plant for most gardens, being easily grown and propagated and requiring very little attention for an impressive display.

Some years ago our home nursery set

convenience, I chose to use the common terminology of referring to Zonal Pelargoniums as Zonals, not their correct name of *Pelargonium hortorum*. Regals or Regal Pelargoniums was used to describe *Pelargonium domesticum*. Ivy leaved Pelargonium was used to describe *Pelargonium peltatum*. Stellas, miniatures and fancy leaf were terms for describing other groups.

Within the 50 plants were some regal pelargoniums some ivy leaved, also stella pelargoniums and fancy leaf varieties,

before the catalogue was produced. Public reaction to colour, shape and form was gauged before the final choices were made. These plants were trial marketed at craft shops and retail nurseries and occasionally in larger quantities through a local supermarket chain. Early sales indicated that there was an untapped market and sufficient encouragement was gained to start collecting more named varieties.

The main source of further stocks became Mrs Wilcox of the "Geranium Nursery", Henderson, Auckland. Mrs Wilcox has since retired to Australia but was a great source of information and help. She advised on the best selling types and the colours that customers like. Mrs Wilcox imported a few named varieties as new additions to her collection each year from Australia. Another supplier was a South Auckland nurseryman who had a shop called the "Geranium Shoppe". He gave us very sound commercial advice in that if the customers did not immediately show strong interest in the bloom it was not worth retaining.

Cultural Aspects

Our climate in the Wanganui district has much colder winters than South Auckland, the source of all our mother stock. Consequently, we needed to house the growing collection under cover during winter months. We had on the property a shade house, a Novalite clad shed and a glasshouse for mother stock. The Novalite house was used for propagation and the shade area for hardening off before sale.

Stock beds were also made up outside to gain an increased take of cuttings from the regal pelargoniums. During winter the occasional heavy frost damaged the leaves of the plants, but the rest survived if they were sufficiently well grown and established before the onset of winter. While we always kept reserve mother stock in the glasshouse, the increased output from outdoor multiplication far outweighed the frost risk. Pruning times became important. A late pruning could result in tender growth still on the bush in early winter, and an early frost could destroy the new growth and the plant. If pruning was done in January the plant was invariably sufficiently well grown as to not be damaged. The very hot dry summers meant a watering system needed to be devised to suit the plants without damaging the blooms. Capillary watering trays overcame this particular problem.

Many of our customers lived in areas where there was snow in the winter and heavier frosts than we experience in Wanganui. In these situations customers were advised to grow the plants in pots and bring them into conservatories in the winter.



Fig. 1. Mother stock on display

out to build up a unique collection of pelargoniums, develop a catalogue and market plants nationally by mail order. This project involved tracking down and obtaining interesting named varieties within the country, evaluating their colour, shape and form and finally writing a standard description of the plant.

This included checking the description in overseas lists to ensure correct naming. Later the collection was added to by imports from Australia; this too involved standardizing the descriptions and evaluating colour, shape and form.

Sources

The beginnings of the collection started out as one of those chance happenings. While visiting an Auckland tomato grower, I chanced to remark on the vibrant colour of an unusual, particularly bright orange pelargonium. The result of the comment was that the boot of my car was filled with 50 named varieties of pelargoniums.

In descriptions, for customer

but mostly they were zonal. Amongst the regal pelargoniums there was a spectacular frilled black bloom which was uncommon in our district. The plants were duly brought home and potted into gallon buckets and given a card on which to note their progress. The card described and classified each plant and the source from which it was obtained, as well as dates and number of cuttings taken and their progress. Photographs were taken of the blooms, large prints were placed in an album and small prints pasted on the card in the index file. Checks were made on flowering ability, size and shape of the blooms, how many blooms per plant per year and the lasting quality of the blooms. The vigour of the plant was noted, its ability to strike roots was evaluated and a standardised colour description included to make a later list easier for the customer to follow.

The collection needed to be balanced with a wide colour range within each of the groups. The market had to be tested

Importing New Selections

Having established the nucleus of a collection and the fact there was a market for plants, the next step for us was to import varieties into New Zealand that no other grower had previously stocked. The obvious choice was to import from Australia, with a climate in some areas similar to our own. We wrote to Geranium and Pelargonium Societies all over Australia requesting export lists and catalogues. We eventually had a positive reply from Geoff Stockton of "Georyl Pelargoniums", Tyabb, near Melbourne, Victoria, who forwarded his extensive list.

The N.Z. Ministry of Agriculture and Fisheries was contacted for advice on quarantine procedures and on how to set up a quarantine house which we decided should be in a small separate glasshouse on our property. This had to be insect proofed, scrubbed down and sterilized.

Establishing Preferences

Selecting stock from the list became a mind boggling choice as there were highly descriptive passages giving rave reviews of most of the blooms. By this time we had a fair idea of what sold and what did not; a good selection had to be market orientated. A customer profile was drawn up and we contacted several "Mrs Average Customers", mostly retired ladies living in smaller gardens than they were previously used to, who still had an eye for the spectacular but sought more compact plants. These ladies were given copies of the list and were asked to pick out 25 each of these that they would consider as a must for their gardens. The results were very interesting, with individual colour preferences showing through. One lady chose mostly mauves and another chose predominantly pinks and whites, all however chose large showy blooms. The need for the spectacular was clear. There was also a marked preference for regal pelargoniums.

One fact did surprise; was how many customers wanted ivy leafed pelargoniums. We had assumed that because they were very common and easy to propagate there would be little demand. The predominant colour preference for trailing pelargoniums was red. It seemed upon questioning, that many customers had sentimental attachments to red trailing pelargoniums, rambling from a pot or hanging over a wall. They remarked that unless you had a friend that had one, you could not buy them anywhere. The stellas were the least popular of the range of choices, probably due to the fact that they were so little known. It seemed that showy large spectacular blooms were the priority, rather than leaf colour. From these investigations we compiled a list of preferences:

Glamorous and unusual regal pelargoniums.

Zonal pelargoniums with large blooms.

Stella pelargoniums with a wide colour selection.

Large white blooms of any type.

A range of fancy leafed selections including silver leafed types.

Bronzed tri-colour selections.

Plants with lime green dark leaves and ivy leaves.

The ivy leafed pelargoniums were also to be doubles, brightly coloured or multi coloured, again with large showy flowers.



Fig. 2. The Stella Pelargonium – Fairy Queen.

When the selection was made we wrote to Tyabb and sent our list of preferences, asking for recommendations and comment.

The list had grown to 300. However we felt limited by the numbers we could afford, the capacity of the quarantine house and the effort of handling our existing collection. From our locally acquired plants we felt that we could present a selection to the customer of the very best available in New Zealand. Replies came through from Australia and arrangements were made to whittle down the final selection in Tyabb during a visit to Australia when we were able to view photographic slides of the blooms. When we went out to make the final selection, some of the listed line had been deleted but the grower recommended many of his new unlisted varieties. He had experimented extensively, cross pollinating many of his favourites and had come up with some stunning results.

He had also carefully selected sports and propagated from those. He was about to launch a winner at the Melbourne show, a selection he had named "Tyabb Princess". This selection was to be displayed for the first time before our plants were to be released from quarantine so we became the first to import "Tyabb Princess" into New Zealand. Ultimately the plant proved to be one of our top sellers.

On the due date the plants arrived by air in New Zealand and after fulfilling quarantine routines at the airport, and

freighting on to Wanganui, we were able to transfer them to our own quarantine house for unpacking. Each rooted cutting was well grown and was dipped in a weak solution of fungicide/insecticide prior to planting in prepared planter bags. Each had a label and this was duly checked off against our list and Geoff Stockton's list. There were a few minor discrepancies and included in the consignment were a few unnamed varieties not listed before. There were three selections in the "Zebra" series without descriptions which consequently turned out to be popular sellers. All were striped, hence their names. Despite our carefully selected collection, we had some interesting surprises awaiting us.

The plants acclimatised without any problem and soon outgrew their containers. When the three months quarantine period was up, ending with a final inspection, the plants were ready to have cuttings taken from them and to be further potted on. As each plant came into flower it was photographed, the photograph attached to its card in the card index system and one placed in the album for customer perusal.

The plants came out of quarantine in the last few days of October and were transferred to the larger glasshouse for display of the mother stock. Each plant had as many cuttings taken as possible. The display house soon became an excellent gauge of public market opinion. The black flowered pelargonium and Tyabb Princess in particular became highly sought after. Our method of selling was to have mother stock plants in bloom or photographs available of others and then to supply from the sales area a smaller plant of the same variety.

With the Tyabb collection and our own we had nearly 600 different varieties which needed to be culled down to a selection of 350-400 which we subsequently found out was still too many choices for the small New Zealand population.

The aim was to incorporate the best selling varieties from each grouping as the basis of our first catalogue and further delete those with poor demand. Customer reaction and the sales figures were the main guide. With the larger collection on display we were able to confirm the preferences better. Description from a catalogue can be deceiving; one person's perception of colour and beauty is different from the next.

