

Plant species first recognised as naturalised for New South Wales over the period 2000–2001

John R. Hosking¹, Barry J. Conn² and Brendan J. Lepschi³

¹NSW Agriculture and CRC for Australian Weed Management, RMB 944, Tamworth, NSW 2340, AUSTRALIA, john.hosking@agric.nsw.gov.au; ²National Herbarium of New South Wales, Royal Botanic Gardens, Sydney, NSW 2000, AUSTRALIA, Barry.Conn@rbgsyd.nsw.gov.au; ³Australian National Herbarium, Centre for Plant Biodiversity Research, GPO Box 1600, Canberra, ACT 2601, AUSTRALIA, Brendan.Lepschi@csiro.au

Abstract: Information is provided on the taxonomy and distribution of 40 species of naturalised or naturalising plants newly recorded for New South Wales during the period 1 January 2000 to 31 December 2001. These species are: *Abrus precatorius* subsp. *precatorius*, *Acacia pulchella* var. *pulchella*, *Agave vivipara*, *Alnus glutinosa*, *Berberis thunbergii*, *Bryophyllum daigremontianum* × *Bryophyllum delagoense*, *Callisia fragrans*, *Celtis sinensis*, *Chamaesyce ophthalmica*, *Cotoneaster ?horizontalis*, *Cupressus arizonica*, *Cylindropuntia arbuscula*, *Cylindropuntia leptocaulis*, *Cylindropuntia spinosior*, *Cylindropuntia tunicata*, *Cyperus teneristolon*, *Deutzia crenata*, *Erica arborea*, *Erica glandulosa*, *Geranium robertianum*, *Hieracium murorum* species group, *Hippeastrum puniceum* hybrid, *Hyacinthoides non-scripta*, *Hypericum kouytchense*, *Hypericum patulum*, *Jacaranda mimosifolia*, *Jasminum polyanthum*, *Juglans regia*, *Justicia betonica*, *Koelreuteria formosana*, *Myagrum perfoliatum*, *Oenothera biennis*, *Pinus durangensis* (naturalising), *Pinus nigra* var. *corsicana*, *Schinus terebinthifolius*, *Scorpiurus muricatus*, *Tillandsia usneoides*, *Triadica sebifera*, *Viola riviniana* and *Vitis vinifera* s. lat.

Cunninghamia (2003) 8(2): 175–187

Introduction

The naturalised flora of Australia has received scant attention. In particular, there has been a general lack of concern about new naturalisations. Attention has traditionally focused on ‘known’ weedy species, and then frequently on weeds of agriculture. Species in the early stages of naturalisation, especially those from horticulture (including ornamentals), agriculture and pastures have typically fared worst, being deemed not worthy of scientific attention. This is reflected in the dearth of herbarium collections of a number of naturalised species, some of which have the potential to become serious weeds. This paper draws attention to a number of new naturalisations for the state of New South Wales over the period 2000–2001. Only species considered to be spreading from initial plantings or other naturalisations (e.g. from discarded garden refuse) are covered. ‘Naturalised’ in this paper refers to non-native species which are reproducing (sexually or vegetatively) in the wild for at least one generation.

Methods

Species are only listed here if there is at least one voucher specimen lodged at either the National Herbarium of New South Wales, Sydney (NSW) or the Australian National Herbarium, Canberra (CANB). A number of species listed were first collected prior to 2000 but are included as these records were overlooked for *Flora of New South Wales* accounts and were first noted in recent times at

the National Herbarium of NSW in 2000 or 2001, or specimens were not forwarded until after 2000. Following recent collections a few old records of species stored at the end of genera and families in the National Herbarium of NSW collection were able to be determined to species. There are likely to be other records of recently naturalised species for NSW collected during 2000 and 2001 (or first noted at NSW herbarium during this period) housed at other Australian herbaria. For example a number of species from north-eastern NSW are likely to have been sent to the Queensland Herbarium, Toowong (BRI) and some from southern NSW to the National Herbarium of Victoria, South Yarra (MEL). We are not aware of these at present but ‘Australia’s Virtual Herbarium’ project (<http://plantnet.rbgsyd.nsw.gov.au/avh.html>) should serve to highlight these in the future.

Names used for families and taxa are those currently used by the National Herbarium of NSW and can be viewed in PlantNET (Royal Botanic Gardens Sydney 18 March 2003). Herbarium codes follow Holmgren et al. (1990).

Information on the means of dispersal of the various taxa treated in this paper is given under ‘Notes’ for each taxon where this is known. Where the dispersal mechanism is not listed, then the plants are here presumed to be spread by seed. However, the actual means of dispersal in NSW is not known for a number of the taxa.

The format of this paper is based on that of Heenan et al. (1998, 1999, 2002) publications on recent plant naturalisations in New Zealand.

Discussion

The definition of the term ‘naturalised’ as used in this paper is outlined above. However, given that there is a degree of disagreement as to how this term should be applied (Richardson et al. 2000), we have provided additional information on numbers of plants present, area covered and reproductive status of all taxa treated in this paper to allow for these differences in interpretation.

There are many ways of detecting new plant naturalisations (Hosking et al. 2001). The records of plant naturalisations in the National Herbarium of New South Wales listed below are the result of (i) collections made by experts who have a reasonable knowledge of local floras, including local government weeds officers, environmental consultants, bush regenerators, professional botanists and staff from Landcare and Greening Australia and (ii) specimens retained by herbaria who provide plant identifications for the general public, government agencies and other professionals.

The species listed below include many succulents, particularly cacti. These are often not collected because of perceived difficulty in preparing good specimens. It is worthwhile summarising methods for preparing herbarium material of these plants. Succulents can be dealt with in a number of ways. Many can be frozen to destroy cell structure and then dried rapidly in warm air. Bulky succulents, such as cacti with large cladodes, can be cut parallel to the large faces of cladodes, frozen, and then dried rapidly in warm air. Another method of drying succulents, using a commercial hair-drier and a bag of tightly woven fire-resistant tissue, is described in Eggli and Leuenberger (1996). In this case high temperatures (65–70°C) maintained for 2–3 hours kill all plant tissue. The rest of the drying process takes 6–12 hours at a lower ventilation and temperature setting.

A number of species listed here, for example *Juglans regia* (walnut), *Schinus terebinthifolius* (broad-leaf pepper tree) and *Tillandsia usneoides* (Spanish moss) to name a few, are likely to have been recognised in the field for many years but have not been collected as many people are able to identify them. However, there is a need to collect specimens as a permanent record of when, where and how species begin to naturalise. This information is useful in calculating rates of spread and the time taken for species to become a problem.

It is hoped that publication of new records of plant species naturalised in NSW will prompt further collections of introduced species. In the long term, this approach will focus attention on potential problem species, and lead to their eradication before they have the opportunity to spread and become serious weeds.

Plant species first recognised as naturalised in New South Wales during 2000 and 2001

The species are grouped under Conifers and allies, Monocotyledons and Dicotyledons, then listed in alphabetical order (by scientific name), followed by vernacular name (where known). This is followed by

references to published descriptions (including botanical illustrations and photographs), distribution within NSW according to botanical regions, habitat preferences (including areas where the species is likely to naturalise based on native range and areas where it has naturalised, if such information can be determined), the first known herbarium record, and additional herbarium records for the State, the region of origin and miscellaneous notes (including relative abundance, invasiveness and whether naturalised in other states). Authorities for native species are those currently recognised at the National Herbarium of NSW.

Conifers and allies

CUPRESSACEAE

Cupressus arizonica Greene

Arizona Cypress

DESCRIPTION: Tree to 20 m high. See Eckenwalder in Morin (1993).

REGION OF ORIGIN: Native to Arizona, California, New Mexico and Texas in the USA and Chihuahua and Sonora in Mexico.

NSW DISTRIBUTION / HABITATS: Southern Tablelands and Central Tablelands. The species is known to be naturalised in a few localities near existing plantings in NSW Tableland areas. At Majors Creek plants are growing in an area that was *Eucalyptus radiata* forest but is now cleared and dominated by mowed *Themeda australis*. Here it is growing on soil derived from granite. At Blackheath this species is growing in disturbed native *Eucalyptus sieberi* and *Eucalyptus oreades* shrubby woodland on sandy soil derived from sandstone.

FIRST RECORD: Majors Creek Township. Majors Creek Recreation Reserve, G.W. Carr 9903-55 & P.J. Tucker, 17 Mar 1999 (CANB, MEL, NSW).

ADDITIONAL RECORD: Native bush over road from 237 Hat Hill Road, Blackheath, J.R. Hosking 2240 & C.H. Barker, 25 Nov 2002 (CANB, MEL, NE, NSW).

NOTES: The taxonomy adopted here follows Eckenwalder in Morin (1993) and species previously included as varieties of *Cupressus arizonica* (var. *glabra* (Sudworth) Little, var. *nevadensis* (Abrams) Little and var. *stephonsii* (C.B. Wolf) Little) or as the species *Cupressus glabra* Sudworth, *Cupressus nevadensis* Abrams and *Cupressus stephonsii* C.B. Wolf are all considered to be *Cupressus arizonica*. Notes with the Majors Creek specimen indicate that naturalised plants arise from about 45 trees planted 60+ years ago. At the time of collection there were thousands of plants present from tiny seedlings to small trees about 5 m high. At the Blackheath site there were three naturalised plants over the road from garden plants of the same species. Two of these plants were cone-bearing. There are a few other specimens of this species from the ACT held at CANB, but label data on these specimens does not indicate whether or not plants that have established naturally are reproducing or not. The earliest specimen of this type was collected by Mulvaney in March 1984 (*M.J. Mulvaney* s.n. ANU 30018 (CANB)). This species is also naturalised in Victoria (*G.W. Carr 9711–179* (CANB, MEL, NSW)). Spread occurs by seed via wind.

PINACEAE

Pinus durangensis Martinez

DESCRIPTION: Pine tree to 40 m high. See Farjon et al. (1997).

REGION OF ORIGIN: Native to northern Mexico.

NSW DISTRIBUTION / HABITATS: Northern Tablelands, naturalising alongside a trial plantation of this species.

FIRST RECORD: c. 400 m west of Ponderosa Picnic Area, Hanging Rock State Forest J.R. Hosking 1876, T.L. & G.R. Hosking, 13 Aug 2000 (CANB, MEL, NE, NSW).

NOTES: There are over 70 young plants to 4 m high growing alongside a plantation of this species. Plants are not yet cone-bearing. This species has not been recorded as naturalised or naturalising elsewhere in Australia or overseas to date.

Pinus nigra J.F. Arnold var. *corsicana* (Loudon) Hyl.

Corsican Pine

DESCRIPTION: Pine tree to 40 m high. See Jessop in Jessop & Toelken (1986, as *Pinus nigra* var. *maritima* (Aiton) Melville), Entwisle in Walsh & Entwisle (1994), Spencer (1995) and Hill in Orchard (1998).

REGION OF ORIGIN: Native to Corsica.

