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MELALEUCA & ALLIED GENERA STUDY GROUP

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Dear Member,

This newsletter is a bit later than I had hoped but a number of things have contributed to its lateness. We had good rains here in February/March and following those rainfalls we had a very good out-of-season flowering of the many species and cultivars of Calistemon growing around Brisbane. The red form of Melaleuca quinquinervia has been putting on a good display as also have the red and burgundy colour forms of Melaleuca viridiflora.

The standard colour form of Melaleuca quinquinervia started flowering in February this year whereas it doesn't usually flower until April.

Verna and I had a two week trip to Tasmania in January. We covered most of the island but we would have liked to have been able to spend more time in many places and to do more walking in the National Parks and Reserves. We have a good excuse to go back. We were impressed by the number of Leptospermums of various shape and size which were in flower. Some were identified and some weren't. There was a fair range of various genera of plants in flower in both coastal and alpine heath areas.

Control of Melaleuca quinquinervia in Florida U.S.A.

I received a letter from a research scientist in Florida U.S.A. seeking advice on control of Melaleuca quinquinervia. This plant was introduced to Southern Florida in the early 1900's and until about 30 years ago did not pose any real threat. However, it has now reached pest proportions and is threatening the natural environment. Fire, cutting and herbicides have been used with limited success and there are areas where the tree has become dominant at the expense of virtually all understorey and a large percentage of wildlife.

Research into introduction of a biological control is in progress but this is a slow process as exhaustive testing is required to ensure that any such control introduced does not affect other plant species.

I contacted a number of agencies throughout Australia but in all cases the answer was the same. In Australia all effort has been directed towards preservation or regeneration of the species. However, during the course of this research some interesting studies came to notice.

The article below is reproduced from "Bee Briefs" published by N.S.W. Department of Agriculture.

"Tea tree, belbowrie - Melaleuca quinquinervia

Tea tree or belbowrie (Clemson, p. 116) was a major honey and pollen source for NSW north coast and southern Queensland beekeepers. Although agricultural and urban development on the coast is reducing the availability of this valuable resource. The pollen is of very high quality with a crude protein level of 30%. Iso-leucine, is slightly low, but the high crude protein level compensates for any loss in digestibility. (Table 13)

Tea tree has an ideal balance between pollen quality and quantity. From February to June, the tree has a flush of flowers every three-four weeks. Each flush may last for 10 to 20 days. The best flowerings are those in February and March when large quantities of both nectar and pollen are collected by the bees. The queen bee will often lay 3 to 4 frames of eggs in the first few days of the tree flowering. If it doesn't rain and the bees can collect and store tea tree pollen and nectar for the full flower flush, then the high quality and extra quantity of this pollen source enables the hive to be strong and productive. Nutrition is good and disease incidence is low. Under such conditions bees have been known to swarm. However, these good times are the exception and not the rule.

The probability of rain in February-March is very high, and often the tea tree flowering will be washed out after 3 to 7 days. Should rain fall and wash the nectar and pollen out of the flowers there will be no spare pollen and nectar to feed the young brood. At such times, nutritional diseases like nosema and European brood disease occur within the beehives.

Tea tree pollen is useful for feedback to bees. It is easy to trap and a strong hive at peak flush will produce 500-800 grams of pollen per day. However rain and high humidity at this time mean that the traps need to be emptied frequently.

Many coastal beekeepers are reviewing their use of tea tree as an economic floral source. The excessive clearing of tea tree swamps for agricultural and urban development, the loss of access to undisturbed tea tree swamps due to these areas becoming placed into National Parks, and the nosema problem associated with this tree are all encouraging beekeepers to look for alternative autumn flowers. Flying foxes also feed very actively on tea tree.

The more southern stands of tea tree around Kempsey and Taree are known to be regular producers of tea tree honey."

A paper from "Reclamation and Revegetation Research" looks at "Fuelwood species for salt affected sites". The abstract and introduction from the paper is reproduced below as is the section relating to Melaleuca species which have been used or considered for use.

"ABSTRACT

Midgley, S.J., Turnbull, J.W. and Hartney, V.J.,1986. Fuel-wood species for salt affected sites. Reclam. Reveg. Res., 5: 285-303.

Keywords: species selection, afforestation, salt affected soils, wood fuel production.

There is a shortage of fuel-wood for domestic purposes in many developing countries and acute scarcity in some areas of Africa, the Indian subcontinent and Latin America. This deficit affects more than 1.0×10^9 people and is being exacerbated by both over-cutting and population growth. An increase in the rate at which fuel-wood plantations are established is the most promising measure to alleviate the problem. Plantings need to be accessible to densely populated agricultural areas and urban centres, and will involve using all forms of degraded land, including salt affected wasteland.

Although trees and shrubs are often the only plants that can be profitably grown on salt affected sites, few forest tree species have been found suitable for planting on such areas. Recently, rapid progress has been made in the selection and mass propagation of genotypes adapted to salt affected sites. Fuel-wood has been produced on salt affected sites from Eucalyptus camaldulensis, Acacia auriculiformis, Rhizophora spp., Prosopis tamarugo, Casuarina equisetifolia and Melaleuca quinquinervia.

1. INTRODUCTION

More than 1.5×10^9 people in the world's developing countries depend on wood for cooking and heating. Fifty four countries have a deficit between fuel-wood demand

and available supply. Wood for fuel accounts for over half the world's annual cut and for 85% of annual consumption in developing countries (Arnold and Jongma, 1978; Arnold, 1983; de Montalembert and Clement, 1983).