Fashion also dictated colour preference. Many customers wanted a particular colour because it enhanced their existing house colour. What was fashionable in interior decor in Europe and the U.S.A. the previous winter seemed to be the colour requested. Similarly, preference followed the predominant fashion colour in ladies clothing. We soon learnt to look ahead and to confer with other growers as to the "in" colour. Delicate bridal colours always sold, pale mauve seemed to be the least popular choice.

Bloom size, lasting quality and vigour, were also a criterion in the final selection.

A bloom size of 10 cm or more always sold. Frilled flowers and multi-colour blooms were also popular.

The miniature plants proved not to be as popular as we had first believed. When confronted with the choice between large and small, large won every time. The miniature selections did not propagate easily or bulk up quickly and were thus not such an economic proposition. However they needed to be on the list as a collectors item.

Added extra choices arose from our own experiments with cross pollinating. Seed was carefully saved, plants grown and results monitored over three seasons to confirm uniformity and consistency. We crossed plants of known parentage and we also raised seed from random crosses.

Any unusual or attractive looking possibilities were checked for likeness against other growers lists. Sports were monitored in the same manner.

Once the selection had been made and the plant description and photographs completed, a mailing catalogue was required in a form that prospective customers could understand without confusion. Space limitations demanded that the typed descriptions be brief, but still be sufficiently distinctive to avoid confusion between plants. A fuller description was kept on the card index. The colour standard we followed was that in *Exotica* Vol. 3. Much verifying of data and plant descriptions went into the catalogue after careful searching and checking of overseas grower's lists.

Conclusion

The building up of a collection of these most popular genera and the subsequent indexing to a catalogue proved both a challenge and worthwhile experience, one which gave much satisfaction apart from the actual growing of the plants. The project involved a good deal of intensive background effort to achieve authenticity, as well as calling on photographic skills. Most gratifying has been the appreciative response from customers, from both those who were able to visit the nursery and those more distant who have used the catalogue to make their choices.

We have since passed the collection to another nursery confident that it forms a sound basis for supplying a selective specialist market throughout New Zealand.

Old Man's Beard and Other *Clematis*

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(From *Weed Identification News*)

Old man's beard (*Clematis vitalba*) is an aggressive and troublesome vine of scrub, native forest, and waste land. Recently it has been targeted in a prominent TV advertising campaign featuring Dr David Bellamy and the slogan "old man's beard must go". However, old man's beard is just one of thirteen wild species of *Clematis* in New Zealand, and people sometimes have trouble telling them apart. It's important not to mistake a native species for old man's beard.

The native species, such as the beautiful puawhananga (*C. paniculata*) and smaller-flowered often sweet-scented species, are all evergreen, although this barely applies to *C. afoliata* which is leafless except as a seedling. They have separate male and female plants although the flowers can appear similar because female flowers have staminodes (sterile stamens which look similar to fertile stamens, but have

no pollen). Their petals overlap at the edges in the flower bud. Flowering is in spring. This contrasts with the naturalised species, including old man's beard, where the plants are deciduous and have male and female parts (stamens and carpels) combined in each flower with petals abutting at the edges in the bud. They flower in summer to autumn.

For distinguishing the naturalised species from each other, the best characters are found in the leaves. Leaves in *Clematis* are compound; that is, each leaf is made up of several leaflets. Care is necessary to avoid confusion between leaves and leaflets: leaves have a shoot or a tiny shoot bud at the axil where the leaf stalk joins the stem, but this shoot or bud is absent where a leaflet stalk joins the leaf stalk. In *C. flammula* and *C. tangutica* the leaflets are divided again, to form a bipinnate leaf. *C. tangutica* is further

distinguished by its yellow flowers and bluish leaves. *C. montana*, the species commonly cultivated, has large pink or white flowers and the leaves have only three leaflets. Old man's beard differs from all these species by having five leaflets on each leaf, but it shares this feature with a species recently identified here, *Clematis maximowicziana*.

Clematis maximowicziana has rounded weakly ribbed stems and rather thick leaves. Its creamy white petals are larger than in old man's beard, over 15 mm long and 3 mm wide, and have only a few hairs except along the margins beneath. It is known from Dargaville and Buller Gorge. Old man's beard has 6-angled stems that are strongly ribbed and thin leaves. Its greenish white petals are 6-11 mm long (rarely up to 15 mm) by 2-4 mm wide, and densely hairy above and beneath.

Tree Evaluation Schemes – Making the Right Choice?

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Abstract

Students at Lincoln University evaluated trees using four different systems over five years. The final values in all systems were found to be influenced by individual evaluators. Systems that used a multiplier for individual factors to achieve the final value have the highest level of variability.

Introduction

The question of how to put a monetary value on a living organism such as a tree is not a new one. But once a system is devised, how can one gauge if it is fair or

rational and should any system simply be adopted?

A number of different systems of tree evaluation have been produced, possibly twenty or more in total. The earliest generally accepted method was developed in the early 1900's by Dr. George Stone of the Massachusetts Agricultural College (Grey and Denecke, 1986).

Tree evaluation systems have become important over recent years, the major reason cited as being for the protection of trees (usually involving a single tree), which in the opinion of experts, are notable in some way. A tree may be a very good

form of a particular species, or it may be of historic value, it may be very large, or it may occupy a position in the landscape, such that the tree's removal would ruin that general area. It may include a tree with spiritual values attributed to it, or the tree may be a relatively rare species and so on. Other general reasons cited include compensation sought for damage to trees and evaluation of trees as assets for planning purposes.

The value of trees, in the group sense, to society should be promoted. These include cooling and filtering air, providing oxygen and absorbing water that would otherwise be lost through storm water systems. Trees are valuable in recycling nutrients and as part of the ecosystem, as habitats for a variety of living organisms. They have therapeutic value, an escape from artificial surroundings, and recreational value for children — swings, climbing or building tree huts. Trees thus demand the widest possible recognition for their value to society at large.

None of the tree evaluation systems compared looked at the broader values and deal mainly with trees as single entities.

In order to consider the merits or otherwise of some of the more common tree evaluation schemes a study at Lincoln University involving a number of horticultural students was set up. In 1986 students at Lincoln University were set tree evaluation projects to compare two systems of evaluation based initially on a dissertation by Duncan Burns called *Tree Evaluation Methods* (3). This provided a brief descriptive outline of ten different evaluation systems and pointed to the number of subjective judgements made. The early part of the study considered two systems — the Helliwell (4) and the Australian Institute of Horticulture (AIH) system. (6) The system adopted from the Helliwell system by the Royal N.Z. Institute of Horticulture and presented at the 1988 AGM was also compared in the study. Finally in 1990 a composite of the three systems above and the U.S. system as adopted by the International Shade Tree Conference and National Arborist Association (7) was tested by Lincoln students. The systems were used on two mature trees on the Lincoln campus, *Quercus palustris* (Fig. 1) and *Eucalyptus viminalis* (Fig. 2).

1986 – 1989 Experiments with Three Evaluation Systems

A brief summary of the main points of the Helliwell, RNZIH and the AIH systems is given below.

a) Helliwell System.

The Helliwell system involves



Fig. 1. The *Quercus palustris* tree at Lincoln University growing in a raised bed in a prominent position near the main steps of Hilgendorf wing. This tree had some major cavity repairs carried out around 1977, with the trunk filled and bolted together. The tree has made a good recovery since.

TABLE 1. A COMPARISON OF INDIVIDUAL FACTORS FROM THE HELLIWELL, RNZIH AND AIH SYSTEMS IN TREE EVALUATION *Eucalyptus viminalis* AND *Quercus palustris* TREE EVALUATIONS