NSW DISTRIBUTION / HABITATS: Southern Tablelands. Naturalised near planted trees in disturbed scrub and the adjacent riparian community.

FIRST RECORD: Yass River, c. 1 km NE of Yass Post Office, *B.J. Lepschi 1062*, 29 Aug 1993 (CANB, NSW).

NOTES: A few plants are scattered through weedy native vegetation at the collection site. This species is also naturalised in Victoria and South Australia (Jessop in Jessop & Toelken 1986, Entwisle in Walsh & Entwisle 1994).

Monocotyledons



Fig. 1. *Agave vivipara* growing in native woodland at Yamba.

AGAVACEAE

Agave vivipara L.

DESCRIPTION: Succulent herb with trunk to 1 m high and inflorescence spikes to 5 m high. See Forster in George (1986).

REGION OF ORIGIN: Native to North America, but precise origin unknown.

NSW DISTRIBUTION / HABITATS: North Coast. Only known in NSW from native coastal woodland near Yamba where it was growing on sand (Fig. 1).

FIRST RECORD: North western edge of Yamba on sandy spit, alongside Clarence River, *J.R. Hosking 2145* & *R.H. Holtkamp*, 28 Nov 2001 (CANB, MEL, NE, NSW).

NOTES: About 100 large plants and many smaller plants occur over an area of about 50 m × 50 m within *Banksia integrifolia* subsp. *integrifolia* woodland at the collection site. *Agave vivipara* is also naturalised and spreading in similar woodland on the beach side of the same track closer to Yamba. The species appears to be spreading via rhizomes. Large amounts of seed are being produced but it is not known if these are viable. This succulent probably originally reached this location as discarded garden waste. *Agave vivipara* is also recorded as naturalised from North Kennedy to Moreton pastoral districts in Queensland (Henderson 2002) with the first naturalised specimen collected by S.T. Blake at Rockhampton in May 1956 (G. Batianoff pers. comm. Dec 2002).

AMARYLLIDACEAE

Hippeastrum puniceum (Lam.) Kuntze hybrid

Barbados Lily

DESCRIPTION: Herb with flower scapes to 1.2 m high where collected. See Green in Orchard & Wilson (1994).

REGION OF ORIGIN: Hybrid developed in horticulture but the only known parent of the hybrid is *Hippeastrum puniceum*, which is native to the West Indies, Central America and northern South America.

NSW DISTRIBUTION / HABITATS: North Coast. Occurs in weedy *Eucalyptus* woodland.

FIRST RECORD: Vacant land alongside Warrawee Street, Sapphire Gardens, north of Coffs Harbour, *J.R. Hosking 1974*, 23 Nov 2000 (CANB, MEL, NE, NSW).

ADDITIONAL RECORDS: *Hippeastrum* sp., possibly the same taxon, Orana Park, Leumeah (small patch persistent on old homestead site), *E. McBarron* s.n., 5 Mar 1966 and 12 Mar 1966 (NSW).

NOTES: At Sapphire Gardens hundreds of plants were growing over more than 100 m at the edge of weed-infested *Eucalyptus* woodland between the Pacific Highway and a parallel side road. This infestation is likely to have originated from disposal of garden waste from nearby houses. This hybrid has not been recorded as naturalised in other Australian states.

BROMELIACEAE

Tillandsia usneoides (L.) L.

Spanish Moss

DESCRIPTION: Hanging epiphyte widely grown as an ornamental in NSW. See Conran in George (1987).

REGION OF ORIGIN: Native to south-eastern USA south to Chile and Argentina.

NSW DISTRIBUTION / HABITATS: North Coast. Occurs in a rainforest remnant, growing on *Araucaria cunninghamii* and *Grevillea robusta*. Likely to naturalise in warmer coastal areas of NSW.

FIRST RECORD: Rotary Park, Lismore, *J.R. Hosking 1961*, *R.G. Joseph* & *L.J. Wellman*, 20 Nov 2000 (BRI, CANB, MEL, NE, NSW).

ADDITIONAL RECORDS: Lismore (cult.?), *S.A. Flett* s.n., 29 Mar 1974 (NSW); Kirribilli (cult.), *J. Rogers* s.n., Aug 1968 (NSW).

NOTES: Naturalised in a remnant patch of rainforest, Rotary Park, in Lismore and reportedly naturalised at a number of other locations in Lismore (R. Joseph pers. comm. Nov 2000). This bromeliad is likely to be confused with native bryophytes and lichens. There is an earlier (1974) specimen from Lismore (*Flett* s.n.) that may represent an earlier naturalisation, but label data is ambiguous ('cult.?'). An earlier specimen collected in 1968 from Kirribilli (*Rogers* s.n.) has the following information on the label 'Growing on juniper, apparently spreading on this tree'. This suggests that the species was probably naturalised and spreading at this time. The species is also recorded as naturalised in south-eastern Queensland (Moreton and Wide Bay pastoral districts) (Conran in George 1987, Henderson 2002) with the first naturalised specimen collected by E.C. Cuning at Maryborough in November 1965 (G. Batianoff pers. comm. Dec 2002).

COMMELINACEAE

Callisia fragrans (Lindl.) Woodson

Fragrant Inch Plant

DESCRIPTION: Herb with inflorescence to 70 cm high. See Green in Orchard & Wilson (1994) and Hunt in Walters et al. (1984).

REGION OF ORIGIN: Native to Mexico.

NSW DISTRIBUTION / HABITATS: North Coast. Plants occur on a road cutting with introduced vegetation.

FIRST RECORD: Southern side of Bangalow Road cutting (planted on other side [of road] outside 162 Bangalow Road), Lismore, *J.R. Hosking 1964* & *B.A. Scott*, 21 Nov 2000 (CANB, MEL, NE, NSW).

NOTES: At the collection site there were about 500 naturalised plants growing on and at the base of a steep cutting (slope to 60°). At the time of collection cultivated plants were being grown across the road from the naturalised plants. There are a number of cultivated plant specimens from NSW, dating from 1912 (held at NSW). The species is also recorded as naturalised in Queensland in the South Kennedy, Moreton and Wide Bay pastoral districts (Henderson 2002) with the first naturalised specimen collected by B. Lebler at Indooroopilly in September 1969 (G. Batianoff pers. comm. Dec 2002).

CYPERACEAE

Cyperus teneristolon Mattf. & Kuk. [syn. *Kyllingia pulchella* Kunth]

DESCRIPTION: Sedge with culms to 80 cm high. See Haines & Lye (1983) and Terry & Michieka (1987).

REGION OF ORIGIN: Native to eastern and southern Africa.

NSW DISTRIBUTION / HABITATS: Central Tablelands. Growing with other, mostly exotic, sedges and grasses in damp areas alongside a sandy watercourse.

FIRST RECORD: Minnehaha [as Minniehaha] Falls Reserve, c. 3 km N of Katoomba, *K.L. Wilson 9868*, 10 Mar 2000 (CANB, GENT, K, L, P, PRE, NSW, US).

ADDITIONAL RECORD: Alongside Yosemite Creek, Blue Mountains Refuse Tip, Katoomba, *J.R. Hosking 2009* & *P.T. Gorham*, 7 Mar 2001 (CANB, MEL, NE, NSW).

NOTES: Locally abundant from Blue Mountains Refuse Tip downstream along Yosemite Creek to Minnehaha Reserve, North Katoomba, a distance of about 1.4 km. This species was first recognised as a new naturalisation by Van Klaphake in February 2000. The species is not known to be naturalised elsewhere in Australia. Likely to have been introduced to the tip area in garden refuse. This species spreads by stolons, rhizomes and possibly by seed and is reportedly an important weed of crops in highlands of eastern Africa (Terry & Michieka 1987). However, in Natal the species is 'Now becoming uncommon, probably due to interference with its natural habitats in Midlands' (Gordon-Gray 1995). *Cyperus teneristolon* is mainly found in open damp grassland areas or associated with rock outcrops in Natal (Gordon-Gray 1995). These habitats are similar to the area where it has naturalised in the Blue Mountains.

HYACINTHACEAE

Hyacinthoides non-scripta (L.) Chouard ex Rothm.

English Bluebell

DESCRIPTION: Herb with flowering culms to 45 cm high. See Healy & Edgar (1980, as *Scilla non-scripta* (L.) Hoffmanns. & Link).

REGION OF ORIGIN: Native to western Europe.

NSW DISTRIBUTION / HABITATS: Central Tablelands. Growing with native and exotic vegetation in disturbed areas. Most likely to naturalise in high altitude and high rainfall areas in NSW.

FIRST RECORD: Alongside Lone Pine Avenue, Gordon Falls Reserves, Leura, *J.R. Hosking 1921*, 5 Oct 2000 (CANB, MEL, NSW).

NOTES: Scattered through the Blue Mountains. Probably mainly growing as a result of disposal of garden waste. Also recorded as naturalised in the Southern Lofty botanical region of South Australia (Jessop 1993) and reportedly naturalised in Victoria (G. Carr pers. comm. Aug 1996). Listed as 'Garden outcast on roadsides and grassy waste places' in New Zealand (Healy & Edgar 1980).

Dicotyledons

ACANTHACEAE

Justicia betonica L.

Squirreltail

DESCRIPTION: *Justicia betonica* is an erect shrub that grows to 2 m high. See Immelman (1995).

REGION OF ORIGIN: Native to Asia and tropical Africa.

NSW DISTRIBUTION / HABITATS: North Coast from a *Casuarina* and *Melaleuca* swamp at Tweed Heads.

FIRST RECORD: Swamp at edge of road alongside golf course, Ukerebagh Nature Reserve, Tweed Heads, *J.R. Hosking 1973*, 22 Nov 2000 (AD, CANB, MEL, NE, NSW).

ADDITIONAL RECORD: Swamp at edge of road alongside golf course, Ukerebagh Nature Reserve, Tweed Heads, *J.R. Hosking 2025*, 14 Mar 2001 (AD, CANB, MEL, NE, NSW).

NOTES: *Justicia betonica* at present covers an area about 7 m × 3 m at Ukerebagh Nature Reserve. It appears to be spreading via stems that root where they contact the ground. Plants are producing large amounts of seeds but it is not known if these seeds are viable. The species probably reached this location as discarded garden waste. *Justicia betonica* is also recorded as naturalised in northern Queensland (Cook pastoral district) and south-eastern Queensland (Moreton pastoral district) (Henderson 2002) with the first naturalised specimen collected by A.E. Wilson at Townsville in October 1960 (G. Batianoff pers. comm. Dec 2002).

ANACARDIACEAE

Schinus terebinthifolius Raddi

Broad-leaf Pepper Tree

DESCRIPTION: Tree to 6 (rarely to 15) m high. See Taylor & Harden in Harden (2002) and Hussey et al. (1997).

REGION OF ORIGIN: Native to Argentina, southern Brazil and eastern Paraguay.