In some areas, the requirement for fuel-wood is placing immense pressures on a dwindling forest resource; in Asia alone, the deficit between demand and supply could reach $500 \times 10^6 m^3 yr^{-1}$ by the year 2000 (de Montalembert and Clement, 1983). In many countries, agricultural residues and dried animal dung are used as fuel instead of being returned to the fields; a consequent reduction in soil fertility and crop yields has begun to appear.

There are numerous social consequences of fuel-wood shortages, e.g. poorly cooked food, unboiled water, and problems of nutrition and health. People spend more time, effort and income acquiring fuel. Substitute energy source such as kerosene, solar power or electricity are mostly beyond the resources of the people affected. The most obvious solutions to the problems are to increase wood production and the efficiency of wood use.

The increasing demand for agricultural land by expanding populations makes it unlikely that further high quality land will become available for tree planting. Consequently, future increases in wood supply must come from raising the productivity of existing forests, incorporating tree planting into agricultural systems (agroforestry) or making better use of marginal land. Marginal land, although often over grazed, compacted, eroded, infertile, waterlogged or saline, is the only area remaining for fuel-wood plantings in some countries. When used in agricultural systems, trees provide shade, shelter and animal forage, and may lower water-tables in salt affected areas. This paper discusses the choice of species for fuel-wood plantings on salt affected land, emphasizing the role of Australian flora.

4.4 Melaleuce quinquinervia (Cav.) S.T. Blake (Myrtaceae)

M. quinquinervia is a small to medium tree, commonly 8-12m tall, with a moderately straight to crooked stem and an open narrow crown. It is a native of the coastal region of eastern Australia, New Caledonia, Papua New Guinea and adjacent parts of Indonesia (Blake, 1968; Cherrier, 1981). It has been cultivated in India, Africa, the USA, Central America and the West Indies (Morton, 1966). In Queensland, this species only grows to 100 m above sea level, but in New Caledonia it also extends to the mountain peaks and ridges. It is common in open grassland, along river banks and fringing tidal estuaries. It forms pure stands in swampy soils and is a common species in woodland savannas in seasonally inundated solodic plains in northern Australia (Gillison, 1983). It is also found associated with M. viridiflora, occupying slightly higher ground immediately next to mangrove swamps. The largest area of M. quinquinervia is in Florida, where it is the dominant species on about 200×10^3 ha, with pure stands covering 16×10^3 ha (Cost and Carver, 1981).

4.4.1 Main attributes and limitations

M. quinquinervia is deep rooting and capable of growing on nutrient deficient coastal soils. It grows close to the beach and will tolerate wind-blown salt. It grows best with fresh water but may tolerate a low level of groundwater salinity (Woodall, 1981). It grows on well drained sites, continuously flooded sites, or where there is a fluctuating water-table. It is highly fire tolerant during all but the early seedling stages and regenerates readily after coppicing (Conde et al., 1981).

The wood is hard, has an air dry density of 700-750 kg m^{-3}, with an interlocked grain, and is an excellent fuel-wood (Huffman, 1981; Wang et al., 1981). In Florida, M. quinquinervia has potential as a source of useful quantities of biomass (Smith and Dowd, 1981) with first year coppice-yields from established stands of 3.4 t dry matter ha^{-1} (Conde et al., 1981). The dust and low density of the bark make it more difficult to to process as an industrial fuel than other sources of woody biomass (Geary et al., 1981).

M. quinquinervia seeds profusely and can become a nuisance, especially where periodic fires provide a suitable seed bed (Woodall, 1981). Severe frosts will defoliate and kill the branches but the tree generally recovers by epicormic sprouting.

4.4.2 Related species

M. styphelioides is a fast growing tree, 6-18 m tall, occurring chiefly along water-courses and swampy coastal sites in eastern Australia, and is more salt tolerant than M. quinquinervia. M. styphelioides tolerates a variety of soils including sandy, wet, saline and heavy clay soils, and can withstand moderate coastal exposure (Mathews,1980; Pike, 1981). M. armillaris, M. ericifolia, M. halmaturorum and M. lanceolata are temperate species adapted to coastal saline sites. Species such as M. bracteata, M. glomerata, M. nervosa and M. pauperiflora occur on the margins of salt lakes in the interior of Australia. Melaleuca species have potential for fuel-wood production on waterlogged soils under subsaline conditions and where there is moderate exposure to coastal wind."

Dr Greenway from Griffith University in Queensland has conducted research in litter accession and accumulation in a M. quinquinervia wetland in S.E. Queensland. Dr. Greenway's paper on this subject is quite extensive and too large to reproduce here so I have reproduced only the Abstract and Introduction.

"ABSTRACT

Litterfall and litter accumulation were investigated over two years in a Melaleuca quinquinervia wetland in south-eastern Queensland. In 1992, a seasonally wet year, litterfall was 809 ± 135 g m^{-2} yr^{-1} at the floodplain site and 764 ± 192 g m^{-2} yr^{-1} at the riparian site, of which Melaleuca leaf litter made up 65% and 56% respectively. Litterfall was significantly lower and more variable in 1993, a drought year, being 725 ± 106 g m^{-2} $year^{-1}$ and 675 ± 216 g m^{-2} $year^{-1}$. There was a distinct seasonal pattern, with peak leaf litterfall occurring in spring in 1992 but extending into summer in 1993. Melaleuca leaf fall was significantly lower in 1993, possibly because drought conditions caused greater leaf longevity.

Litter accumulation on the forest floor was 3457 g m^{-2} at the floodplain site and 2320 g m^{-2} at the riparian site; there was no significant difference between years, although the organic matter content of the litter was lower in 1992, possibly as a result of leaching during flooding. Carbon content decreased with decreasing particle size of the litter, whereas nitrogen and phosphorus increased. There was no evidence to suggest leaching of nitrogen or phosphorus, and the high C:N:P ratios indicate slow rates of litter decay. The high accumulation of litter mass suggests that these woody wetlands may function as nutrient sinks.