Factor	System	Year	No. of Assessors	<i>Eucalyptus viminalis</i>			<i>Quercus palustris</i>		
				Range	Av.	CV(%)	Range	Av.	CV(%)
Condition/ Useful Life Expectancy	Hel	86	11	2-4	3.27	20			
	AIH	86	11	6-10	8.05	17			
	Hel	87	35	1-4	2.66	26	1-4	2.51	34
	AIH	87	35	4-10	7.69	19	2-6	4.39	29
	RNZ	88	24	1-4	2.33	37	1-3	1.91	32
	AIH	88	24	5-10	7.79	14	3-8	5.96	25
	Hel	89	8	2-3	2.5	21	1-3	1.88	45
	AIH	89	8	5-9	7.64	16	4-6.5	5.0	18
Relationship to Setting	Hel	86	11	2-4	2.9	19			
	Hel	87	35	2-4	2.93	18	1-4	2.46	32
	RNZ	88	24	1-3	1.91	48	1-3	2.26	27
	Hel	89	8	1-3	2.38	31	2-3	2.38	22
Presence of Other Trees	Hel	86	11	1-3	2.27	28			
	Hel	87	35	1-4	2.11	34	1-4	2.34	33
	RNZ	88	24	2-4	2.63	25	1-4	2.6	30
	Hel	89	8	1-4	1.88	53	1-4	2.25	46
Importance of Position in the Landscape	Hel	86	11	2-4	2.55	27			
	AIH	86	11	6-9	7.09	15			
	Hel	87	35	2-3	2.34	21	1-4	2.69	25
	AIH	87	35	2-9	6.13	26	3-10	6.09	29
	RNZ	88	24	1-3	1.88	36	1-4	2.17	38
	AIH	88	24	3-9	6.35	29	1-9	6.27	28
	Hel	89	8	2-3	2.13	17	2-3	2.5	21
	AIH	89	8	5.8-8.5	7.16	14	4-9.1	6.8	31
Occurrence of species	RNZ	88	24	1-3	1.71	40	1-3	1.71	37
Form	Hel	86	11	2-4	3.45	20			
	Hel	87	35	2-4	3.45	21	1-3	2.66	20
	Hel	89	8	2-3	3.0	18	2-4	2.75	17
Special Factors	Hel	86	11	0-1	0.91	33			
	Hel	87	35	0-2	1.06	39	0-2	1.17	49
	RNZ	88	24	1-3	1.71	37	1-3	1.75	42
	Hel	89	8	0-2	1.0	76	1-1	1.0	0
Size	Hel	86	11	3-4	3.72	13			
	Hel	87	35	3-4	3.94	6	2-4	2.92	13
	RNZ	88	24	3-4	3.04	7	2-3	2.04	10
	Hel	89	8	3-4	3.88	9	2-3	2.75	17

LEGEND

Hel = Helliwell System
 RNZ = Royal New Zealand Institute of Horticulture System
 AIH = Australian Institute of Horticulture System

consideration of seven factors. Each factor can be awarded points between a range of one to four. For each factor the points chosen are then multiplied with the next factor, until each of the seven factors has been considered. Once the total points have been calculated they are then multiplied by a monetary unit (£3 in 1987 in UK) to calculate the final tree value.

b) Royal New Zealand Institute of Horticulture System. (RNZIH)

The RNZIH System is largely the same as the Helliwell system, with one or two minor modifications. The major difference is the addition of one extra factor. A comparison of factors is seen in the chart below, with the maximum number of

points that may be multiplied together to produce the final points value.

c) Australian Institute of Horticulture System. (AIH)

This system used a formula for calculating tree values which is based on the tree size and merit and this is multiplied by a land factor, based on the unimproved value of the land on which the tree is growing. Details of the application of the systems are given in Appendix 1.

Results and Discussion

Results are tabled below. Table 1 deals with the variability of individual factors within systems for the two individual

trees evaluated and are based on the records of a number of evaluators. Table 2 shows the total variability based on the final calculations of the tree value for each of the systems.

Because of the variable student numbers involved in the different assessments, the coefficient of variation (CV) was used to show the percentage variation from the mean for all tables. The CV is calculated by multiplying the standard deviation by one hundred and dividing this figure by the average.

This allows results from differing numbers of assessors and different systems to be compared for each year.

TABLE 2. FINAL CALCULATED TREE VALUES USING HELLIWELL, RNZIH AND AIH SYSTEMS

System	P.	Year	<i>Eucalyptus viminalis</i>		Mean	SD.	CV(%)
			No. of Assessors	Range (\$)			
HELLIWELL	£3	86	11	3240-46080	18435	11953	65
	£3	87	35	864-16053	4840	3224	67
	\$20	89	8	1440-30720	8340	9750	116
RNZIH	\$20	88	24	960-77760	15900	19251	121
Between years		78	864-77760	10519	13252	126	
AIH	\$8.82	86	11	467-628	522	52	10
	\$8.82	87	35	444-954	610	140	23
	\$8.82	88	24	282-670	498	89	18
	\$8.82	89	8	533-682	598	59	10
Between years		78	444-954	562	121	22	
<i>Quercus palustris</i>							
HELLIWELL	£3	87	35	657-14100	3386	2848	84
	\$20	89	8	1440-6480	3445	2112	61
RNZIH	\$20	88	24	720-17280	8023	5492	68
Between years		67	657-17280	5054	4490	89	
AIH	\$8.82	87	35	261-657	386	91	24
	\$8.82	88	24	251-468	348	57	16
	\$8.82	89	8	310-486	383	57	16
Between years		67	251-657	372	79	21	

P = Dollar or Pounds awarded per point. Students individually converted English pounds to N.Z. dollars, this calculation itself produced variable results. (From 1988 the \$20 per point adopted by the RNZIH (Wellington) (5) was also used as the points value for the Helliwell system to reduce error.)

Condition / Useful Life Expectancy.

The RNZIH and Helliwell systems both ask evaluators to predict useful life expectancy, whereas the AIH asks the evaluator to judge the condition of the tree. The students overall were able to assess the condition more objectively than the potential life expectancy.

Relationship to the Setting.

The RNZIH and the Helliwell systems both used this factor with little obvious difference between the two in the amount of variability. The variability for the eucalyptus in 1988 was high at 48%.

Presence of Other Trees.

This factor was again used by the RNZIH and Helliwell systems and showed considerable variation with the extremes ranging from 1-4 in many of the years.

Importance of Position in the Landscape.

While this was used only by the RNZIH and Helliwell, I included the AIH in the category based on Impact as one of the Merit Factors being somewhat equivalent. There was little difference in the levels of variability between all three systems.

Occurrence of Species.

This factor was only included by the RNZIH and showed considerable variability at 40% and 37% (Table 1).

Form.

This category was used by the RNZIH and the Helliwell systems only and the

variability was not generally as high as for the other factors.

Special Factors.

This factor was used by the RNZIH and the Helliwell systems and showed considerable variation. Evaluators consistently chose zero which was not an option on the points scale for the Helliwell system. Unfortunately the wording on the scale for point one says zero, point two being one and so on. As this was the bottom line of Helliwell's chart it is easy to see why so many misinterpreted this choice (This factor was ruled as 0 for the pin oak in 1989 hence a CV value of zero.)

Size.

All three systems used the size factor which produced the least variability in the results.

Calculated Tree Values

Table 2 consistently shows a high CV for both the Helliwell and the RNZIH systems. The range of both systems is extreme with the *Eucalyptus viminalis* in one year being valued at between \$960 and \$77,760 for the RNZIH system and the *Quercus palustris* from \$720 to \$17,280 again with the RNZIH system. Note the \$77,760 figure for the RNZIH is more than twice the top figure for the Helliwell system even though both systems in 1988 and 1989 used the figure of \$20 per point as a monetary base. The variability within

each factor seen in Tables 1 and 2 is compounded by the procedure of multiplying factors within both the Helliwell and the RNZIH systems. The Australian Institute of Horticulture System produced lower levels of variation between evaluators both within years and between different years.

1990 Experiment with a Composite Evaluation System

In 1990 a system was compiled to integrate what were perceived to be the less variable factors of many of the existing systems. The National Arborists Association and International Shade Tree Conference in USA produced their Fifth Revision of a Tree Evaluation System (7). This system along with features of those already considered was integrated to form a composite system. A class of thirteen students used this composite system on the two trees that had been assessed since 1986, *Eucalyptus viminalis* and *Quercus palustris*. Details of the application of the composite system for evaluating the two trees is given in Appendix 2.

Discussion of Results Using a Composite System

Base Value.

Results of the 1990 experiment with the composite system are given in table

TABLE 3. APPLICATION OF A COMPOSITE SYSTEM FOR TREE EVALUATION OF
Eucalyptus viminalis AND *Quercus palustris* (13 ASSESSORS)

TREE	FACTOR	CONTRIBUTING FACTORS		
		RANGE	MEAN	CV.(%)
<i>Eucalyptus</i>	BASE VALUE (G)	4900–4900	4900	0.0
<i>Quercus</i>	(6)	1620–1650	1631	0.9
<i>Eucalyptus</i>	CONDITION/HEALTH	0.7–1.0	0.9	10.0
<i>Quercus</i>		0.6–0.8	0.71	0.9
<i>Eucalyptus</i>	SPECIES TYPE	0.2–0.6	0.41	34.0
<i>Quercus</i>		0.5–0.7	0.59	10.0
OTHER FACTORS				
<i>Eucalyptus</i>	CORRECTION	0	0	0
<i>Quercus</i>		0	0	0
<i>Eucalyptus</i>	LOCATION	0.3–1.0	0.45	49.0
<i>Quercus</i>		0.3–0.9	0.72	22.0
<i>Eucalyptus</i>	ROLE IN SETTING	0.0–1.0	0.45	66.0
<i>Quercus</i>		0.0–0.5	0.42	45.0
<i>Eucalyptus</i>	FORM	0.0–1.0	0.84	33.0
<i>Quercus</i>		0.5–0.9	0.76	17.0
<i>Eucalyptus</i>	SPECIAL FACTORS	0	0	0
<i>Quercus</i>		0	0	0
<i>Eucalyptus</i>	TOTAL OTHER FACTORS	1.2–3.0	1.77	29.0
<i>Quercus</i>		0.9–2.3	1.9	22.0
BASE VALUE x CONDITION				
<i>Eucalyptus</i>		66847–95495	85946	10.0
<i>Quercus</i>		6263–8662	7492	9.0
BV x CO x SPECIES				
<i>Eucalyptus</i>		20054–51567	35165	37.0
<i>Quercus</i>		3758–5197	4415	10.0
BV x CO x SP x OTHER FACTORS = FINAL CALC TREE VALUE				
<i>Eucalyptus</i>		20627–87644	61881	39.0
<i>Quercus</i>		3382–10915	8409	24.0

Note

(G) = the same circumference figure used by all assessors.