NSW DISTRIBUTION / HABITATS: North Coast, Central Coast and possibly North Western Plains. Grows on many substrates in woodland, open forest, pasture and disturbed areas. Most likely to naturalise in warmer coastal areas of NSW.

FIRST RECORD: Pittwater area, *N. Shields* s.n., 11 Jan 1995 (NSW).

ADDITIONAL RECORDS: Hastings Point, *G.N. Batianoff 980216*, 26 Feb 1998 (BRI, CANB, MEL, NSW); Byron Bay, Cape Byron, *G.N. Batianoff 980722*, *980723*, 7 Jul 1998 (BRI, CANB, DNA, NSW); 'Old Brigalows' homestead [c. 80 km west of Moree] (seedling plants), *B. S. Wannan 1040* & *M. E. Wannan*, 10 Jan 1999 (NSW); 1 km NW of Mullumbimby Post Office, *B. Scott* s.n., 2 Sep 2000 (NSW); farm of Jack Emery, Dudgeons Lane via Mullumbimby, *J.R. Hosking 1969* & *P.E. Schweitzer*, 22 Nov 2000 (CANB, MEL, NE, NSW).

NOTES: The largest infestation known in NSW occurs near Mullumbimby (see *J.R. Hosking 1969* & *P.E. Schweitzer*) where thousands of trees cover many hectares. Plants are spread by seed, mostly by birds and mammals, but also by water. *Schinus terebinthifolius* is widely planted as an ornamental and is now naturalised in temperate and subtropical Australia. The species is considered to be one of the most invasive naturalised plants in south-eastern Queensland (Batianoff & Butler 2002), an increasing problem in north-eastern NSW (B. Scott pers. comm. Nov 2000) and also occurs in the Perth region in Western Australia (Hussey et al. 1997). The first naturalised specimen collected in Queensland was collected by L.S. Smith at Bingera (Wide Bay pastoral district) in October 1948 and the first naturalised specimen collected in Western Australia was collected at Alfred Cove, on the south bank of the Swan River, 6 km upriver from Fremantle by R.J. Cranfield in August 1980 (P. Wilson pers. comm. Jan 2003). The species is a weed in South Africa (Henderson 2001) and a major weed

in Florida, USA (Ferriter 1997). According to Ferriter (1997), *Schinus terebinthifolius* is a weed in sub-tropical areas between latitudes 15° and 30° N and S in many countries.



Fig. 2.
Hieracium murorum
growing in a bush
regeneration area at
Katoomba.

ASTERACEAE

Hieracium murorum L. species group

DESCRIPTION: Herb with inflorescence to 70 cm high. See Garnock-Jones in Webb et al. (1988) and Espie (2001).

REGION OF ORIGIN: Native to Europe and western Asia.

NSW DISTRIBUTION / HABITATS: Central Tablelands. Recorded growing in sandy humus and 'taubenite' shale (coal-like) at Katoomba in an area previously planted with *Pinus radiata* D. Don. (Fig. 2) and on red brown clay loam derived from basalt at Mt Irvine in a lawn and garden area. Most likely to naturalise in cooler tableland areas in NSW.

FIRST RECORD: Top NW corner of Frank Walford Park (above/adjacent to the old 'Catalina' racing circuit); and directly E of the SES [State Emergency Service] building by c. 150–180 m, West Katoomba, M. Sherring s.n., Nov 1998 (NSW).

ADDITIONAL RECORDS: Between Catalina Race Track and Great Western Highway, Katoomba, J.R. Hosking 2000, 5 Mar 2001 (CANB, CHR, MEL, NSW, NE); lawns and garden around entrance to 'Lindfield Park', Mt Irvine, C.H. Barker 8 & J.R. Hosking, 24 Mar 2003 (CANB, MEL, NE, NSW).

NOTES: The earliest record was for flowering material and was not identified to species until fruiting material was collected in 2001. The two records from Katoomba are from the same population that appears to be scattered over an area of less than 1 hectare. It is not known how the species reached the area. At the time of the initial collection there were approximately 1000 mature plants and rosettes but at the time of the second collection there were considerably fewer plants present (approximately 100 flowering plants and rosettes). The species is also known from Mt Irvine where over 100 plants were recorded from lawns and a garden around a carpark. A number of *Hieracium* species (hawkweeds) are considered to be problems in New Zealand (Espie 2001), although this species is not of major concern in that country at present (P. Syrett pers. comm. Apr 2001). *Hieracium murorum* is not known to be naturalised in other Australian states.

BERBERIDACEAE

Berberis thunbergii DC.

a barberry

DESCRIPTION: Multistemmed shrub to 4 m high. See Makino (1964) and Ohwi (1965).

REGION OF ORIGIN: Native to Japan.

NSW DISTRIBUTION / HABITATS: Central Tablelands. Growing in *Eucalyptus fastigata* and *Eucalyptus viminalis* tall open forest with a shrub understorey, on red brown clay loam derived from basalt. Likely to naturalise in cool high rainfall areas in NSW.

FIRST RECORD: Wollangambe Crown Reserve, 300 m north of Merriweather Lane, Mt Wilson, J.R. Hosking 1927, M.J. Williams, C.K. Banffy & C.H. Barker, 6 Oct 2000 (CANB, MEL, NE, NSW).

ADDITIONAL RECORD: Wollangambe Crown Reserve, 300 m north of Merriweather Lane, Mt Wilson, J.R. Hosking 2011 & P.T. Gorham, 7 Mar 2001 (CANB, MEL, NE, NSW).

NOTES: This species is not known to be naturalised elsewhere in Australia. Plants in the Reserve have green leaves whereas the most commonly planted form of this species is the red-leaved form known as *Berberis thunbergii* 'Atropurpurea'. There were about 20 flowering and fruiting shrubs at the collection site and a number of smaller non-flowering shrubs. Spread of *Berberis thunbergii* appeared to be by bird-dispersed seed, as for other *Berberis* species. *Berberis darwinii* Hook. is more widely naturalised in the Mt Wilson area than *Berberis thunbergii*.

BETULACEAE

Alnus glutinosa (L.) Gaertn.

Common Alder, Black Alder

DESCRIPTION: Tree to 18 m high. See Sykes in Webb et al. (1988), Fairhurst & Sothill (1989) and Sainty et al. (1998).

REGION OF ORIGIN: Native to Europe, western Asia and north Africa.

NSW DISTRIBUTION / HABITATS: Southern Tablelands and Central Tablelands, growing alongside streams. In Canberra it was growing with willows and other exotic species while at Katoomba it was collected from a wet sclerophyll forest of *Callicoma ceratifolia*, *Leptospermum polygalifolium*, *Eucalyptus oreades*, *Acacia elata*, *Gleichenia discarpa*, *Blechnum indicum* and *Todea barbara*. Plants in the latter area were growing on grey sand derived from sandstone. Likely to naturalise in cool high rainfall areas in NSW.

FIRST RECORD: Canberra; suburb of Belconnen, large metropolitan park on west side of Lake Ginninderra, G.W. Carr 9904-134, 10 Apr 1999 (CANB, MEL, NSW).

ADDITIONAL RECORD: Base of upper part of Katoomba Cascades above Katoomba Falls, Katoomba, J.R. Hosking 2243 & C.H. Barker, 25 Nov 2002 (CANB, MEL, NE, NSW).

NOTES: This species has roots that are nitrogen-fixing and bind the substrate thereby checking erosion (Fairhurst & Sothill 1989). At the Canberra collection only a single naturalised tree was recorded although apparently a number of plants are naturalised around Lake Burley Griffin (Sainty pers. comm. 1998). Over 10 fruiting trees are naturalised alongside the Kedumba River alongside Katoomba Cascades. This species is reportedly naturalised in Victoria (Groves et al. 1997) but there are no herbarium specimens of naturalised plants for Australian states other than NSW and the ACT. Spread by seed via water and wind. Naturalised on the north and south islands of New Zealand where it can form almost pure stands (Webb et al. 1988).

BIGNONIACEAE

Jacaranda mimosifolia D. Don

Jacaranda

DESCRIPTION: Deciduous to semi-deciduous tree to 20 m high. See Henderson (2001).

REGION OF ORIGIN: Native to north-western Argentina and southern Bolivia.

NSW DISTRIBUTION / HABITATS: North Coast and Central Coast, naturalised near existing stands of *Jacaranda mimosifolia* in grasslands and woodlands. Associated vegetation in the area where *Hosking 1869* was collected comprised a number of weed species including *Lantana camara* L. Likely to naturalise in warmer coastal areas of NSW.

FIRST RECORD: Lake Parramatta near North Rocks Road [North Parramatta], *G. Dolman* s.n., 27 Sep 1983 (CANB).

ADDITIONAL RECORD: Alongside Bruxner Highway, above Mallanganee Nature Reserve (8.4 km from Mummulgum & 3.1 km from upper road into Mallanganee), *J.R. Hosking 1869*, 4 May 2000 (CANB, MEL, NE, NSW).

NOTES: The species is rarely collected as it is readily identified. Grown as an ornamental tree in many locations in NSW. The notes accompanying Dolman's specimen indicate that there were numerous seedlings growing in the collection area but do not give any indication of surrounding vegetation. Seedling trees rarely grow to adults in the Sydney region and the species is not reported to be a problem in this area (*G. Sainty* pers. comm. Oct 2003). Plants of all ages were present where *Hosking 1869* was collected. *Jacaranda mimosifolia* is considered to be an environmental weed in the Lismore area (*B. Scott* pers. comm. May 2000) and is also a weed in South Africa (Henderson 2001). Spread appears to be by seed from cultivated plants. The species is also recorded as naturalised in south-eastern Queensland (Burnett, Darling Downs, Moreton and Wide Bay pastoral districts) (Henderson 2002) with the first naturalised specimen collected by P.I. Forster at Munduberra in November 1987 (*G. Batianoff* pers. comm. Dec 2002).

BRASSICACEAE

Myagrurn perfoliatum L.

Muskweed

DESCRIPTION: Herb to 1 m high. See Hewson in Jessop & Toelken (1986), Parsons & Cuthbertson (1992) and Entwisle in Walsh & Entwisle (1996).

REGION OF ORIGIN: Native to Europe and western Asia.

NSW DISTRIBUTION / HABITATS: North Western Slopes. A weed of cultivation on cracking clay soils (vertosols) and likely to be found on this soil type anywhere in cropping areas of NSW.

FIRST RECORD: Near Pump Station Creek, 'Windy Station', south-west of Quirindi, *J.R. Hosking 1875*, *A.M. Storrie & P.G. McKenzie*, 1 Aug 2000 (CANB, MEL, NE, NSW).

ADDITIONAL RECORD: Near Pump Station Creek, 'Windy Station', south-west of Quirindi, *J.R. Hosking 1930 & A.S. Cook*, 12 Oct 2000 (CANB, MEL, NE, NSW).