INTRODUCTION

In south-eastern Queensland, coastal lowland vegetation has been disappearing at an alarming rate. Catterall and Kingston (1994) have estimated that over the past 15 years 50% of Melaleuca forests have been lost as a consequence of residential development and rural activities. A concerted effort is now being made to preserve remaining Melaleuca wetlands and to compile baseline data on their hydrological and ecological importance. Melaleuca forests in south-eastern Queensland (Brisbane Region) are associated with coastal floodplains that drain into the lower reaches of rivers that flow into Moreton Bay. Most Melaleuca forests are only seasonally inundated, and during the wet season they may be under as much as 50 cm of water for two to six months.

The Nutrient dynamics of Melaleuca wetlands are of particular interest with respect to whether these wetlands function as nutrient sinks or nutrient exporters. If they are sinks, then where are the nutrients stored - in the plant tissue, litter or soil? If they are nutrient exporters, then during times of flooding are Melaleuca wetlands significant contributors of detritus (particulate organic matter) and dissolved nutrients to the estuarine ecosystem? In order to answer these fundamental questions, a long-term investigation into the nutrient dynamics of these woody wetland ecosystems is being conducted.

This paper presents data on litter accession and litter accumulation at two sites with different water availability regimes within seasonally inundated wetland dominated by Melaleuca quinquinervia (Cav.) S.T. Blake. The aims of this work were, firstly, to determine whether litter fall displayed any seasonal patterns and whether these patterns were phenological or environmental; secondly, to determine whether litter accumulation

was in a steady state and the extent of any lateral movement; and thirdly, to determine the nutrient content of both freshly fallen and accumulated litter."

Should anyone require a copy of the full paper I can arrange for one to be forwarded.

Another paper submitted by K.G.E. Bolton and M. Greenway relates to use of Melaleuca as candidates for constructed wetlands for waste water treatment. Again I am reproducing only the Abstract and the Introduction. A full copy of the paper is available if required.

"ABSTRACT

Melaleucas are being investigated as candidates for constructed wetlands for wastewater treatment. Melaleuca wetlands provide important habitats for a wide variety of native animals in South-East Queensland, Australia, however natural stands have been dramatically depleted. Melaleucas also provide resources including tea tree oil, nectar and bark for primary industries. Pot trials consistingof 324 self-watering 40L pots have been established to examine the responses of M. quinquinervia, M. alternifolia and M. leucadendra to various effluent concentrations and waterlogging cycles. A plot trial consisting of 7 densely planted terraced beds examines plant responses to effluent and the wastewater polishing potential of the system. An N-15 trial will take place to establish N partitioning within the system components. Preliminary results show that all 3 species have increased biomass 2-4 times in the first 3 months. Plants growing under waterlogged conditions produced an abundance of adventitious roots increasing the surface area for biofilms, nutrient uptake and oxygenation.

KEYWORDS: Melaleuca, Sewage effluent, Growth trials, Nutrient sequestering

INTRODUCTION

In Australia, Melaleuca wetlands are important wildlife habitats that provide food and shelter for koalas, possums, bats, birds and bees. (Greenway, 1994a). Melaleucas also provide resources for primary industries such as tea tree oil, honey and paperbark cottage industries such as bark pictures. In sub-tropical Australia these woody swamps are seasonally flooded. They are highly productive, having annual litter falls of 700 gm^{-2} but very slow rates of litter decay; and appear to function as nutrient sinks (Greenway, 1994b). Unfortunately, vast areas of coastal Melaleuca wetlands have been destroyed by development for agriculture and urbanisation. The loss of these flood plain buffers and nutrient filters has caused deteriorating water quality in many places.

In Queensland, several constructed wetlands have recently been established as partof the 'Artificial Wetlands for Sewage Treatment Research Program'. Melaleucas are particularly viable candidates for constructed wetlands for wastewater polishing because; their woody tissue may function in long-term nutrient storage; their ability to produce adventitious roots increases biofilm colonisation and nutrient uptake and; they are able to survive extreme environmental conditions including very low pH, high salinity and anoxic sediments (White, 1988; present study). However, there have been no attempts to use these woody species in a constructed wetland. This project investigates the potential of M. quinquinervia, M. alternifolia and M. leucadendra for wastewater treatment. A three-pronged approach incorporates experimental effluent-fed pot and plot trials with monitoring programmes of natural Melaleuca wetlands receiving various nutrient loadings."

A workshop relating to "Productive use of saline lands" was conducted at Euchuca Victoria in March 1994 and was aimed at discussing the use of various species for agroforestry, woodlots and plantation systems on salt-affected lands under both dryland and irrigated conditions. The Abstract and the first few sections of the paper are reproduced here. A full copy of the paper is available if required.

The attached copy (Appendix A) from a draft book "Australian Trees for Salt-affected Land" gives some indication of trees and shrubs which may be useful in reclamation of saline soils projects.

"ABSTRACT

Considerable scope exists in the choice of tree and shrub species for agroforestry,

woodlot and plantation systems on salt-affected land under both dryland and irrigated conditions. This paper presents some data on the respones of trees and shrubs to salinity from trials conducted in NSW by theCSIRO Division of Forestry in collaboration with the NSW Soil Conservation Service (CaLM). Reference is also made to trials in other states, particularly where data has been entered into the MPTDAT database.

WHY PLANT TREES IN DISCHARGE LOCATIONS?

The usefulness of trees in increasing the productivity of saline sites, improving their quality through ameliorative processes or assisting with environmentally-sound reuse of saline water will be mainly a function of; (i) tree survival and growth, (ii) tree water use and, (iii) location and density of tree planting. This paper considers aspects related to (i).

