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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 stocky 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

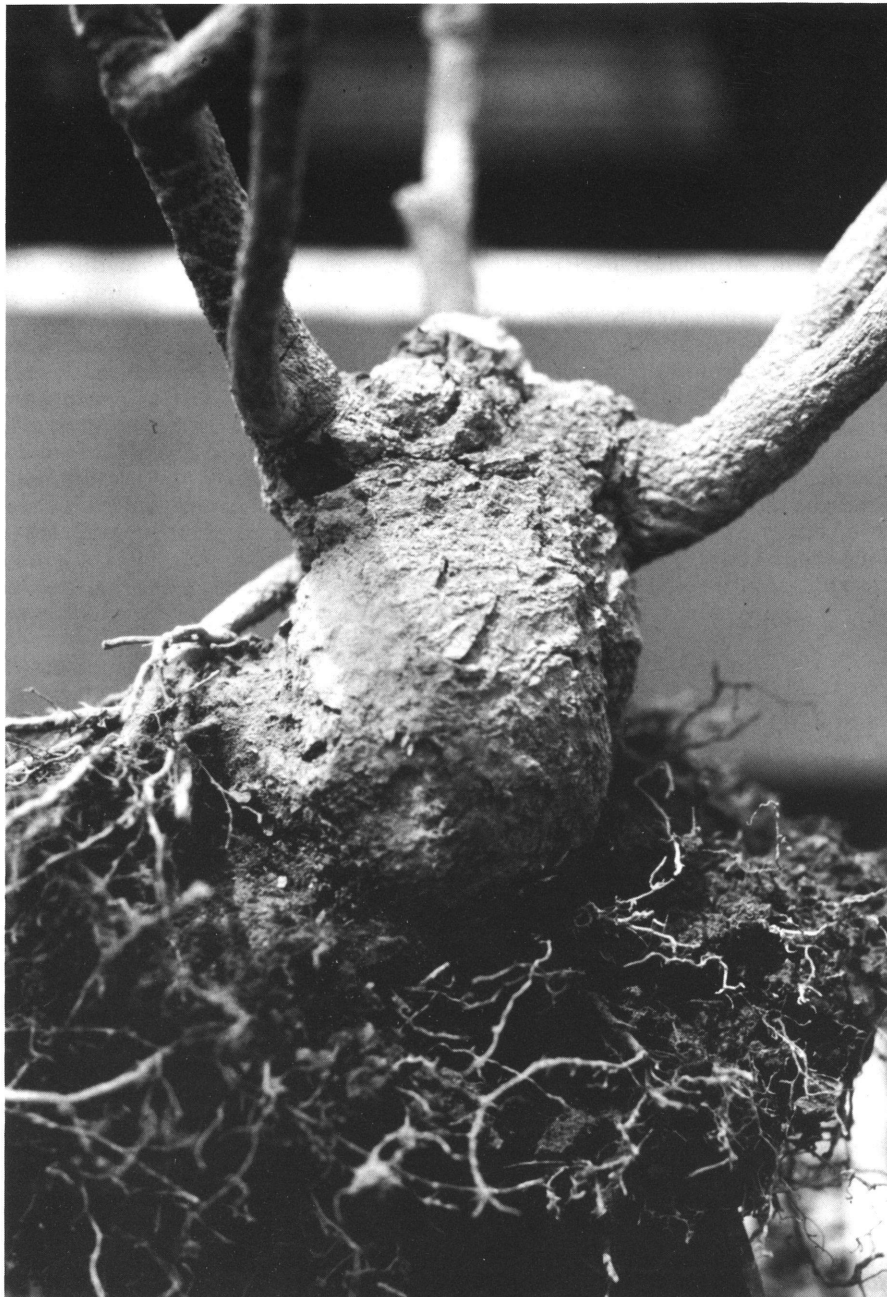


Figure 2. A distinctive lignotuber from a 20 year old plant of the Lord Howe Island kowhai growing at DSIR Lincoln. (Photo. P.B. Heenan).

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 truck, 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

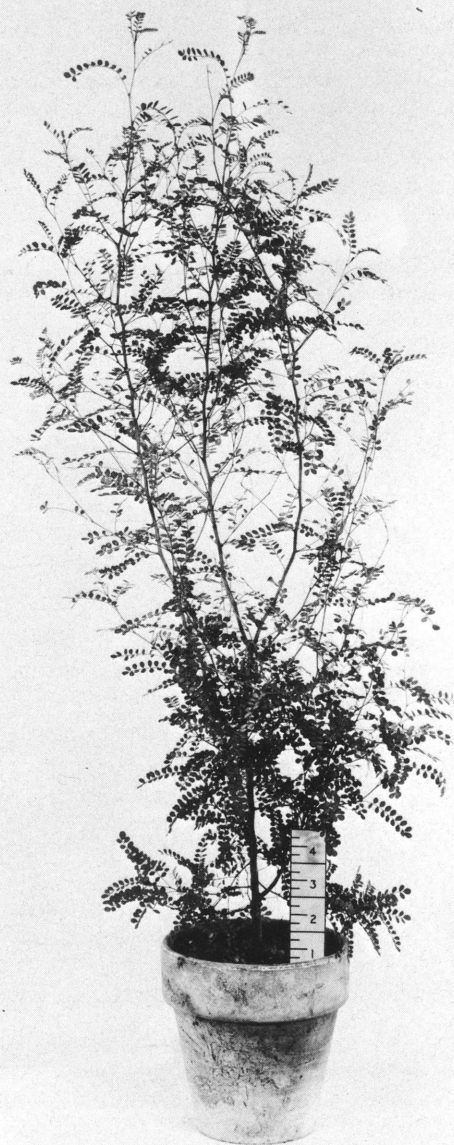


Figure 3. A 2 year 10 month old specimen of Stephens Island kowhai, raised from seed, with a distinctive upright habit. (Photo. C.J. Miles).

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



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. Hagg.

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".

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

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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