

Recent Incursions of Weeds to Australia 1971 - 1995

Convened by R.H. Groves
Appendix compiled by J.R. Hosking





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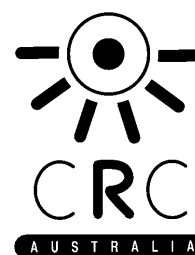
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Cooperative Research Centre for Weed Management Systems

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Front Cover: left *Coleonema pulchrum* - Eumeralla Scout Camp near Anglesea, Victoria (JR Hosking)
t. right *Cotoneaster pannosus* - Oxley Park, Tamworth, NSW (JR Hosking)
b. right *Pelargonium quercifolium* - sand dunes of Eastern Beach, Victoria (JR Hosking)

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1. Introduction

Weeds form a special group of plants which interfere with human activities in some way. Traditionally weeds have decreased production and hence economic returns from crops and/or grazing animals. Certain weeds may deleteriously affect human health. Some plants have attracted attention recently because they reduce environmental values in some way; they are so-called 'environmental' weeds. Whilst most crop and pasture weeds and some environmental weeds have been introduced, either accidentally or deliberately, to Australia from elsewhere, a sub-category of environmental weeds is assuming greater importance — namely certain plants indigenous to one region of Australia but now weedy in another region (see Carr 1993 for Victorian examples). One of the best known examples is Cootamundra wattle (*Acacia baileyana*) but there is an increasing number of others. The latter sub-category will not be considered further as they are not incursions to Australia. Only introduced weeds will be the subject of this report.

1.1 Definition of some terms

For the purposes of this report, the following definitions will be used.

Weed: A plant that is in some way deleterious to human activities.

Naturalised plant: An invasive species that has become established and has reproduced in the wild.

Introduced plant: A plant known to be native to a region outside Australia and not native to Australia.

Environmental weed: A weed that is in some way deleterious to the environment.

Pest plant: see 'Weed'

Invasive species: A species that colonises and persists in an ecosystem in which it did not occur previously.

Exotic plant: see 'Introduced plant'

Alien plant: see 'Introduced plant'

Taxon/Taxa: Term used to describe any taxonomic category e.g. species, variety or subspecies.

An important function of quarantine services is to keep pests out of a region. Pests such as insects and pathogens have entered Australia and in some cases, have reproduced quickly, been detected and recorded as 'introduced' within one to five years of their first appearance. The period between actual introduction and the record of their occurrence is in many cases short. Sometimes the same short period between introduction and a record of an incursion also applies to weeds. More usually, however, the period between the introduction of such plants and recognition of their weedy status is longer than five years and may even exceed twenty-five (the period of this report). This period is sometimes called the 'lag' phase of a plant invasion. For instance, many introduced plants remain in people's gardens for years until some change occurs that allows for their spread and reproduction in the wild. Such a variable delay period between introduction and naturalisation means that there may be greater confusion in the dates for weed incursions than those for other pests.

The report that follows assigns dates to weed incursions and naturalisations wherever known. Sometimes the record will be to the actual date of introduction, but in other cases it may be to the date that the 'new' plant was collected and a specimen deposited in an herbarium. Traditionally weeds have not interested plant collectors and they are usually poorly represented in herbaria. Australia is no exception in this regard. Further, there may be problems in naming weeds accurately (Hosking *et al.* 1996). In yet other cases a date will refer to a plant's date of naturalisation. A further complication in an analysis of plant records such as is to be presented here is that weeds are likely to have had multiple introductions, especially those introduced for their horticultural or pastoral value. Wherever possible, the information that follows refers to the date of the first record, but in cases where a plant genotype is variable (and weeds often are!) the first record may not necessarily refer to the weedy genotype that subsequently spreads. This report generally will ignore this further complication.

1.2 Incursions prior to 1971

About 15% of the total Australian vascular flora has been introduced from elsewhere, with the percentage of the introduced component of that flora varying regionally from as low as 5% in the Northern Territory to as high as 60% on Norfolk Island (Table 2.1 of Humphries *et al.* 1991). Of this total of 2000 or so introduced plants, none is known to have been introduced by the Aborigines. The first plant considered to have been introduced to Australia is the tamarind (*Tamarindus indica*), which was brought by the Macassans to the shores of northern Australia prior to Flinders' visit in 1802 (Macknight 1976). Since 1788, many plants have been introduced — sometimes accidentally, sometimes deliberately (see Groves 1986a for further discussion).

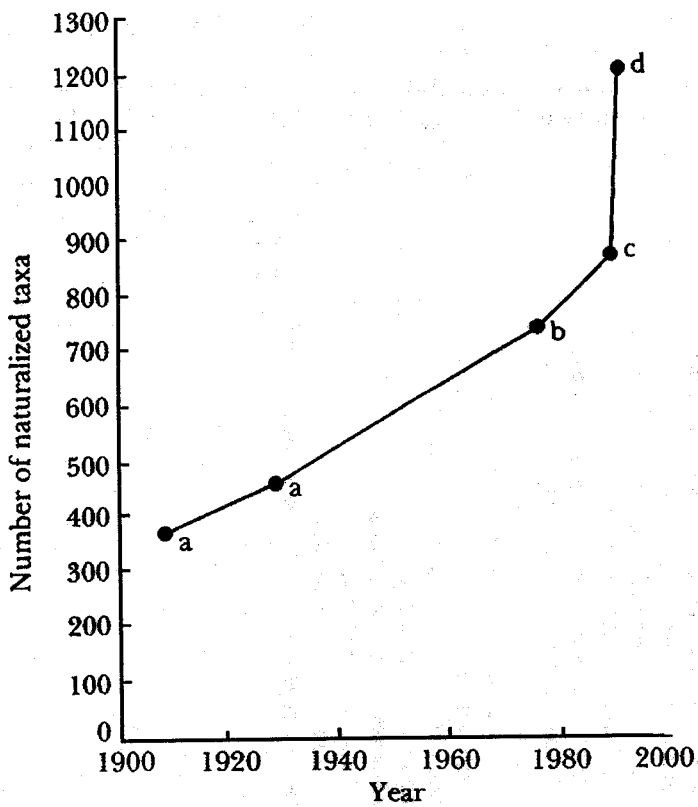
Specht (1981) showed for four Australian States (Queensland, New South Wales, Victoria and South Australia) that the rate of increase in the number of naturalised species was linear with time (see Figure 1), a relationship which is also true for Western Australia (Gill 1986). Between four and six new additions to the flora of each State per year have occurred for about the last 100 years, which is a rate of increase similar to that found for California (Frenkel 1970) and for the environs of Auckland (Esler and Astridge 1987). Such a rate of increase seems to be general. For Australia, the rate has not changed with the passing of *The Quarantine Act 1908*, partly because it does not necessarily refer to the number of introduced plant species but rather to the number of naturalised species, many of which entered Australia prior to 1908. Whilst the rate of increase in the number of naturalised species is linear for the period 1870–1980, a steeply curvilinear increase has been recorded for Victoria in the number

of naturalised taxa (cf. species) for the recent period between 1988 and 1993 (see Figure 2 – Figure 11.2 of Carr 1993) — only time and the accumulation of further data, such as is contained in this report, will reveal the significance of this apparent change. One reason for the recent increase in naturalised species in Victoria is undoubtedly an increased collection effort.

If the data presented as Figures 1 and 2 are extrapolated to include Western Australia, Tasmania and the Northern Territory, it could be claimed that, for the Australian continent as a whole, about 30 plant species have become naturalised each year over the 100-year period from the 1870s. Such an increase assumes that a plant species naturalised in one Australian State has not become naturalised in another State; otherwise it would be counted twice (or even more than twice, depending on its distribution) in extrapolating Specht's data presented in Figure 1. On this reasoning, the estimate of 30 species being added per year over the last 100 years to the naturalised flora is almost certainly an overestimate. For instance, a number of naturalised species occur in more than one State.

There is another way of approaching the same question. If there are at present about 2000 plant species naturalised in Australia (Humphries *et al.* 1991) and, with the exception of tamarind (see earlier), they all are known to have entered Australia in the last 200 years, the rate of addition to the naturalised flora comes to about 10 plant species per year. The next chapter assembles the evidence available to estimate whether the rate of naturalisation over the recent 25-year period subsequent to 1971 lies within this broad range of between 10 and 30 species per year for the Australian continent.

Figure 1. Number of naturalised plant species in the four Australian States of Queensland, Victoria, New South Wales and South Australia 1870–1980 (Figure 14 of Specht 1981).



(Figure 11.2 of Carr 1993). Points 'c' and 'd' represent data subsequent to those of Specht (1981) — see Figure 1 above.

2. Introduction and establishment of weeds 1971–1995

2.1 Methods

In this chapter we present for the first time a national synthesis of recent incursions of weeds for the period 1971–1995. In doing so, we have used whatever information was available to us in the relatively short time (8 weeks or so). These sources of information range from published records to personal communications. Far more information was available on the date a species was recorded as naturalised (see Table 1). This more complete set of information matches the data presented in Figure 1 for the period prior to 1971, from which any change in the rate of naturalisation can be calculated. For each 'new' taxon we have assigned a country or region of origin and have estimated the extent of its spread subsequent to naturalisation.

2.2 Results

At least 290 taxa were recorded as becoming naturalised in Australia over the last 25 years (see Table 1). There is a trend for an increasing number of naturalisations over the last 25 years when considered yearly (Figure 3) or as five-yearly periods (Figure 4).

The taxa which have become naturalised represent a wide range of plant families, with the Asteraceae, Fabaceae, Iridaceae, Poaceae, Cyperaceae and Salicaceae being the major families represented (Figure 5). Whilst Asteraceae, Fabaceae and Poaceae are among the most commonly represented families in the weed flora of most regions, the Iridaceae and the Salicaceae (the willows) are significant additions.

Species belonging to the family Iridaceae are widely represented in the horticultural flora. The family is mainly of southern African origin. Iridaceous species are typically the showy bulbs commonly grown in people's gardens for many years. More and more of them are 'escaping' such situations to become common components of the ground flora of southern Australian vegetation. The willows are a different case. Willows are 'dioecious' in that male and female organs are borne on different plants. Until relatively recently, the range of material widely used in Australia was vegetatively propagated and was restricted to plants of the one sex. More recently (but probably before 1971) new material has been introduced and where this new material is of a different sex, hybridisation may occur and seedling willows may become weeds. Recent incursions in the Salicaceae represent not only entry of new taxa but also material of a different sex and thus the

Year

Figure 3. Number of plant taxa naturalising in Australia per year between 1971 and 1995.

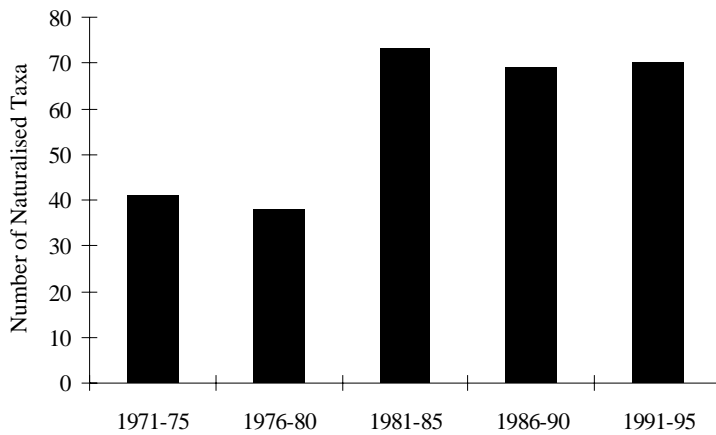


Figure 4. Number of plant taxa naturalising in Australia for each five-yearly period between 1971 and 1995.

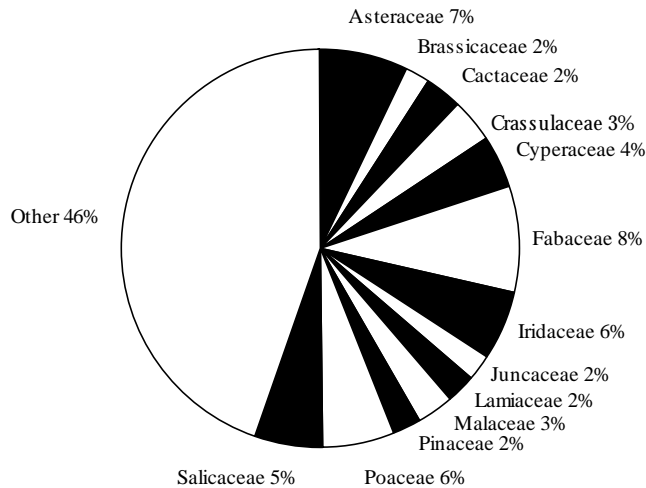


Figure 5. Major plant families represented in the flora naturalising in Australia for the period between 1971 and 1995.

naturalisation and spread of new hybrids (see Table 1). It also represents an increase in Australian knowledge of this group of plants (Carr 1996).

Whereas most early weeds in Australia came mainly from Europe, and often northern Europe (for that is where the first white settlers came from), there has been a gradual shift over time in the countries of origin of Australian weeds. This change is most clearly reflected in the weed flora of two Australian States: that of Queensland in which weeds of American origin have become proportionally more significant recently (Everist 1960); and that of South Australia where plants originating in the Mediterranean region have become the major group

of weeds in that region of predominantly mediterranean-type climate (Kloot 1987). Such shifts in the region of origin of Australia's weeds were known previously. For the 99% of cases where the country of origin is known, our results show that for Australia as a whole, the African continent and the Americas are each equally important as a source of plants naturalised since 1971 as is Europe (Figure 6).

Most of the taxa naturalised in the last 25 years are still localised in their distribution (Table 1). On the evidence available to us, some have been destroyed, though these will presumably need regular monitoring in the field for some time to come.

Table 1: Earliest Record of Naturalisation in Australia

Genus	Species	ssp or var	Family	Year	Region of Origin	Extent of Spread	Reference
<i>Abies</i>	<i>sp.</i>		Pinaceae	1995?		Localised	G. Carr p
<i>Acacia</i>	<i>catechu</i>		Fabaceae	1978	India	Localised	DNA spe
<i>Acacia</i>	<i>karoo</i>		Fabaceae	1988	Afr	Localised	Labelled
<i>Acer</i>	<i>negundo</i>		Aceraceae	1987	N Amer	Localised	NSW spe
<i>Acer</i>	<i>palmatum</i>		Aceraceae	1985	Japan, Korea	Localised	G. Carr p
<i>Aeonium</i>	<i>arboresum</i>		Crassulaceae	1974	Canary Islands	Localised	Kloot 198
<i>Aeonium</i>	<i>haworthii</i>		Crassulaceae	1988	Teneriffe	Localised	G. Carr p
<i>Agapanthus</i>	<i>praecox</i>	<i>ssp. orientalis</i>	Liliaceae	1972	S Afr	Localised	G. Carr p
<i>Agapanthus</i>	<i>praecox</i>	<i>ssp. praecox</i>	Liliaceae	1986	S Afr	Localised	PERTH s
<i>Agave</i>	<i>sisalana</i>		Agavaceae	1973	Mexico	Localised	BRI spec
<i>Ajuga</i>	<i>reptans</i>		Lamiaceae	1990	Eur	Localised	HO speci
<i>Alliameda</i>	<i>cathartica</i>		Apocynaceae	1988	trop S Amer	Localised	BRI spec
<i>Alliaria</i>	<i>petiolaris</i>		Brassicaceae	1995	Eur	Localised	G. Carr p
<i>Alnus</i>	<i>glutinosa</i>		Betulaceae	1992	NW Eur to W Asia	Localised	R. Robin:
<i>Aloe</i>	<i>cameronii</i>		Asphodelaceae	1991	Afr	Localised	Forster 1
<i>Aloe</i>	<i>saponaria</i>	<i>var. ficksburgensis</i>	Asphodelaceae	1984	S Afr	Localised	Forster 1
<i>Alternanthera</i>	<i>betzickiana</i>		Amaranthaceae	1981	Brazil	Localised	QRS spe
<i>Amsinckia</i>	<i>menziesii</i>		Boraginaceae	1986	W USA	Localised	Parsons
<i>Anacardium</i>	<i>occidentale</i>		Anacardiaceae	1988	trop Amer	Localised	DNA spe
<i>Anagyris</i>	<i>foetida</i>		Fabaceae	1990	S Eur, Middle East	Localised	Cooke 19
<i>Anthoxanthum</i>	<i>aristatum</i>		Poaceae	1990	S Eur	Localised	MEL spe:
<i>Aquilegia</i>	<i>vulgaris</i>		Ranunculaceae	1988	Eur	Localised	G. Carr p
<i>Aralia</i>	<i>crenata</i>		Myrsinaceae	1994	Japan to N India	Localised - 3 plants	NSW spe
<i>Arisarum</i>	<i>vulgare</i>	<i>ssp. vulgare</i>	Araceae	1982	Medit	Localised	Kloot 198
<i>Aristea</i>	<i>ecklonii</i>		Iridaceae	1988	S and trop @ Afr	Localised	G. Carr p
<i>Artemisia</i>	<i>absinthium</i>		Asteraceae	1974	Eur	Localised	PERTH s
<i>Artemisia</i>	<i>ludoviciana</i>		Asteraceae	1993	W USA, Mexico	Localised	Annual re
<i>Asparagus</i>	<i>africanus</i>		Asparagaceae	1976	S Afr	Localised	BRI spec
<i>Babiana</i>	<i>tubulosa</i>		Iridaceae	1988	S Afr	Localised	PERTH s
<i>Bacopa</i>	<i>caroliniana</i>		Scrophulariaceae	1981	SE USA	Localised	NSW spe
<i>Barleria</i>	<i>prionitis</i>		Acanthaceae	1992	trop. Asia, Afr	Localised	S. Csurh
<i>Basella</i>	<i>alba</i>		Basellaceae	1989	Afr, SE Asia	Localised	NSW spe
<i>Berberis</i>	<i>vulgaris</i>		Berberidaceae	1988	Eur, Asia	Localised	NSW spe
<i>Betula</i>	<i>nigra</i>		Betulaceae	1986	N Amer	Localised	PERTH s
<i>Betula</i>	<i>pubescens</i>		Betulaceae	1981	Eur to Siberia	Localised	G. Carr p
<i>Brachiaria</i>	<i>humidicola</i>		Poaceae	1981	Afr	Localised	BRI spec
<i>Bryophyllum</i>	<i>beauverdi</i>		Crassulaceae	1991	Madagascar	Localised	Forster 1
<i>Bryophyllum</i>	<i>fedtschenkoi</i>		Crassulaceae	1980	Madagascar	Localised	Forster 1
<i>Buddleia</i>	<i>asiatica</i>		Buddleiaceae	1986	E Indies	Localised	R. Robin:
<i>Buddleia</i>	<i>dysophylla</i>		Buddleiaceae	1985	S Afr	Localised	G. Carr p
<i>Bulbostylis</i>	<i>striatella</i>		Cyperaceae	1987	S Afr	Localised - spreading	NSW spe
<i>Cabomba</i>	<i>caroliniana</i>		Cabombaceae	1981	Amer	Widespread in rivers	NSW spe
<i>Calamagrostis</i>	<i>epigejos</i>		Poaceae	1973	Eur, Asia, Afr	Eradicated?	HO speci