Dryland Sites

Trees, shrubs (including Atriplex sp.) and grasses can be planted on or adjacent to discharge areas (seeps and scalds). Trees planted adjacent to saline seeps and/or scalds will have better survival, growth and water use than those planted on the seep (scald). This is because soil physical (e.g. more topsoil) and chemical (salinity, pH, aeration) conditions are more favourable adjacent to the seep or scald and tree roots will have a greater chance of tapping into less saline groundwater. Planting trees in discharge locations can; (i) assist in the lowering of locally high watertables (e.g. George 1990), (ii) assist in minimising soil erosion via root activity and litter decomposition, (iii) assist in lowering surface soil salinities by providing a perennial vegetative cover, (iv) increase site productivity by providing shelter, shade and tree products, (v) decrease stream salinity and, (vi) improve aesthetics.

Irrigation Sites

There are two main types of salinity benefits that may be provided by trees planted within areas that are salt-affected and/or have high water tables of varying salinity. These are; (i) drawdown of (local) saline watertables, through either control of accessions or withdrawal from groundwater, thereby improving agricultural productivity and, (ii) use of saline groundwater which would otherwise have flowed to streams and eventually rivers by sub-surface seepage or deliberate drainage disposal, thereby reducing costs to water users and environmental damage, or saving salt credits."

Members Reports

Unfortunately, members reports have been a bit light on since last newsletter.

Derrick Arnall maintains his regular correspondence and keeps me up-to-date with what is growing (and/or not growing) in his garden. Except for a couple of species he is still having trouble getting Melaleuca species to fire.

Jeff Irons from England advised thay have experienced their warmest winter since records began in 1659. Temperatures generally ranged between 3°C and 11°C with only one frost at -7°C. It was also wetter than usual.

Jeff sends me copies of the Australasian Plant Society Newsletter from time to time. In the May issue reference is made to a new intergeneric hybrid from New Zealand - Kunzspermum - a hybrid between Kunzea and Leptospermum. Kunzspermum hirakimata 'Karo Hobson Choice' was grown from seed collected on a specimen of Kunzea sinclairii on Mount Hobson, Great Barrier Island. The putative male parent is Leptospermem scoparium. The hybrid has the multiple flowerd cymes of Kunzea sinclairii and the larger flowers of Leptospermum scoparium.

Leptospermums in England

The following article, minus the leading notes on propagation and pruning etc. was prepared by Jeff Irons and published in the Australasian Plant Society Newsletter of Nov 1994.

"Leptospermum were among the earliest Antipodean plants grown in Britain. L. scoparium from New Zealand was introduced in 1772 and L. lanigerum from Tasmania was grown here in 1774. It was 1800 before Australian L. scoparium was grown in Britain.

The German father and son botanists Forster and Forster named the genus in 1776, but other botanists had difficulty in understanding its classification. In fact classification had to wait until 1979 when Briggs and Thompson explained the inflorescence. Today about 83 species are recognised, for more have been added since Thompson's 1979 revision. One of them, L. scoparium is found in both Australia and New Zealand, three are found in New Guinea and S.E. Asia, and all the others are endemic to Australia.

Most species have white flowers and there is a bewilderingly large number of cultivars of the red and pink flowered variants of L. scoparium from New Zealand. The doubles were bred in California by Lammerts. He selected Ruby Glow and Red Damask from 830 out of 1000 seedlings that were grown on to flowering. Three species have strongly fragrant foliage. The long flower sprays of several species make excellent cut flowers.

Cultivation

Leptospermum are found in a wide range of habitats from montane to tropical and inland as far as semi-arid areas. Most sites are moist, often for long periods, and the genus does not occur in dry places. L. laevigatum tolerates alkaline soil but in general soils should be acid or only slightly alkaline. In general a sunny site is preferred though many will grow well in dappled or partial shade. Most species that can be grown outside in Britain flower in early summer. Frost hardiness depends upon seed origin and growing conditions, and there is little information available in the literature. Bean considers that most of the species listed by him should be hardy to about -10°C (14°F), and lists L. scoparium as being hardy to -15°C (5°F). At Kew L. rupestre has survived -17°C (1°F) without injury.

Botanical Details

Shrubs and small trees, often with attractive papery bark which develops with age on the larger branches. Leaves are usually dull green, but some species have attractive coloured or silvery young growth. Some species have red young stems and/or purplish new growth. Flowers are usually white and are often profuse. Some species have pink buds which open white; a few have coloured flowers, notably L. rotundifolium, macrocarpum and scoparium (some forms). The fruits are woody capsules, sometimes with the flower capsules persisting on the fruit. Most of the species grown in Britain have fruits which remain on the plant for several years. L. obavatum is an exception, and has fruits which both mature quickly and open to shed their seed. In sub tropical areas the dark red flowered L. spectabile can be grown.

Species in the APS seedlist and given in the 1994-5 Plant Finder

L. arachnoides N.E. NSW and the Qld Granite Belt. A small shrub, usually to about 1m (3.3ft), rarely 2m (6.6ft). Fairly hardy. Introduced to Britain in 1795.

L. argenteum From the Barrington Tops area of northern NSW, along streams and in swamps. First described in 1989 and now available in Britain. A shrub 1-7m (3.3-23ft) with silvery grey new growth. Flowers on the previous year's growth, blooms up to 1.2cm (0.4") across. Hardiness unknown but should be similar to that of L. arachnoides.

L. blakelyi From the Clarence area of NSW on shallow sandy soil. A small shrub, 0.6-1m (24-39") which has pink or white flowers in spring on the previous year's growth. Deciduous fruits. Has survived two winters in NW England.