(6) = students worked in groups to measure the trunk, only six measurements were made.

3. There is no difference in the final calculated figure between students for the base value for *Eucalyptus* as the figures were given.

A very low CV was returned for the *Quercus* which was measured by students much lower than for the size calculations in other systems. As only the trunk needs to be measured a lower CV between evaluators should be expected and this is as in the composite system where the cv is particularly low. Provided that the trunk measurement is a good indicator of the size of any normal tree, it should be incorporated into any future tree evaluation system.

Condition/Health.

Four broad guidelines are given in the evaluation of this factor, with some degree of flexibility within each category. The range for each category chosen was within

two of the four categories for each tree, with acceptable CVs for both species of 10% and 9%.

Species Type.

This factor was also covered by four broad guidelines with a degree of flexibility in choice within each. The guidelines, while appearing satisfactory for the *Quercus* (CV 10%), clearly was unsatisfactory for *Eucalyptus*, where the CV was 34%.

Other Factors.

This category involves five other factors that are frequently found in other tree evaluation systems, particularly the RNZIH and the Helliwell systems. The intention here was to include them as additive factors in the first instance in order that any errors are not exacerbated by multiplication.

Correction Factor.

The correction factor operates only in extreme situations. Neither of the trees was in this category, the wording would appear to work satisfactorily as a CV of 0% was returned for both species.

Location.

This factor does not appear to integrate satisfactorily, as both trees returned high CVs of 49% and 22% respectively. This factor may be improved by listing many more possible sites as done with the USA system.

Role in Setting.

This factor appears unacceptable with its current wording. The CVs returned were extremely high at 66% and 45% respectively. The factor may be too subjective to include in any system.

Form.

This factor has also returned CVs which are on the high side, particularly in the



Fig. 2. The *Eucalyptus viminalis* tree sited to the west of the main campus, near tennis courts and sports fields, but away from the major buildings. This is the largest tree on campus with a height of about 29m and a spread of about 22m.

case of *Eucalyptus viminalis* at 33%. The *Quercus palustris* result is more acceptable with a CV of 17%.

Special Factors.

This appears to be written satisfactorily in the case of the two trees tested, both returning CVs of zero as expected. As this factor includes an X factor however it could potentially be controversial. The X factor allows a number of evaluators in agreement to simply state that the tree is of inestimable value and under no circumstances should it be destroyed.

Note that the sum of Other Factors could be negative in extreme cases, allowing a negative value to be calculated. If this occurs substitute zero for the other factors. The product of multiplying this would be a tree of no calculable value. At the other extreme this factor is flexible enough to allow trees of inestimable value to be noted and provides guidelines for submissions to be made to ensure protection based on wide consultation.

Base Value x Condition.

This multiplication of factors returned

an acceptable 10% and 9% CV respectively. Note that this has the effect of reducing the calculated base value. This would normally be expected unless the condition was perfect, when the value would not change.

Base Value x Condition x Species.

The high CV of 37% for the eucalypt is a reflection of the earlier high CV for the species factor and is not acceptable. That of the pin oak, 10%, is acceptable. Note that this has the effect of reducing the calculated base value.

This would normally be expected unless the species was perfect, rare or notable in some unique way when the value would not change.

Tree Value – Base Value x Condition x Species x Other Factors.

The final calculated values for the eucalypt and the pin oak gave CVs of 39% and 24% respectively. These values were less than those calculated for the Helliwell and RNZIH system, although slightly higher than those calculated for the AIH system.

General Discussion

Final Calculated Tree Values.

It is the final calculated CVs that indicate the objectivity or subjectivity within a system. The lower the CV the more objective and therefore the less difference between the different evaluators. On that basis alone both the Helliwell and the RNZIH systems have shown high levels of subjectivity within the systems as indicated by the CVs. The major reason for the Helliwell and RNZIH systems returning high CVs is clearly related both to the number of subjective judgements that have to be made as well as the multiplication of all these factors. Essentially it is the multiplication of error that leads to the high CV. With the RNZIH system having one more factor than the Helliwell system, the final calculated value, assuming \$20 a point for both systems, could potentially be \$327,680 for the Helliwell system, and for the same tree evaluated by the RNZIH system \$1,310,720. A value almost four times greater! If you were suing or being sued which system would you choose?

The second and major problem with both the Helliwell and the RNZIH systems relates to the establishment of a dollar value. There is no indication with either system as to how the figures calculated for each point are formulated. Similarly, while there are indications that the dollar value should be kept in line with inflation, it is not clear how this would be done. The establishment of a dollar value for each point must always be a point of conjecture, at least until there is some way of proving its validity. A value based on cross sectional area of trunk related to the initial cost of a nursery tree may help provide a legitimate value.

The composite system returned final CVs that were considerably lower than either the Helliwell or the RNZIH systems, while the AIH system returned the lowest CVs of all the systems and appears the most objective. The AIH system however, also needs further consideration. While one of the advantages of the AIH system is in the way a true dollar value can be legitimately sourced, compared with the Helliwell or the RNZIH system, the value applied is to the land occupied by the tree, rather than any inherent value of the tree itself. An example of the difference that this could make can be seen by comparing two suburbs, one an affluent suburb with many trees and more desirable to live in as reflected by the higher property values. The other suburb is less desirable, has fewer trees and property values are lower. Identical trees in these two suburbs however would not be equal in AIH calculated dollar terms.

The poorer suburb would have a tree worth less than the similar one in the more desirable suburb yet, if it is trees that make a suburb more desirable, it would seem to make sense to value the tree much more in the poorer suburb, where there are fewer trees.

The composite system has clearly favoured the size of *Eucalyptus viminalis* against the inherently smaller, slower growing *Quercus palustris*. The *Eucalyptus viminalis* had an average calculated value of \$61,881 compared to the *Quercus palustris* at \$8,409. To make this system more equitable a differential price system to calculate the base value would seem necessary. This may be possible by looking at the prices of retail trees in nurseries and garden centres to establish true base values.

The Compensation Issue.

It is clear that trees may be valued to seek compensation against their removal, but perhaps consideration should also be given to compensate the party that is financially or otherwise disadvantaged by having to retain that tree. Should the party that wishes to remove a tree from their own property for reasons such as comfort, light, view or commercial gain be penalised by threat of court proceedings? Can it be perceived as fair that people who own important trees should be threatened with costs based on some calculated tree value if they wish to remove that tree? The value of trees in any community are surely society values. The broad benefits provided by trees include aesthetics, air purification and ecological values as well as recreational and therapeutic opportunities. The benefits trees provide are not exclusive to the owner of a tree. Should society at large therefore compensate the owner if necessary for the calculated value of a threatened tree in order to save it? In disputes over trees it seems that the human threat to the tree comes because either the tree is a nuisance of unbearable proportion to one party or the tree is standing in the way of commercial gain. Therefore the argument over the carrot or the stick would seem to prevail. You can threaten that party with court action on the basis of the tree's calculated value or compensate the aggrieved party for the calculated value of the tree! Either way the tree is protected.

What is the value of a tree that is lost through a storm? Oates (1988) in a

reference to the large number of trees blown over in a storm in the United Kingdom in 1987 commented "The main lesson from the disaster was that trees like all living things do not last forever. Many of the trees that fell over were mature and nearing the end of their lives. In most cases, no thought had been given to replacement planting programmes. In that single day over 15 million trees were destroyed, many of which were old and valuable trees, many were rare." Also cited in the same reference was an observation by Buchan and Lacey in the 'Observer', "By disregarding posterity we have impoverished the present", referring to the lack of forethought to the continued need to replant trees, even while other existing trees are alive and may look perfectly sound. Would it matter if trees had been valued or not in this situation?

Conclusion.

There is a need to build in as much objectivity into any tree evaluation system as is possible. There is a need to balance the 'necessity' for tree evaluation systems with common sense and the realisation that trees must be continually planted for the future and recognise also that trees themselves have finite life spans. There is also a need for horticulturists and landscape architects to choose the 'right' tree for any particular site and still recognise that mistakes can and will happen requiring the removal of badly sited or inappropriate trees.