<i>Calepina</i>	<i>irregularis</i>		Brassicaceae	1985	Eur	~1500 ha	C
<i>Campsis</i>	<i>radicans</i>		Bignoniaceae	1988	E USA	Localised	P
<i>Carduus</i>	<i>acanthoides</i>		Asteraceae	1979	Eur	Destroyed?	M
<i>Carex</i>	<i>arenaria</i>		Cyperaceae	1984	Eur	Localised	N
<i>Carex</i>	<i>lepidocarpa</i>		Cyperaceae	1971	Eur	Localised	H
<i>Carex</i>	<i>pilulifera</i>		Cyperaceae	1994	Eur	Localised	H
<i>Carex</i>	<i>punctata</i>		Cyperaceae	1982	Eur	Localised	M
<i>Carex</i>	<i>scoparia</i>		Cyperaceae	1984	N Amer	Localised	H
<i>Carex</i>	<i>festacea</i>		Cyperaceae	1983	NZ	Localised	G
<i>Carthamus</i>	<i>leucocaulos</i>		Asteraceae	1975	Medit	Localised	P
<i>Centaurea</i>	<i>eriphora</i>		Asteraceae	1984	Spain, Portugal	Eradicated?	A
<i>Cestrum</i>	<i>Nocturnum</i>		Solanaceae	1974	C Amer	Localised	G
<i>Chasmanthe</i>	<i>bicolor</i>		Iridaceae	1990	S Afr	Localised	G
<i>Cheiranthus</i>	<i>cheiri</i>		Brassicaceae	1974	C & S Eur	Localised	K
<i>Chenopodium</i>	<i>macrospermum</i>		Chenopodiaceae	1978	S Amer	Localised	P
<i>Chromolaena</i>	<i>odorata</i>	(less weedy form)	Asteraceae	1995	southern Brazil	Localised	B
<i>Chromolaena</i>	<i>odorata</i>	(weedy form)	Asteraceae	1994	W Indies, trop S Amer, Mexico	Locally common	B
<i>Cyperaria</i>	<i>lyrata</i>		Asteraceae	1984	S Afr	Localised	N
<i>Clematis</i>	<i>flammula</i>		Ranunculaceae	1987	S Eur, N afr, Syria, Iran, Turkey	Localised	M
<i>Coffea</i>	<i>arabica</i>		Rubiaceae	1973	trop Afr	Localised	B
<i>Coleonema</i>	<i>pulchrum</i>		Rutaceae	1983	S Afr	Localised	G
<i>Commelina</i>	<i>africana</i>		Commelinaceae	1983	S Afr	Localised	N
<i>Cordylone</i>	<i>australis</i>		Agavaceae	1989	New Zealand	Localised	G
<i>Cornus</i>	<i>capitata</i>		Cornaceae	1984	Himalayas	Localised	G
<i>Cortaderia</i>	<i>jubata</i>		Poaceae	1985	S Amer	Localised - spreading	G
<i>Cosmos</i>	<i>capitata</i>		Asteraceae	1987	Amer	Localised	M
<i>Cotoneaster</i>	<i>divaricatus</i>		Malaceae	1986	China	Localised	M
<i>Cotoneaster</i>	<i>franchetii</i>		Malaceae	1984	China	Localised	N
<i>Cotoneaster</i>	<i>horizontalis</i>		Malaceae	1988	China	Localised	G
<i>Cotoneaster</i>	<i>lacteus</i>		Malaceae	1986	China	Localised	N
<i>Cotoneaster</i>	<i>microphyllus</i>		Malaceae	1972	Himalayas	Localised	N
<i>Cotoneaster</i>	<i>parnosus</i>		Malaceae	1973	China	Localised	M
<i>Crassula</i>	<i>ciliata</i>		Crassulaceae	1981	S Afr	Localised	K
<i>Crassula</i>	<i>ericoides</i>		Crassulaceae		S Afr	Localised	M
<i>Crassula</i>	<i>sarmentosa</i>		Crassulaceae	1985	S Afr	Localised	M
<i>Crassula</i>	<i>spathulata</i>		Crassulaceae	1995	S Afr	Localised	M
<i>Cupressus</i>	<i>glabra</i>		Cupressaceae	1987	Arizona	Localised	G
<i>Cupressus</i>	<i>macrocarpa</i>		Cupressaceae	1972	California	Localised	G
<i>Cuscuta</i>	<i>planiflora</i>		Convolvulaceae	1976	Medit	Localised	N
<i>Cynoglossum</i>	<i>creticum</i>		Boraginaceae	1976	S Eur	Localised	N
<i>Cyperus</i>	<i>aromaticus</i>		Cyperaceae	1979	trop Afr	Localised - spreading	N
<i>Cyperus</i>	<i>vorsteri</i>		Cyperaceae	1979	S Afr	Localised	N
<i>Delonix</i>	<i>regia</i>		Fabaceae	1975	Madagascar	Localised	D
<i>Desmodium</i>	<i>intortum</i>		Fabaceae	1971	trop Afr	Localised	B
<i>Dianthus</i>	<i>plumarius</i>	<i>ssp. vulgare</i>	Caryophyllaceae	1991	C Eur	Localised	H
<i>Dietes</i>	<i>robinsoniana</i>		Iridaceae	1994	Lord Howe Is.	Localised	G
<i>Digitaria</i>	<i>ternata</i>		Poaceae	1982	Asia, Afr	Localised	H

<i>Dimorphotheca ecklonis</i>						Asteraceae				1983	S Afr		Localised - spreading
<i>Diplachne univervia</i>						Poaceae				1992	Amer		Localised
<i>Dovyalis caffra</i>						Flacourtiaceae				1982	Afr		Localised
<i>Echinochloa polystachya</i>						Poaceae				1995	trop Amer		Localised
<i>Eleocharis parodii</i>						Cyperaceae				1977	Argentina		Localised
<i>Elephantopus mollis</i>						Asteraceae				1989	trop Amer		Localised
<i>Epilobium hirsutum</i>						Onoagraceae				1990	Eurasia, N Afr		Localised
<i>Epiphyllum phyllanthus</i>						Cactaceae				1985	S Mexico, Guatemala to Panama		Localised
<i>Equisetum arvense</i>						Equisetaceae				1989	Afr, Eur, N Amer		Localised
<i>Equisetum hiemale</i>						Equisetaceae				1995	N Amer		Localised
<i>Erica melanthera</i>						Ericaceae				1985	S Afr		Localised
<i>Erica quadrangularis</i>						Ericaceae				1988	S Afr		Localised
<i>Erica scoparia</i>						Ericaceae				1983	S France		Localised
<i>Erythrina crista-galli</i>						Fabaceae				1991	S Amer		Localised
<i>Eunonymus sp.</i>						Celastraceae				1988	Japan?		Localised
<i>Euphorbia characias</i>						Euphorbiaceae				1991	Eur, Balkans, Turkey		Localised
<i>Euphorbia tirucalli</i>						Euphorbiaceae				1981	Afr		Localised
<i>Fallopia japonica</i>						Polygonaceae				1979	E Asia		Localised
<i>Felicia petiolata</i>						Asteraceae				1973	S Afr		Localised
<i>Ficaria verna</i>						Ranunculaceae				1986	Eur		Localised
<i>Fraxinus ornus</i>						Oleaceae				1992	Medit, S Eur, Turkey		Localised
<i>Froelichia gracilis</i>						Amaranthaceae				1982	Amer		Localised
<i>Galium palustre</i>						Rubiaceae				1990	Eur		Localised
<i>Gamolepis chrysanthemoides</i>						Asteraceae				1991	S Afr		Localised
<i>Gazania linearis</i>						Asteraceae				1973	S Afr		Localised
<i>Genista sp.</i>						Fabaceae				1995	Nursery trade		Localised
<i>Genista tinctoria</i>						Fabaceae				1992	Eur		Localised
<i>Geranium palmatum</i>						Geraniaceae				1979	Madeira		Localised
<i>Geranium rubescens</i>						Geraniaceae				1981	Madeira		Localised
<i>Gladolus cardinalis</i>						Iridaceae				1980	S Afr		Localised
<i>Gladolus natalensis</i>						Iridaceae				1995	S Afr		Localised
<i>Gloriosa superba</i>						Colchicaceae				1972	Afr, Asia		Localised
<i>Glyceria plicata</i>						Poaceae				1977	Eur, W Asia, NW Afr		Localised
<i>Gymnocoronis spilanthoides</i>						Asteraceae				1980	C Amer		Localised
<i>Hellanthus debilis</i>						Asteraceae				1981	S USA		Localised
<i>Hovenia dulcis</i>						Rhamnaceae				1974	China, Korea, Japan		Localised
<i>Hura crepitans</i>						Euphorbiaceae				1988	W Indies, Costa Rica, S Amer		Localised
<i>Hyacinthoides hispanica</i>						Hyacinthaceae				1994	SE Eur, N Afr		Localised
<i>Hyacinthoides non-scripta</i>						Hyacinthaceae				1995	W Eur		Localised
<i>Hydrocotyle nymphoides</i>						Limnocaritaceae				1979	trop Amer		Localised
<i>Hydrocotyle ranunculoides</i>						Apiaceae				1983	Amers, Eur		Localised
<i>Hymenachne amplexicaule</i>						Poaceae				1995	trop Amer		Localised - serious
<i>Hymenocallis caribea</i>						Amaryllidaceae				1978	W Indies		Localised
<i>Hypericum grandifolium</i>						Clusiaceae				1977	Madeira, Canary Is.		Localised
<i>Hypis pectinata</i>						Lamiaceae				1984	trop Amer		Localised - spreading
<i>Indigofera decora</i>						Fabaceae				1978	Japan to C China		Localised

<i>Indigofera</i>	<i>oblongifolia</i>					1992	India	Localised
<i>Ipomoea</i>	<i>alba</i>			Fabaceae	Convolvulaceae	1985	trop Amer	Localised
<i>Iris</i>	<i>orientalis</i>			Iridaceae	Iridaceae	1978	W Turkey, E Aegean Is.	Localised
<i>Iris</i>	<i>pseudacorus</i>			Iridaceae	Iridaceae	1988	E Medit	Localised
<i>Iris</i>	<i>spuria</i>			Iridaceae	Iridaceae	1980	Eur, Asia	Localised
<i>Iris</i>	<i>xiphium</i>			Iridaceae	Iridaceae	1985	SW Eur	Localised
<i>Ixia</i>	<i>longituba</i>			Iridaceae	Iridaceae	1992	S Afr	Localised
<i>Ixia</i>	<i>viridiflora</i>			Iridaceae	Iridaceae	1972	southern Afr	Localised
<i>Juglans</i>	<i>regia</i>			Juglandaceae	Juglandaceae	1993	SE Eur to China	Localised
<i>Juncus</i>	<i>acuminatus</i>			Juncaceae	Juncaceae	1973	N & S Amer	Localised
<i>Juncus</i>	<i>conglomeratus</i>			Juncaceae	Juncaceae	1974	Eur to NE Asia, N Afr	Localised
<i>Juncus</i>	<i>fontanesii</i>			Juncaceae	Juncaceae	1979	S Eur, Turkey, northern Afr	Localised
<i>Juncus</i>	<i>ssp. fontanesii</i>			Juncaceae	Juncaceae	1986	S Afr	Localised
<i>Juncus</i>	<i>indescriptus</i>			Juncaceae	Juncaceae	1985	N Afr, India, Eurasia	Localised
<i>Juncus</i>	<i>inflexus</i>			Juncaceae	Juncaceae	1990	Eur, Asia	Localised
<i>Juncus</i>	<i>nodosus</i>			Juncaceae	Juncaceae	1978	Eur, Iceland, Greenland, Morocco	Locally abundant
<i>Juncus</i>	<i>squarrosus</i>			Juncaceae	Juncaceae	1985	eastern N Eur	Localised
<i>Juniperus</i>	<i>virginiana</i>			Cupressaceae	Cupressaceae	1983	S Afr	Localised
<i>Kniphofia</i>	<i>uvaria</i>			Asphodelaceae	Asphodelaceae	1990	Eurasia	Localised
<i>Kochia</i>	<i>scoparia</i>			Chenopodiaceae	Chenopodiaceae	1979	S Afr	Throughout Perth
<i>Lachenalia</i>	<i>bulbifera</i>			Hyacinthaceae	Hyacinthaceae	1990	S Afr	Localised
<i>Lachenalia</i>	<i>mutabilis</i>			Hyacinthaceae	Hyacinthaceae	1977	southern Afr	Eradicated?
<i>Lagarosiphon</i>	<i>major</i>			Hydrocharitaceae	Hydrocharitaceae	1993	Eur to W Asia	Localised
<i>Lamium</i>	<i>galeobdolon</i>			Lamiaceae	Lamiaceae	1975	Crete, Italy, Sicily	Localised
<i>Lathyrus</i>	<i>odoratus</i>			Fabaceae	Fabaceae	1971	Eur	Died out?
<i>Lathyrus</i>	<i>sativus</i>			Fabaceae	Fabaceae	1985	E China, Japan, Korea	Localised
<i>Lilium</i>	<i>lanceifolium</i>			Liliaceae	Liliaceae	1995	Eur	Localised
<i>Linaria</i>	<i>sp.</i>			Scrophulariaceae	Scrophulariaceae	1990	W Eur, Medit	Localised
<i>Linum</i>	<i>bienne</i>			Linaceae	Linaceae	1986	S Afr	Localised
<i>Lobelia</i>	<i>erinus</i>			Lobeliaceae	Lobeliaceae	1980	Medit, Portugal	Localised
<i>Lotus</i>	<i>creticus</i>			Fabaceae	Fabaceae	1991	S Amer	Localised
<i>Ludwigia</i>	<i>longifolia</i>			Onagraceae	Onagraceae	1971	N & S Amer	Localised
<i>Ludwigia</i>	<i>peruviana</i>			Onagraceae	Onagraceae	1983	E USA and E Canada	Localised
<i>Lupinus</i>	<i>polyphyllus</i>			Fabaceae	Fabaceae	1987	India, E Asia	Localised
<i>Mahonia</i>	<i>leschenaultii</i>			Berberidaceae	Berberidaceae	1988	S Eur	1 ha
<i>Malcolmia</i>	<i>africana</i>			Brassicaceae	Brassicaceae	1988	trop Amer	Localised
<i>Manihot</i>	<i>flabellifolium</i>			Euphorbiaceae	Euphorbiaceae	1994	S Mexico	Localised
<i>Maurandya</i>	<i>barclatiana</i>			Scrophulariaceae	Scrophulariaceae	1984	S Eur	Localised
<i>Medicago</i>	<i>arborea</i>			Fabaceae	Fabaceae	1981	N Amer	Localised
<i>Monolepis</i>	<i>spatulata</i>			Chenopodiaceae	Chenopodiaceae	1973	S Afr	Localised
<i>Moraea</i>	<i>aristata</i>			Iridaceae	Iridaceae	1974	Asia	Localised
<i>Mucuna</i>	<i>pruriens</i>			Fabaceae	Fabaceae	1990	India, Malasia	Localised
<i>Murraya</i>	<i>paniculata</i>			Rutaceae	Rutaceae	1992	India to Japan	Localised
<i>Nandina</i>	<i>domestica</i>			Nandinaaceae	Nandinaaceae	1981	W Eur	Localised
<i>Narcissus</i>	<i>pseudonarcissus</i>			Amaryllidaceae	Amaryllidaceae	1995	Paraguay	Localised
<i>Nassella</i>	<i>chairuana</i>			Poaceae	Poaceae	1987	S Afr	Localised
<i>Nerine</i>	<i>filifolia</i>			Amaryllidaceae	Amaryllidaceae	1971	W Medit	Localised
<i>Oenanth</i>	<i>pimpinellifolides</i>			Apiaceae	Apiaceae			300 ha