L. erubescens Inland W.A. in heath and woodland, sandy and gravelly soils. A shrub 1.5-3m (10ft) with white or pink flowers in winter and spring. Deciduous fruits.

L. grandiflorum From Tasmania on granite rocks at about 300m (990ft) on the warm E. coast. Ashrub to 5m (16ft) with large white blooms to 3cm (1.2") across in early summer. Likes a warm, sunny site. Often confused with L. grandifolium and L. nitidum. The recent Lancaster introduction sold by Cox' is the true plant. The simplest way to

check a bought plant is by the leaf tips. They are blunt, whereas the leaves of L. grandifolium are sharply pointed. The fruit has deciduous sepals, while those of L. grandifolium are persistent. There is a rare pink flowered form.

L. grandifolium NSW and Victoria on Tablelands and Highlands, along watercourses. A handsome shrub 1-7m (3.3-23 ft) high with silky hairy young growth and 2cm (0.8") white flowers in early summer. Purplish young growth.

L. juniperinum From southern Qld and northern NSNW. A bushy shrub or small tree to 5m (16ft) which stands salt spray and which will grow on sand dunes. Prickly leaves and fragrant white flowers in spring. Forms from the southern part of the distribution are hardy in the milder parts of Britain.

L. laevigatum From coastal parts of NSW, Vic, SA, and northern Tas. A shrub or tree 3-8m (10-26ft) which withstands salt spray and stabilizes dunes. Has white flowers in late winter and early spring. Tolerates alkaline soil. Grows well in Ireland. Most Leptospermum have 3, 4, or 5 compartments in their fruits, a few have more and one has only 2. Fruits of L. laevigatum have 6 to 11 locules (compartments) in their fruits, and any Leptospermum species found growing outdoors in Britain, which has more than 7 locules can be taken to be L. laevigatum.

L. lanigerum From NSW, Vic, Tas, SA. A shrub or small tree to 8m (26ft). Very variable and although the leaves are usually hairy and grey-green, green forms do exist. A plant sold in Britain as L. hypericifolia was confirmed as green L. lanigerum. Some forms have pendulous habit, and may be less than 1m (3.3ft) high after 10 years. This is one of the hardiest species and is certainly hardier than L. scoparium. Selections are sold under promotional names. 'Silver Sheen' is one with very silvery young leaves. It has been sold as L. cunninghamii, though that name is probably a synonym of L. myrtifolium. It is still being sold as L. "Cunninghamii". "Wellington" is a seedling from Mount Wellington in Tasmania. L. lanigerum "Citratum" originated in New Zealand and is said to be scentless in both flower and leaf.

L. liversidgei From southern Qld to northern NSW in coastal swampy heath. It is an erect shrub 1-2m (3.3-6.6ft) high with leaves which have a strong lemon scent. White or rarely pink flowers are borne in summer. In British cultivation it has been confused with L. petersonii. Distinction is preferably by the fruit, which will rarely be seen on garden centre plants. Liversidgeihas leaves 5-7mm (0.2-0.3") long and only 1-2mm (up to 0.1") wide; those of petersonii are larger, 2-4cm (0.8-1.5") long and 4-5mm (0.15-0.2") wide.

L. macrocarpum NSW rocky sandy sites in the Blue Mountains, on north west slopes at the base of cliffs, in full sun or part shade. A low shrub which can reach 2m (6.6ft) but which is usually up to 1m (3.3ft) high by 2m (6.6ft) across. Notable for its large fruits, which can be 2cm (0.8") across. Flowers may be greenish white to dark red in colour, and appear in late summer and autumn. In cultivation the red forms are preferred. Usually grown as a conservatory plant in Britain, this species deserves wider trial outdoors. It will need excellent drainage and ample summer water.

L. minutifolium From the northern tablelands of NSW and the Granite Belt of Qld, in swamps and on stream banks. A shrub to 2.5m (8ft) with densely packed dark green leaves to 3-4mm (0.1-0.15") long. White flowers in spring are a bonus to this species which, in Britain, is grown as an indoor plant. Though grown in Mediterranean areas, it needs summer watering.

L. minutifolium x scoparium These are presumed hybrids which were grown from seed collected after the putative parents had been grown side by side.

L. morrisonii NSW in elevated parts of the Central Tablelands. A rounded shrub usually about 1-1.5m (3.3-5ft) high, which can reach 4m (13ft) in favoured sites. The foliage is very aromatic and large white flowers appear in summer. Described first in 1989, this species should be reasonably hardy in well drained soil in southern and western Britain. It could be tried elsewhere too.

L myrtifolium From the Southern Tablelands of NSW and adjacent parts of Vic. A 1-3m

(3.3-10ft) high shrub from poorly drained swamp margins. White flowers in late summer. Useful for extending flowering shrub season into a time when there is little other than hydrangeas. Hardy in southern and western Britain. Worth trying elsewhere.

L. nitidum Tasmania in cold wet heaths, often on granite, but also on dolerite derived soils. a 2-4m (6.6-13ft) shrub with elliptical shiny leaves and white flowers in late summer. One of the hardiest Leptospermums and worthy of wider trial. It has been sold as L. grandiflorum, but is easily distinguished by its leaves.

L. obovatum From the Central and Southern Tablelands of NSW. A 2-8m (6.6-26ft) high shrub with long arching branches and profuse white flowers in early summer. Stands dry soil. The clone in general cultivation suffers slight injury in temperatures below -12°C (10°F).

L. petersonii From Northern NSW and Southern Qld, on and near coasts. A shrub of 3-7m (10-23ft) with white flowers in summer. Sometimes confused with L. liversidgei which also has scented foliage. Not hardy in Britain.