Given that there is considerable variation for most of the systems between evaluators, it should not be overlooked that different ways of evaluating trees have also produced final dollar values that differ widely. When and if a perfect system is devised it must bear some relationship to what the market value of the tree is worth. Since this type of market situation is unlikely, then the value may be what compensation society, a group or an individual, is prepared to pay to save the tree. This might be in the form of a rates rebate to a tree owner, with the owner of a tree then charged a real value if damage should occur. If this seems

unlikely, then a system where the tree value bears some relation to the worth of a tree in a nursery, modified for age, condition and location seems like the most sensible choice. In this sense the International Shade Tree Conference and National Arborists Assn. (USA) system would appear to present the most logical system in relation to real values. The cost per square inch in dollars could be modified for New Zealand based on actual costs of trees in this country.

It may also be prudent to consider using expert opinions on trees simply to state an opinion on the health or condition of a tree or its rarity in a region, rather than put a reputation on the line by trying to calculate a dollar value for a tree.

There are acknowledged economic advantages conferred by properly sited and selected trees. It is these values that make people want to keep planting for the future and these values are not likely to be challenged.

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Appendix 1

APPLICATION OF THE HELLIWELL ROYAL NZ INSTITUTE OF HORTICULTURE (RNZIH) AND AUSTRALIAN INSTITUTE OF HORTICULTURE (AIH) TREE EVALUATION SYSTEMS

(a) Comparison of Helliwell and RNZIH systems

HELLIWELL SYSTEM		RNZIH SYSTEM	
Factor	Max. points	Factor	Max. points
1. Size of tree	4	A. Size of tree	4
2. Useful life expectancy	16	B. Importance of position	16
3. Importance in position in landscape	64	C. Presence of other trees	64
4. Presence of other trees	256	D. Occurrence of the species	256
5. Relation to the setting	1,024	E. Role in location or setting	1,024
6. Form	4,096	F. Useful life expectancy	4,096
7. Special factors	16,384	G. Form or shapeliness	16,384
		H. Special factors	65,536

(b) Australian Institute of Horticulture System

The formula for calculating TREE VALUE (TV) is :

$$TV (\$) = \frac{(SF + MF) \times LV}{\text{size factor} \quad \text{merit factor} \quad \text{land value}}$$

1. The SIZE FACTOR basically involves measuring the height of the tree, then subtracting the trunk height to give the canopy height. The canopy area is then calculated by measuring the canopy spread and multiplying by the canopy height. Charts of exponential scales are consulted to ascertain values for the canopy and the height value of the tree. Exponential scales are used to reduce the effect of either extremely large or small trees.

2. The MERIT FACTOR (MF) formula is :

$$MF = S \quad (I + C - N - D)$$

Stress Impact Condition Nuisance Detraction

The range of choices varies considerably for each factor;

Stress	-	No stress	=	1,	maximum stress	=	3	(increments 0.1)
Impact	-	No impact	=	1,	maximum impact	=	10	(increments 1.0)
Condition	-	Poor	=	1,	max. (perfect)	=	10	(increments 1.0)
Nuisance	-	No nuisance	=	1,	max. nuisance	=	5	(increments 1.0)
Detraction	-	No detraction	=	0,	max. detraction	=	8	(increments 1.0)

3. LAND VALUE (LV) – use the value of one metre squared of land based on the unimproved capital value.

Appendix 2

APPLICATION OF A COMPOSITE SYSTEM FOR TREE EVALUATION

This proposal operates on the basis of four fundamentals.

- | | | |
|--|---|----|
| a) The calculation of a BASE VALUE. | = | BV |
| b) CONDITION or HEALTH of the tree. | = | CO |
| c) Type of SPECIES involved. | = | SP |
| d) Consideration of the OTHER FACTORS. | = | OF |

Calculating TREE VALUE

The formula for calculating the tree value (TV) is

$$TV = BV \times CO \times SP \times OF$$

a) BASE VALUE

- 1) Measure the circumference of the tree trunk in mm, 1.5m from ground level.
- 2) Calculate from the above measurement the sectional area in mm squared.
- 3) Multiply trunk area in mm squared by \$0.05 = BASE VALUE.

See Appendix 3 for guide sheet given to students.

Notes

- In the case of multi-stemmed trees, take the value of the largest stem and add 50-70% of the mean value for all other stems. This is the same recommendation as for the USA system.
- It may not be possible to measure or truly represent the accurate diameter of the trunk, 1.5m from ground level, due either to branching out at this height or a large gall or some other reason. In these cases, measure the trunk at a point immediately above and below the obstruction and halve the difference between the two measurements.
- The five cents per mm square is an estimate only of what a tree may be worth at the time of sale at a nursery and could therefore reflect the true value or worth of a tree at that stage in its life. It assumes also that the trunk in mm squared and divided into the dollar cost of the tree is both an accurate measure of the tree's value and that other factors have a lesser impact on the valuing of trees for sale. More work needs to be done to determine exactly how a value is placed on nursery trees to establish all of the factors involved here. Ideally a value could be measured for each species sold.

b) CONDITION

(Choose between range 0.1 to 1.0 with increment steps of 0.1)

Guidelines

- 0.1 to 0.3 represents trees showing poor condition. Repair work would be costly and probably pointless.
0.4 to 0.6 represents trees that may be repairable, but are not in good condition.
0.7 to 0.9 represents trees that are in good condition, but may need minor repair work.
1.0 a tree in perfect health.

c) SPECIES

(Choose between range 0.1 to 1.0 with increment steps of 0.1) Guidelines:

- 0.1 to 0.3 represents fast growing, typically short lived trees.
0.4 to 0.6 represents trees with a moderate growth rate and life expectancy.
0.7 to 0.9 represents trees with a slow growth rate.
1.0 a notable species, hybrid or cultivar that may be rare, or difficult to grow normally in this region. A highly desirable species in this region.

d) OTHER FACTORS

OTHER FACTORS	RANGE									
Correction factor	0.0			1.0			1.5			2.0
Location	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
Role in setting	-1.0		-0.5		0.0		0.5		1.0	
Form	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
Special factors	0.0			1.0			2.0			(X)
TOTAL OF OTHER FACTORS										

Notes

A Correction Factor

may only be applied in either of the following situations :

- Where a tree is rare and normally is of only small to medium size even when fully mature.
- Where a tree has struggled to grow in a particular situation and yet it is because of the nature of that situation that the tree has not grown well. No other species is likely to grow well on this site and because of the difficult conditions replacement would be slow, or unsuccessful. However, if the problem has been that the tree chosen for that particular spot was a bad choice initially, because another species would do well, then this category cannot be used, eg. trees that cannot tolerate salt water struggling in an area where there are saline soils, when salt tolerant species would do better.

The intention of the correction factor is to adjust the Base Value upward because it may be unfairly weighted in some cases because of tree size. In all other cases however, larger trees have a greater environmental and visual impact than smaller trees. Therefore, no adjustment should normally be made.

Location

(Choose from range 0.1 to 1.0 with increment steps of 0.1)

- 0.1 to 0.2 Forest tree.
- 0.3 to 0.4 Trees near minor roads.
- 0.5 to 0.6 Trees near major roads.
- 0.7 to 0.9 Town or city trees, or trees of important places.
- 1.0 Landmark trees.

Role in Setting

(Choose from range -1.0 to +1.0 in increment steps of 0.5)

The negative options allow for the remote possibility of a tree growing in a situation, such that its removal would improve the area. Where this situation occurred it would be mandatory to seek the services of an independent landscape architect for advice.

Guidelines

- 1.0 A badly sited tree, its removal could only improve the area.
- 0.5 A poorly sited tree, removal may improve the area.
- 0 An ordinary tree that neither detracts nor particularly adds to the area.
- 0.5 A very good choice of tree for the site.
- 1.0 A superb tree in the perfect setting. This category may also be chosen where a tree may have been removed from a group of trees whereby its removal has, or would spoil the effect of all others.

Form

(Choose from range 0.1 to 1.0 in increment steps of 0.1)

Guidelines

- 0.1 to 0.4 Very poor to poor form.
- 0.5 to 0.7 Form average.
- 0.8 to 0.9 Form very good.
- 1.0 Perfect form.

Special Factors

(Choose from range 0 to 2 in increment steps of 1.0 except for a special category X [see below])

Most trees will not come into this category and would only be used after wide ranging consultation. Examples of trees that could apply could be trees with spiritual or historical significance, or trees of exceptional rarity, large size or beauty.

(X) allows a tree of inestimable value to be given a value far beyond what would ever normally occur. This could only be given in exceedingly rare cases after wide consultation within a community. In cases of this importance no dollar value would be calculated, but submissions would be made from expert opinion.