<i>Opuntia bergeriana</i>	Cactaceae	1981 Americas	Localised
<i>Opuntia erinacea</i>	Cactaceae	1980 SW USA	Localised
<i>Opuntia leucotricha</i>	Cactaceae	1986 Mexico	Localised
<i>Opuntia lindheimeri</i>	Cactaceae	1978 NE Mexico & adjacent USA	Localised
<i>Opuntia pachypus</i>	Cactaceae	1986 Peru	Localised
<i>Opuntia phaeacantha</i>	Cactaceae	1986 Mexico, SW USA	Localised
<i>Opuntia schickendantzii</i>	Cactaceae	1993 N Argentina	Localised
<i>Opuntia tunicata</i>	Cactaceae	1980 Ecuador to Chile	Localised
<i>Ornithogalum longibracteatum</i>	Hyacinthaceae	1983 S Afr, trop E Afr	Localised
<i>Osteospermum fruticosum</i>	Asteraceae	1982 S Afr	Localised
<i>Oxalis obtusa</i>	Oxalidaceae	1989 S Afr	Localised
<i>Panicum racemosum</i>	Poaceae	1991 S Amer	Localised
<i>Paspalum virgatum</i>	Poaceae	1988 Amer	Localised
<i>Pelargonium alchillemoides</i>	Geraniaceae	1981 S Afr	Localised
<i>Pelargonium quercifolium</i>	Geraniaceae	1983 S Afr	Localised
<i>Peperomia pellucida</i>	Piperaceae	1981 trop Afr, Amer	Localised
<i>Phoenix canariensis</i>	Arecaceae	1976 Canary Islands	Localised
<i>Phormium tenax</i>	Agavaceae	1984 NZ	Localised
<i>Photinia serratifolia</i>	Malaceae	1985 China	Localised
<i>Phyllostachys aurea</i>	Poaceae	1971 China	Localised
<i>Picea sp.</i>	Pinaceae	1995 ?	Localised
<i>Pinus canariensis</i>	Pinaceae	1974 Canary Islands	Localised
<i>Pinus contorta</i>	Pinaceae	1994 NW Amer	Localised
<i>Pinus elliotii</i>	Pinaceae	1978 SE USA, C Amer, W Indies	Localised
<i>Pinus pinea</i>	Pinaceae	1983 Medit	Localised
<i>Piptochaetium montevidense</i>	Poaceae	1988 S Amer	Localised
<i>Pistacia chinensis</i>	Anacardiaceae	1990 Afghanistan to Kashmir	Localised
<i>Pithecoctenium cyanochoides</i>	Bignoniaceae	1993 Brazil to Argentina	Localised
<i>Pittosporum crassifolium</i>	Pittosporaceae	1984 NZ	Localised
<i>Pittosporum eugenoides</i>	Pittosporaceae	1986 NZ	Localised
<i>Pittosporum tenuifolium</i>	Pittosporaceae	1987 NZ	Localised
<i>Plantago arenaria</i>	Plantaginaceae	1984 S, C & E Eur	Localised
<i>Plantago australis</i>	Plantaginaceae	1973 S Amer	Localised
<i>Plantanus x acerifolia</i>	Plantanaceae	1983 Nursery	Localised
<i>Plectranthus ciliatus</i>	Lamiaceae	1972 S Afr	Localised
<i>Plectranthus ecklonii</i>	Lamiaceae	1994 S Afr	Localised
<i>Podalyria sericea</i>	Fabaceae	1982 S Afr	Localised
<i>Polypogon chilensis</i>	Poaceae	1993 Chile, Argentina, Uruguay & S Brazil	Localised
<i>Populus tremula</i>	Salicaceae	1995 Eur, Medit, Asia, Japan	Localised
<i>Populus x jackii</i>	Salicaceae	1994 C & E N Amer	Localised
<i>Praxelis clematidea</i>	Asteraceae	1993 S Brazil, Bolivia, Paraguay, N Argentina	Locally common
<i>Prunus lusitanica</i>	Amygdalaceae	1980 SE Eur	Localised
<i>Prunus mahaleb</i>	Amygdalaceae	1982 Eur	Localised
<i>Prunus spinosa</i>	Amygdalaceae	1973 Eur, W Asia	Localised
<i>Pseudotsuga menziesii</i>	Pinaceae	1995 W USA, W Canada	Localised
<i>Pyracantha koidzumii</i>	Malaceae	1972 Taiwan	Localised
<i>Quercus canariensis</i>	Fagaceae	1988 N Afr, Iberian Peninsula	Localised

Recent Incursions of Weeds to Australia 1971 - 1995

<i>Quercus</i>	<i>suber</i>					1990	N Afr, S Eur	Localised
<i>Reseda</i>	<i>phyteuma</i>					1985	N Afr, S Eur	<200 ha in SA
<i>Ribes</i>	<i>sanguineum</i>					1985	western N Amer	Localised
<i>Romneya</i>	<i>trichocalyx</i>					1978	California	Localised
<i>Romulea</i>	<i>rosea</i>			var. <i>reflexa</i>		1987	S Afr	Localised
<i>Rotala</i>	<i>rotundifolia</i>					1985	India to Japan	Localised
<i>Rubus</i>	<i>pyramidalis</i>					1975	Eur	Localised
<i>Ruschia</i>	<i>decumbens</i>					1986	southern Afr	Localised
<i>Ruta</i>	<i>graveolens</i>					1971	SE Eur, Balkans Peninsula	Localised
<i>Salix</i>	<i>alba</i>			X <i>S. matsudana</i>		1994	Nursery	Localised
<i>Salix</i>	<i>alba</i>			var. <i>vitellina</i>		1994	Eur	Localised
<i>Salix</i>	<i>fragilis</i>			var. <i>fragilis</i> X <i>S. nigra</i>		1995	Natural hybrid	Localised
<i>Salix</i>	<i>fragilis</i>			var. <i>furcata</i>		1994	Eur	Localised
<i>Salix</i>	<i>humboldtiana</i>			var. <i>pyramidalis</i>		1992	Amer	Localised
<i>Salix</i>	<i>matsudana</i>			cv. 'Tortuosa'		1994	China	Localised
<i>Salix</i>	<i>matsudana</i>			X <i>chrysochroma</i>		1995	Garden?	Localised
<i>Salix</i>	<i>nigra</i>					1994	USA	Localised
<i>Salix</i>	<i>purpurea</i>					1994	Eur to Japan	Localised
<i>Salix</i>	X <i>pendulina</i>					1995	Garden	Localised
<i>Salix</i>	X <i>reichardtii</i>					1993	Eur hybrid	Localised
<i>Salix</i>	X <i>rubra</i>					1994	Eur hybrid	Localised
<i>Salix</i>	X <i>sepulcralis</i>			var. <i>sepulcralis</i>		1994	Garden	Localised
<i>Salix</i>	X <i>sepulcralis</i>			var. <i>chrysocoma</i>		1994	Garden	Localised
<i>Sanchezia</i>	<i>parvibracteata</i>					1992	trop Amer	Localised
<i>Schoenoplectus</i>	<i>californicus</i>					1981	N Amer, C Amer, S Amer	Localised
<i>Scirpus</i>	<i>pendulus</i>					1979	N Amer, C Amer, S Amer	Localised
<i>Sedum</i>	<i>fosterianum</i>					1980	W Eur	Localised
<i>Sedum</i>	<i>reflexum</i>					1982	Eur	Localised
<i>Senecio</i>	<i>glastifolius</i>					1986	S Afr	Localised - spreading
<i>Setaria</i>	<i>poiretiana</i>					1987	trop Amer	Localised
<i>Silene</i>	<i>diocia</i>					1982	Eur, Medit	Localised
<i>Silene</i>	<i>tridentata</i>					1986	Algeria	Localised
<i>Sisyrinchium</i>	sp.					1995	N or S Amer	Localised
<i>Solanum</i>	<i>abutiloides</i>					1985	NW Argentina, S Bolivia	Localised
<i>Spathodea</i>	<i>campanulata</i>					1992	trop Afr	Localised
<i>Spiraea</i>	<i>cantonensis</i>						China, Japan	Localised
<i>Stylosanthes</i>	<i>hamata</i>					1973	S Amer	Localised?
<i>Stylosanthes</i>	<i>scabra</i>					1976	trop S Amer	Localised?
<i>Stylosanthes</i>	<i>viscosa</i>					1973	trop S Amer	Localised?
<i>Succowia</i>	<i>balaerica</i>					1992	Medit	Localised
<i>Synadenium</i>	<i>grantii</i>					1991	Uganda to Zimbabwe	Localised
<i>Tamarix</i>	<i>ramosissima</i>					1985	E Eur to C & E Asia	Localised
<i>Tecoma</i>	<i>capensis</i>					1990	S Afr	Localised
<i>Teesdalia</i>	<i>nudicaulis</i>					1973	Eur	Localised
<i>Tephrosia</i>	<i>inandensis</i>					1971	S Afr	Localised
<i>Teucrium</i>	<i>scorodonia</i>					1993	Eur	Localised
<i>Thunbergia</i>	<i>laurifolia</i>					1987	India, Malaysia	Localised

2.3 Discussion

The most significant result of our analysis is that there has indeed been an increase in the rate of naturalisation of plant species over the 25 years from 1971, and especially over the last 15 years (see Figure 4). The rate of increase for Australia as a whole is not as great as that claimed for Victoria by Carr (1993).

Another significant feature of our analysis is the unexpectedly low proportion of recent incursions that have their origins in Europe (Figure 6). Africa and the Americas are as equally significant a source as is Europe. This pattern reflects, among other things, a changing agricultural and horticultural pattern in contemporary Australia away from the traditional European model of the previous 180 years. Such a change represents a challenge for quarantine practice.

The composition of the introduced flora is presumably also changing, with some families being more represented now than formerly. We have

pointed in our analysis to an apparent increase in representation of the Iridaceae and the Salicaceae (Figure 5), but only time and a further Australia-wide analysis in years to come can verify this apparent change.

Finally, few recent incursions are yet widespread (Table 1). Rarely do invasive plants spread as rapidly as pathogens or even insects. Rather, most are localised and may remain so for many years. Some will be eradicated as a result of deliberate attempts at weed control; others will just naturally disappear and may never be detected again. But most will probably remain as a minor component of the naturalised flora. We shall comment further on this point in Chapter 5.

Further details on the known history of introduction and naturalisation of each taxon listed in Table 1 are presented as Appendix 1 in Chapter 8.

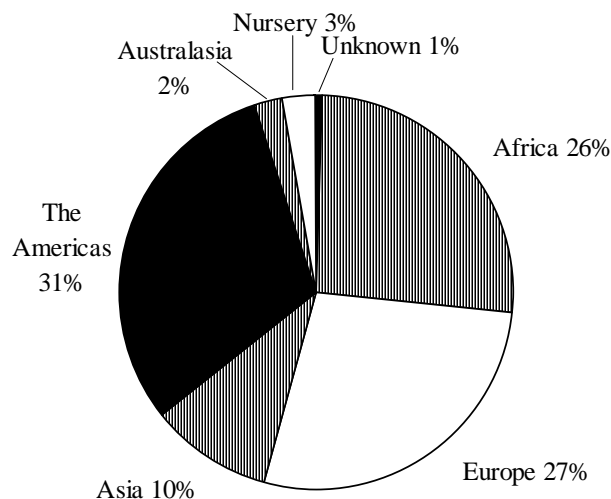


Figure 6. Region of origin of the taxa naturalising in Australia between 1971 and 1995.

3. Probable means of introduction of weeds 1971-1995

3.1 Introduction

It is often considered that most weeds are introduced accidentally and usually as contaminants of imported crop or pasture seed. The few statistics available, however, reveal that the majority of weeds have been introduced deliberately and most of them have been introduced for horticultural purposes. Only when they 'escape' from home or botanic gardens do they become naturalised and a problem to humans. Kloot (1987) analysed the records for the introductions of the naturalised flora of South Australia. Of his total of 904 naturalised plant species in South Australia, 515 were intentionally introduced, 214 were unintentionally introduced and there was no information available for 175 species. Of the intentionally introduced species 359 (about 35% of the total number of naturalised species) were ornamental species introduced for horticulture - other categories of intentionally introduced species were those introduced as fodder plants, for culinary purposes, as hedge plants and those for medicinal purposes. Among the unintentionally introduced categories were those 'attached to stock', as contaminated seed, plants introduced with ballast, contaminated footwear, clothing and fodder (for further details see Kloot 1987).

Carr (1993) estimated that as much as 65-70 % of the 1221 naturalised introduced taxa in Victoria had been deliberately introduced. Within this group, Carr

drew attention to the predominance of environmental weeds currently available in the nursery trade, often as highly popular garden plants.

This chapter presents the evidence, where available, for the means of introduction of those taxa which have become naturalised in Australia in the period 1971-1995.

3.2 Results

The means of introduction was unknown in only about 25% of all taxa naturalised over the last 25 years (Table 2). Of those taxa for which information was available, the majority had been introduced deliberately, with 65% of the total having been introduced as ornamental plants for horticulture (Figure 7, derived from Table 2). The number introduced as seed contaminants was very low (2%).

3.3 Discussion

Few plant species introduced to Australia have resulted from natural migration or invasion (i.e. those processes unrelated to quarantine policy or practice). For the South Australia flora, Kloot (1984) claimed that about 10% of the total number of plant species

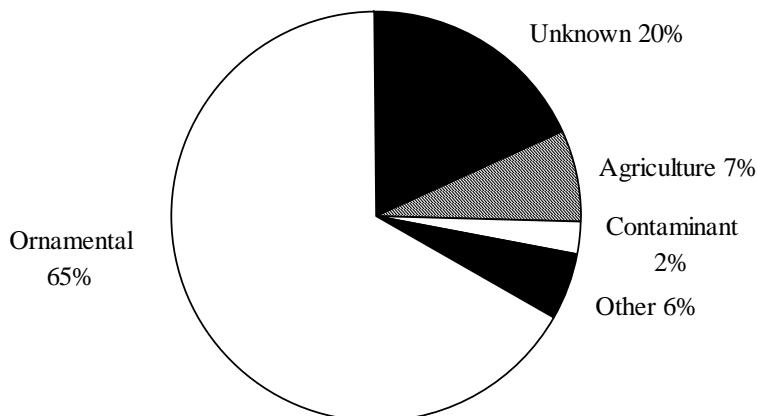


Figure 7. Means of introduction of those plant taxa naturalising in Australia for the period between 1971 and 1995.

could have arrived by a process of long-distance dispersal. Such 'cosmopolitan' species (now regarded as 'native') may have arrived naturally in Australia in prehistoric times and over millennia. Such a group of species seem to be associated particularly with aquatic environments - seashores or wetlands - and could have been brought here by migratory birds. We have no evidence for the significance of this means of introduction in the data we have analysed, but it is probably of very minor significance over the relatively short 25-year period that we are considering.

The majority of new incursions to the Australian flora have resulted from a combination of inadequate quarantine procedures and policies. The majority of new plant taxa have been allowed to enter legally because of some perceived use to humans - as potential crop or pasture plants or for ornamental horticulture. Many taxa that have been recorded in our survey as recently naturalised have probably been introduced years previously and prior to 1971. The increase in the rate of naturalisation that we have recorded may not necessarily bear a direct relationship to the number of taxa introduced over the last 25 years.

Table 2: Means of Introduction to Australia

Genus	Species	ssp or var	Family	Means	Reference
<i>Abies</i>	<i>sp.</i>		Pinaceae	Ornamental and timber	
<i>Acacia</i>	<i>catechu</i>		Fabaceae	Botanic gardens	I. Miller pers. comm.
<i>Acacia</i>	<i>karoo</i>		Fabaceae	Unknown	
<i>Acer</i>	<i>negundo</i>		Aceraceae	Ornamental	
<i>Acer</i>	<i>palmatum</i>		Aceraceae	Ornamental	
<i>Aeonium</i>	<i>arboresum</i>		Crassulaceae	Ornamental	
<i>Aeonium</i>	<i>haworthii</i>		Crassulaceae	Ornamental	
<i>Agapanthus</i>	<i>praecox</i>	ssp. <i>orientalis</i>	Liliaceae	Ornamental	
<i>Agapanthus</i>	<i>praecox</i>	ssp. <i>praecox</i>	Liliaceae	Ornamental	
<i>Agave</i>	<i>sisalana</i>		Agavaceae	Agriculture - rope	
<i>Ajuga</i>	<i>reptans</i>		Lamiaceae	Ornamental	
<i>Allamanda</i>	<i>cathartica</i>		Apocynaceae	Ornamental	
<i>Alliaria</i>	<i>petiolaris</i>		Brassicaceae	Unknown	
<i>Alnus</i>	<i>glutinosa</i>		Betulaceae	Ornamental	
<i>Aloe</i>	<i>cameronii</i>		Asphodelaceae	Ornamental	
<i>Aloe</i>	<i>saponaria</i>	var. <i>ficksburgensis</i>	Asphodelaceae	Ornamental	
<i>Alternanthera</i>	<i>bettzickiana</i>		Amaranthaceae	Ornamental?	
<i>Amsinckia</i>	<i>menziesii</i>		Boraginaceae	Unknown	
<i>Anacardium</i>	<i>occidentale</i>		Anacardiaceae	Agriculture - nuts	
<i>Anagyris</i>	<i>foetida</i>		Fabaceae	Ornamental	
<i>Anthoxanthum</i>	<i>aristatum</i>		Poaceae	Unknown	
<i>Aquilegia</i>	<i>vulgaris</i>		Ranunculaceae	Ornamental	
<i>Ardisia</i>	<i>crenata</i>		Myrsinaceae	Ornamental	
<i>Arisarum</i>	<i>vulgare</i>	ssp. <i>vulgare</i>	Araceae	Ornamental	
<i>Aristea</i>	<i>ecklonii</i>		Iridaceae	Ornamental	
<i>Artemisia</i>	<i>absinthium</i>		Asteraceae	Ornamental	
<i>Artemisia</i>	<i>ludoviciana</i>		Asteraceae	Ornamental	
<i>Asparagus</i>	<i>africanus</i>		Asparagaceae	Ornamental	
<i>Babiana</i>	<i>tubulosa</i>		Iridaceae	Ornamental	
<i>Bacopa</i>	<i>caroliniana</i>		Scrophulariaceae	Ornamental	
<i>Barleria</i>	<i>prionitis</i>		Acanthaceae	Ornamental	
<i>Basella</i>	<i>alba</i>		Basellaceae	Agriculture - edible	B. Waterhouse pers. comm
<i>Berberis</i>	<i>vulgaris</i>		Berberidaceae	Ornamental	
<i>Betula</i>	<i>nigra</i>		Betulaceae	Ornamental	
<i>Betula</i>	<i>pubescens</i>		Betulaceae	Ornamental	
<i>Brachiaria</i>	<i>humidicola</i>		Poaceae	Agriculture - pasture	
<i>Bryophyllum</i>	<i>beauverdii</i>		Crassulaceae	Ornamental	
<i>Bryophyllum</i>	<i>fedtschenkoi</i>		Crassulaceae	Ornamental	
<i>Buddleja</i>	<i>asiatica</i>		Buddlejaceae	Ornamental	
<i>Buddleja</i>	<i>dysophylla</i>		Buddlejaceae	Ornamental	
<i>Bulbostylis</i>	<i>striatella</i>		Cyperaceae	Unknown	
<i>Cabomba</i>	<i>caroliniana</i>		Cabombaceae	Aquaria	
<i>Calamagrostis</i>	<i>epigejos</i>		Poaceae	Unknown	
<i>Calepina</i>	<i>irregularis</i>		Brassicaceae	Contaminant probably	APCC records
<i>Campsis</i>	<i>radicans</i>		Bignoniaceae	Ornamental	
<i>Carduus</i>	<i>acanthoides</i>		Asteraceae	Unknown	
<i>Carex</i>	<i>arenaria</i>		Cyperaceae	Unknown	
<i>Carex</i>	<i>lepidocarpa</i>		Cyperaceae	Unknown	
<i>Carex</i>	<i>pilulifera</i>		Cyperaceae	Unknown	
<i>Carex</i>	<i>punctata</i>		Cyperaceae	Unknown	
<i>Carex</i>	<i>scoparia</i>		Cyperaceae	Unknown	
<i>Carex</i>	<i>testacea</i>		Cyperaceae	Ornamental	
<i>Carthamus</i>	<i>leucocaulos</i>		Asteraceae	Unknown	Parsons & Cuthbertson 1992
<i>Centaurea</i>	<i>eriphora</i>		Asteraceae	Unknown	APCC records
<i>Cestrum</i>	<i>Nocturnum</i>		Solanaceae	Ornamental	
<i>Chasmanthe</i>	<i>bicolor</i>		Iridaceae	Ornamental	
<i>Cheiranthus</i>	<i>cheiri</i>		Brassicaceae	Ornamental	
<i>Chenopodium</i>	<i>macrospermum</i>		Chenopodiaceae	Unknown	
<i>Chromolaena</i>	<i>odorata</i>	(less weedy form)	Asteraceae	Seed contaminant	R. McFadyen pers. comm.
<i>Chromolaena</i>	<i>odorata</i>	(weedy form)	Asteraceae	Seed contaminant	F. McFadyen pers. comm.
<i>Cineraria</i>	<i>lyrata</i>		Asteraceae	Unknown	Parsons & Cuthbertson 1992
<i>Clematis</i>	<i>flammula</i>		Ranunculaceae	Ornamental	
<i>Coffea</i>	<i>arabica</i>		Rubiaceae	Agriculture - crop	
<i>Coleonema</i>	<i>pulchrum</i>		Rutaceae	Ornamental	