NOTES: Apparently identified by agricultural consultants in 1999 but no specimens were sent to herbaria for confirmation. The species is locally abundant in winter crops (such as canola – *Brassica napus* L., also in Brassicaceae) on the Liverpool Plains. Cruciferous weeds such as *Myagrurn perfoliatum* are difficult to control in canola crops. *Myagrurn perfoliatum* is spread by seed, either in contaminated grain or by water and mud. The species is not known to be naturalised elsewhere in NSW, but is recorded from South Australia, Victoria and Queensland where it is also considered to be a weed of cereals. The earliest naturalised specimen was collected by *J.R. Tovey* from the Wimmera district (Victoria) in February 1912 (*V. Stajsic* pers. comm. Jan 2003). For more information see Parsons and Cuthbertson (1992).

CACTACEAE

Cylindropuntia arbuscula (Engelm. & J.M. Bigelow)

F.M. Knuth

DESCRIPTION: Small shrub cactus to 1.7 m high. See Benson (1982, as *Opuntia arbuscula* Engelm.).

REGION OF ORIGIN: Native to USA and Mexico.

NSW DISTRIBUTION / HABITATS: North Western Plains. Recorded from *Eucalyptus populnea* subsp. *bimbil* woodland.

FIRST RECORD: Northern side of Grawin, *J.R. Hosking 1889*, 19 Sep 2000 (BRI, CANB, MEL, NE, NSW).

NOTES: Segments have spines covered with detachable sheaths. Means of spread is not known but as with most cacti spread is likely to be through movement of segments and where seed is produced, by seed. Naturalised in disturbed areas around opal fields in northern New South Wales, although not common or widespread. Plants were being treated by the Prickly Pear Destruction Commission from the 1970s until cactus control was handed over to local councils in the late 1990s. Plants were only identified as cactus species at this time and specimens were not sent to any herbaria for identification. *Cylindropuntia arbuscula* is damaged by *Dactylopius tomentosus* (Lamarck) (L. Tanner pers. comm. Sep 2000), a cochineal insect that damages many species in the genus *Cylindropuntia*. This species is not known to be naturalised elsewhere in Australia.

Cylindropuntia leptocaulis (DC.) F.M. Knuth

Pencil Cactus

DESCRIPTION: Small shrub cactus to 1.5 m high. See Benson (1982, as *Opuntia leptocaulis* DC.).

REGION OF ORIGIN: Native to north western Mexico and adjoining areas of the USA.

NSW DISTRIBUTION / HABITATS: North Western Plains. Recorded from *Eucalyptus populnea* subsp. *bimbil* woodland.

FIRST RECORD: Northern side of Grawin, *J.R. Hosking 1890*, 19 Sep 2000 (BRI, CANB, MEL, NE, NSW).

NOTES: Segments pencil-like with spines covered with detachable sheaths. Means of spread is not known. Not common or widespread, only known to be naturalised on the northern side of Grawin township where it occurs with *Cylindropuntia arbuscula*, *Cylindropuntia tunicata*, *Austrocylindropuntia cylindrica* (Lam.) Backeb. (cristate form) and *Opuntia stricta* (Haw.) Haw. Other notes on early recognition and treatment as per *Cylindropuntia arbuscula* (above). Damage to *Cylindropuntia leptocaulis* by *Dactylopius tomentosus* is significant and this cochineal can be used to control this cactus (L. Tanner pers. comm. Mar 1993). This species is thought to be naturalised in the Barmera area of South Australia (Telford in George 1984).

Cylindropuntia spinosior (Engelm.) F.M. Knuth

DESCRIPTION: Small shrub cactus to 1.2 m high. See Benson (1982, as *Opuntia spinosior* (Engelm.) Tourney).

REGION OF ORIGIN: Native to USA and Mexico.

NSW DISTRIBUTION / HABITATS: North Far Western Plains. Recorded as growing with *Maireana pyramidata*.

FIRST RECORD: On hillslopes near dugouts and below plantings, above town area, White Cliffs, *C. Innes* s.n., 9 May 2000 (NSW).

NOTES: Segments have spines covered with detachable sheaths. Means of spread is not known. Scattered plants are recorded as growing near plantings. The species spread down slopes following heavy rains prior to collection (*C. Innes* pers. comm. May 2000). *Cylindropuntia spinosior* is likely to be damaged by *Dactylopius tomentosus*, a cochineal insect that damages many species in the genus

Cylindropuntia, although this cochineal has not been used to control *Cylindropuntia spinosior* in NSW. This cactus is not known to be naturalised elsewhere in Australia.

Cylindropuntia tunicata (Lehm.) F.M.Knuth

Hudson Pear (name used in New South Wales)

DESCRIPTION: Small shrub cactus to 1 m high although often mat-forming. See Swinbourne in Jessop & Toelken (1986), Stajsic & Carr in Walsh & Entwisle (1996) and Benson (1982). In all these references this species is under the name *Opuntia tunicata* (Lehm.) Link & Otto.

REGION OF ORIGIN: Native to Mexico, USA and Cuba.

NSW DISTRIBUTION / HABITATS: North Western Slopes, North Western Plains. Recorded from *Eucalyptus* woodland.

FIRST RECORD: Cumborah behind abandoned garage over road from turnoff to Lightning Ridge, *J.R. Hosking 1887, J.P., T.L. & G.R. Hosking*, 18 Sep 2000 (BRI, CANB, MEL, NE, NSW).

NOTES: Segments have spines covered with detachable sheaths. Means of spread is not known but as the species is now widely dispersed spread is likely to be both vegetative and by seed. Naturalised in disturbed areas in northern NSW (e.g. around towns such as Cumborah, Grawin, Glen Garry, Lightning Ridge and near Five Ways (west of Baradine)), where locally abundant. Present over many hundreds of hectares (G. Grimshaw pers. comm. Mar 2002). Other notes on early recognition and treatment as per *Cylindropuntia arbuscula* (above). *Cylindropuntia tunicata* is damaged by *Dactylopius tomentosus* (L. Tanner pers. comm. Sep 2000); damage may initially be significant but plants appear to recover. This cactus is naturalised in Victoria, South Australia (Telford in George 1984, Swinbourne in Jessop & Toelken 1986, Stajsic & Carr in Walsh & Entwisle 1996) and Western Australia (*S. Januskiewicz* s.n., 22 Oct 2002, PERTH, NSW), and is also reported to be naturalised in South America (GRIN 21 June 2002) and South Africa (Zimmerman pers. comm. Feb 2003).

CLUSIACEAE

Hypericum kouytchense H.Lév.

DESCRIPTION: Shrubs in the collection area grow to 1.3 m high but plants reportedly grow to 1.8 m high. See Robson (1985).

REGION OF ORIGIN: Native to China (Guizhou province).

NSW DISTRIBUTION / HABITATS: Central Tablelands. Growing on brown sandy loam derived from sandstone with *Hypericum androsaemum* L., *Cytisus scoparius* (L.) Link, *Leycesteria formosa* Wall., *Lonicera japonica* Thunb., *Buddleja davidii* Franch., *Blechnum* sp., *Rubus anglocandicans* A. Newton and native and exotic herbs and rushes. Most common on banks of a small watercourse.

FIRST RECORD: Gordon Falls, Leura, *L. Thomas*, 2 Feb 2000 (NSW).

ADDITIONAL RECORDS: Gordon Falls Park, Leura, *J.R. Hosking 2007 & P.T. Gorham*, 7 Mar 2001 (BM, CANB, MEL, NE, NSW); Gordon Falls Park, Leura, *J.R. Hosking 2296*, 28 Mar 2003 (CANB, MEL, NE, NSW).

NOTES: The *Hosking 2007 & Gorham* collection was made from a single shrub 80 cm high. Two naturalised *Hypericum kouytchense* were seen in this area in November 2002. In March 2003 a scramble through weeds of many species, further down the hill, revealed over 100 fruiting shrubs and many immature plants growing over 70 m of creek front. The species has also been seen growing in a damp area below South Lawson Tip. Spread by seed. As not all specimens were available we were unable to check whether this species is the one referred to as *Hypericum × moserianum* André in Miller in Harden (2000). *Hypericum kouytchense* is not known to be naturalised elsewhere in Australia but it is recorded as naturalised near Lake Paringa on the South Island of New Zealand (Robson 1985).

Hypericum patulum Thunb.

DESCRIPTION: Multistemmed shrub to 2 m high. See Robson (1985), Li (1996) and Spencer (1997).

REGION OF ORIGIN: Native to south-western China and northern Vietnam.

NSW DISTRIBUTION / HABITATS: Central Tablelands. Growing on chocolate brown krasnozems derived from basalt, in an opening in montane rainforest with *Acer pseudoplatanus* L., *Leycesteria formosa* Wall., *Hymenanthera dentata* and ferns.

FIRST RECORD: Below house on lower side of Queen's Avenue, Mt Wilson, *J.R. Hosking 1845 & M.J. Williams*, 23 Feb 2000 (shrubs not visible from road) (BM, CANB, MEL, NE, NSW).

NOTES: Many hundreds of plants were present in an overgrown house yard and an opening in rainforest below the yard. This *Hypericum* is often planted as an ornamental but is not known to be naturalised elsewhere in Australia. The species is recorded as naturalised in Ecuador, Japan, South Africa and Taiwan (Robson 1985).

CRASSULACEAE

Bryophyllum daigremontianum (Raym.-Hamet &

H.Perrier) A. Berger × ***Bryophyllum delagoense*** (Eckl. & Zeyh.) Schinz

Hybrid Mother-of-Millions

DESCRIPTION: Succulent herb with inflorescences to 1.2 m high. See Hannan-Jones & Playford (2002).

REGION OF ORIGIN: This hybrid was developed in the USA by A.D. Houghton of San Fernando, California using plant species that originated from Madagascar, although this hybrid is not known to occur naturally in Madagascar (Hannan-Jones & Playford 2002).

NSW DISTRIBUTION / HABITATS: North Coast, North Western Slopes and North Western Plains. Grows on many substrates in woodland, open forest, pasture and disturbed areas. Likely to naturalise in warmer areas of NSW.

FIRST RECORD: Wallangra, NE of Warialda, collector not mentioned, 24 Jul 1970 (NSW).

ADDITIONAL RECORDS: Oxley Park, Tamworth, *J.R. Hosking* s.n., 26 Sep 1987 (NE, NSW); W end entrance of Gooniwigal BR, 4 km SE Inverell, *G.J. Baldwin 84*, 11 Feb 1993 (NE); Garrieties Gully, Oxley Park, Tamworth, *J.R. Hosking 1880*, 31 Aug 2000 (BRI, CANB, MEL, NE, NSW); alongside Bucketts Road, Gloucester, *J.R. Hosking 2202 & M.W. Tull*, 1 Mar 2002 (CANB, MEL, NE, NSW); amongst otherwise mostly native vegetation opposite road to tip, Lightning Ridge, *J. R. Hosking 2344*, 4 Sep 2003 (BRI, CANB, MEL, NE, NSW).