Final Step to Calculate the Tree Value

TREE VALUE = Base Value x Condition x Species x Other Factors

Note

- This system should only be used by and acknowledged tree or horticultural authority, in consultation with a landscape architect if necessary.
- If the calculated tree value is negative, substitute zero value.

Appendix 3

TREE EVALUATION METHOD SHEET

Tree one *Eucalyptus viminalis* Southwest Tennis courts – Farm Road.

1. Base Value

Measure circumference of trunk 1.5m from ground level.
Square the circumference and divide by 4Pi (12.5714)
Multiply the answer by \$0.05 = BASE VALUE

2. Condition or Health

See guidelines in Appendix 2, choose a category and multiply the BV.

3. Sum of (BV. x CO.) x Species

See guidelines in Appendix 2. Select the appropriate category and multiply the answer at 2.

4. Sum of (BV. x CO. x SP) x Other Factors.

See guidelines for each of the following categories. Select the appropriate figure and ADD the sum of each.

Correction Factor

Location

Role in setting

Form

Special Factors

TOTAL

5. Final Step.

Multiply the figure obtained by adding the factors in figure 4 with the answer obtained at step 3.
This equals the calculated TREE VALUE.

Christchurch — The First Garden City?

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Christchurch has long been known as 'The Garden City' and this title has recently been in the news with the adoption of a new city slogan. Christchurch is now to be known as 'The Garden City — the city that shines'.¹ The subject of this paper is to consider the original title 'The Garden City'. When did this develop and why?

When the first issue of *The City Beautiful* appeared in October 1924 Christchurch was already well known as 'The Garden City'. In this issue the Mayor of the day, J.A. Fleisher, in a guest editorial, referred

Surprisingly, according to Osborn (1946), Chicago had been the first to call itself the Garden City, . . . "through pride in its magnificent surroundings". Garden City was also the official name of a New York suburb on Long Island, founded in 1869 by Alexander L Stewart. By 1900 there were, besides this one, nine villages and a small town also named Garden City in the USA. Christchurch, founded in 1850, was known as the Garden City of New Zealand. (Osborn, 1946, p. 181). The Garden City of Long Island became one of the USA's first planned communities,

were often built without proper water supplies, drains and privies. Construction was often in back-to-back houses, lacking ventilation and wallowing in sewage. As a result cholera was a problem and death rates were high. At the time *laissez-faire* and capitalist philosophies dominated the economy and society. Opinion grew that if towns were filthy, and they and their inhabitants were cleaned up, they would far more contented and thus better workers, making more goods and more profits. A number of reports and Royal

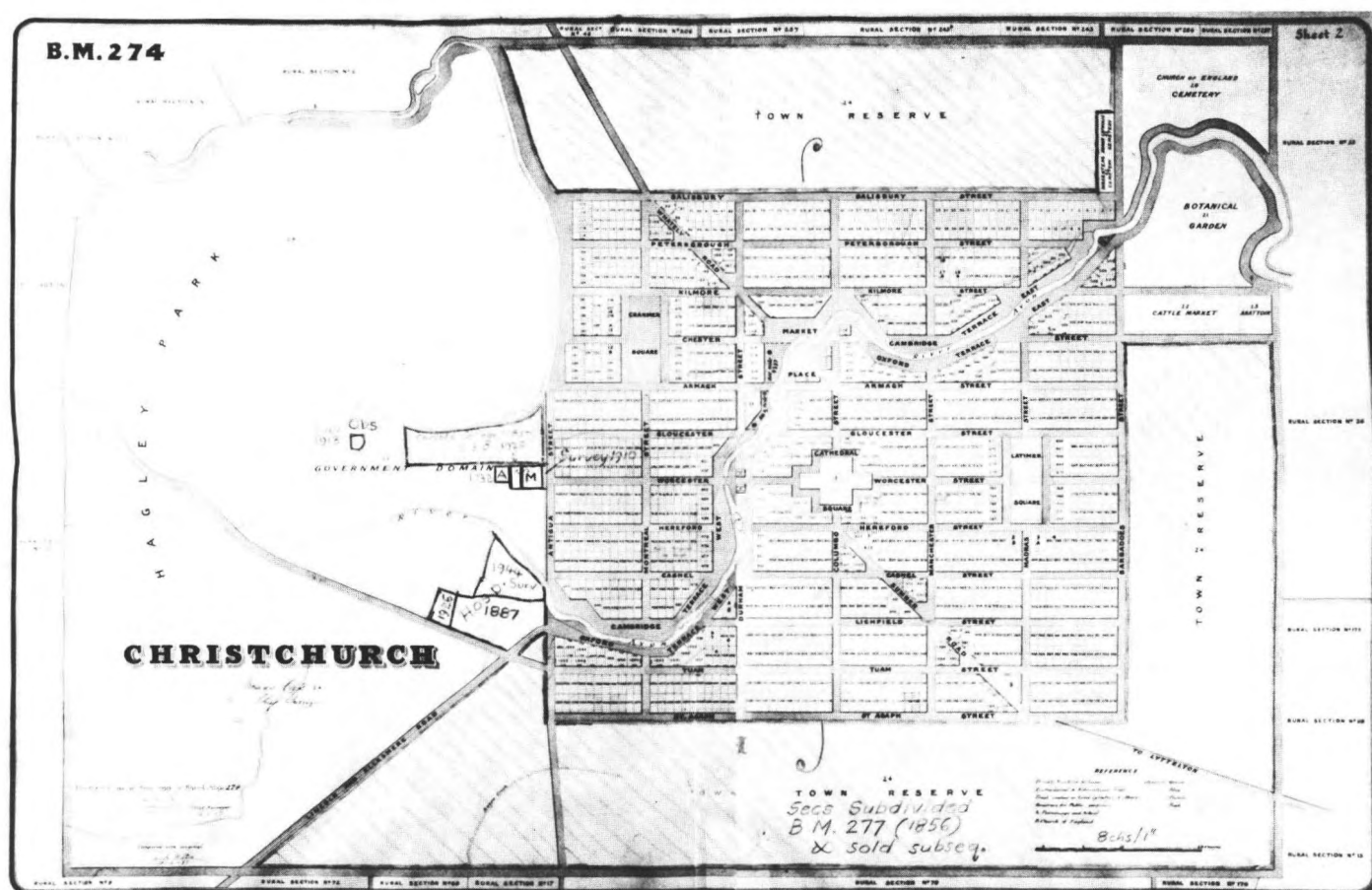


Figure 1: Black Map 274, Christchurch 1850 by Edward Jollie, Copy by Thos. Cass. Pictorial Archives, Canterbury Museum

to 'the Garden City' in his second paragraph:

"Well known as the garden city of New Zealand, it is splendidly laid out with broad streets and liberally provided with open spaces, all of which are well cared for and greatly conduce to the health and comfort of the community. Its beautiful homes, artistically designed, surrounded by well arranged nicely kept gardens, together with the peaceful Avon which winds its way through the borders of the City, never fail to impress the visitor with the beauties of Christchurch." (Fleisher, 1924, p.2)

which was incorporated in 1919. It was distinguished by its handsome residential areas and garden atmosphere.

The Canterbury Association founded Christchurch in 1850, after the 'planned' settlements of Wellington, Nelson and Dunedin. It followed the ideas of Edward Gibbon Wakefield on systematic colonization and was a 'planned city'. The plans of the Canterbury Association, which had been published in March 1848, were in part a reaction to urban development from the Industrial Revolution. Towns had grown so quickly that the new parts

Commissions resulted during the 1830s and 1840s, many associated with the name of Sir Edwin Chadwick. Among them in 1833 was the *Report from the Select Committee on Public Walks*, which was appointed to "... consider the best means of securing Open Spaces in the Vicinity of populous Towns, as Public Walks and Places of Exercise calculated to promote the Health and Comfort of the Inhabitants".

The Committee reported in favour of 'Public Walks' and suggested legislation to secure them but nothing was



Figure 2: 'The Plains around Christchurch', 1851. Watercolour sketch by J. E. Fitzgerald. *Pictorial Archives, Canterbury Museum.*

immediately forthcoming. In the 1840s several pieces of legislation included provision for open space but not until 1859 was a public general Act passed, the Recreation Grounds Act 1959 (Chadwick, 1966, pp. 49-52). Canterbury and Christchurch were thus established against the background of a major debate about the value of public open space. When New Zealand was settled Governor Hobson was asked to report 'on land suited for health and enjoyment and forbidden to dispose of it to private individuals' — a very forward looking brief (Challenger, 1989, p.57).

Captain Thomas, the Canterbury Association's surveyor, chose a slightly raised site on the Avon River out on the Canterbury plains. The layout in March 1850, with substantial open spaces, was by Edward Jollie, Captain Thomas' surveyor (Challenger 1989). Subsequently Christchurch has been described as the Canterbury Association's proudest dream: "... a quiet university town of spires and quadrangles, lawns and trees." (Gardner, 1971, p.5).