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<i>Commelina</i>	<i>africana</i>		Commelinaceae	Ornamental	
<i>Cordyline</i>	<i>australis</i>		Agavaceae	Ornamental	
<i>Cornus</i>	<i>capitata</i>		Cornaceae	Ornamental	
<i>Cortaderia</i>	<i>jubata</i>		Poaceae	Ornamental	
<i>Cosmos</i>	<i>capitata</i>		Asteraceae	Ornamental	
<i>Cotoneaster</i>	<i>divaricatus</i>		Malaceae	Ornamental - hedging	
<i>Cotoneaster</i>	<i>franchetii</i>		Malaceae	Ornamental	
<i>Cotoneaster</i>	<i>horizontalis</i>		Malaceae	Ornamental	
<i>Cotoneaster</i>	<i>lacteus</i>		Malaceae	Ornamental	
<i>Cotoneaster</i>	<i>microphyllus</i>		Malaceae	Ornamental	
<i>Cotoneaster</i>	<i>pannosus</i>		Malaceae	Ornamental	
<i>Crassula</i>	<i>ciliata</i>		Crassulaceae	Ornamental	
<i>Crassula</i>	<i>ericoides</i>		Crassulaceae	Ornamental	
<i>Crassula</i>	<i>sarmentosa</i>		Crassulaceae	Ornamental	
<i>Crassula</i>	<i>spathulata</i>		Crassulaceae	Ornamental	
<i>Cupressus</i>	<i>glabra</i>		Cupressaceae	Ornamental	
<i>Cupressus</i>	<i>macrocarpa</i>		Cupressaceae	Ornamental	
<i>Cuscuta</i>	<i>planiflora</i>		Convolvulaceae	Seed contaminant probably	
<i>Cynoglossum</i>	<i>creticum</i>		Boraginaceae	Ornamental	
<i>Cyperus</i>	<i>aromaticus</i>		Cyperaceae	Unknown	Parsons & Cuthbertson 1992
<i>Cyperus</i>	<i>vorsteri</i>		Cyperaceae	Unknown	
<i>Delonix</i>	<i>regia</i>		Fabaceae	Ornamental	
<i>Desmodium</i>	<i>intortum</i>		Fabaceae	Ornamental	
<i>Dianthus</i>	<i>plumarius</i>	<i>ssp. vulgare</i>	Caryophyllaceae	Ornamental	
<i>Dietes</i>	<i>robinsoniana</i>		Iridaceae	Ornamental	
<i>Digitaria</i>	<i>ternata</i>		Poaceae	Agriculture - pasture	
<i>Dimorphotheca</i>	<i>ecklonis</i>		Asteraceae	Ornamental	
<i>Diplachne</i>	<i>univervia</i>		Poaceae	Unknown	
<i>Dovyalis</i>	<i>caffra</i>		Flacourtiaceae	Ornamental - hedging	
<i>Echinochloa</i>	<i>polystachya</i>		Poaceae	Agriculture - pasture	
<i>Eleocharis</i>	<i>parodii</i>		Cyperaceae	Unknown	
<i>Elephantopus</i>	<i>mollis</i>		Asteraceae	Ornamental?	
<i>Epilobium</i>	<i>hirsutum</i>		Onoagraceae	Ornamental?	
<i>Epiphyllum</i>	<i>phyllanthus</i>	<i>var. hookeri</i>	Cactaceae	Ornamental	
<i>Equisetum</i>	<i>arvense</i>		Equisetaceae	Ornamental	Parsons & Cuthbertson 1992
<i>Equisetum</i>	<i>hiemale</i>		Equisetaceae	Ornamental	
<i>Erica</i>	<i>melanthera</i>		Ericaceae	Ornamental	
<i>Erica</i>	<i>quadrangularis</i>		Ericaceae	Ornamental	
<i>Erica</i>	<i>scoparia</i>		Ericaceae	Ornamental	
<i>Erythrina</i>	<i>crista-galli</i>		Fabaceae	Ornamental	
<i>Euonymus</i>	<i>sp.</i>		Celastraceae	Ornamental	
<i>Euphorbia</i>	<i>characius</i>	<i>ssp. Wulfenii</i>	Euphorbiaceae	Ornamental	
<i>Euphorbia</i>	<i>tirucalli</i>		Euphorbiaceae	Ornamental	
<i>Fallopia</i>	<i>japonica</i>		Polygonaceae	Ornamental	
<i>Felicia</i>	<i>petiolata</i>		Asteraceae	Ornamental	
<i>Ficaria</i>	<i>verna</i>		Ranunculaceae	Unknown	
<i>Fraxinus</i>	<i>ornus</i>		Oleaceae	Ornamental	
<i>Froelichia</i>	<i>gracilis</i>		Amaranthaceae	Ornamental	
<i>Galium</i>	<i>palustre</i>		Rubiaceae	Unknown	
<i>Gamolepis</i>	<i>chrysanthemoides</i>		Asteraceae	Ornamental	
<i>Gazania</i>	<i>linearis</i>		Asteraceae	Ornamental	
<i>Genista</i>	<i>sp.</i>	<i>G. monspessulana X G. sp.</i>	Fabaceae	Ornamental	
<i>Genista</i>	<i>tinctoria</i>	<i>ssp. depressa</i>	Fabaceae	Ornamental	
<i>Geranium</i>	<i>palmatum</i>		Geraniaceae	Ornamental	
<i>Geranium</i>	<i>rubescens</i>		Geraniaceae	Ornamental	
<i>Gladiolus</i>	<i>cardinalis</i>		Iridaceae	Ornamental	
<i>Gladiolus</i>	<i>natalensis</i>		Iridaceae	Ornamental	
<i>Gloriosa</i>	<i>superba</i>		Colchicaceae	Ornamental	
<i>Glyceria</i>	<i>plicata</i>		Poaceae	Unknown	
<i>Gymnocoronis</i>	<i>spilanthoides</i>		Asteraceae	Aquaria	Parsons & Cuthbertson 1992
<i>Helianthus</i>	<i>debilis</i>		Asteraceae	Ornamental	
<i>Hovenia</i>	<i>dulcis</i>		Rhamnaceae	Agriculture - edible fruit	
<i>Hura</i>	<i>crepitans</i>		Euphorbiaceae	Forestry	
<i>Hyacinthoides</i>	<i>hispanica</i>		Hyacinthaceae	Ornamental	
<i>Hyacinthoides</i>	<i>non-scripta</i>		Hyacinthaceae	Ornamental	
<i>Hydrocleys</i>	<i>nymphoides</i>		Limncharitaceae	Ornamental	
<i>Hydrocotyle</i>	<i>ranunculoides</i>		Apiaceae	Unknown	

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<i>Hymenachne</i>	<i>amplexicaule</i>		Poaceae	Agriculture-pasture	
<i>Hymenocallis</i>	<i>caribea</i>		Amaryllidaceae	Ornamental	
<i>Hypericum</i>	<i>grandifolium</i>		Clusiaceae	Ornamental	
<i>Hyptis</i>	<i>pectinata</i>		Lamiaceae	Ornamental	
<i>Indigofera</i>	<i>decora</i>		Fabaceae	Ornamental	
<i>Indigofera</i>	<i>oblongifolia</i>		Fabaceae	Ornamental	
<i>Ipomoea</i>	<i>alba</i>		Convolvulaceae	Ornamental	
<i>Iris</i>	<i>orientalis</i>		Iridaceae	Ornamental	Kloot 1986
<i>Iris</i>	<i>pseudacorus</i>		Iridaceae	Ornamental	
<i>Iris</i>	<i>spuria</i>		Iridaceae	Ornamental	
<i>Iris</i>	<i>xiphium</i>		Iridaceae	Ornamental	
<i>Ixia</i>	<i>longituba</i>		Iridaceae	Ornamental	
<i>Ixia</i>	<i>viridiflora</i>		Iridaceae	Ornamental	
<i>Juglans</i>	<i>regia</i>		Juglandaceae	Agriculture - nuts	
<i>Juncus</i>	<i>acuminatus</i>		Juncaceae	Unknown	
<i>Juncus</i>	<i>conglomeratus</i>		Juncaceae	Unknown	
<i>Juncus</i>	<i>fontanesii</i>	ssp. <i>fontanesii</i>	Juncaceae	Unknown	
<i>Juncus</i>	<i>indescriptus</i>		Juncaceae	Unknown	
<i>Juncus</i>	<i>inflexus</i>		Juncaceae	Unknown	
<i>Juncus</i>	<i>nodosus</i>		Juncaceae	Unknown	
<i>Juncus</i>	<i>squarrosus</i>		Juncaceae	Unknown	
<i>Juniperus</i>	<i>virginiana</i>		Cupressaceae	Ornamental	
<i>Kniphofia</i>	<i>uvaria</i>		Asphodelaceae	Ornamental	
<i>Kochia</i>	<i>scoparia</i>	var. <i>scoparia</i>	Chenopodiaceae	Soil conservation	
<i>Lachenalia</i>	<i>bulbifera</i>		Hyacinthaceae	Ornamental	Keighery pers. Comm.
<i>Lachenalia</i>	<i>mutabilis</i>		Hyacinthaceae	Ornamental	Keighery pers. Comm.
<i>Lagarosiphon</i>	<i>major</i>		Hydrocharitaceae	Aquaria	Parsons & Cuthbertson 1992
<i>Lamium</i>	<i>galeobdolon</i>	forma <i>argentatum</i>	Lamiaceae	Ornamental	
<i>Lathyrus</i>	<i>odoratus</i>		Fabaceae	Ornamental	
<i>Lathyrus</i>	<i>sativus</i>		Fabaceae	Agriculture - prob. Fodder	
<i>Lilium</i>	<i>lancefolium</i>		Liliaceae	Ornamental	
<i>Linaria</i>	<i>sp.</i>		Scrophulariaceae	Ornamental	
<i>Linum</i>	<i>biene</i>		Linaceae	Unknown	
<i>Lobelia</i>	<i>erinus</i>		Lobeliaceae	Ornamental	
<i>Lotus</i>	<i>creticus</i>		Fabaceae	Soil conservation	R. Adair pers. comm.
<i>Ludwigia</i>	<i>longifolia</i>		Onagraceae	Ornamental	
<i>Ludwigia</i>	<i>peruviana</i>		Onagraceae	Ornamental	
<i>Lupinus</i>	<i>polyphyllus</i>		Fabaceae	Ornamental	
<i>Mahonia</i>	<i>leschenaultii</i>		Berberidaceae	Ornamental	
<i>Malcolmia</i>	<i>africana</i>		Brassicaceae	Unknown	APCC records
<i>Manihot</i>	<i>fiabellifolium</i>		Euphorbiaceae	Ornamental	
<i>Maurandya</i>	<i>barclaiana</i>		Scrophulariaceae	Ornamental	
<i>Medicago</i>	<i>arborea</i>		Fabaceae	Ornamental	
<i>Monolepis</i>	<i>spathulata</i>		Chenopoliaceae	Unknown	
<i>Moraea</i>	<i>aristata</i>		Iridaceae	Ornamental	
<i>Mucuna</i>	<i>pruriens</i>	ssp. <i>pruriens</i> var. <i>utilis</i>	Fabaceae	Silage/green manure crop	
<i>Murraya</i>	<i>paniculata</i>		Rutaceae	Ornamental	
<i>Nandina</i>	<i>domestica</i>		Nandinaceae	Ornamental	
<i>Narcissus</i>	<i>pseudonarcissus</i>		Amaryllidaceae	Ornamental	
<i>Nassella</i>	<i>charruana</i>		Poaceae	Unknown	
<i>Nerine</i>	<i>filifolia</i>		Amaryllidaceae	Ornamental	George 1987
<i>Oenanthe</i>	<i>pimpinelloides</i>		Apiaceae	Unknown	
<i>Opuntia</i>	<i>bergeriana</i>		Cactaceae	Ornamental	
<i>Opuntia</i>	<i>erinacea</i>		Cactaceae	Ornamental	
<i>Opuntia</i>	<i>leucotricha</i>		Cactaceae	Ornamental	
<i>Opuntia</i>	<i>linheimeri</i>		Cactaceae	Ornamental	
<i>Opuntia</i>	<i>pachypus</i>		Cactaceae	Ornamental	
<i>Opuntia</i>	<i>phaeacantha</i>		Cactaceae	Ornamental	
<i>Opuntia</i>	<i>schickendantzii</i>		Cactaceae	Ornamental	
<i>Opuntia</i>	<i>tunicata</i>		Cactaceae	Ornamental	
<i>Ornithogalum</i>	<i>longibracteatum</i>		Hyacinthaceae	Ornamental	
<i>Osteospermum</i>	<i>fruticosum</i>		Asteraceae	Ornamental?	
<i>Oxalis</i>	<i>obtusa</i>		Oxalidaceae	Ornamental	
<i>Panicum</i>	<i>racemosum</i>		Poaceae	Unknown	
<i>Paspalum</i>	<i>virgatum</i>		Poaceae	Agriculture? - pasture?	
<i>Pelargonium</i>	<i>alchilleoides</i>		Geraniaceae	Ornamental	
<i>Pelargonium</i>	<i>quercifolium</i>		Geraniaceae	Ornamental	
<i>Peperomia</i>	<i>pellucida</i>		Piperaceae	Nursery seed contaminant	

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<i>Phoenix</i>	<i>canariensis</i>		Arecaceae	Ornamental	
<i>Phormium</i>	<i>tenax</i>		Agavaceae	Ornamental	Curtis & Morris 1994
<i>Photinia</i>	<i>serratifolia</i>		Malaceae	Ornamental	
<i>Phyllostachys</i>	<i>aurea</i>		Poaceae	Ornamental	
<i>Picea</i>	<i>sp.</i>		Pinaceae	Ornamental and timber	
<i>Pinus</i>	<i>canariensis</i>		Pinaceae	Ornamental and timber	
<i>Pinus</i>	<i>contorta</i>		Pinaceae	Timber	
<i>Pinus</i>	<i>elliottii</i>		Pinaceae	Timber	
<i>Pinus</i>	<i>pinea</i>		Pinaceae	Ornamental and timber	
<i>Piptochaetium</i>	<i>montevidense</i>		Poaceae	Unknown	
<i>Pistacia</i>	<i>chinensis</i>		Anacardiaceae	Ornamental	
<i>Pithecoctenium</i>	<i>cyanchoides</i>		Bignoniaceae	Ornamental	
<i>Pittosporum</i>	<i>crassifolium</i>		Pittosporaceae	Ornamental	
<i>Pittosporum</i>	<i>eugenoides</i>		Pittosporaceae	Ornamental	
<i>Pittosporum</i>	<i>teniufolium</i>		Pittosporaceae	Ornamental	
<i>Plantago</i>	<i>arenaria</i>		Plantaginaceae	Unknown	
<i>Plantago</i>	<i>australis</i>		Plantaginaceae	Unknown	
<i>Plantanus</i>	<i>x acerifolia</i>		Plantanaceae	Ornamental	
<i>Plectranthus</i>	<i>ciliatus</i>		Lamiaceae	Ornamental	
<i>Plectranthus</i>	<i>ecklonii</i>		Lamiaceae	Ornamental	
<i>Podalyria</i>	<i>sericea</i>		Fabaceae	Ornamental	
<i>Polypogon</i>	<i>chilensis</i>		Poaceae	Unknown	
<i>Populus</i>	<i>tremula</i>		Salicaceae	Ornamental	
<i>Populus</i>	<i>x jackii</i>		Salicaceae	Ornamental	
<i>Praxelis</i>	<i>clematidea</i>		Asteraceae	Seed contaminant	B. Waterhouse pers. Comm.
<i>Prunus</i>	<i>lusitanica</i>		Amygdalaceae	Ornamental	
<i>Prunus</i>	<i>mahaleb</i>		Amygdalaceae	Agriculture	
<i>Prunus</i>	<i>spinosa</i>		Amygdalaceae	Hedging plant	
<i>Pseudotsuga</i>	<i>menziesii</i>		Pinaceae	Timber	
<i>Pyracantha</i>	<i>koidzumii</i>		Malaceae	Ornamental	
<i>Quercus</i>	<i>canariensis</i>		Fagaceae	Ornamental	
<i>Quercus</i>	<i>suber</i>		Fagaceae	Ornamental	
<i>Reseda</i>	<i>phyteuma</i>		Resedaceae	Seed contaminant	APCC records
<i>Ribes</i>	<i>sanguineum</i>		Grossulariaceae	Ornamental	
<i>Romneya</i>	<i>trichocalyx</i>		Papaveraceae	Ornamental	
<i>Romulea</i>	<i>rosea</i>	var. <i>reflexa</i>	Iridaceae	Ornamental	
<i>Rotala</i>	<i>rotundifolia</i>		Lythraceae	Ornamental	
<i>Rubus</i>	<i>pyramidalis</i>		Rosaceae	Agriculture - fruit	
<i>Ruschia</i>	<i>decumbens</i>		Aizoaceae	Unknown	
<i>Ruta</i>	<i>graveolens</i>		Rutaceae	Ornamental	
<i>Salix</i>	<i>alba</i>	<i>X S. matsudana</i>	Salicaceae	Ornamental	
<i>Salix</i>	<i>alba</i>	var. <i>vitellina</i>	Salicaceae	Ornamental	
<i>Salix</i>	<i>fragilis</i>	var. <i>fragilis X S. nigra</i>	Salicaceae	Ornamental	
<i>Salix</i>	<i>fragilis</i>	var. <i>furcata</i>	Salicaceae	Ornamental	
<i>Salix</i>	<i>humboltiana</i>	var. <i>pyramidalis</i>	Salicaceae	Ornamental	
<i>Salix</i>	<i>matsudana</i>	cv. 'Tortuosa'	Salicaceae	Ornamental	
<i>Salix</i>	<i>matsudana</i>	<i>X chrysochroma</i>	Salicaceae	Ornamental	
<i>Salix</i>	<i>nigra</i>		Salicaceae	Ornamental	
<i>Salix</i>	<i>purpurea</i>		Salicaceae	Soil stabilisation	
<i>Salix</i>	<i>X pendulina</i>		Salicaceae	Ornamental	
<i>Salix</i>	<i>X reichardtii</i>		Salicaceae	Ornamental	
<i>Salix</i>	<i>X rubra</i>		Salicaceae	Soil stabilisation	
<i>Salix</i>	<i>X sepulcralis</i>	var. <i>sepulcralis</i>	Salicaceae	Ornamental	
<i>Salix</i>	<i>X sepulcralis</i>	var. <i>chrysocoma</i>	Salicaceae	Ornamental	
<i>Sanchezia</i>	<i>parvibracteata</i>		Acanthaceae	Ornamental	
<i>Schoenoplectus</i>	<i>californicus</i>		Cyperaceae	Unknown	
<i>Scirpus</i>	<i>pendulus</i>		Cyperaceae	Unknown	
<i>Sedum</i>	<i>fosterianum</i>		Crassulaceae	Ornamental	
<i>Sedum</i>	<i>reflexum</i>		Crassulaceae	Ornamental	
<i>Senecio</i>	<i>glastifolius</i>		Asteraceae	Ornamental	
<i>Setaria</i>	<i>poiretiana</i>		Poaceae	Unknown	
<i>Silene</i>	<i>diocia</i>		Caryophyllaceae	Ornamental	
<i>Silene</i>	<i>tridentata</i>		Caryophyllaceae	Ornamental	
<i>Sisyrinchium</i>	<i>sp.</i>		Iridaceae	Unknown	
<i>Solanum</i>	<i>abutiloides</i>		Solanaceae	Botanic garden	Symon & Swarbrick 1986
<i>Spathodea</i>	<i>campanulata</i>		Bignoniaceae	Ornamental	
<i>Spiraea</i>	<i>cantonensis</i>		Malaceae	Ornamental	
<i>Stylosanthes</i>	<i>hamata</i>		Fabaceae	Agriculture - pasture	