NOTES: The first record was identified as *Kalanchoe daigremontiana* Raym.-Hamet & H. Perrier but is this species. This taxon was correctly identified by staff at NSW in 1987 but was overlooked for *Flora of New South Wales* treatments (Everett & Norris in Harden 1990, Harden & Murray 2000). This hybrid is locally dominant in many areas and is particularly common on the opal fields around Lightning Ridge. Most naturalised populations originate from old gardens or discarded garden refuse and in a number of areas the species grows with *Bryophyllum delagoense* (Eckl. & Zeyh.) Schinz. This hybrid spreads via movement of plantlets and does not appear to produce much (if any) viable seed (Hannan-Jones & Playford 2002). Outside Australia the hybrid is naturalised in the Cayman Islands and the Lesser Antilles (Hannan-Jones & Playford 2002). *Bryophyllum* spp. are the subject of a biological control program at present (Hannan-Jones & Playford 2002). For more information on this hybrid, and its distribution in south-eastern Queensland, see Hannan-Jones & Playford (2002).

ERICACEAE

Erica arborea L.

Tree Heath

DESCRIPTION: Tree to 8 m high. See Jessop in Jessop & Toelken (1986), Walsh in Walsh & Entwisle (1996) and Sykes in Webb et al. (1988).

REGION OF ORIGIN: Native to southern Europe, Asian Turkey, central to northern Africa and the Canary and Madeira Islands.

NSW DISTRIBUTION / HABITATS: Central Tablelands. Growing in disturbed *Eucalyptus* woodland amongst native and exotic shrubs below native and exotic trees. Most likely to naturalise in cool, high rainfall areas of NSW.

FIRST RECORD: Roadsides near corner of Ada and Wombat Streets, Blackheath (and also both sides of railway line above this location), *J.R. Hosking 1925, M.J. Williams, C.K. Banffy & C.H. Barker*, 6 Oct 2000 (CANB, MEL, NE, NSW).

NOTES: Locally common in the area where the collection was made. In this area it was growing on vacant land, roadsides and between the road edge and railway line. This species appears to spread by seed. *Erica arborea* is not known to be naturalised elsewhere in NSW but is reported to be naturalised in South Australia and Victoria (Jessop in Jessop & Toelken 1986, Walsh in Walsh & Entwisle 1996). *Erica arborea* is also naturalised in New Zealand where it is not considered to be a problem (Sykes in Webb et al. 1988).

Erica glandulosa Thunb.

DESCRIPTION: Shrub to around 1 m high. See Schumann & Kirsten (1992) and Thiselton-Dyer (1909).

REGION OF ORIGIN: Native to South Africa (south-eastern Cape Province).

NSW DISTRIBUTION / HABITATS: Central Tablelands. Collected from a slashed high tension power line easement through shrubby *Eucalyptus*–*Angophora* woodland.

FIRST RECORD: 60 m N of the end of Allen St, North Lawson, *M. Williams s.n.*, 17 May 2000 (NSW).

ADDITIONAL RECORDS: 60 m west north west of the end of Allen Street, *J.R. Hosking 2323 & C.H. Barker*, North Lawson, 20 Aug 2003 (AD, CANB, MEL, NE, NSW).

NOTES: Notes with the original collection indicate that that the species had naturalised from an adjacent residential area and that there were juvenile and mature plants present in an area of 25 square metres. Notes from a collection from the same area but three years later indicate that there were about 90 plants in an area the same size as previously, and that there were a few shrubs scattered for about 2 m below this area and an additional plant was located 45 m from the original area.

EUPHORBIACEAE

Chamaesyce ophthalmica (Pers.) D.G.Burch

DESCRIPTION: Prostrate to semi-erect herb to 10 cm high. See Harris (2001).

REGION OF ORIGIN: Native to southern Mexico to Ecuador.

NSW DISTRIBUTION / HABITATS: North Coast. Occurs as a weed of pavements, home gardens, lawns, road verges and other disturbed areas. Likely to become widespread and common in disturbed areas in northern NSW although we are uncertain as to the possible full extent of spread.

FIRST RECORD: Roadside outside Far North Coast County Council depot, Wyrallah Road, East Lismore, *J.R. Hosking 1965 & B.A. Scott*, 21 Nov 2000 (BRI, CANB, NE, NSW).

ADDITIONAL RECORDS: Edge of Bangalow Road near intersection with Donnans Road, Lismore, *J.R. Hosking 2020*, 13 Mar 2001 (CANB, MEL, NE, NSW); gardens and pavements at Twin Pines Motel, 49 Woolli Street (opposite Yamba Bowling Club), Yamba, *J.R. Hosking*

2146, 29 Nov 2001 (CANB, MEL, NE, NSW); lawns and gardens of Bellinger Valley Motor Inn, Bellingen, *J.R. Hosking 2269*, 13 Mar 2003 (CANB, MEL, NE, NSW).

NOTES: Locally abundant on roadsides (in gravelled areas) and in lawns, spread by seed. Frequency on roadside areas suggest the species is spread by graders and probably in soil attached to vehicles. It is unlikely that this species was deliberately introduced. First collected in Australia by N. Byrnes at Mt Ommaney (Brisbane) on 11 February 1981 (G. Batianoff pers. comm. Dec 2002), it now occurs in a number of locations in Brisbane (Harris 2001) and occurs as far south as Port Macquarie in NSW. This species is also naturalised in mainland USA (Long & Lakela 1971). *Chamaesyce ophthalmica* is similar in habit and often occurs in disturbed areas with other *Chamaesyce* spp. such as *Chamaesyce hirta* (L.) Millsp., *Chamaesyce maculata* (L.) Small (previously *Chamaesyce supina* (Raf.) Moldenke) and *Chamaesyce prostrata* (Aiton) Small.



Fig. 3. *Triadica sebifera* forming a dense stand on the edge of a wetland at Casino.

Triadica sebifera (L.) Small [syn. *Sapium sebiferum* (L.) Roxb.]

Chinese Tallow Tree

DESCRIPTION: Deciduous dioecious tree to 10 (rarely to 15) m high. See Ohba in Iwatsuki et al. (1999).

REGION OF ORIGIN: Native to China.

NSW DISTRIBUTION / HABITATS: North Coast. At Casino it occurs as scattered trees amongst herbs and grasses at the edge of roadside drains or forms thickets excluding other species on the edge of a lake (Fig. 3).

FIRST RECORD: Alongside Queensland Road adjacent to Jabiru–Geneebeinga wetland, northern edge of Casino, *J.R. Hosking 1863 & B.A. Scott*, 3 May 2000 (CANB, MEL, NE, NSW).

ADDITIONAL RECORDS: Alongside Queensland Road adjacent to Jabiru–Geneebeinga wetland, northern edge of Casino, *J.R. Hosking 1966* (male) and *J.R. Hosking 1967* (female), 21 Nov 2000 (BRI, CANB, MEL, NE, NSW).

NOTES: *Triadica sebifera* was apparently planted on the edge of the wetland alongside Casino golf course (B. Scott pers. comm. May 2000) where there are now thousands of *Triadica sebifera* trees. It was recognised as a weed a number of years earlier by a local resident but specimens were not sent to any herbaria (B. Scott pers. comm. May 2000). The species is grown as a street tree in Sydney and in northern NSW but is not known to be a problem elsewhere in NSW. It is a weed of a few wet areas in south-eastern Queensland; the first naturalised specimen was collected by C.T. White at Chermiside (Brisbane) in December 1928 (G. Batianoff pers. comm. Dec 2002). Spread occurs by seeds that are water and bird-dispersed. Fruits float and accumulate on margins of areas from which floodwater recedes. *Triadica sebifera* is considered to be a weed of wet areas in the USA from south Texas eastwards to Florida and north to North Carolina

(Randall & Marinelli 1996, Bruce et al. 1997) and is also naturalised in Japan, Taiwan, India, Pakistan, central and southern Europe, Martinique and the Sudan (Ohba in Iwatsuki et al. 1999, Bruce et al. 1997). Over time, *Triadica sebifera* plants in the USA appear to have become more invasive as genotypes have adapted to high growth and low defence, for example leaves from invasive trees are more poorly defended from herbivores by tissues containing defensive compounds such as tannins than are trees from native sources (Siemann & Rogers 2001). This sort of adaptation may be occurring in Australia. Extracts from *Triadica sebifera* appear to enhance its own germination and growth rather than hinder growth of other species (Conway et al. 2002). *Triadica sebifera* has been cultivated in China for 14 centuries for soap (seed coat), fuel (wood), candles (seed coat), drying oil (seed kernel), black dye (leaves), honey (nectar) and protein meal (seed kernel) (Bruce et al. 1997).

FABACEAE (FABOIDEAE)

Abrus precatorius L. subsp. *precatorius*

Crabs Eye

DESCRIPTION: Climber growing to 10 m high on supporting vegetation at Chinderah Golf Range. See Stanley in Stanley & Ross (1983).

REGION OF ORIGIN: Native to northern Australia, Malesia, tropical Asia and tropical Africa.

NSW DISTRIBUTION / HABITATS: North Coast. Coastal areas in various types of *Banksia* and *Eucalyptus* forest. Likely to naturalise in other high rainfall areas of coastal north-eastern NSW.

FIRST RECORD: Chinderah Golf Range, 11 km south of Tweed Heads, J.R. Hosking 2024 & R.L. Watson, 14 Mar 2001 (CANB, MEL, NE, NSW).

ADDITIONAL RECORDS: Crabbes Creek, near Murwillumbah (NSW), A.J. Beck s.n., 29 Jun 1981; roadside S of nursery, Hulls Road, S of Mooball, N. Nicholson & A. McKinley, Dec 1996 (NSW).

NOTES: This vine is also apparently common at the southern end of the township of Kingscliff (R. Watson pers. comm. Mar 2001). Although considered native by Stanley & Ross (1983), the first specimen collected in south-eastern Queensland was not collected until January 1967 by B. Lebler from Amity Point, North Stradbroke Island (G. Batianoff, Dec 2002), suggesting that *Abrus precatorius* is introduced to south-eastern Queensland. The species is not recorded in *Flora of New South Wales* (Harden 2002) but there are two specimens at NSW herbarium (Beck s.n. and McKinley s.n.) that may be from naturalised plants. The Beck specimen was collected in 1981, but the label states 'Growing in old banana plantation' and is ambiguous with regard to whether or not the species was naturalised or planted, the McKinley specimen only mentions the roadside location where it was collected. Plants may cause death of supporting vegetation by smothering (R. Watson pers. comm. Mar 2001). Spread appears to be by seed that are mostly bird-dispersed. Viable seeds may be found in drift lines and on the fore dunes in south-eastern Queensland and north-eastern NSW (G. Batianoff pers. comm. Dec 2002). Seeds are decorative and often used as ornaments, but they are highly toxic (Everist 1981).

Scorpiurus muricatus L.

Scorpion Plant

DESCRIPTION: Annual prostrate to erect herb to 80 cm high. See Harden in Harden (2002).