L. polyanthum NSW on escarpments and stream banks at medium elevations 300-400m (990-1300ft). A shrub or small tree with slender pendulous stems covered with small white flowers in late spring and early summer. This species, described first in 1989 is unlikely to be hardy in Britain but should be tried in warmer parts. It will make an excellent indoor plant.

L. polygalifolium From N. Qld to just north of Sydney. This is a very variable species with 6 subspecies and a named selection. I have not seen the plant sold in Britain, but the Plant Finder refers L. flavescens to L. polygalifolium. I conclude that what is being offered is probably subspecies polygalifolium. It is unlikely to be hardy.

L. riparium From Tasmania, along the banks of a few rivers in the south. A tall narrow shrub or small tree, to 5m (16ft) or more by 1.3m (4.2ft). Dark green leaves, and white flowers in summer. Will grow in shade, but only flowers well in sun. Stands wet and waterlogged soil. Uninjured by frost of -12°C (10°F). Two provenances have been grown in NW England.

L. rotundifolium From the Central and Southern Tablelands of NSW. A very variable shrub or small tree, 0.5-3m (1.6-10ft) with white, lavender or pink flowers in early summer. This is a very ornamental species, hardy in southern and western Britain. The APS has seed from the selection 'Lavender Queen'.

L. rupestre Tasmania, above 1000m (3300ft). A shrub 0.3-2m (1-6.6ft) high. Seedlings should be rogued for a prostrate habit. This, the hardiest Leptospermum was uninjured by -17°C (1°F) at Kew. In my garden it has suffered tip damage at -14°C (7°F). White flowers are borne in June. Established plants will provide weed-proof ground cover, and can cover large areas. MY own specimen was 4m (13ft) across before it was restrained. It is very long lived - at least 70 years.

L. scoparium From Tasmania and New Zealand. A tree to 6m (20ft) high. Grown most commonly in one of the large number of selections from the pink/red flowered New Zealand forms. None are reliably hardy, but all make good specimens for the cool greenhouse. The Tasmanian L. scoparium var. eximium has been absorbed into the species. It differs only in the leaf shape, and is considered to be more difficult in cultivation."

Leptospermum Slides

Does any member have a collection of Leptospermum slides that I may borrow for copying. I have a slide copier and would undertake to get any loaned slides back as soon as possible. I would like to produce a slide programme on Leptospermum similar to the one I have prepared on Melaleuca. I have sufficient slides to prepare a programme on Callistemon and hope to get this done in the near future.

The Melaleuca slide programme is available to individuals or groups on request. It comprises about 90 slides on various Melaleuca species and has a written commentary relating to the species covered.

Melaleuca, Callistemon, Leptospermum as Cut Flowers or Foliage

I would be interested to hear of any experience you have had with using cut flowers or foliage in floral arrangements. Any information received will be analysed and collated and a resume published in the next newsletter. If you have used any material from these genera for cut flowers or foliage what treatment do you give it to ensure maximum vase life?

Feature Garden

The feature garden for this newsletter is owned by Barry and Helen Galbraith at Cranebrook, NSW and I thank them for the excellent description provided and for the detailed plan (Appendix B). This is a relatively new garden with the first plantings in 1992.

How about some other members sending in reports of their gardens.

"First of all, I have included a map of my property and what is growing on it as I keep a computer record of all the plantings, otherwise I would have forgotten most names by now. On this map I have colour coded the plants according to the soil types. The right hand side of our property has a band of dreadful soil - soil that is impervious to water and is a mixture of loam and clay - the biggest problem with this side of the property is the inability of the soil to absorb or hold moisture - the soil actually repels water and it runs off! We are in a slow process of plowing and improving this side of the property but with drought over the last year or two we have shelved doing this until regular rain will grow grass back. This is the reason that we imported sandy loam and raised up some of the garden beds. All trees on my property have underground watering available to them but the trees on the right hand side of the property particularly rely on this water in order to eke a living. With the drought those trees would most certainly have perished had they not been watered regularly and artificially. It has also been a constant battle to provide an environment for the trees which are planted in the natural ground on the right hand side of the property for them to prosper. We moved a number of trees planted in 1992 out of the unprosperous clayey soil into raised gardens of sandy loam and all plants have recovered and are growing much better. I think we are slowly winning though.

We are situated at the base of the Blue Mountains although we are quite high up (60 metres above sea level) just slightly on the leeward side of an exposed westerly slope. We have a harsh climate, always higher temperatures and lower temperatures than Sydney ranging from -2°C in winter (due to frosts) and up to 45°C in summer, sometimes with high humidity. We have heavy frosts in winter although the right hand side of the property is somewhat protected from frost by large Eucalypts and we are exposed to tremendous winds. Our rainfall is much less than Sydney's - we seem to get no rain sometimes when Sydney is drenched. Just this week (March, 1995) we have had about two years worth of rain in about four days, it was so lovely to have decent rain at last. With all that and the clay soils its a wonder we have any garden at all! We have not yet had any callistemons affected by frosts and we have had some quite heavy frosts in 1993.

I will list hereunder the most notable plants I have and the ones which are particularly not doing so well.

On the left hand side of my property (the most fertile part) I have some very prosperous plants - some of the most notable being Callistemon Wilderness White, Taree Pink, Purple Splendour, Mauve Mist, Western Glory, pityoides (formerly sieberi), Candy Pink, subulatus and Packers Selection, Injune, Hannah Ray, Harkness, glaucus (speciosus), Dawson River, Hinchinbrook, Perth Pink. Some of these have attained quite a reasonable amount of growth in two to three years and most of these are exposed to frosts. I particularly like my Wilderness White, Taree Pink, Candy Pink and Perth Pink. I have another plant which I particularly like although it has not grown enormously even though it is healthy and that is Callistemon Matilda's Dream. It flowers a very light lolly pink and is covered in flowers. It seems to be of the salignus variety with bright red new growth. Unfortunately it only flowers for about a week or two once a year. I have a Melaleuca squarrosa which is also a picture and armillaris doing well.