<i>Stylosanthes</i>	<i>scabra</i>		Fabaceae	Agriculture-pasture	
<i>Stylosanthes</i>	<i>viscosa</i>		Fabaceae	Agriculture-pasture	
<i>Succowia</i>	<i>balaerica</i>		Brassicaceae	Botanical gardens	Keighery pers. comm.
<i>Synadenium</i>	<i>grantii</i>		Euphorbiaceae	Ornamental	
<i>Tamarix</i>	<i>ramosissima</i>		Tamaricaceae	Ornamental	
<i>Tecoma</i>	<i>capensis</i>		Bignoniaceae	Ornamental	
<i>Teesdalia</i>	<i>nudicaulis</i>		Brassicaceae	Unknown	
<i>Tephrosia</i>	<i>inandensis</i>		Fabaceae	Unknown	
<i>Teucrium</i>	<i>scorodonia</i>		Lamiaceae	Ornamental	
<i>Thunbergia</i>	<i>laurifolia</i>		Acanthaceae	Ornamental	
<i>Tordylium</i>	<i>apulum</i>		Apiaceae	Ornamental?	
<i>Torilis</i>	<i>arvensis</i>		Apiaceae	Unknown	
<i>Trachycarpus</i>	<i>fortunei</i>		Arecaceae	Ornamental	
<i>Trachystemon</i>	<i>orientalis</i>		Boraginaceae	Ornamental	
<i>Tragopogon</i>	<i>hybridus</i>		Asteraceae	Ornamental	Cooke 1987
<i>Trianoptiles</i>	<i>solitaria</i>		Cyperaceae	Unknown	
<i>Tribolium</i>	<i>echinatum</i>		Poaceae	Unknown	
<i>Trifolium</i>	<i>uniflorum</i>		Fabaceae	Agriculture-pasture?	
<i>Trifolium</i>	<i>vesiculosum</i>		Fabaceae	Agriculture-pasture	
<i>Ulmus</i>	<i>procera</i>		Ulmaceae	Ornamental	
<i>Veronica</i>	<i>scutellata</i>		Scrophulariaceae	Unknown	
<i>Washingtonia</i>	<i>filifera</i>		Arecaceae	Ornamental	
<i>Washingtonia</i>	<i>robusta</i>		Arecaceae	Ornamental	
<i>Watsonia</i>	<i>aletroides</i>		Iridaceae	Ornamental	
<i>Wedelia</i>	<i>trilobata</i>		Asteraceae	Ornamental	S. Csurhes pers. comm.

4. Economic and environmental costs of weed incursions

4.1 Introduction

The economic costs of weeds comprise both direct and indirect costs. Most weeds also have some perceived positive values or benefits which are occasionally assessable — e.g. their value in herbal medicine or their contribution to the bee industry. Whilst there have been previous attempts to assess the costs of certain major individual weeds (see e.g. Marsden 1980 for *Chondrilla juncea* and IAC 1985 for *Echium plantagineum*, both of which entered Australia much earlier than 1971), there has been only one published assessment of the overall costs of weeds to the Australian community. Combellack (1987) estimated that the total cost of weeds was of the order of \$2750 million; his survey included both crop and pasture weeds, but did not include the environmental weeds. The indirect costs of the latter group are more difficult to estimate and almost no information is presently available on these costs (but see Greer and Sheppard 1990 for an example from New Zealand). More recently, in 1995 it was estimated that weeds cost the Australian community \$3300 million (J. Cullen, pers. comm) and in 1996, just under \$5000 million (J.H. Combellack, pers. comm.) Some of the plants listed in Table 3 have a direct cost that is cited; most will not, however, because they are either taxa which have yet to reach their weed potential or they will only ever be minor components of the total weed flora. There are some exceptions to this generalisation, however, and we shall highlight several aspects of the overall costs where information is available. Whilst the subject of economic assessment of most agricultural weeds in Australia is under-researched, that for environmental weeds is almost totally absent and in urgent need of attention.

4.2 Results

It has proven to be an almost impossible task to assign even direct costs to most of the recently incursions (Table 3). In 98% of cases no information was readily available for the cost of individual weeds to Australia. Several major weed species are on the list which are weeds world-wide and their direct costs to Australia may be estimated. In what follows, we consider just three instances of species where some costs are

available — viz. *Chromolaena odorata* recently found in northern Queensland, the weedy form of *Kochia scoparia*, a recent deliberate introduction to Western Australia, and the collective example of several parasitic weeds introduced to South Australia as seed contaminants. Money has been put in directly and immediately on detection in each of the above cases. The costs for other recent incursions are unknown in the short term and will necessarily overlook costs for control and their effects on aesthetics, loss of diversity and/or competition with crop or pasture species — the latter resulting in reduced yields and product contamination.

4.2.1 *Chromolaena odorata*

Economically, perhaps the most significant recent naturalisation concerns the more widespread form of *Chromolaena odorata*. Since it was discovered near Tully in northern coastal Queensland in 1994, this weed has cost State and Federal Governments \$460 000 in direct costs in an attempt to both halt its further spread and to eradicate it. This more widespread form of *Chromolaena odorata* is thought to have been introduced accidentally in the early 1970s as a contaminant of pasture seed (see Tables 2 and 3). The plant is a major world weed which hitherto has not been known to occur in Australia, although it occurs in Indonesia, Papua New Guinea and the Philippines. Prior to its discovery in northern Queensland, Australia has funded, through ACIAR, a research program on biological control of this weed in these adjoining countries. This research was undertaken to reduce the chances of its introduction to Australia — a further cost of this weed to Australia, albeit a less direct one. The total cost for this 4-year biological control project has been \$493 684 (P. Ferrar, pers. comm.). What the total direct and indirect cost to Australia of this recent incursion is remains to be analysed in the future. The cost of this particular incursion will depend on a future economic analysis which will, in turn, depend on whether the weed can be contained, let alone eradicated, from its present known distribution in northern Queensland.

4.2.2 *Kochia scoparia*

The species *Kochia scoparia* listed in Table 3 is a variable taxon. One form of the species (known as *K. scoparia* var. *trichophylla*) has been grown as an ornamental in Australia for many years (Brunning 1924) and apparently never become weedy. In 1990, however, the weedy form of this species (known as *K. scoparia* var. *scoparia*) was deliberately introduced from the United States to Western Australia as a forage plant suitable for salinised soils (Dodd and Moore 1993). By early 1992 the weedy form had begun spreading from sites at which it had been sown. Since then every effort has been made to eradicate it from Western Australia. The eradication program has incurred a direct cost of \$530 000 so far and it still has one year to run. What the total direct cost will be is still unknown and will depend in part on the efficiency with which isolated plants can be found. More recently, a second incursion of the weedy form has been reported as occurring in northern Tasmania, to which it was introduced as an impurity in carrot seed (A. Harradine, pers. comm.). This incursion is also being eradicated and the success of this program is being monitored.

4.2.3 Some parasitic weeds

Costs of incursions of certain parasitic weeds may be considerable. For instance, witchweed (*Striga asiatica*) occurs widely in the United States and has been subject to an eradication program for many years. Since 1984, the United States program has cost US\$55 million; it has achieved containment, but not eradication, of the species, at an on-going annual cost of US\$750 000 (Carter 1996). The species was recorded in Australia in the last century (Bentham 1869) but apparently did not naturalise. Other parasitic weeds have become naturalised, however, such as *Cuscuta campestris* in southeastern Australia. Despite quarantine restrictions on entry of this species, the species continues to be repeatedly introduced as a contaminant of seed of various herbs, especially sweet basil (*Ocimum basilicum*). Seed of *C. campestris* may be present in herb and spice seed at a level below that likely to be detected using International Seed Testing Protocols. It has been found in individual seed imports in South Australia at least three times over the last 25 years (in 1981, 1988 and 1990). Whilst the latter two incursions have been detected rapidly and the direct costs consequently trivial (less than \$1000), the former has already incurred direct costs (for eradication, compensation paid to the landowner, surveys and on-going inspections) of at least \$600 000. The program continues, with the species last found near Keith, South Australia, in 1993. As with our other two examples, the total direct and indirect costs remain unknown. Whilst most recent incursions may be due to a breakdown in procedures, the case of the parasitic weeds is a clear breakdown in protocols and one for which at least some direct costs are known for South Australian occurrences.

Table 3: Cost of Control in

Genus	Species	ssp or var	Family	Cost	Reference
<i>Abies</i>	<i>sp.</i>		Pinaceae		
<i>Acacia</i>	<i>catechu</i>		Fabaceae		I. Miller pers. comm.
<i>Acacia</i>	<i>karoo</i>		Fabaceae		
<i>Acer</i>	<i>negundo</i>		Aceraceae		
<i>Acer</i>	<i>palmatum</i>		Aceraceae		
<i>Aeonium</i>	<i>arboreum</i>		Crassulaceae		
<i>Aeonium</i>	<i>haworthii</i>		Crassulaceae		
<i>Agapanthus</i>	<i>praecox</i>	ssp. <i>orientalis</i>	Liliaceae		
<i>Agapanthus</i>	<i>praecox</i>	ssp. <i>praecox</i>	Liliaceae		
<i>Agave</i>	<i>sisalana</i>		Agavaceae		
<i>Ajuga</i>	<i>reptans</i>		Lamiaceae		
<i>Allamanda</i>	<i>cathartica</i>		Apocynaceae		
<i>Alliaria</i>	<i>petiolaris</i>		Brassicaceae		
<i>Alnus</i>	<i>glutinosa</i>		Betulaceae		
<i>Aloe</i>	<i>cameronii</i>		Asphodelaceae		
<i>Aloe</i>	<i>saponaria</i>	var. <i>ficksburgensis</i>	Asphodelaceae		
<i>Alternanthera</i>	<i>betzickiana</i>		Amaranthaceae		
<i>Amsinckia</i>	<i>menziesii</i>		Boraginaceae		
<i>Anacardium</i>	<i>occidentale</i>		Anacardiaceae		
<i>Anagyris</i>	<i>foetida</i>		Fabaceae		
<i>Anthoxanthum</i>	<i>aristatum</i>		Poaceae		
<i>Aquilegia</i>	<i>vulgaris</i>		Ranunculaceae		
<i>Ardisia</i>	<i>crenata</i>		Myrsinaceae		
<i>Arisarum</i>	<i>vulgare</i>	ssp. <i>vulgare</i>	Araceae		
<i>Aristea</i>	<i>ecklonii</i>		Iridaceae		
<i>Artemesia</i>	<i>absinthium</i>		Asteraceae		
<i>Artemesia</i>	<i>ludoviciana</i>		Asteraceae		
<i>Asparagus</i>	<i>africanus</i>		Asparagaceae		
<i>Babiana</i>	<i>tubulosa</i>		Iridaceae		
<i>Bacopa</i>	<i>caroliniana</i>		Scrophulariaceae		
<i>Barleria</i>	<i>prionitis</i>		Acanthaceae		
<i>Basella</i>	<i>alba</i>		Basellaceae		B. Waterhouse pers. comm
<i>Berberis</i>	<i>vulgaris</i>		Berberidaceae		
<i>Betula</i>	<i>nigra</i>		Betulaceae		
<i>Betula</i>	<i>pubescens</i>		Betulaceae		
<i>Brachiaria</i>	<i>humidicola</i>		Poaceae		
<i>Bryophyllum</i>	<i>beauverdii</i>		Crassulaceae		
<i>Bryophyllum</i>	<i>fedtschenkoi</i>		Crassulaceae		
<i>Buddleja</i>	<i>asiatica</i>		Buddlejaceae		
<i>Buddleja</i>	<i>dysophylla</i>		Buddlejaceae		
<i>Bulbostylis</i>	<i>striatella</i>		Cyperaceae		
<i>Cabomba</i>	<i>caroliniana</i>		Cabombaceae		
<i>Calamagrostis</i>	<i>epigejos</i>		Poaceae		
<i>Calepina</i>	<i>irregularis</i>		Brassicaceae	~\$150,000	APCC records
<i>Campsis</i>	<i>radicans</i>		Bignoniaceae		
<i>Carduus</i>	<i>acanthoides</i>		Asteraceae		
<i>Carex</i>	<i>arenaria</i>		Cyperaceae		
<i>Carex</i>	<i>lepidocarpa</i>		Cyperaceae		
<i>Carex</i>	<i>pilulifera</i>		Cyperaceae		
<i>Carex</i>	<i>punctata</i>		Cyperaceae		
<i>Carex</i>	<i>scoparia</i>		Cyperaceae		
<i>Carex</i>	<i>testacea</i>		Cyperaceae		
<i>Carthamus</i>	<i>leucocaulos</i>		Asteraceae		
<i>Centaurea</i>	<i>eriphora</i>		Asteraceae		Small - spot sprayed
<i>Cestrum</i>	<i>Nocturnum</i>		Solanaceae		
<i>Chasmanthe</i>	<i>bicolor</i>		Iridaceae		
<i>Cheiranthus</i>	<i>cheiri</i>		Brassicaceae		
<i>Chenopodium</i>	<i>macrospermum</i>		Chenopodiaceae		
<i>Chromolaena</i>	<i>odorata</i>	(less weedy form)	Asteraceae		
<i>Chromolaena</i>	<i>odorata</i>	(weedy form)	Asteraceae	\$460,000	QDNR records
<i>Cineraria</i>	<i>lyrata</i>		Asteraceae		
<i>Clematis</i>	<i>flammula</i>		Ranunculaceae		
<i>Coffea</i>	<i>arabica</i>		Rubiaceae		
<i>Coleonema</i>	<i>pulchrum</i>		Rutaceae		