REGION OF ORIGIN: Native to Mediterranean Europe, Crimea, Transcaucasia, Asia Minor and Mediterranean Africa.

NSW DISTRIBUTION / HABITATS: Central Western Slopes. Likely to naturalise in pasture to open forest areas as *Scorpiurus muricatus* is adapted to disturbance and survives grazing. Often planted on heavy clay soils.

FIRST RECORD: c. 18 km W of Bribbaree, G. Howe s.n., 20 Oct 1999 (AD, BRI, CANB, K, MEL, NSW).

NOTES: Planted as a pasture species at a number of locations in NSW. Notes accompanying the Howe specimen record that *Scorpiurus muricatus* was naturalised over a small area adjacent to a stock route. Spread is likely to be by seed. *Scorpiurus muricatus* is also recorded as naturalised in southern Queensland (Darling Downs and Maranoa pastoral districts) (Henderson 2002) with the first naturalised specimen collected by C.S. Clydesdale in Geham District (Darling Downs pastoral district) in September 1952 (G. Batianoff pers. comm. Dec 2002).

FABACEAE (MIMOSOIDEAE)

Acacia pulchella R.Br. var. *pulchella*

Prickly Moses

DESCRIPTION: Spiny, bipinnate shrubby wattle to 1.5 m high. See Maslin in Orchard & Wilson (2001).

REGION OF ORIGIN: Native to south-western Western Australia.

NSW DISTRIBUTION / HABITATS: Central Tablelands, recorded from a bushland nature-strip with native trees and shrubs.

FIRST RECORD: Corner of Livingstone and Cataract St, Lawson (in front of and beside 28 Livingstone in bushland nature-strip), D. Coleby s.n. & M.J. Williams, 27 Sep 2000 (NSW).

NOTES: The specimen cited above has notes indicating that there were 15 plants over an area of 160 square metres and that these plants varied from seedlings and juveniles to mature plants. There was one horticultural plant noted on a nearby property and this was thought to be the source of the naturalised plants.

GERANIACEAE

Geranium robertianum L.

Herb Robert

DESCRIPTION: Biennial (sometimes annual) herb to 60 cm (rarely to 80 cm) high. See Aedo (2000), Smith in Walsh & Entwisle (1999) and Sykes in Webb et al. (1988).

REGION OF ORIGIN: Native to Europe, Asia and north Africa but the species is widely naturalised and the exact native range is obscure.

NSW DISTRIBUTION / HABITATS: Central Tablelands. Disturbed areas and creeklines in woodland to forest. Widely grown and likely to naturalise in wetter areas of NSW.

FIRST RECORD: 42 Seventh Avenue, North Katoomba, I. Lett s.n., 21 Nov 2000 (NSW).

ADDITIONAL RECORD: Alongside Gordon Creek, Gordon Falls Park, Leura, J.R. Hosking 2001, 5 Mar 2001 (CANB, MEL, NE, NSW).

NOTES: Often planted as an ornamental and appears to have naturalised along a number of creeklines in the Blue Mountains. The Lett specimen was from plants that grew in soil imported into a garden during landscaping work. Probably more widely distributed in NSW but likely to be overlooked as it is easily confused with native *Geranium* spp. Naturalised in Victoria and South Australia (Jessop 1993, Smith in Walsh & Entwisle 1999). *Geranium robertianum* is closely related to *Geranium purpureum* Vill. with which it is frequently confused (Aedo 2000), the latter sometimes referred to as *Geranium robertianum* subsp. *purpureum* (Vill.) Nyman (Stace 1991). *Geranium purpureum* Vill. has been recorded as naturalised in the Wellington district (Harden 1992). *Geranium robertianum* is naturalised and widespread in the USA and southern Canada (Aedo 2000).

HYDRANGEACEAE

Deutzia crenata Siebold & Zucc.

Deutzia

DESCRIPTION: Multistemmed shrub to 4 m (rarely to 7 m) high with hollow stems. See Makino (1964), Ohwi (1965) and Spencer (2002).

REGION OF ORIGIN: Native to Japan.

NSW DISTRIBUTION / HABITATS: Central Tablelands, recorded from *Eucalyptus* woodland on riverbank.

FIRST RECORD: Near Jenolan River crossing, Moorara Boss Trail, *D.H. Benson 2417* & *D. Keith*, 19 Nov 1985 (NSW).

ADDITIONAL RECORDS: Jenolan River system, *M. Sherring* s.n., Feb 2000 (NSW); alongside Jenolan River below Jenolan Caves and above power station, *J.R. Hosking 2213*, 23 Apr 2002 (CANB, MEL, NE, NSW).

NOTES: *Benson 2417* & *Keith* was originally identified as *Deutzia scabra* Thunb., however that species has 4–5-rayed stellate hairs on the lower leaf surface, while *Deutzia crenata* has 10–15-rayed stellate hairs on the lower leaf surface (Ohwi 1965). *Deutzia crenata* is often referred to as *Deutzia scabra* in horticulture (Given & Webb in Webb et al. 1988). *Deutzia crenata* is locally dominant, and appears to be displacing native species, along the Jenolan River over at least 1 km and is known to occur along at least 9 km of the Jenolan River. Growth of *Deutzia crenata* is similar to many multistemmed *Salix* spp. *Deutzia crenata* is not recorded as naturalised elsewhere in Australia but is recorded in low numbers at two locations in New Zealand (Given & Webb in Webb et al. 1988).

JUGLANDACEAE

Juglans regia L

Walnut

DESCRIPTION: Tree to over 20 m high. See Sykes in Webb et al. (1988) and Lu Ammin et al. (1999, 2001).

REGION OF ORIGIN: Native to south-eastern Europe to temperate Himalayas, China.

NSW DISTRIBUTION / HABITATS: Southern Tablelands. Grows on very steep, rocky limestone slopes in cleared, grazed eucalypt woodland with a weedy understorey. Numerous plants of *Prunus persica* (L.) Batsch. var. *persica* and *Prunus persica* var. *nucipersica* (Suckow) C.K.Schneid. (*B.J. Lepschi 4638, 4639* & *A.J. Whalen*) also occur at the Wee Jasper–Yass road site.

FIRST RECORD: North bank of Murrumbidgee River at Taemas Bridge, 19 km SSW of Yass, *B.J. Lepschi 1592*, 4 Mar 1994 (CANB, NSW).

ADDITIONAL RECORD: 0.6 km W of Mountain Creek Road turnoff on Wee Jasper–Yass road, 17 km NE of Wee Jasper, *B.J. Lepschi 4637* & *A.J. Whalen*, 14 Nov 2001 (CANB, CDA, K.L., MEL, NSW, P, US).

NOTES: Numerous plants of different ages, ranging from saplings to 1 m high to adult trees to c. 12 m high, growing on steep slopes above the Murrumbidgee River/Burrinjuck Reservoir and at another site c. 3 km to the south-west, along c. 500 m of Mountain Creek Road, extending into grazed woodland. Probably originating from plantings, although the origin of the parent plants is obscure, as all plants occur on extremely steep, relatively inaccessible slopes, sites unlikely to have supported habitation or plantings of any sort. The species also appears to be naturalised in South Australia (*Pearce 224* (AD, CANB)) and is reportedly naturalised in Victoria (Groves et al. 1997, although there are no specimens to support this record). In New Zealand the species is listed as ‘Spontaneous in the vicinity of parent trees, near old gardens and plantations.’ (Sykes in Webb et al. 1988). This is also likely to be the case in many locations in temperate south-eastern Australia.

MALACEAE

Cotoneaster ?horizontalis Decne.

Prostrate Cotoneaster

DESCRIPTION: Prostrate shrub. See Cullen et al. (1995) and Spencer (2002).

REGION OF ORIGIN: Native to China.

NSW DISTRIBUTION / HABITATS: Central Tablelands. Known from a number of disturbed locations on sandstone-derived soils in *Eucalyptus* woodland.

FIRST RECORD: Alongside drainage line in Harold Hodgson Park, Katoomba, *J.R. Hosking 1840*, 23 Feb 2000 (AD, CANB, MEL, NE, NSW).

ADDITIONAL RECORD: Amongst ruins of old building near corner of Narrow Neck Road and Furnells Road, Katoomba, *J.R. Hosking 2208*, 22 Apr 2002 (AD, CANB, MEL, NE, NSW).

NOTES: Similar to, and sometimes treated as a variety of, the related *Cotoneaster microphyllus* Wall. ex Lindl., which is also naturalised in the Blue Mountains (e.g. *J.R. Hosking 1844* & *M.J. Williams* (AD, CANB, MEL, NE, NSW)). *Cotoneaster microphyllus* is an erect shrub to 5 m high with dull red mature fruit whereas *Cotoneaster horizontalis* is prostrate and has scarlet mature fruit. The taxonomic status of *Cotoneaster* spp. in Australia is presently under study by D.E. Symon at the State Herbarium of South Australia (AD). Therefore the name of this taxon is not certain. *Cotoneaster horizontalis* is widely planted in cool climate areas of Australia and was recorded as a garden escape from Mt Buffalo, Victoria but has now been eradicated from this area (Groves et al. 1997).

OLEACEAE

Jasminum polyanthum Franch.

Jasmine

DESCRIPTION: Layering, climbing shrub. See Sykes in Webb et al. (1988).

REGION OF ORIGIN: Native to China (Guizho, Sichuan, Yunnan).

NSW DISTRIBUTION / HABITATS: Central Tablelands. Often growing with other vines into the tree canopy. Notes on specimens suggest that it forms a groundcover as well as penetrating the edge of rainforests and into disturbed open forest to tall open forest. Grows in coastal areas and at altitudes to over 1000 m at Mt Wilson.

FIRST RECORD: Mungo Brush, *A.N. Rodd 3723*, 10 Sep 1981 (NSW).

ADDITIONAL RECORD: Near intersection of Purchase Road and New Line Road, Cherrybrook, *P. Kodela 74* & *R. Rowe*, 11 Dec 1990 (NSW).

NOTES: Early specimen at NSW herbarium overlooked and Kodela & Rowe specimen was housed at the University of New South Wales herbarium prior to transfer to NSW. This species may be locally dominant and is listed as a problem weed in the Blue Mountains area (Harley 2000). According to Harley (2000) seeds are rarely produced and plants spread mainly vegetatively by layering and suckering from the roots. The specimen from Mungo Brush also notes that this plant was ‘spreading by underground runners’. *Jasminum polyanthum* is also present in secondary forest margins, scrub, waste ground and abandoned gardens in New Zealand (Sykes in Webb et al. 1988).

ONAGRACEAE

Oenothera biennis L.

Evening Primrose

DESCRIPTION: Erect herb to 1.5 m high. See Sykes in Webb et al. (1988), Dietrich et al. (1997) and Spencer (2002).

REGION OF ORIGIN: Native to eastern USA and eastern Canada.

NSW DISTRIBUTION / HABITATS: Central Tablelands. Road verge near *Eucalyptus* woodland.