On the right hand side of my property (growing in sandyloam) Callistemon Eureka, Bright Rose (Rose Opal, I think), Ewan Road, Guyra, Salignus (cream), Bluff, Nodding Red, pallidus, Father Xmas, and Running River are doing well. I particularly like Nodding Red which is very healthy indeed, Pink Champagne which flowers a lovely salmon pink, Guyra and Bluff which has a very unusual flower colour. It opens a very light pink (like Injune) and slowly turns creamy yellow which gives an overall beige colour to the flowers (I purchased this one in Qld). It also flowers prolifically and often. The only Callistemon doing well in the natural soil on the right hand side of the property are the ones which I think are native to our area - pinifolius (green and red). I also have a number of Leptospermum which are doing well (in the sandy loam) - Leptospermum Burgundy Queen and scoparium var. rotundifolium. I have also lately become interested in dwarf banksias and have planted quite a number in the last few months - marginata dwarf, blechnifolia, spinulosa dwarf etc as well as a few prostrate banksias. Theyseem to be doing well.

I have not had much success in growing Callistemon Eastland - I could not get it to grow in the natural soil on the right hand side of the property and I have now purchased a new one for one of the sandy loam mound gardens but the same problem has emerged with the second one even though it is in a totally different soil type. It gets minute rusty spots on the leaves and does not send out any new growth. I think it is battling to stay alive. I know Eastland grows around Sydney as I have seen them growing at Mt Annan Gardens. I would like to know the trick to get the Eastland moving.

I have also not had much success in getting my Callistemon Captain Cook to grow. I have tried everything - bucketing extra water to it, feeding it etc. all to no avail. I have just given up and will be planting a new one in a new mound garden soon. Other Callistemon which spring to mind which are having a battle are phoeniceus, Marlborough, Pindi Pindi and Angela. They are alive but not thriving. I have two C. Burgundy (flowers are slightly different shades) not far from each other - one is doing well, the other not so well. Demesne Prestige Pink is flowering well but does not grow much.

One interesting point that I have noticed is that the trees on the left hand side of our property are affected more by insect pests. I have some of the same varieties of Callistemons on both sides of the property but only the ones on the left hand side of the property are affected i.e. I have two Hannah Rays on the left hand side and three Hannah Rays on the right hand side. Only the two on the left (and other varieties of Callistemons) are attacked by leaf hoppers but not on the right hand side and there are many other instances along these lines. Another example is that regardless of species, psyllids attack only the varieties with red new growth on the left and side of my property."

Membership Fees

Fees for 1995/96 are due on the 1st July, 1995. Fees will remain at $5.00 for the coming years.

Financial Statement

Receipts		Expenditure	
Balance at 8/9/94	$646.33	Petty Cash	$26.85
Membership	$120.00	Photocopy (NL 9)	$22.50
	$766.33	Postage (NL 9)	$35.40
Less expenditure	$114.00	Petty Cash	$29.25
	$652.33		$114.00
Less GDT	0.75		
	$651.58		

Balance as per Bank Statement 30/1/95 $651.58

I would like a few more updates on what is happening in your gardens.

Until next time.

Regards. Col Comfort

From draft book "Australian Trees for salt-affected land".

DRAFT ONLY

Appendix 'A'

Table 1. A selection of tree species suitable for saline and waterlogged sites together with their expected wood and non-wood uses

Size	*Average root-zone soil salinity (EC_e)*				*Waterlogged Sites*
	slight (2-4)	*moderate (4-8)*	*severe (8-16)*	*extreme (>16)*	
T	*A. m elanoxylon* a,e,f,h *A. mearnsii* a *E. campaspe* a,c *E. camphora* a,c *E. cinerea* *E. cladocalyx* a,b,e,f,j *E. cornuta* *E. crenulata* *E. dumosa* a *E. elata* *E. globulus* a,b,d,e,f,* *E. grandis* a,d,e,* *E. ovata* a,c,e,f,h *E. robusta* a,c?,d?	*E. aggregata* *E. astringens* a *E. botryoides* d?,e? *E. brockwayi* a,c *E. rudis* a *E. largiflorens* a,c,f,h *E. camaldulensis* a,c,e,f,h,* *E. polybractea* a, *E. leucoxylon* a,c,e? *E. microtheca* a *E. platypus* a *E. tereticornis* a,c,e,f,h *M. styphelloides*	*A. salicina* a,j?,f *A. stenophylla* a,c,j? *C. cristata* a,e,j *C. cunninghamiana* a,c,i,j? *E. campaspe* a,c *E. occidentalis* a,c?,f *E. sargentii* a *E. spathulata* a	*A. ampliceps* a,c?,j? *A. cyclops* a,j? *C. glauca* a,c,j,* *C. obesa* a,c,j,* *E. kondininensis* a,c?	*C. glauca* *C. obesa* *E. camaldulensis* *E. camphora* *E. ovata* *E. robusta* *E. tereticornis*
S	*A. acuminata* c *A. iteaphylla* a *A. longifolia* a *A. saligna* a,j? *All. luehmanii* *All. verticillata* *M. armillaris* a,c *M. ericifolia* a *M. linariifolia* a	*A. retinodes* *M. decussata* *M. lanceolata* a,c *M. leucadendra* a,c *M. quinquenervia* a,c *M. uncinata*	*M. halmaturorum* a	*M. decussata* *M.. ericifolia* *M. halmaturorum* *M. lanceolata* *M. leucadendra*

(i) Species listed under one category will perform well under lower salinities. The above rankings are conservative, i.e. it might be worth trying a species, or certain provenances of a species in the next category of saline soil. It would be expected that in their present grouping that these species would be have good to very good survival and might grow up to 25% slower than if they were planted on non-saline land,.