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<i>Commelina</i>	<i>africana</i>		Commelinaceae		
<i>Cordylone</i>	<i>australis</i>		Agavaceae		
<i>Cornus</i>	<i>capitata</i>		Cornaceae		
<i>Cortaderia</i>	<i>jubata</i>		Poaceae		
<i>Cosmos</i>	<i>capitata</i>		Asteraceae		
<i>Cotoneaster</i>	<i>divaricatus</i>		Malaceae		
<i>Cotoneaster</i>	<i>franchetii</i>		Malaceae		
<i>Cotoneaster</i>	<i>horizontalis</i>		Malaceae		
<i>Cotoneaster</i>	<i>lacteus</i>		Malaceae		
<i>Cotoneaster</i>	<i>microphyllus</i>		Malaceae		
<i>Cotoneaster</i>	<i>pannosus</i>		Malaceae		
<i>Crassula</i>	<i>ciliata</i>		Crassulaceae		
<i>Crassula</i>	<i>ericoides</i>		Crassulaceae		
<i>Crassula</i>	<i>sarmentosa</i>		Crassulaceae		
<i>Crassula</i>	<i>spatulata</i>		Crassulaceae		
<i>Cupressus</i>	<i>glabra</i>		Cupressaceae		
<i>Cupressus</i>	<i>macrocarpa</i>		Cupressaceae		
<i>Cuscuta</i>	<i>planiflora</i>		Convolvulaceae		
<i>Cynoglossum</i>	<i>creticum</i>		Boraginaceae		
<i>Cyperus</i>	<i>aromaticus</i>		Cyperaceae		
<i>Cyperus</i>	<i>vorsteri</i>		Cyperaceae		
<i>Delonix</i>	<i>regia</i>		Fabaceae		
<i>Desmodium</i>	<i>intortum</i>		Fabaceae		
<i>Dianthus</i>	<i>plumarius</i>	ssp. <i>vulgare</i>	Caryophyllaceae		
<i>Dietes</i>	<i>robinsoniana</i>		Iridaceae		
<i>Digitaria</i>	<i>ternata</i>		Poaceae		
<i>Dimorphotheca</i>	<i>ecklonis</i>		Asteraceae		
<i>Diplachne</i>	<i>univervia</i>		Poaceae		
<i>Dovyalis</i>	<i>caffra</i>		Flacourtiaceae		
<i>Echinochloa</i>	<i>polystachya</i>		Poaceae		
<i>Eleocharis</i>	<i>parodii</i>		Cyperaceae		
<i>Elephantopus</i>	<i>mollis</i>		Asteraceae	\$35,000	QDNR records
<i>Epilobium</i>	<i>hirsutum</i>		Onoagraceae		
<i>Epiphyllum</i>	<i>phyllanthus</i>	var. <i>hookeri</i>	Cactaceae		
<i>Equisetum</i>	<i>arvense</i>		Equisetaceae	~\$10,000	
<i>Equisetum</i>	<i>hiemale</i>		Equisetaceae		
<i>Erica</i>	<i>melanthera</i>		Ericaceae		
<i>Erica</i>	<i>quadrangularis</i>		Ericaceae		
<i>Erica</i>	<i>scoparia</i>		Ericaceae		
<i>Erythrina</i>	<i>crista-galli</i>		Fabaceae		
<i>Euonymus</i>	<i>sp.</i>		Celastraceae		
<i>Euphorbia</i>	<i>characius</i>	ssp. <i>Wulfenii</i>	Euphorbiaceae		
<i>Euphorbia</i>	<i>tirucalli</i>		Euphorbiaceae		
<i>Fallopia</i>	<i>japonica</i>		Polygonaceae		
<i>Felicia</i>	<i>petiolata</i>		Asteraceae		
<i>Ficaria</i>	<i>verna</i>		Ranunculaceae		
<i>Fraxinus</i>	<i>ornus</i>		Oleaceae		
<i>Froelichia</i>	<i>gracilis</i>		Amaranthaceae		
<i>Galium</i>	<i>palustre</i>		Rubiaceae		
<i>Gamolepis</i>	<i>chrysanthemoides</i>		Asteraceae		
<i>Gazania</i>	<i>linearis</i>		Asteraceae		
<i>Genista</i>	<i>sp.</i>	<i>G. monspessulana</i> X <i>G. sp.</i>	Fabaceae		
<i>Genista</i>	<i>tinctoria</i>	ssp. <i>depressa</i>	Fabaceae		
<i>Geranium</i>	<i>palmatum</i>		Geraniaceae		
<i>Geranium</i>	<i>rubescens</i>		Geraniaceae		
<i>Gladiolus</i>	<i>cardinalis</i>		Iridaceae		
<i>Gladiolus</i>	<i>natalensis</i>		Iridaceae		
<i>Gloriosa</i>	<i>superba</i>		Colchicaceae		
<i>Glyceria</i>	<i>plicata</i>		Poaceae		
<i>Gymnocoronis</i>	<i>spilanthoides</i>		Asteraceae		
<i>Helianthus</i>	<i>debilis</i>		Asteraceae		
<i>Hovenia</i>	<i>dulcis</i>		Rhamnaceae		
<i>Hura</i>	<i>crepitans</i>		Euphorbiaceae		
<i>Hyacinthoides</i>	<i>hispanica</i>		Hyacinthaceae		
<i>Hyacinthoides</i>	<i>non-scripta</i>		Hyacinthaceae		
<i>Hydrocleys</i>	<i>nymphoides</i>		Limncharitaceae		
<i>Hydrocotyle</i>	<i>ranunculoides</i>		Apiaceae		

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<i>Hymenachne</i>	<i>amplexicaule</i>		Poaceae		
<i>Hymenocallis</i>	<i>caribea</i>		Amaryllidaceae		
<i>Hypericum</i>	<i>grandifolium</i>		Clusiaceae		
<i>Hyptis</i>	<i>pectinata</i>		Lamiaceae		
<i>Indigofera</i>	<i>decora</i>		Fabaceae		
<i>Indigofera</i>	<i>oblongifolia</i>		Fabaceae		
<i>Ipomoea</i>	<i>alba</i>		Convolvulaceae		
<i>Iris</i>	<i>orientalis</i>		Iridaceae		
<i>Iris</i>	<i>pseudacorus</i>		Iridaceae		
<i>Iris</i>	<i>spuria</i>		Iridaceae		
<i>Iris</i>	<i>xiphium</i>		Iridaceae		
<i>Ixia</i>	<i>longituba</i>		Iridaceae		
<i>Ixia</i>	<i>viridiflora</i>		Iridaceae		
<i>Juglans</i>	<i>regia</i>		Juglandaceae		
<i>Juncus</i>	<i>acuminatus</i>		Juncaceae		
<i>Juncus</i>	<i>conglomeratus</i>		Juncaceae		
<i>Juncus</i>	<i>fontanesii</i>	<i>ssp. fontanesii</i>	Juncaceae		
<i>Juncus</i>	<i>indescriptus</i>		Juncaceae		
<i>Juncus</i>	<i>inflexus</i>		Juncaceae		
<i>Juncus</i>	<i>nodosus</i>		Juncaceae		
<i>Juncus</i>	<i>squarrosus</i>		Juncaceae		
<i>Juniperus</i>	<i>virginiana</i>		Cupressaceae		
<i>Kniphofia</i>	<i>uvaria</i>		Asphodelaceae		
<i>Kochia</i>	<i>scoparia</i>	<i>var. scoparia</i>	Chenopodiaceae		
<i>Lachenalia</i>	<i>bulbifera</i>		Hyacinthaceae		
<i>Lachenalia</i>	<i>mutabilis</i>		Hyacinthaceae		
<i>Lagarosiphon</i>	<i>major</i>		Hydrocharitaceae		
<i>Lamium</i>	<i>galeobdolon</i>	<i>forma argentatum</i>	Lamiaceae		
<i>Lathyrus</i>	<i>odoratus</i>		Fabaceae		
<i>Lathyrus</i>	<i>sativus</i>		Fabaceae		
<i>Lilium</i>	<i>lanceifolium</i>		Liliaceae		
<i>Linaria</i>	<i>sp.</i>		Scrophulariaceae		
<i>Linum</i>	<i>bienne</i>		Linaceae		
<i>Lobelia</i>	<i>erinus</i>		Lobeliaceae		
<i>Lotus</i>	<i>creticus</i>		Fabaceae		
<i>Ludwigia</i>	<i>longifolia</i>		Onagraceae		
<i>Ludwigia</i>	<i>peruviana</i>		Onagraceae		
<i>Lupinus</i>	<i>polyphyllus</i>		Fabaceae		
<i>Mahonia</i>	<i>leschenaultii</i>		Berberidaceae		
<i>Malcolmia</i>	<i>africana</i>		Brassicaceae	Nil to date	APCC records
<i>Manihot</i>	<i>flabellifolium</i>		Euphorbiaceae		
<i>Maurandya</i>	<i>barclaiana</i>		Scrophulariaceae		
<i>Medicago</i>	<i>arborea</i>		Fabaceae		
<i>Monolepis</i>	<i>spathulata</i>		Chenopoliaceae		
<i>Moraea</i>	<i>aristata</i>		Iridaceae		
<i>Mucuna</i>	<i>pruriens</i>	<i>ssp. pruriens var. utilis</i>	Fabaceae		
<i>Murraya</i>	<i>paniculata</i>		Rutaceae		
<i>Nandina</i>	<i>domestica</i>		Nandinaceae		
<i>Narcissus</i>	<i>pseudonarcissus</i>		Amaryllidaceae		
<i>Nassella</i>	<i>charruana</i>		Poaceae		
<i>Nerine</i>	<i>filifolia</i>		Amaryllidaceae		
<i>Oenanthe</i>	<i>pimpinelloides</i>		Apiaceae	~\$500,000	APCC records
<i>Opuntia</i>	<i>bergeriana</i>		Cactaceae		
<i>Opuntia</i>	<i>erinacea</i>		Cactaceae		
<i>Opuntia</i>	<i>leucotricha</i>		Cactaceae		
<i>Opuntia</i>	<i>lindheimeri</i>		Cactaceae		
<i>Opuntia</i>	<i>pachypus</i>		Cactaceae		
<i>Opuntia</i>	<i>phaeacantha</i>		Cactaceae		
<i>Opuntia</i>	<i>schickendantzii</i>		Cactaceae		
<i>Opuntia</i>	<i>tunicata</i>		Cactaceae		
<i>Ornithogalum</i>	<i>longibracteatum</i>		Hyacinthaceae		
<i>Osteospermum</i>	<i>fruticosum</i>		Asteraceae		
<i>Oxalis</i>	<i>obtusa</i>		Oxalidaceae		
<i>Panicum</i>	<i>racemosum</i>		Poaceae		
<i>Paspalum</i>	<i>virgatum</i>		Poaceae		
<i>Pelargonium</i>	<i>alchilleoides</i>		Geraniaceae		
<i>Pelargonium</i>	<i>quercifolium</i>		Geraniaceae		
<i>Peperomia</i>	<i>pellucida</i>		Piperaceae		

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<i>Phoenix</i>	<i>canariensis</i>		Arecaceae		
<i>Phormium</i>	<i>tenax</i>		Agavaceae		
<i>Photinia</i>	<i>serratifolia</i>		Malaceae		
<i>Phyllostachys</i>	<i>aurea</i>		Poaceae		
<i>Picea</i>	<i>sp.</i>		Pinaceae		
<i>Pinus</i>	<i>canariensis</i>		Pinaceae		
<i>Pinus</i>	<i>contorta</i>		Pinaceae		
<i>Pinus</i>	<i>elliotii</i>		Pinaceae		
<i>Pinus</i>	<i>pinea</i>		Pinaceae		
<i>Piptochaetium</i>	<i>montevicense</i>		Poaceae		
<i>Pistacia</i>	<i>chinensis</i>		Anacardiaceae		
<i>Pithecoctenium</i>	<i>cyanchoides</i>		Bignoniaceae		
<i>Pittosporum</i>	<i>crassifolium</i>		Pittosporaceae		
<i>Pittosporum</i>	<i>eugenoides</i>		Pittosporaceae		
<i>Pittosporum</i>	<i>teniifolium</i>		Pittosporaceae		
<i>Plantago</i>	<i>arenaria</i>		Plantaginaceae		
<i>Plantago</i>	<i>australis</i>		Plantaginaceae		
<i>Plantanus</i>	<i>x acerifolia</i>		Plantanaceae		
<i>Plectranthus</i>	<i>ciliatus</i>		Lamiaceae		
<i>Plectranthus</i>	<i>ecklonii</i>		Lamiaceae		
<i>Podalyria</i>	<i>sericea</i>		Fabaceae		
<i>Polypogon</i>	<i>chilensis</i>		Poaceae		
<i>Populus</i>	<i>tremula</i>		Salicaceae		
<i>Populus</i>	<i>x jackii</i>		Salicaceae		
<i>Praxelis</i>	<i>clematidea</i>		Asteraceae		
<i>Prunus</i>	<i>lusitanica</i>		Amygdalaceae		
<i>Prunus</i>	<i>mahaleb</i>		Amygdalaceae		
<i>Prunus</i>	<i>spinosa</i>		Amygdalaceae		
<i>Pseudotsuga</i>	<i>menziesii</i>		Pinaceae		
<i>Pyracantha</i>	<i>koidzumii</i>		Malaceae		
<i>Quercus</i>	<i>canariensis</i>		Fagaceae		
<i>Quercus</i>	<i>suber</i>		Fagaceae		
<i>Reseda</i>	<i>phyteuma</i>		Resedaceae	\$231,680	APCC records
<i>Ribes</i>	<i>sanguineum</i>		Grossulariaceae		
<i>Romneya</i>	<i>trichocalyx</i>		Papaveraceae		
<i>Romulea</i>	<i>rosea</i>	<i>var. reflexa</i>	Iridaceae		
<i>Rotala</i>	<i>rotundifolia</i>		Lythraceae		
<i>Rubus</i>	<i>pyramidalis</i>		Rosaceae		
<i>Ruschia</i>	<i>decumbens</i>		Aizoaceae		
<i>Ruta</i>	<i>graveolens</i>		Rutaceae		
<i>Salix</i>	<i>alba</i>	<i>X S. matsudana</i>	Salicaceae		
<i>Salix</i>	<i>alba</i>	<i>var. vitellina</i>	Salicaceae		
<i>Salix</i>	<i>fragilis</i>	<i>var. fragilis X S. nigra</i>	Salicaceae		
<i>Salix</i>	<i>fragilis</i>	<i>var. furcata</i>	Salicaceae		
<i>Salix</i>	<i>humboldtiana</i>	<i>var. pyramidalis</i>	Salicaceae		
<i>Salix</i>	<i>matsudana</i>	<i>cv. 'Tortuosa'</i>	Salicaceae		
<i>Salix</i>	<i>matsudana</i>	<i>X chrysochroma</i>	Salicaceae		
<i>Salix</i>	<i>nigra</i>		Salicaceae		
<i>Salix</i>	<i>purpurea</i>		Salicaceae		
<i>Salix</i>	<i>X pendulina</i>		Salicaceae		
<i>Salix</i>	<i>X reichardtii</i>		Salicaceae		
<i>Salix</i>	<i>X rubra</i>		Salicaceae		
<i>Salix</i>	<i>X sepulcralis</i>	<i>var. sepulcralis</i>	Salicaceae		
<i>Salix</i>	<i>X sepulcralis</i>	<i>var. chrysocoma</i>	Salicaceae		
<i>Sanchezia</i>	<i>parvibracteata</i>		Acanthaceae		
<i>Schoenoplectus</i>	<i>californicus</i>		Cyperaceae		
<i>Scirpus</i>	<i>pendulus</i>		Cyperaceae		
<i>Sedum</i>	<i>fosterianum</i>		Crassulaceae		
<i>Sedum</i>	<i>reflexum</i>		Crassulaceae		
<i>Senecio</i>	<i>glastifolius</i>		Asteraceae		
<i>Setaria</i>	<i>poiretiana</i>		Poaceae		
<i>Silene</i>	<i>diocia</i>		Caryophyllaceae		
<i>Silene</i>	<i>tridentata</i>		Caryophyllaceae		
<i>Sisyrinchium</i>	<i>sp.</i>		Iridaceae		
<i>Solanum</i>	<i>abutiloides</i>		Solanaceae		
<i>Spathodea</i>	<i>campanulata</i>		Bignoniaceae		
<i>Spiraea</i>	<i>cantonensis</i>		Malaceae		
<i>Stylosanthes</i>	<i>hamata</i>		Fabaceae		

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<i>Stylosanthes</i>	<i>scabra</i>		Fabaceae		
<i>Stylosanthes</i>	<i>viscosa</i>		Fabaceae		
<i>Succowia</i>	<i>balaerica</i>		Brassicaceae		
<i>Synadenium</i>	<i>grantii</i>		Euphorbiaceae		
<i>Tamarix</i>	<i>ramosissima</i>		Tamaricaceae		
<i>Tecoma</i>	<i>capensis</i>		Bignoniaceae		
<i>Teesdalia</i>	<i>nudicaulis</i>		Brassicaceae		
<i>Tephrosia</i>	<i>inandensis</i>		Fabaceae		
<i>Teucrium</i>	<i>scorodonia</i>		Lamiaceae		
<i>Thunbergia</i>	<i>laurifolia</i>		Acanthaceae		
<i>Tordylium</i>	<i>apulium</i>		Apiaceae		
<i>Torilis</i>	<i>arvensis</i>		Apiaceae		
<i>Trachycarpus</i>	<i>fortunei</i>		Arecaceae		
<i>Trachystemon</i>	<i>orientalis</i>		Boraginaceae		
<i>Tragopogon</i>	<i>hybridus</i>		Asteraceae		
<i>Trianoptiles</i>	<i>solitaria</i>		Cyperaceae		
<i>Tribolium</i>	<i>echinatum</i>		Poaceae		
<i>Trifolium</i>	<i>uniflorum</i>		Fabaceae		
<i>Trifolium</i>	<i>vesiculosum</i>		Fabaceae		
<i>Ulmus</i>	<i>procera</i>		Ulmaceae		
<i>Veronica</i>	<i>scutellata</i>		Scrophulariaceae		
<i>Washingtonia</i>	<i>filifera</i>		Arecaceae		
<i>Washingtonia</i>	<i>robusta</i>		Arecaceae		
<i>Watsonia</i>	<i>aletroides</i>		Iridaceae		
<i>Wedelia</i>	<i>trilobata</i>		Asteraceae		

5. Discussion and conclusions

This report concerns changes in the rate of naturalisation of plant taxa in Australia over the last 25 years. It shows that:

- 1) 295 plant taxa are known to have naturalised between 1971 and 1995;
- 2) the rate of naturalisation has increased for the period 1981–1995;
- 3) those taxa which have naturalised have their origins equally in Africa, the Americas and Europe;
- 4) most recently naturalised taxa are still only locally distributed;
- 5) the majority of recently naturalised taxa have been introduced deliberately and usually legally;
- 6) the direct costs of these recent incursions are known in only very few instances; and
- 7) the environmental costs of these recent incursions are unknown and little studied.

The incursion process for any plant taxon may be subdivided into three phases — introduction, colonisation and naturalisation. Concerning the introduction phase, very little is known in a quantitative sense concerning the number of taxa which are introduced to Australia each year. We have not asked AQIS whether their data base can provide the number of all plant taxa known to have been introduced over the last 25 years, but we doubt that such information is available. A small proportion of the total number of plant taxa are introduced for the purposes of research or initial trial propagation; for the two-year period 1994–95, these totalled 2441 accessions, not all of which were necessarily ‘new’ incursions (Orr *et al.* 1996). If we accept the proposition of Groves (1986b) that for every 100 species introduced only 10% will become naturalised, then on the basis of our results for naturalised species, it may be assumed that at least 3000 new species were introduced over the last 25 years. The total number of introductions will also include introductions of species or taxa already in the country. We have already pointed to the existence of differentially

weedy genotypes in some species such as *Chromolaena odorata* and *Kochia scoparia* (see Chapter 4). The proportion of new introductions which are different genotypes of the same species already in Australia is unknown; they comprise yet another (and probably significant) component of the total number of introductions. We conclude that the number of taxa known to have naturalised is probably only a small proportion of the total number of introductions over the last 25 year period and may be less than the 10% previously hypothesised.