FIRST RECORD: Alongside Bells Line of Road, Mt Tomah, *J.R. Hosking 2035*, 10 Apr 2001 (CANB, MEL, NE, NSW, US).

NOTES: Not recorded as naturalised in Australia prior to 2000. As for most *Oenothera* species, *Oenothera biennis* is common on roadsides and in other disturbed areas. The species is naturalised in many other countries and occurrences in western North America west of the plains region may represent naturalised populations (Dietrich et al. 1997).

SAPINDACEAE

Koelreuteria formosana Hayata

Chinese Rain Tree

DESCRIPTION: Tree to 5 m high. See Meyer (1976).

REGION OF ORIGIN: Native to Taiwan.

NSW DISTRIBUTION / HABITATS: North Coast, recorded from woodland with many naturalised exotic species and likely to naturalise in northern coastal areas of NSW.

FIRST RECORD: Undeveloped land alongside City View Drive, East Lismore, J.R. Hosking 2019, 13 Mar 2001 (CANB, MEL, NE, NSW).

NOTES: *Koelreuteria formosana* is an ornamental that appears to have become popular in recent years. This species is often known as *Koelreuteria elegans* (Seem) A.C. Sm. subsp. *formosana* (Hayata) F.G. Mey. However, Smith (1985) and D.J. Crayn (pers. comm. Aug 2002) suggest that *Koelreuteria elegans* subsp. *formosana* should be a separate species and referred to as *Koelreuteria formosana*. There are many hundreds of naturalised plants in the area where Hosking 2019 was collected, and this tree is likely to be naturalised in other areas on the north coast of NSW. *Koelreuteria formosana* is also naturalised in south-east Queensland with the first naturalised specimen collected by J. Wright at Brisbane Forest Park (Brisbane) in March 2001 (G. Batianoff pers. comm. Dec 2002). *Koelreuteria formosana* has been recorded as a cultivation escape in Florida (Meyer 1976) and is listed (under *Koelreuteria elegans*) as an invasive environmental weed by Batianoff & Butler (2002).



Fig. 4. *Celtis sinensis* is spreading in coastal areas of north-eastern New South Wales via bird- and bat-dispersed seed.

ULMACEAE

Celtis sinensis Pers.

Chinese Celtis

DESCRIPTION: Tree to 15 m high. See Harden & Murray (2000).

REGION OF ORIGIN: Native to China, Korea and Japan.

NSW DISTRIBUTION / HABITATS: North Coast. Grows on many substrates in woodland, open forest, pasture and disturbed areas. Likely to naturalise in high rainfall areas of northern NSW.

FIRST RECORD: Evans Head, J. Buchanan s.n., 10 Mar 1986 (NSW).

ADDITIONAL RECORDS: Coffs Harbour, A.G. Floyd s.n., 30 Nov 1998 (NSW); farm of J. & J. Dibley, Chauvel Street, Kyogle, J.R. Hosking 1962 & B.A. Scott, 21 Nov 2000 (CANB, MEL, NE, NSW).

NOTES: Label data on Buchanan s.n. is ambiguous as to whether or not the specimen is from a naturalised plant, but recent observations and

collections suggest that it is likely to have been naturalised in the area since at least 1986. *Celtis sinensis* is known to be naturalised near Kyogle, Lynchs Creek, The Risk and Coffs Harbour and is also likely to be naturalised in many other areas in north-eastern New South Wales. Seeds of *Celtis sinensis* are spread by birds and fruit bats (Fig. 4), but seeds rarely survive for more than two years (Panetta 2001). The species is naturalised in damp areas, particularly along banks of waterways, in south-eastern Queensland. The first naturalised specimen was collected by C.T. White at Warwick in July 1926 (although there is an earlier sterile specimen, presumed to be naturalised, collected by T.L. Bancroft at Eidsvold in 1912) (G. Batianoff pers. comm. Dec 2002). In south-eastern Queensland it is considered to be one of the most invasive naturalised plants (Batianoff & Butler 2002).

VIOLACEAE

Viola riviniana Rchb.

Common Dog Violet

DESCRIPTION: Perennial herb to 20 cm high. See Entwisle in Walsh & Entwisle (1996) and Garnock-Jones in Webb et al. (1988).

REGION OF ORIGIN: Native to Europe and Morocco.

NSW DISTRIBUTION / HABITATS: Southern Tablelands and Central Tablelands in woodlands to shrublands close to where it has been planted. Likely to naturalise in cooler tableland areas in NSW.

FIRST RECORD: Australian Capital Territory, [Australian] National Botanic Gardens, car park, M.D. Crisp 7199, 21 Dec 1983 (CANB).

ADDITIONAL RECORDS: Australian Capital Territory, Australian National Botanic Gardens, Canberra, I.R. Telford 11768, 29 Oct 1992 (CANB); under power lines, above Govett Street, Katoomba, J.R. Hosking 1915, 4 Oct 2000 (CANB, MEL, NE, NSW); alongside Jefferson Bridge, Waterfall Creek, Gregson Park (between Queens Avenue and Waterfall Road), Mt Wilson, J.R. Hosking 2276 & C.H. Barker, 24 Mar 2003 (CANB, MEL, NE, NSW).

NOTES: This violet is widely grown as an ornamental herb. Known to be naturalised in the Australian Capital Territory where it is recorded as naturalised in the Australian National Botanic Gardens. Apart from being recorded as adventive in the car park by M.D. Crisp, notes supplied by I.R.H. Telford record that his collection was from disturbed open forest in the Gardens. *Viola riviniana* is also naturalised at Katoomba in the Blue Mountains and at Mt Wilson. Label data for Hosking 1915 record that the species is locally frequent (>30 clumps of plants where collected) and that the species is widely naturalised in disturbed bush in and around Katoomba and other urban areas within the Blue Mountains. Label data for Hosking 2276 & Barker indicate that there were many 1000s of naturalised plants in the collection area. Spread appears to be by seed from cultivated plants or via discarded garden waste. The species is also recorded as naturalised in Victoria (Entwisle in Walsh & Entwisle 1996).

VITACEAE

Vitis vinifera L. s. lat.

Grape

DESCRIPTION: Climber to 8 m high on supporting vegetation. See Sykes in Webb et al. (1988).

REGION OF ORIGIN: Native to Europe, western Asia, Asia Minor and North Africa.

NSW DISTRIBUTION / HABITATS: North Coast and Central Tablelands. Scattered on a number of substrates. At the site below South Lawson tip it is part of a weed plume, mostly a closed forest of *Salix cinerea* L., spreading down a watercourse from the tip site. This plume is surrounded by native Sydney sandstone flora.

FIRST RECORD: 'Weetaliba', Weetaliba, J. Raybone s.n., 10 Feb 1971 (NSW).

ADDITIONAL RECORDS: Upper Bunya, on upper Wang Wank River in Wallis Lakes catchment, *L. Hill s.n.*, 15 Jan 2001 (NSW); about 100 m below South Lawson tip site at end of Ridge Street, South Lawson, *C.H. Barker 6 & J.R. Hosking*, 27 Nov 2002 (CANB, MEL, NE, NSW).

NOTES: The taxon found at Upper Bunya and South Lawson has cobwebby hairs on the lower surface, while the one recorded from near Weetaliba is likely to be a muscatel grape and has dissected leaves and is hairless. *Vitis vinifera* was not considered to be naturalised at the time that Harden (1992) was published but recent records suggest that it has naturalised although only weakly so at present. To date only known from single plants at each location but likely to be scattered elsewhere. Spread by bird-dispersed seed. *Vitis vinifera* has naturalised in Western Australia (PERTH specimen) and Victoria (MEL specimen). *Vitis vinifera s. lat.* is also naturalised in New Zealand and naturalised taxa under this name also vary in a number of characters (Sykes in Webb et al. 1988). In New Zealand the variation in characters is ascribed to variation in grape cultivars and hybrids introduced to that country, some of these involve crosses with North American *Vitis* species. This is also likely to be the explanation for variation occurring in Australia.

Acknowledgements

Many people assisted with collections of new records for NSW, particularly Bruce Scott and Mark Williams. Those responsible for the development and maintenance of the PlantNET database are also thanked for providing a number of records, particularly Peter Hind and Gary Chapple. Many people also freely provided identifications and other information: Robyn Barker (*Justicia*), Darren Crayn (*Koelreuteria*), Wayne Harris (*Chamaesyce*), Peter Heenan (*Hieracium*), Peter Hind (*Callisia*, *Hippeastrum*), Rosemary Joseph (*Tillandsia*), David McCosh (*Hieracium*), Norman Robson (*Hypericum*), Bruce Scott (*Triadica*), David Symon (*Cotoneaster*), Warren Wagner (*Oenothera*), R. Watson (*Abrus*), Mark Williams (*Berberis*, *Erica arborea*, *Acacia*) and Karen Wilson (*Cyperus*). All species identifications were checked against specimens held at NSW and also using literature held at the National Herbarium of NSW library. Library and herbarium staff at NSW herbarium are thanked for locating references and providing information that enabled identification of species listed here. We would also like to thank George Batianoff, Richard Groves, Peter Heenan, Barbara Waterhouse, Royce Holtkamp and Dane Panetta for reading drafts of this paper.

References

Aedo, C. (2000) The genus *Geranium* L. (Geraniaceae) in North America. 1. Annual species. *Anales Jardín Botánico de Madrid* 58: 39–82.

Batianoff, G.N. & Butler, D.W. (2002) Assessment of invasive naturalised plants in south-east Queensland. *Plant Protection Quarterly* 17: 27–34.

Benson, L. (1982) *The cacti of the United States and Canada* (Stanford University Press: Stanford, USA).

Bruce, K.A., Cameron, G.N., Harcombe, P.A. & Jubinsky, G. (1997) Introduction, impact on native habitats, and management of a woody invader, the Chinese tallow tree, *Sapium sebiferum* (L.) Roxb. *Natural Areas Journal* 17: 255–260.

Conway, W.C., Smith, L.M. & Bergman, J.F. (2002) Potential allelopathic interference by the exotic Chinese tallow tree (*Sapium sebiferum*). *The American Midland Naturalist* 148: 43–53.

Cullen, J., Alexander, J.C.M., Brady, A., Brickell, C.D., Green, P.S., Heywood, V.H., Jörgensen, P.-M., Jury, S.L., Knees, S.G., Leslie, A.C., Matthews, V.A., Robson, N.K.B., Walters, S.M., Wijnands, D.O. & Yeo, P.F. (1995) *The European garden flora. Dicotyledons (Part II)*. Volume 2 (Cambridge University Press: Cambridge).

Dietrich, W., Wagner W.L. & Raven P.H. (1997) Systematics of *Oenothera* section *Oenothera* subsection *Oenothera* (Onagraceae). *Systematics Botany Monographs* 50: 1–234.

Eggl, U. & Leuenberger, B.E. (1996) A quick and easy method of drying plant specimens, including succulents, for the herbarium. *Taxon* 45: 259–261.