(ii) The above rankings do not take into account the effects of salinity and waterlogging together. If the saline site is periodically waterlogged (e.g. during the winter months in southern Australia), trees will suffer more problems than if the soil was well drained (refer section on on 'Waterlogging and Trees')

(iii) Provenances within a species may grow very differently on saline and other soils. Those species marked with an * are known to exhibit marked provenance response on saline soils and in some cases clones have been developed from selected individual plants (refer chapter 2 on 'Species Profiles')

(iv) Superscripted capital letters next to a species name indicate suitablity for the following products (refer chapter 2 on 'Species Profiles'): a: Firewood; b: Preserved posts; c: Durable posts, rails etc., d: Pulpwood; e: Sawlogs; f: Furniture; g: Honey; h:Pollen; i: Attractive to bees; j:Fodder; ?: indictates uncertainty about product output

(v) T = tree (> 5 metres); S = shrub (< 5 metres) ; A = *Acacia*, C = *Casuarina*, E = *Eucalyptus*, M = *Melaleuca*.

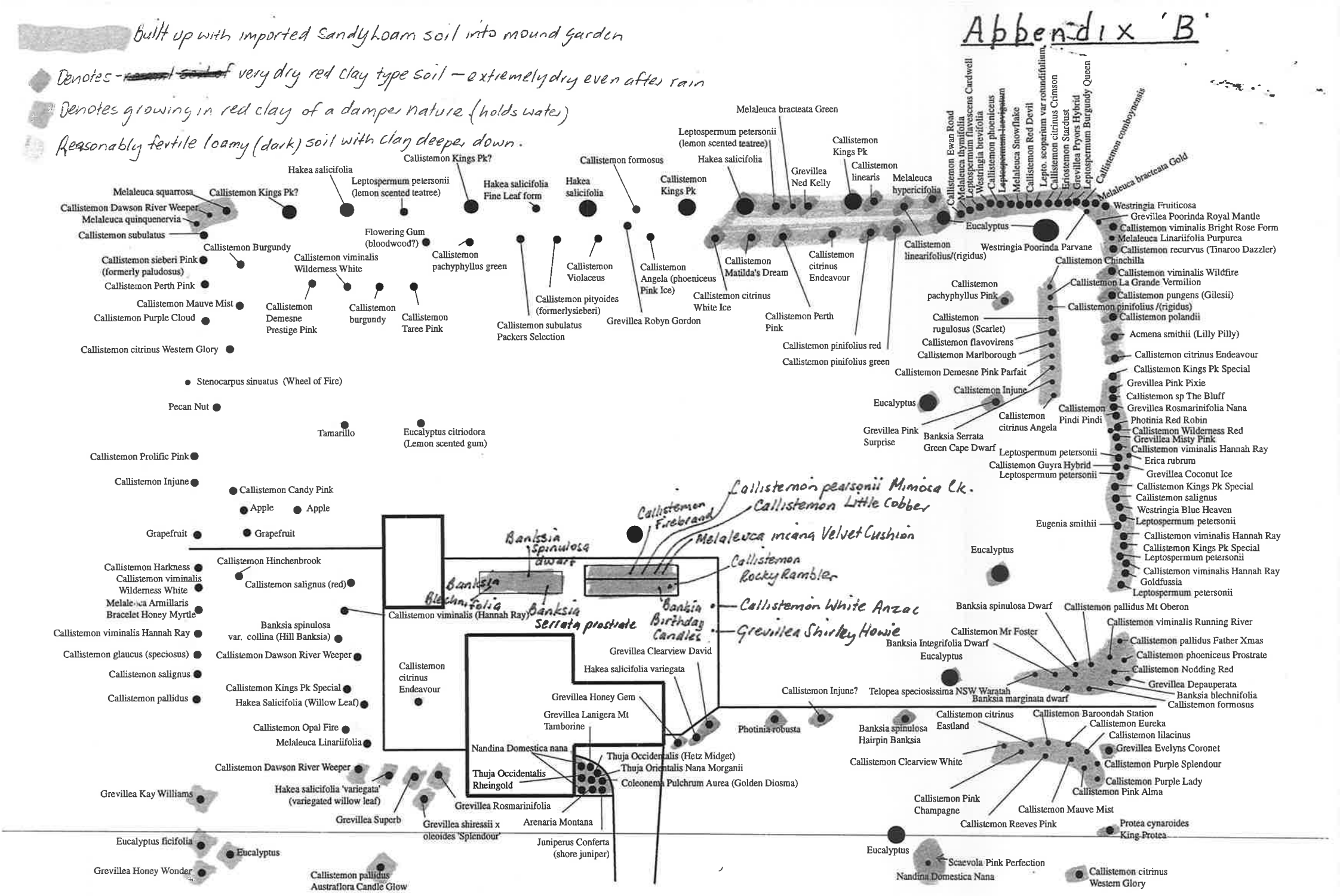
Appendix 'B'

Built up with imported Sandy Loam soil into mound garden

Denotes - ~~[illegible]~~ very dry red clay type soil – extremely dry even after rain

Denotes growing in red clay of a damper nature (holds water)

Reasonably fertile loamy (dark) soil with clay deeper down.



Garden Plan - Barry & Helen Galbraith