It was not accidental that it was named after Godley's Oxford college. However, new arrivals saw from the Port Hills a freshly developed town like a whistle stop in the midst of the American Prairie: "... It was exposed, it was utterly treeless, and it was dusty, ... simply a collection of scattered houses separated by wide paddocks and uncultivated tracts ... " (Gardner, 1971, pp.5-6).

The town was so difficult to see that Fitzgerald could describe it prophetically: "It will always be like the suburbs of a large town. The houses will all probably stand in gardens."²²

At that time there was little to be seen of gardens. Clumps of flax and cabbage trees provided the only shelter from the nor'wester. The early settlers were particularly discouraged by the flatness and lack of greenery. They had a desperate urge to relieve their homesickness and

the monotony of their surroundings by planting trees and gardens (Gardner, 1971, pp. 5-6). Morrison (1948) has described how the early settlers of Canterbury had sought to be reminded of 'home' by planting English trees in their "... strange, bare and ugly landscape." But it was to the planters of private gardens, in Morrison's view, that most of the credit was due for transforming the dreary Canterbury landscape. Ordinary residents of towns and suburbs surrounded their homes with well tended gardens, carefully planted with English flowers and shrubs (Morrison, 1948, pp. 131-2). Miles Fairburn has recently suggested that planting gardens was an important way in which settlers countered the atomisation of settler society, loneliness and the distance of kin. The case of Christchurch appears to confirm his argument (Fairburn, 1989, p. 202).

Within a few years of the establishment of Christchurch, substantial planting along

the Avon was advocated by John Hall, the first Chairman of the city council (later Sir John Hall — Colonial Premier), and William Wilson, another councillor and the most prominent early Canterbury nurseryman (later the first Mayor of the city). Hall was an ardent planter of trees on what he described as the windswept and originally treeless Canterbury Plains. This planting occurred at his home, *The Terrace*, a station on the Rakaia River near Hororata, and throughout Christchurch. He and Wilson were on the Council's planting committee and after the Avon they turned their attention to the town belts. The town belt was a strip of largely unformed road, two chains wide, along the north, east and south boundaries of the city. It had been set aside as a reserve by the Canterbury Association's Reserves Ordinance, 1855, which provided for its planting. Planting had begun by September 1863, but must have encountered difficulties because a further council committee was formed in 1867 to report on the state of the town belt and to develop further planting plans (Lamb, 1963, pp. 53-56).

However, Christchurch was built on a swamp and this was reflected in the period 1850-1875 by a high death rate due to enteric disorders — typhoid, diphtheria and diarrhoea. In 1875 the death rate was 30.4 per thousand live births. But proper drains and sewers were laid to such good effect, under the Christchurch District Drainage Act of that year, that by 1889 the death rate had fallen to 9.8 per thousand live births. In 1907 a Commission of Inquiry into disputes between the Drainage Board and local authorities heard medical testimony that before the setting up of the Board typhoid and diphtheria were rampant, but with the Board Christchurch had become "... one of the healthiest cities in the dominion" (Wilson, J, 1989, pp. 32-42).

By 1893 the *New Zealand Official Yearbook* (p407) described Christchurch



Figure 3: 'City of Christchurch, Canterbury, New Zealand', June 16, 1851. Sketch by A. C. Barker. *Pictorial Archives, Canterbury Museum.*



Figure 4: Planting along the Avon in the Public Domain. Postcard in the F. T. Series, 1905. *Pictorial Archives, Canterbury Museum.*

as follows: "Christchurch, the capital city of the Canterbury District, is situated on the plains. It is practically level, laid out in rectangular form, two mile by one mile and a quarter, and is intersected by a diagonal street. The streets are 66ft in width. There are numerous open spaces, including the Cathedral Square in the centre, beside Cramner and Latimer Squares. The Avon, a beautiful stream, intersects the city, presenting from all points charming vistas. The city is surprisingly English in its appearance, architecture and surroundings . . . The whole is admirably set off by Hagley Park, 400 acres in extent, the Domain and Botanical Gardens, 79 acres, Lancaster Park, the town belts and other public and private gardens and plantations. The suburbs comprise a large number of handsome houses amid beautifully kept grounds."

To counter public concerns about the state of development of the city the Christchurch Beautifying Association was founded in 1897³. The only clue as to the reasons for the founding of the Beautifying Association comes from Sir Henry Wigram's *The Story of Christchurch*. In the Appendix he listed various Christchurch organisations and societies including the Christchurch Beautifying Association which he suggests was established after an Amenities Society was founded in Dunedin. This Society had the express object of the artistic and scenic improvement of that city, and the cultivation of all that was beautiful. It appears that Christchurch adopted these objects too. Leonard Cockayne set out the aims of the Association in his first annual report as foundation secretary. They were: ". . . in the first place . . . to beautify, by suitable landscape gardening, the various waste or partially improved spots within our city and its immediate suburbs, and in the second place (and this we take to be one of its most important functions) to influence by example,

suggestion and assistance, others to help in making our city beautiful and attractive, as for instance, through the better and more artistic cultivation of their gardens, or the removal or masking of unsightly objects. Also our Association is always on hand to call a public meeting of the citizens, should any contemplated act of vandalism threaten any of the attractive features of our locality." (Chilton, 1924, pp. 11-12)

The Dunedin Amenities Society, which appears to have been the model for Christchurch, had been founded in October 1888 as 'The Dunedin and Suburban Reserves Conservation Society'. It resulted from a suggestion by Alexander Bathgate, a Dunedin notable, who had argued for the creation of a society to preserve Dunedin's beautiful surroundings. Before going on to the example of the 'Dunedin of the north', Bathgate pointed out what had been done by the people of

Christchurch (quote in Vine, 1983, p. 30) ". . . who 'were almost compelled to hide the nakedness of the land'. Now they boasted of their park, their gardens, and their stream — 'or river as they prefer to call it' — with a fond pride 'that I never heard a Dunedinite indulge in regarding any of the amenities of our town'."

Bathgate suggested the foundation of a society to foster the amenities of the city as the Cockburn Association did for Edinburgh (McDonald, 1965, p. 211). The Cockburn Association had been set up in 1875, honouring the name of Edinburgh's early environmentalist, Lord Cockburn. Lord Cockburn had been an eminent Whig politician in the early nineteenth century with a specific concern for environmental issues. The Association had been set up with the intention that it should become 'a popular association for preserving and increasing the attractions of the city and its neighbourhood'⁴. Its supporters included many 'leading and valuable citizens', a point which supports Hague's thesis that the planning and development of Edinburgh was controlled by a class, 'an ascendant *bourgeoisie* who had merged with the old Scottish ruling class who remained connected with the former capital (Hague, 1984, pp. 153-4). Vine (1983) has studied the founders and the formation of the Dunedin Amenities Society and has concluded that it was partly a reaction to the discovery of undesirable features in Dunedin — crowding, and insanitary and poor working conditions — and that it was founded by the cream of Dunedin society (Vine, 1983, pp. 38-61). Like the Cockburn Association it too continues to be an active environmental pressure group. Perhaps the Dunedin Amenities Society, the Christchurch Beautifying Association and Cockburn Society of Edinburgh were all controlled by the ascendant *bourgeoisie* of their respective cities, to the exclusion of the working classes from power in



Figure 5: Part of the remains of the Town Belt looking south on Fitzgerald Avenue from Kimore Street. No date. *Pictorial Archives, Canterbury Museum*



Exhibition Series No. 7. Exhibition Lake, Christchurch

Figure 6: The Exhibition Lake in Hagley Park in 1905. Postcard, Exhibition Series, No. 7. Pictorial Archives, Canterbury Museum.

planning and development matters. Certainly the initial membership of the Committee of the Christchurch Beautifying Association was from the Christchurch establishment (Chilton, 1924).

A clue to the origin of the garden city idea may be given by what we do know of the formation of the Christchurch Beautifying Association. The original committee included the eminent architect Samuel Hurst Seager. Seager was educated at Canterbury College and left in 1882 to study at London University. His family had migrated to New Zealand in 1870. Seager gained certificates of merit in science and history. He also obtained an honours certificate in architecture and was awarded a studentship at the Royal Academy. In 1884 he became an Associate of the Royal Institute of British Architects (A.R.I.B.A.) and lectured at South Kensington on the science of building. Then he toured Western Europe before returning to Christchurch to set up his practice. In 1885 he won a competition for municipal offices for Christchurch when his estimated cost was much cheaper than those of other competitors. Seager's plan for the Christchurch City Council Chambers provided a contrast with prevailing Christchurch traditions. He designed a building of mixed architectural character, which combined the old English Queen Anne style of architecture with Domestic Revivalist features. The building has been described as being influenced by Richard Norman Shaw, the Victorian architect in England."