Although this report is necessarily concerned with the dates of naturalisation of plant taxa (because those are the only reliable data available), some have been introduced and gone on to become naturalised over the last 25 years. Several of these incursions are known to be major weeds world-wide. Direct costs of their early detection, containment and eradication are available for only a few of these introductions (see Chapter 4). Such incursions, albeit numerically few, nevertheless have the potential to contribute in a major way to the total costs of weeds to the Australian economy. Their ultimate eradication will be cost-effective and the political and administrative arrangements currently in place to share those direct costs seem to be working well.

Some of the recently naturalised plant taxa listed in Table 1 have been introduced — and introduced deliberately — since 1971. The majority of recent weed incursions have, however, been introduced prior to 1971. The sequence of events between their dates of introduction and their dates of naturalisation will probably be unique for each species and is available only rarely. More research on the history of individual weed incursions is needed to refine some of the data we have been able to assemble. Such research requires skills in the taxonomy of weedy species as well as in historical scholarship (but see Michael 1964 for an example of such a blending of skills).

A generalised ‘ideotype’ for a recently naturalised plant species will include recognition of the following features:

- 1) the species is widely distributed and taxonomically variable in its region of origin;

- 2) its taxonomy is poorly-known and there will be few collections available for study in herbaria;
 - 3) it has been introduced to Australia deliberately for ornamental horticulture;
 - 4) there have been multiple introductions of the species over time and naturalisation of the different introductions has occurred in different regions of Australia;
 - 5) the period between introduction and naturalisation will vary with each species; and
 - 6) environmental costs of the naturalised flora will be greater than their direct costs to agriculture but will only rarely be assessable at this stage of our knowledge.
- These features, common to most of the plants naturalised over the last 25 years, makes interpretation of the results presented in this report both difficult and species- or taxon- specific. For these and other reasons, the recent incursions of weeds must be considered separately from recent incursions of other pests. The fact that the rate of naturalisation of weedy taxa has increased recently (Figure 4) highlights the importance of commissioning a follow-up similar study in ten or so years' time.
- In the meantime, progressive refinements of the system for screening the weed potential of plant introductions to Australia (in this regard, see Panetta *et al.* 1994 and Pheloung 1995), together with an increase in the number of economic analyses of all weeds, but especially of environmental weeds, and refinement of the methodologies used in those analyses, may help to reduce the number of future weed incursions and, hopefully, the costs of those incursions to the Australian economy.

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8. Appendix 1 - Checklist of the introduced taxa naturalised in Australia 1971 - 1995.

Notes and distribution details are from many sources. Most of the taxa listed are based on herbarium records and many of the personal communications are based on plant specimens which are to be lodged in herbaria in the future. The main source of information for the first date of naturalisation of a taxon is based on herbarium specimens. This report would not have been possible without assistance from the staff of the following herbaria: the National Herbarium of New South Wales, Sydney (NSW), the National Herbarium of Victoria, Melbourne (MEL), the Tasmanian Herbarium, Hobart (HO), the Western Australian Herbarium, Perth (PERTH), the Queensland Herbarium, Brisbane (BRI), the Northern Territory Herbarium, Darwin (DNA), the State Herbarium of South Australia, Adelaide (AD), the Australian National Herbarium, Canberra (CANB), the New England Herbarium, Armidale (NE) and the Queensland Research Station, Atherton (QRS). The names listed in brackets are used when referring to specimens held at these herbaria. Distribution of naturalised taxa is based on Hnatiuk (1990), knowledge of the authors and information supplied by the herbaria listed above and information being used to prepare a weed book authored by G. Sainty *et al.*. This latter source has also been used to prepare some of the notes. Other notes are based on information supplied by those preparing this preceding report and from records of the Australian Weeds Committee.

The botanical regions listed for the distribution (Distrib:) for Australian states are based on those used in Hnatiuk (1990) except for Western Australia where the regions are the IBRA regions used by Environment Australia (and also used by PERTH).

Whilst every effort has been made to make this checklist as accurate as possible there are sure to be references and specimens overlooked and inaccuracies due to problems with weed taxonomy (Hosking *et al.* 1996). Updates and corrections will be welcomed.

8.1 Taxa first recorded as naturalised between 1971 and 1995 (inclusive - with notes on naturalisations during part of 1996)

FERNS

EQUISETACEAE

Equisetum arvense HORSETAIL. Native of S Afr., Eur., Asia, N Amer. First definite record of naturalisation appears to be November 1989 (NSW specimen) at Belrose, Sydney (first NSW specimen is for 1927 at the Barrington Tops without any additional information - possibly only a pot plant at this time). Not listed in Hnatiuk (1990). Introduced as an ornamental. Notes: A garden escape that is extremely difficult to eradicate, especially in rocky soils. In Sydney it dies back in winter. Has potential to be a serious weed in Aust. Poisonous to livestock; contains equisetine, a toxic alkaloid that causes equisetosis. Introduced to NZ c. 1910, where there are now localised colonies up to 200 ha. Major weed in northern hemisphere and recorded by Holm *et al.* (1977) as one of the world's worst weeds. Spread continues in NSW. To date \$10 000 has been spent by NSW Agriculture on control of this fern. Occasionally sold as an ornamental. Detected for first time in Queensland at the Mt. Coot-tha Botanic Gardens (Brisbane) on 20 June 1996 (by Warwick Wright). Origin of the Mt Coot-tha plants is unknown as yet (may have been imported as a garden ornamental, either from overseas or interstate sources). The Botanic Gardens have been requested to remove the plant. It is suspected that *Equisetum* species are used as 'medicinal herbs' and other introductions may have been made for this purpose (S. Csurhes pers. comm.). See Parsons and Cuthbertson (1992) for more information on this species. #Noxious in Qld, NSW, Tas and SA. Distrib: Localised. Qld (Moreton), NSW (CC - naturalised in Sydney).

Equisetum hiemale [*Equisetum hymenale*] Native of N Amer. First recorded as spreading from existing plantings in NSW around start of 1995 (species identified by National Herbarium of NSW). Not listed in Hnatiuk (1990). Introduced as an

ornamental. Notes: The species was planted in a park at Taree on the NSW north coast and started spreading through the adjacent lawn area prior to removal. No longer naturalised at this location? Also found in a house garden in Deloraine, Tas, in 1991 (HO specimen). Other species were recently being sold by nurseries in NSW but the entire genus is now declared noxious throughout NSW. Distrib: Localised. NSW (?NC).

CONIFERS

CUPRESSACEAE

Cupressus glabra Native of Arizona. First recorded as naturalised in Vic in 1987 (G. Carr pers. comm.). Introduced as an ornamental. Notes: Naturalised near Geelong, Benambra (NE Vic) and near Foster (S. Gippsland, Vic) etc. A minor environmental weed. Obviously present for a long time prior to the first report of naturalisation. Distrib: Localised. Vic (NPTWJ).

Cupressus macrocarpa MONTEREY CYPRESS. Native of Calif. Obviously present for a long time and first recorded as naturalised at Anglesea, Vic in 1973 (G. Carr pers. comm.). Present but not considered to be naturalised in Vic in 1970 (Willis 1970). Recorded from Badger Island, Chappell Group, Tas associated with ruins of a house (HO specimen). Introduced as an ornamental. Notes: Planted as a windbreak in southern Aust. A relatively minor environmental weed in Vic (Carr *et al.* 1992). Distrib: Widespread but fairly small populations; Vic (EKNPT), Tas (North-eastern).

Juniperus virginiana [*Sabina virginiana*] Native of eastern N Amer. First recorded as naturalised in 1985 (NE specimen from J.R. Hosking - possibly retained by NSW). Introduced as an ornamental. Notes: Naturalised at a number of locations in Oxley Park, Tamworth (J. Hosking pers. comm. and NE specimens). Distrib: Localised. NSW (NWS).

Juniperus sp. JUNIPER. (awaiting identification) Native of ? First recorded as naturalised in Vic in 1996 (D. Cameron pers. comm.). Introduced as an ornamental. Notes: Rarely planted. Naturalised from Castlemaine Botanic Garden and obviously present for a long time prior to the first report of naturalisation. A minor environmental weed. Distrib: Localised. Vic (N).

PINACEAE

Many species are probably recently recorded as naturalised although they have been naturalised for many years.

Abies sp. FIR. Native of ? First recorded as naturalised in Vic in 1995 (G. Carr pers. comm.). Introduced as an ornamental and for timber. Not listed in Hnatiuk (1990). Notes: Naturalised at Mt Macedon, Vic. Distrib: Localised. Vic (N).

Picea sp. FIR. Native of ? First recorded as naturalised in Vic in 1995 (G. Carr pers. comm.). Not listed in Hnatiuk (1990). Introduced as an ornamental and for timber. Notes: Naturalised at Mt Macedon, Vic. Distrib: Localised. Vic (N).

Pinus brutia TURKISH PINE. Native of E Mediterranean to Black Sea. First recorded as naturalised in Vic in 1996 (G. Carr & V. Stajsic pers. comm.). Not listed in Hnatiuk (1990). Introduced as an ornamental. Notes: Naturalised from plantings at Castlemaine Botanic Gardens, Vic. Distrib: Localised and population small. Vic (N).

Pinus canariensis CANARY ISLANDS PINE. Native of Canary Islands. Present for a long time but became naturalised only in early 1970s, first recorded naturalised at Geelong in 1974 (G. Carr pers. comm.). Introduced as an ornamental and for timber. Notes: Widespread but populations small; a minor environmental weed. Distrib: Localised; noted at Geelong, Jolimont (Melbourne), Rockbank and between Dunkeld and Lake Bolac. Vic (JNP).

Pinus contorta LODGEPOLE PINE. Native of NW Amer. First recorded as naturalised in NSW in 1994 (NSW specimen). Not listed in Hnatiuk (1990). Introduced for forestry. Notes: Not widely planted but very efficient invader of native forest. Obviously present for some time before first record of naturalisation. Distrib: Localised. NSW (ST).

Pinus elliotii SLASH PINE. Native of SE USA, C Amer., W Indies. Recorded from Qld in 1978 (BRI specimen - likely to be naturalised at this time but no specimens from Qld indicating that this pine has definitely naturalised). First recorded as naturalised in NSW in 1987 (NSW specimen - recorded as a new record for NSW in the 1989-90 annual report of the National Herbarium of NSW). Obviously present for a long time before it was first recorded as naturalised. Not listed in Hnatiuk (1990). Introduced for forestry. Notes: Plantations established in warmer coastal

areas. Naturalised in surrounding native forest due to its prolific seeding. This species is known to hybridise with *Pinus caribaea*. Distrib: Localised. Qld (Darling Downs, Moreton, Wide Bay), NSW (NC).

Pinus patula Native of Mexico. First recorded as naturalised in Vic in 1996 (G. Carr & V. Stajsic pers. comm.). Not listed in Hnatiuk (1990). Introduced for forestry. Notes: Naturalised at Mt Macedon, Vic. Distrib: Localised. Vic (N).

Pinus pinea STONE PINE. Native of Medit. First recorded as naturalised in Vic in 1983 (G. Carr pers. comm.). First recorded as naturalised in WA in 1985 (PERTH specimen). Not listed in Hnatiuk (1990). Introduced as an ornamental and for timber. Notes: Recorded as escaping from a windbreak in WA. A minor environmental weed in Vic (G. Carr pers. comm.). Distrib: Localised with very small populations in Vic (Barrabool Hills, Greenvale (Woodlands Historic Park) and Castlemaine). Vic (NP), WA (ESP).

Pinus sabiniana DIGGER PINE. Native of Western USA. First recorded as naturalised in Vic in 1996 (G. Carr & V. Stajsic pers. comm.). Introduced as an ornamental. Notes: Naturalised at Castlemaine from old plantings in Castlemaine Botanic Garden, Vic. Not naturalised for decades after planting. A minor environmental weed. Distrib: Localised. Vic (N).

Pseudotsuga menziesii DOUGLAS FIR. Native of British Columbia to California. First recorded as naturalised in Vic in 1995 (G. Carr pers. comm.). Not listed in Hnatiuk (1990). Introduced for forestry trial. Notes: Naturalised at Mt Macedon, Vic after 1983 Ash Wednesday fire; population small and localised. Distrib: Localised. Vic (N).

MONOCOTYLEDONS

AGAVACEAE

Agave sisalana SISAL. Native of Mexico. First recorded in Qld in 1973 (BRI specimen - probably from naturalised plants). First recorded as naturalised in WA in 1986 (PERTH specimen). Anecdotal reports suggest that it was widely planted on islands off eastern Cape York Peninsula (also Torres Strait) last century to provide a source of fibre, so that crews on passing ships could mend their sails (B. Waterhouse pers. comm.). Introduced for fibre production. Notes: Leaves source of fibre for cord and string, and woven

into coarse material for sacks etc. Escape from plantings at Rottneest Island. First recorded as naturalised on Rottneest Island in 1986 but obviously present for a long time (G. Keighery pers. comm.). Eradicated 1990 (Keighery 1993). Species rarely collected for herbaria as it is a large species and is difficult to dry. Distrib: Localised. Qld (Cook, Darling Downs, Leichhardt, Moreton, North Kennedy, Port Curtis), WA (SWA).

Cordyline australis NEW ZEALAND CABBAGE TREE. Native of New Zealand. First recorded as naturalised in Vic in 1989 (G. Carr pers. comm.). Introduced as an ornamental. Notes: Naturalised at Knox (Melbourne), Apollo Bay, Gladysdale (Yarra Valley), Portland, Gipsy Point, East Gippsland, Vic, and many other locations but populations small; a potentially serious environmental weed (Carr *et al.* 1992). Distrib: Localised. Vic (EKNS).

Phormium tenax NEW ZEALAND FLAX. Native of New Zealand, Norfolk Is. First recorded as naturalised in Tas in 1984 (HO specimen). Not listed in Hnatiuk (1990). Introduced as an ornamental. Notes: Occasionally grown as an ornamental (Curtis and Morris 1994). Naturalised in sand dunes on both banks of Bream Creek, Tas (HO herbarium specimen). This species persists in old gardens but was not considered naturalised in George (1986). Distrib: Localised. Tas (North-eastern).

AMARYLLIDACEAE

Hymenocallis caribaea SPIDER LILY. Native of West Indies. First recorded as naturalised in NSW in 1978 (NSW specimen). First recorded as naturalised in WA in 1994 (PERTH specimen). Introduced as an ornamental. Notes: Well established and seeding in the karri forest, Woodmans Point, WA. Distrib: Localised. NSW (NC), WA (SWA).

Narcissus pseudonarcissus DAFFODIL. Native of W Eur. First recorded as naturalised in WA in 1981 (PERTH specimen). First recorded as naturalised in Vic in early 1980s (G. Carr pers. comm.). Recorded as persisting but not naturalised in Tas (Curtis and Morris 1994). No specimens at NSW. Introduced as an ornamental. Notes: Commonly cultivated, occasionally naturalised. Distrib: Localised. NSW (CC), Vic – widespread but localised as a predominantly vegetative garden escape (DNST), Tas (North-eastern), WA (JF).

Nerine filifolia. Native of S Afr. First recorded specimen at NSW was collected in 1904 (grown at the Botanic Gardens, Sydney). First recorded as naturalised in NSW in 1987 (NSW specimen - recorded as a new record for NSW in the 1992-93 annual report of the National Herbarium of NSW). Not listed in Hnatiuk (1990). Introduced as an ornamental. Notes: Distrib: Localised. NSW (CWS).

ARACEAE

Arisarum vulgare subsp. *vulgare* Native of Medit. First recorded as naturalised in SA in 1982 (Kloot 1986). Introduced as an ornamental. Notes: Recorded as a garden weed in Adelaide. Distrib: Localised. SA (SL).

ARECACEAE

Phoenix canariensis CANARY ISLAND DATE PALM. Native of Canary Islands. First recorded as naturalised in Vic at Natimuk in 1976 (G. Carr pers. comm.). First recorded as naturalised in NSW in 1988 (NSW specimen). Not listed in Hnatiuk (1990). Introduced as an ornamental. Notes: Valuable decorative palm. May become home to rats, sparrows and starlings. Occasionally naturalised in disturbed areas. Obviously present for a long time prior to the first record of naturalisation. A minor environmental weed in Vic (Carr *et al.* 1992). Distrib: Localised. Vic – widespread but populations mostly small, e.g. Geelong, Melbourne, Mildura, Swan Hill, Natimuk and Portland (ECFGHJNPX), NSW (CC).

Trachycarpus fortunei CHINESE FAN PALM, CHUSAN PALM. Native of subtropical Asia. First recorded as naturalised in Vic in 1991 (G. Carr pers. comm.). Not listed in Hnatiuk (1990). Introduced as an ornamental. Notes: Common ornamental in temperate Australia. Naturalised at Healesville and Creswick, Vic. Distrib: Localised. Vic (JS).

Washingtonia filifera AMERICAN COTTON PALM. Native of SE USA, Mexico. First recorded as naturalised in Vic in 1981 (G. Carr pers. comm.). Not listed in Hnatiuk (1990). Introduced as an ornamental. Notes: Common ornamental from tropics to temperate areas in Australia. Naturalised at Lake Washpool, Vic. Distrib: Localised. Vic (S).

Washingtonia robusta FAN PALM, WASHINGTON PALM. A native of N Amer. First recorded as naturalised in 1990 (PERTH specimen) but from size

of palms they have been present for a long time. The species was included in a plant list for the area in 1980 but without a voucher specimen being lodged at the herbarium in Perth (G. Keighery pers. comm.). Not listed in Hnatiuk (1990). Introduced as an ornamental. Notes: Competes with a rare native palm, *Livistonia alfredii*, in Millstream National Park, WA. Distrib: Localised. WA (PIL).

ASPARAGACEAE [often part of Liliaceae]

Asparagus africanus [*Protasparagus africanus*] Native of S Afr. First recorded as naturalised in Qld in 1976 (BRI specimen). First recorded as naturalised in NSW in 1981 (NSW specimen - recorded as a new record for NSW in the 1989-90 annual report of the National Herbarium of NSW). Introduced as an ornamental. Notes: Garden escape occasionally naturalised in coastal areas. Anecdotal information suggests that this species was present during World War II in the Ipswich area (T. Stanley pers. comm.). Distrib: Localised. Qld (Burnett, Moreton, Wide Bay), NSW (NC).

ASPHODELACEAE

Aloe cameronii Native of Afr. First recorded as naturalised in Qld in 1991 (Forster 1992). Not listed in Hnatiuk (1990). Introduced as an ornamental. Notes: Naturalised between Brisbane and Ipswich where garden rubbish has been dumped and unlike most naturalised species of *Aloe* this species produces copious seed (Forster 1992). Distrib: Localised. Qld (Moreton).