Espie, P. (2001) *Hieracium in New Zealand: ecology and management* (AgResearch Ltd.: Mosgiel).

Everist, S.L. (1981) *Poisonous plants of Australia*. 2nd Edition (Angus and Robertson: Sydney).

Fairhurst, A. & Soothill, E. (1989) *Trees of the countryside* (Blandford Press: London).

Farjon, A., Perez de la Rosa, J.A. & Styles, B.T. (1997) *A field guide to the pines of Mexico and Central America* (The Royal Botanic Gardens: Kew).

Ferriter, A. (Ed.) (1997) Brazilian pepper management plan for Florida. A report from The Exotic Pest Plant Council's Brazilian Pepper Task Force. <http://www.near.org/pier>

George, A.S. (Ed.) (1984) *Flora of Australia*. Volume 4, Phytolaccaceae to Chenopodiaceae (AGPS: Canberra).

George, A.S. (Ed.) (1986) *Flora of Australia*. Volume 46, Iridaceae to Dioscoreaceae (AGPS: Canberra).

George, A.S. (Ed.) (1987) *Flora of Australia*. Volume 45, Hydatellaceae to Liliaceae (AGPS: Canberra).

Gordon-Gray, K.D. (1995) Cyperaceae in Natal. *Strelitzia* 2: 1–218.

GRIN (21 June 2002) Germplasm Resources Information Network database of the USDA. URL <http://www.ars-grin.gov/npgs/tax/taxgenform.html>

Groves, R.H., Bishop, A., Carr G.W., Carter, R.J., Corey, S.A., Csurhes, S.M., Hosking, J.R., Keighery, G.J., Cowie, I., Stajsic, V. & Waterhouse, B. (1997) Recent incursions of weeds to Australia 1971–1995. CRC for Weed Management Systems Technical Series No. 3.

Haines, R.W. & Lye, K.A. (1983) *The sedges and rushes of East Africa* (East African Natural History Society: Nairobi).

Hannan-Jones, M.A. & Playford, J. (2002) The biology of Australian weeds 40. *Bryophyllum* Salisb. species. *Plant Protection Quarterly* 17: 42–57.

Harden, G. J. (Ed.) (1990, 1992) *Flora of New South Wales*. Vols 1, 3 (UNSW Press: Sydney).

Harden, G. J. (Ed.) (2002) *Flora of New South Wales*. Vol. 2, Revised Edition (UNSW Press: Sydney).

Harden, G.J. & Murray, L.J. (Eds) (2000) *Supplement to Flora of New South Wales* Volume 1 (UNSW Press: Sydney).

Harley, B. (2000) *Weeds of Blue Mountains bushland* (BJ Productions: Sydney).

Harris, W.K. (2001) *Chamaesyce ophthalmica* (Pers.) Burch (Euphorbiaceae): a weed species newly recorded from Australia. *Plant Protection Quarterly* 16: 31–32.

Healy, A.J. & Edgar, E. (1980) *Flora of New Zealand*. Vol. 3 (Government Printer: Wellington).

Heenan, P.B., Breitwieser, I., Glenny, D.S., de Lange, P.J. & Brownsey, P.J. (1998) Checklist of dicotyledons and pteridophytes naturalised or casual in New Zealand: additional records 1994–1996. *New Zealand Journal of Botany* 36: 155–162.

Heenan, P.B., de Lange, P.J., Glenny, D.S., Breitwieser, I., Brownsey, P.J. & Ogle, C.C. (1999) Checklist of dicotyledons, gymnosperms and pteridophytes naturalised or casual in New Zealand: additional records 1997–1998. *New Zealand Journal of Botany* 37: 629–642.

- Heenan, P.B., de Lange, P.J., Cameron, E.K. & Champion, P.D. (2002) Checklist of dicotyledons, gymnosperms and pteridophytes naturalised or casual in New Zealand: additional records 1999–2000. *New Zealand Journal of Botany* 40: 155–174.
- Henderson, L. (2001) *Alien weeds and invasive plants*. Plant Protection Research Institute Handbook No. 12 (Agricultural Research Council: Cape Town).
- Henderson, R.J.F. (Ed.) (2002) *Names and distribution of Queensland plants, algae and lichens* (Queensland Herbarium: Environment Protection Agency, Brisbane).
- Holmgren, P.K., Holmgren, N.H. & Barnett, L.C. (1990) *Index herbariorum Part 1: the herbaria of the world*. 8th Edition (New York Botanical Gardens: Bronx, New York).
- Hosking, J.R., Conn, B.J. & Lepschi, B.J. (2001) Detection of recent plant naturalisations in New South Wales. 11th Biennial Noxious Weeds Conference, 4–6 September 2001, Moama. pp. 136–139 (NSW Agriculture: Orange).
- Hussey, B.M.J., Keighery, G.J., Cousens, R.D., Dodd, J & Lloyd, S.G. (1997) *Western weeds: a guide to the weeds of Western Australia* (The Plant Protection Society of Western Australia (Inc.): Perth).
- Immelman, K.L. (1995) *Justicia*. *Flora of Southern Africa* 30: 18–46.
- Iwatsuki K., Boufford D.E. & Ohba H. (Eds) (1999) *Flora of Japan* 2c: 17 (Kodansha: Tokyo).
- Jessop, J.P. (Ed.) (1993) *A list of the vascular plants of South Australia*. 4th Edition (The Botanic Gardens of Adelaide and State Herbarium).
- Jessop, J.P. & Toelken, H.R. (Eds) (1986) *Flora of South Australia* Parts I–IV. 4th Edition (South Australian Government Printing Division: Adelaide).
- Li, S. (Ed.) (1996) *Wild flowers of China* (Tianjin Education Press: Tianjin).
- Long, R.W. & Lakela, O. (1971) *A flora of tropical Florida* (University of Miami Press: Florida).
- Lu Amin, Stone, D.E. & Grauke, L.J. (1999) Juglandaceae. *Flora of China* 4: 277–285.
- Lu Amin, Stone, D.E. & Grauke, L.J. (2001) Juglandaceae. *Flora of China Illustrations* 4: 263–273.
- Makino, T. (1964) *Makino's new illustrated flora of Japan* (The Hokuryukan Co. Ltd.: Tokyo).
- Meyer, F.G. (1976) A revision of the genus *Koelreuteria* (Sapindaceae). *Journal of the Arnold Arboretum* 57: 129–166.
- Morin, N.R. (convening Ed.) (1993) *Flora of North America north of Mexico* (Oxford University Press: New York).
- Ohwi, J. (1965) *Flora of Japan*. English Edition (Smithsonian Institution: Washington, D.C.).
- Orchard, A.E. (Ed.) (1998) *Flora of Australia*. Volume 48, Ferns, Gymnosperms and Allied Groups (ABRS/CSIRO Publishing: Melbourne).
- Orchard, A.E. & Wilson, A.J.G. (Eds) (1994) *Flora of Australia*. Vol. 49, Oceanic Islands 1 (Australian Government Publishing Service: Canberra).
- Orchard, A.E. & Wilson, A.J.G. (Eds) (2001) *Flora of Australia*, Vol. 11B, Mimosaceae, Acacia part 2 (ABRS/CSIRO Publishing: Melbourne).
- Panetta, F.D. (2001) Seedling emergence and seed longevity of the tree weeds *Celtis sinensis* and *Cinnamomum camphora*. *Weed Research* 41: 83–95.
- Parsons, W.T. & Cuthbertson, E.G. (1992) *Noxious weeds of Australia* (Inkata Press: Melbourne).
- Randall, J.M. & Marinelli, J. (Eds) (1996) *Invasive plants: weeds of the global garden* (Brooklyn Botanic Gardens: Brooklyn).
- Richardson, D.M., Pysek, P., Rejmánek, M., Barbour, M.G., Panetta, F.D. & West, C.J. (2000) Naturalization and invasion of alien plants: concepts and definitions. *Diversity and Distributions* 6: 93–107.
- Robson, N.K.B. (1985) Studies in the genus *Hypericum* L. (Guttiferae) 3. Sections 1. *Campyloporus* to 6a. *Umbraculoides*. *Bulletin of the British Museum (Natural History)* 12: 163–325.
- Royal Botanic Gardens Sydney (18 March 2003) The Plant Information Network System of Royal Botanic Gardens, Sydney (version 1.4). <http://plantnet.rbgsyd.nsw.gov.au>
- Sainty, G., Hosking, J. & Jacobs, S. (Eds) (1998) *Alps invaders — weeds of the Australian high country* (Sainty and Associates: Sydney).
- Schumann, D. & Kirsten, G. (1992) *Ericas of South Africa* (Fernwood Press: Vlaeberg).
- Siemann, E. & Rogers, W.E. (2001) Genetic differences in growth of an invasive tree species. *Ecology Letters* 4: 514–518.
- Smith, A.C. (1985) *Flora vitiensis nova a new flora of Fiji (spermatophytes only)* 3, 612–613 (Pacific Tropical Botanic Garden: Lawai, Kauai, Hawaii).
- Spencer, R. (1995) *Horticultural flora of south-eastern Australia*. Vol. 1. *Ferns, Conifers and Their Allies* (UNSW Press: Sydney).
- Spencer, R. (Ed.) (1997) *Horticultural flora of south-eastern Australia*. Volume 2. *Flowering Plants. Dicotyledons. Part 1* (UNSW Press: Sydney).
- Spencer, R. (Ed.) (2002) *Horticultural flora of south-eastern Australia*. Volume 3. *Flowering Plants. Dicotyledons. Part 2* (UNSW Press: Sydney).
- Stace, C.A. (1991) *New flora of the British Isles* (Cambridge University Press: Cambridge).
- Stanley, T.D. & Ross, E.M. (1983) *Flora of south-eastern Queensland*. Volume 1 (Queensland Department of Primary Industries: Brisbane).
- Terry, P.J. & Michieka, R.W. (1987) *Common weeds of East Africa / Magugu ya Afrika Mashariki* (Food and Agriculture Organization of the United Nations: Rome).
- Thiselton-Dyer, W.T. (Ed.) (1909) *Flora Capensis*. Vol. 4. Section 1 (Lovell Reeve & Co. Ltd.: London).
- Walters, S.M., Brady, A., Brickell, C.D., Cullen, J., Green, P.S., Lewis, J., Matthews, V.A., Webb, D.A., Yeo, P.F. & Alexander, J.C.M. (Eds) (1984) *The European garden flora. Monocotyledons (Part II)*. Vol. 2 (Cambridge University Press: Cambridge).
- Walsh, N.G. & Entwisle, T.J. (Eds) (1994, 1996, 1999) *Flora of Victoria*. Vols 2, 3, 4 (Inkata Press: Melbourne).
- Webb, C.J., Sykes, W.R. & Garnock-Jones, P.J. (1988) *Flora of New Zealand*. Volume 4 (Botany Division DSIR: Christchurch).