Shaw would have been at the forefront of architectural practice in England when Seager was undergoing his training. What would have been more natural for a keen student than to take note of the key exponents of his craft at such a time. Shaw was not just associated with domestic architecture and the Arts and Crafts movement. Just before Seager's arrival in Britain, he had begun work on the first English 'garden suburb', Bedford

Park, Turnham Green, on the edge of London. This was a colony of houses placed in gardens amongst trees which provided the model for modern suburbs. (Richards, 1940 p. 65). Shaw's 'solid and sensible brick-built houses with spacious bay windows, no basements and modest back gardens are set in quiet tree lined roads near a railway station, shopping parade and church'. Watkin attributes to Bedford Park many of the characteristics which appeared later at Port Sunlight, Cheshire, for the future Lord Leverhulme, when he developed a 'mildly picturesque model village for his employees' (Watkin, 1982, pp192-5). Two separate traditions met here for the first time: 'the sylvan suburb inspired by Nash, and the Victorian philanthropic movement for the improvement of working class dwellings' (Pevsner *et al.*, 1971, pp3-4).



Figure 7: Samuel Hurst Seager's Garden Suburb development on Clifton Hill, Sumner, viewed from Cave Rock Jetty about 1915. Pictorial Archives, Canterbury Museum.

That Samuel Hurst Seager should have been affected by Shaw seems to be confirmed by his development of a garden suburb of his own at Clifton Spur, Sumner, from 1902. After building a house for himself he purchased a further 2.25 acres on which another group of single storey wooden bungalows was built. The property was laid out as a garden suburb on a hillside. Homes of this form were to be found in Canterbury for many years before they appeared in other parts of the New Zealand. The development of the Spur was entirely Seager's work, with the cottages directly influenced by Voysey and the Arts and Crafts movement. When the Spur was put up for sale in 1914 purchasers were assured that the whole area would be completed as a garden suburb as Hurst Seager had originally intended. He retained the right to design and supervise future developments. As a result the whole suburb retains a unity and harmony as a whole. When Hurst Seager had addressed the Beautifying Association in 1911 on 'Our Beautiful World — Man's work in the making and marring of it' he had drawn attention to the value of developments in a single ownership for retaining harmony. In his own garden suburb development Hurst Seager retained this degree of control by retaining the ownership and only leasing his wooden cottages to interested tenants. Interestingly, Letchworth, the first of Ebenezer Howard's garden cities, which was founded in 1904, receives no mention in Seager's observations on garden cities.

Now whether the development of Ebenezer Howard's 'Garden City' in his book *Tomorrow: a peaceful path to real reform* (1898) was central to Hurst Seager's plans for Sumner is unclear. The book was republished as *Garden Cities of Tomorrow* in 1902 and led to a worldwide movement concerned with establishing garden cities, but again this appeared to occur after Hurst Seager had made his

first moves on Clifton Spur. When these ideas first arrived in Christchurch is again uncertain. Clearly for Hurst Seager garden cities were not confined to the ideas of Ebenezer Howard, although he was inclined to look to the mother country for inspiration (Seager, 1911 and Salmond, 1986, pp. 9-12).

Howard's ideas had been based on dissatisfaction with Victorian cities, the success of radical social ideas and the development of interest in public health. Together with the utopian ideals of Edward Bellamy, expressed in *Looking backwards* (1888) and the land nationalisation ideas of Henry George in *Poverty and progress* (1879) Howard blended all these various influences together into his book, together with the systematic colonization ideas promoted by Edward Gibbon Wakefield (Freestone, 1989, p. 16 and Osborn *op. cit.*, pp. 176-178).

But Wakefield's ideas had also been behind the settlement of Canterbury and the building of Christchurch. Howard refers specifically to Wakefield's ideas, especially as adopted in Adelaide in the context of the green belt idea. However, although Howard used these ideas in his book, it was probably more as an illustration which supported his case. Osborn has argued that Howard's ideas were not based on systematic academic study of his materials, but rather on general ideas and discussions in which he was involved over many years and which came to fruition in *Tomorrow*. Osborn based his argument on a detailed knowledge of Howard and discussion he held with him on the origins of his ideas (Osborn, 1950, pp. 230-1). Interestingly, while Osborn mentions the New Zealand perspective as an influence on Howard, Buder, writing from an American perspective, mentions neither Wakefield, who is specifically mentioned in Howard's book, nor New Zealand, nor Christchurch. Wakefield, systematically settled colonies, Adelaide and even Christchurch may have been an influence on Howard, however, and may have later benefited from the name which Howard coined – Garden City. But this was not Howard's first choice and Buder suggests proposed names went from Unionville, to Rurisville (which was Howard's personal favourite) to Garden City (Buder, 1990, P. 65 footnote ¹).

The outcome of Howard's proposal was very attractive to many who were searching for a more appropriate form of town development which was physically more attractive, hygienic, socially equitable and financially affordable for the poorer classes. Garden city conferences were held at Bournville in 1901 (300 delegates) and at Port Sunlight in 1902 (1200 delegates) (Purdum, 1913, pp. 295-301). These were more than social events. The first garden city following Howard's ideas was constructed at Letchworth from 1904 to designs by Unwin and Parker.

When the New Zealand Shipping Company published a pocket book for passengers in 1908 Canterbury was referred to as the 'Granary of New Zealand'



Figure 8: 'Sir John Hall, K. C. M. G., 1901', from the caricature by W. A. Bowring, No. 42 in the 'Press Portraits' Series from *The Press. Pictorial Archives, Canterbury Museum.*

and Christchurch as 'The City of the Plains'. Seen from the Port Hills the city of Christchurch: '... lies embosomed in the trees — a veritable garden city' (Triggs, 1908, p. 129), but the garden city title does not seem to have been fully adopted.

Charles Reade, a New Zealander, described the garden city movement in his book *The Revelation of Britain: A Book for Colonials* published in 1909. Old industrial cities with their slums, ill health, abysmal working conditions and inequalities were condemned and the remedies were perceived in municipal socialism, town planning and the garden city movement. Christchurch, Auckland and Opotiki had written to the Garden City Association by 1913 for information about garden cities and in 1914-15 Reade led a tour promoting town planning throughout Australasia. The New Zealand leg of the trip was completed in July 1914, before moving across the Tasman. This tour had the effect of bringing the garden city movement before a wider audience and focussing on substandard

urban conditions (Freestone, 1989, p. 67).

Hurst Seager was quite familiar with these ideas when he attended the second Australian Town Planning Conference and Exhibition at Brisbane in 1918. His report for the Minister of Internal Affairs demonstrates this familiarity when he expounded Howard's ideas in distinguishing between 'garden cities', 'garden villages' and 'garden suburbs' (Seager, 1919, p. 25).

The Spur, Sumner, only 37 minutes from the city centre by tram, clearly fell into the last category. However, Christchurch itself, although founded long before Ebenezer Howard ever promoted his idea of 'Garden City' has many of the appropriate characteristics outlined by Seager and it is not difficult to see how this name would have been appropriated by the residents. Perhaps it was Sir John Gorst, the Special Commissioner representing the British Government at the 1906 International Exhibition at Christchurch, who first focussed on Christchurch as a Garden City: "I wish

that I would have a cottage here, and spend the rest of my days in this charming spot. I feel that I have been in England all the time. It is the loveliest town I have ever seen. It is a 'garden city'. To my mind Christchurch is exactly what we are trying to make our garden cities in England. It has the same broad streets, open spaces, and beautiful gardens . . .” (quoted in Triggs, 1908 p. 135).

It was appropriate that the official guests, including Sir John, would have been welcomed to the Exhibition by the Mayor of Christchurch for the Exhibition year, Sir John Hall, formerly the first Chairman of the Christchurch Town Board, who had been persuaded to come out of retirement for the event. As one of the original 'planters' of the garden city who would have been more appropriate to hear it so described (Wigram, 1916, pp. 218-9). Landscape architects have noted for some time the similarities between Howard's 'Garden city' and the original ground plan that was prepared for Christchurch⁶. Perhaps Christchurch should have the slogan: 'The First Garden City' as it clearly predates all other 'garden cities' cited at the beginning of this article and the introduction of the idea by Ebenezer Howard. Howard's title, which he had acquired somewhat accidentally, was clearly appreciated because it fitted Christchurch so well, and because it fitted the aims of its Beautifying Association which promoted it.

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Footnotes

1. 'Christchurch – the Garden City – the city that shines', pp. 46-49 *The City Beautiful*, May/June 1990.
2. Fitzgerald to Rintoul, 6 July 1851: Fitzgerald Papers – quoted in Gardner *op. cit.*, p. 6.
3. The early history of the Beautifying Association is difficult to ascertain because by the time that Chilton began to record its history in the first volume of *The City Beautiful* the first Minute Book of the Association had already been lost. (Chilton, 1924, pp. 11-12.)
4. Quoted in Hague, 1965, p. 153.
5. Typescript held in School of Fine Arts file of architects entry for Seager.
6. Swaffield, S., pers. comm., May 1990.