Aloe parvibracteata Native of southern Afr. Date first recorded as naturalised? Introduced as an ornamental. Notes: Naturalised on road cuttings in suburban Brisbane. Distrib: Localised. Qld (Moreton).

Aloe saponaria var. *ficksburgensis* Native of S Afr. First recorded as naturalised in Qld in 1984 (Forster 1988). Introduced as an ornamental. Notes: Occupying several hundred square metres under eucalypt open forest 15 km NNW of Murgon, Qld (Forster 1988). Distrib: Localised. Qld (Burnett).

Kniphofia uvaria RED HOT POKER. Native of S Afr. First recorded as naturalised in Vic in 1983 (G. Carr pers. comm., specimen at MEL collected in 1984). Not listed as naturalised in George (1986). First recorded as naturalised in NSW in 1986 (NSW specimen). Introduced as an ornamental. Notes: Widely

cultivated. Naturalised in rear-dune swales near the western tip of Phillip Island (Walsh and Entwisle 1994) and at Anglesea, Port Campbell and other southern locations in Vic (G. Carr pers. comm.). A minor environmental weed. Distrib: Localised. NSW (CT), Vic (KPT).

COLCHICACEAE

Gloriosa superba GLORY LILY. Native of Afr, Asia. First recorded as naturalised in NSW in 1972 (NSW specimen). First record in Qld is for 1972 (BRI specimen - probably naturalised at this time but no specimens of naturalised plants are obvious at BRI). Introduced as an ornamental. Notes: Prized ornamental, occasionally a garden escape. Known to be fatally toxic to humans; contains colchicine-like alkaloids in roots, stem, leaves and flowers (Everist 1981). Now a weed on sandy coastal soils, especially Moreton Island, Qld. Distrib: Localised. Qld (Moreton, Wide Bay), NSW (NC CC).

COMMELINACEAE

Commelina africana Native of S Afr. First recorded as naturalised in NSW in 1983 (NSW specimen). Not listed in Hnatiuk (1990). Introduced as an ornamental. Notes: Uncommon garden escape. Distrib: Localised. NSW (CC).

CYPERACEAE

Bulbostylis striatella Native of S Afr. First recorded as naturalised in NSW in 1987 (NSW specimen - listed as a new record for NSW in the 1989-90 annual report of the National Herbarium of NSW). Not listed in Hnatiuk (1990). Means of introduction unknown. Notes: Spreading along the New England Highway from Glen Innes to south of Guyra. Distrib: Localised. NSW (NT).

Carex arenaria Native of Eur. First recorded as naturalised in NSW in 1984 (NSW specimen). Not listed in Hnatiuk (1990). Means of introduction unknown. Notes: Uncommon. On sand dune at Hawks Nest. Distrib: Localised. NSW (NC).

Carex lepidocarpa Native of Eur. First recorded in Tas in 1971 (HO specimen). Not listed in Hnatiuk (1990). Means of introduction unknown. Notes: Herbarium specimens (HO) from Parangana Dam and a dam at Geeveston, both in Tas. Local on

roadsides in wet forests and montane heaths in the North West and South West of Tas (Curtis and Morris 1994). Distrib: Localised. Tas (Western and South Western).

Carex pilulifera Native of Eur. First recorded in Tas in 1994 (HO specimen). Not listed in Hnatiuk (1990). Means of introduction unknown. Notes: Extending over several metres, old tramline, Queenstown (details from herbarium specimens (HO)). Distrib: Localised. Tas (Western and South Western).

Carex punctata Native of Eur. First recorded as naturalised in Vic in 1982 (MEL specimen). Not listed in Hnatiuk (1990). Means of introduction unknown. Notes: Naturalised in the Powelltown-Neerim and Trentham areas (Walsh and Entwisle 1994) and first record from the Tarago – Latrobe State Forest (MEL specimen). Distrib: Localised. Vic (NST).

Carex scoparia Native of N Amer. First recorded as naturalised in Tas in 1984 (HO specimen). Not listed in Hnatiuk (1990). Means of introduction unknown. Notes: Collected from alluvial sand at the mouth of the Arthur River in North West Tas (Curtis and Morris 1994). Distrib: Localised. Tas (Western and South Western).

Carex testacea Native of NZ. First recorded as naturalised in Vic in 1983 (G. Carr pers. comm.). Not listed in Hnatiuk (1990). Introduced as an ornamental. Notes: Planted on roadsides as it is said to be tolerant of road pollution and dry to moist or brackish conditions (Curtis and Morris 1994). Parsons and Cuthbertson (1992) and Curtis and Morris (1994) suggest that the species could become invasive. G. Carr reports that this species was spreading from roadside plantings in Hawthorn, Vic in 1983. The plant has been collected from a native plant garden at Wonthaggi, Vic in 1994 but this specimen was thought to be of nursery origin (NSW specimen and letters with specimen). The species has not been recorded as spreading in Tas to date (D. Morris pers. comm.). Distrib: Localised. Vic (N).

Cyperus aromaticus NAVUA SEDGE. Native of trop. Afr. First recorded as naturalised in the Cairns area in 1979 (BRI specimen with duplicate at NSW). Also recorded from Kuranda in the same year (QRI specimen). Means of introduction unknown. Notes: Prolific seeder and this is main method of spread. Also transported by root pieces. Introduced to north coastal Qld in the late 1970s, and remains confined to that area. Aggressive in high rainfall areas. Can quickly form extensive colonies. Considered one of the worst weeds in Fiji and now a very common weed of roadsides in the moister areas from Cape

Tribulation south towards Innisfail, and near Kuranda as you approach the Atherton Tablelands (B. Waterhouse pers. comm.). #Noxious in Qld. Distrib: Increasing problem. Qld (Cook- centred on Babinda).

Cyperus vorsteri Native of S Afr. First recorded as naturalised in WA in 1979 (NSW specimen). First recorded as naturalised in NSW in 1991 (NSW specimen). Not listed in Hnatiuk (1990). Means of introduction unknown. Notes: Naturalised around Sydney. A potential problem (K. Wilson pers. comm.). Distrib: Localised. NSW (CC), WA (JF, SWA).

Eleocharis parodii Native of Argentina. First recorded as naturalised in NSW in 1977 (NSW specimen - listed as a new record for NSW in the 1983-84 annual report of the National Herbarium of NSW). Means of introduction unknown. Notes: Only recorded once from the Griffith area, where it was growing in a rice crop. Distrib: Localised. NSW (SWP).

Schoenoplectus californicus Native of N C & S Amer. First recorded as naturalised in NSW in 1981 (NSW specimen). Not listed in Hnatiuk (1990). Means of introduction unknown. Notes: Tolerant of brackish water and now thriving in tidal section of Williams River. Naturalised in the Williams River near Raymond Terrace, NSW. Distrib: Localised. NSW (NC).

Scirpus pendulus Native N Amer. First recorded as naturalised in Vic in 1979 (MEL specimen - duplicate at NSW). Means of introduction unknown. Notes: The only Australian record of this species is from the swampy verge of a domestic water-holding basin at Hamilton (MEL specimen). Attempts have been made to eradicate this plant and it may no longer occur in this area (Walsh and Entwisle 1994). A potentially serious environmental weed. Distrib: Localised. Vic (D).

Trianoptiles solitaria Native of S Afr. First recorded as naturalised in Vic in 1989 (MEL specimen). Not listed in Hnatiuk (1990). Means of introduction unknown. Notes: Known from a small urban reserve in the Melbourne suburb of Balwyn (Stajsic and Albrecht 1992, Walsh and Entwisle 1994). Resembles some small species of *Schoenus* (Walsh and Entwisle 1994). A potentially serious environmental weed. Distrib: Localised. Vic (N).

HAEMODORACEAE

Wachendorfia thyrsiflora Native of S Afr. First recorded as naturalised in Vic in 1996 (J. Hawker pers. comm.). Introduced as an ornamental. Notes: Recorded from Emerald, Vic (MEL specimen) where spreading abundantly around a dam and down a drainage line. The species has only recently become available in the horticultural trade (R. Spencer pers. comm.). Distrib: Localised. Vic (N).

HYACINTHACEAE

Hyacinthoides hispanica SPANISH BLUEBELL. Native of SE Eur, N Afr. First recorded as naturalised in Vic in 1994 (MEL specimen). Not recorded in George (1987) or Hnatiuk (1990). Introduced as an ornamental. Notes: Naturalised in Victoria at Ballarat (MEL specimen), Bright and many other locations. Distrib: Localised. Vic (JNPRS).

Hyacinthoides non-scripta Native of W Eur. First recorded as naturalised in Vic in 1995 (G. Carr pers. comm.). Not recorded in George (1987) or Hnatiuk (1990). Introduced as an ornamental. Notes: Several colour forms naturalised at Mt Macedon, Vic where locally abundant (G. Carr pers. comm.). Distrib: Localised. Vic (N).

Lachenalia bulbifera Native of S Afr. First recorded as naturalised in WA in 1979 (G. Keighery pers. comm.). First recorded as naturalised in SA in 1984 (AD specimen). Not in Kloot (1986) but in Jessop and Toelken (1986). Introduced as an ornamental. Notes: Established on vacant lots, road and rail verges throughout suburban Perth (G. Keighery pers. comm.). Distrib: Localised. SA (YP), WA (SWA).

Lachenalia mutabilis Native of S Afr. First recorded as naturalised in WA in 1990 (G. Keighery pers. comm.). Not listed in Hnatiuk (1990). Introduced as an ornamental. Notes: Recently spread from Botanic Garden under *Banksia* woodland in Kings Park, Perth. Distrib: Localised. WA (SWA).

Ornithogalum longibracteatum [*Ornithogalum caudatum*] PREGNANT ONION. Native of S Afr., trop. E Afr. First recorded as naturalised in NSW in 1983 (NSW specimen - listed as a new record for NSW in the 1983-84 annual report for the National Herbarium of NSW. First recorded as naturalised in Vic in 1983 (G. Carr pers. comm.). First recorded as naturalised in WA in 1989 (PERTH specimen). Not listed in George (1987). Only recorded for NSW in

Hnatiuk (1990). Introduced as an ornamental. Notes: Common ornamental. Willis (1970) lists this species as an occasional garden escape in Vic but he did not consider it to have naturalised. Recorded as "recently observed as a roadside weed near Bacchus Marsh, spreading rapidly via asexually produced bulbils" in Walsh and Entwisle (1994), also naturalised at Geelong, Lake Lonsdale and several other locations. Distrib: Localised. NSW (CC), Vic (JNP), WA (SWA).

HYDROCHARITACEAE

Lagarosiphon major LAGAROSIPHON. Native of southern Afr. Recorded from a farm dam in NSW in 1977 but now removed (Parsons and Cuthbertson 1992). Not known to be naturalised elsewhere in Australia. Introduced for aquaria. Notes: A hardy aquatic that can grow in deep clear water and clog intake valves of hydro-electric stations. Will withstand low light levels, and thrives in clear water to more than 6 m deep (at least 7 m in NZ). Recorded from aquaria and from a farm dam near Newcastle and in Vic., but not known to be naturalised. Also recorded from ornamental ponds in Hobart (Curtis and Morris 1994). #Noxious throughout Aust. Distrib: Localised. NSW (NC), Vic (N), Tas (North eastern).

IRIDACEAE

Aristea ecklonii Native of S and tropical W Afr. First recorded as naturalised in Vic in 1988 (G. Carr pers. comm.). First recorded as naturalised in NSW in 1990 (NSW specimen - listed as a new record for NSW in the 1991-92 annual report for the National Herbarium of NSW). Not listed in George (1986) or Hnatiuk (1990). Introduced as an ornamental. Notes: Occasional escape on neglected land. Distrib: Localised. NSW (CC), Vic (T).

Babiana tubulosa Native of S Afr. First recorded as naturalised in WA in 1988 (PERTH specimen). Not listed in George (1986) or Hnatiuk (1990). Introduced as an ornamental. Notes: Garden escape in urban bush, Bold Park, Perth (Keighery 1995). Distrib: Localised. WA (SWA).

Chasmanthe bicolor CHASMANTHE. Native of S Afr. First recorded as naturalised in SA (Kangaroo Island) in 1990 (G. Carr pers. comm.). Not recorded in George (1986) or Hnatiuk (1990). Introduced as an ornamental. Notes: An uncommon species in cultivation; naturalised over c. 5 ha at American River, Kangaroo Island, where extremely abundant. Small

populations recently recorded (1996) as naturalised at Ivanhoe, Vic, in several locations (G. Carr pers. comm.). Distrib: Localised. SA (KI), Vic (N).

Dietes robinsoniana WEDDING LILY. Native of Lord Howe Is. First cultivated specimen at NSW is for 1919 (cultivated at the Botanic Gardens, Sydney). Recorded as naturalised in NSW in ~1994 (G. Sainty pers. comm.). No specimens lodged at NSW. Not recorded in George (1986) or Harden (1993) but recorded in Hnatiuk (1990) for Lord Howe Island. Introduced to Australia as an ornamental. Notes: Occasional weed of urban bushland (G. Sainty pers. comm.). Distrib: Localised. NSW (CC).

Gladiolus cardinalis Native of S Afr. First recorded as naturalised in WA in 1980 (PERTH specimen). Introduced as an ornamental. Notes: Garden escape on road verges and wasteland in the Busselton area, WA (Keighery 1995). Distrib: Localised. WA (JF, WAR).

Gladiolus natalensis [*Gladiolus dalenii*] Native of S Afr. First recorded as naturalised in Vic in 1995 (R. Robinson pers. comm.). Not listed in George (1986) or Hnatiuk (1990). Introduced as an ornamental. Notes: Recorded from three locations at Cape Nelson near Portland, Vic (R. Robinson pers. comm.). Cultivated for many years as an ornamental. Distrib: Localised. Vic (E).

Iris orientalis Native to W Turkey, E Aegean Is. First recorded as naturalised in SA in 1978 (Kloot 1986). Introduced as an ornamental. Notes: A garden escape naturalised along streams in the Southern Lofty region of SA. Distrib: Localised. SA (SL).

Iris pseudacorus YELLOW WATER IRIS, YELLOW FLAG IRIS. Native of eastern Medit. First recorded as naturalised in Vic in 1988 (G. Carr pers. comm.). Not recorded as naturalised in Kloot (1986), George (1986) or Hnatiuk (1990). Introduced as an ornamental. Notes: Widely cultivated and naturalised locally along Yarra River in Melbourne. Grows in shallow water. Distrib: Localised. Vic (NP), SA (SL).

Iris spuria Native of Eur, Asia. First recorded as naturalised in Vic in 1980 (G. Carr pers. comm.). Not recorded as naturalised in George (1986), Hnatiuk (1990) or Walsh and Entwisle (1994). Introduced as an ornamental. Notes: Recorded from Portland and Ararat, Vic (G. Carr pers. comm.). Only small populations. Distrib: Localised. Vic (EJ).

Iris xiphium Native of SW Eur. First recorded as naturalised in SA in 1985 (Cooke 1987). Not recorded as naturalised in George (1986) or Hnatiuk (1990). Introduced as an ornamental. Notes: Recorded from Barossa, SA (Cooke 1987). Distrib: Localised. SA (NL).

Ixia longituba Native of S Afr. First recorded as naturalised in Vic in 1992 (Walsh and Entwisle 1994). Not listed in Hnatiuk (1990). Introduced as an ornamental. Notes: Locally naturalised in urban bushland in Blackburn, an eastern suburb of Melbourne (Walsh and Entwisle 1994). This species is possibly of hybrid origin as it differs from typical South African plants (Walsh and Entwisle 1994). Distrib: Localised. Vic (N).

Ixia viridiflora GREEN IXIA. Native of southern Afr. First recorded as naturalised in Vic in 1972 (G. Carr pers. comm.). Not recorded in Walsh and Entwisle (1994). Introduced as an ornamental. Notes: Garden ornamental. Recorded from Batesford in Vic (G. Carr pers. comm.). May be naturalised in SA (Jessop and Toelken 1986). Distrib: Localised. Vic (P), SA (?SL).

Moraea aristata Native of S Afr. First recorded as naturalised in SA in 1973 (Kloot 1986). Introduced as an ornamental. Notes: Naturalised on roadsides. Almost extinct in native Cape Province, South Africa. Distrib: Localised. SA (SL).

Romulea rosea var. *reflexa* COMMON ONION GRASS. Native of S Afr. Recorded as naturalised in Vic in 1987 (G Carr pers. comm.). Not recorded in Hnatiuk (1990) or as naturalised in Vic in Walsh and Entwisle (1994). Introduced as an ornamental. Notes: Recorded as a probable garden escape in Melbourne but not known to be naturalised in 1986 (George 1986). Recorded from Macleod, Melbourne (G. Carr pers. comm.). Extremely widespread and abundant in many locations in southern Vic where sympatric with *R. rosea* var. *australis*. Vic (DHJKNPS).

***Sisyrinchium* sp.** Native of N or S Amer. First recorded as naturalised in Vic in 1995 (G. Carr pers. comm.). Not listed in Hnatiuk (1990). The means of introduction is unknown and it has not been observed in cultivation. Notes: This species is awaiting identification but is not any of the known species of *Sisyrinchium* taxa so far recorded in Australia. Naturalised at Craigieburn, Vic (G. Carr pers. comm.). Distrib: Localised. Vic (N).

Watsonia aletroides Native of S Afr. First recorded as naturalised in WA in 1981 (PERTH specimen). First recorded as naturalised in Vic in 1989. Introduced as an ornamental. Notes: Species only described in 1989

(Walsh and Entwisle 1994). Naturalised locally on roadside near Benalla, Vic (Walsh and Entwisle 1994), and in Kings Park, Perth (Keighery 1995). Distrib: Localised. Vic (R), WA (SWA).

JUNCACEAE

Juncus acuminatus Native of N & S Amer. First recorded as naturalised in NSW in 1973 (NSW specimen). First recorded in Tas in 1974 (NSW specimen - earliest specimen at HO is for 1975). First recorded in Vic in 1980 (Walsh and Entwisle 1994). Means of introduction unknown. Notes: Recorded from scattered damp locations in NSW, Vic and Tas (Harden 1993, Walsh and Entwisle 1994, Curtis and Morris 1994). Distrib: Localised. NSW (NC CC CT NWS), Vic (UVYZ), Tas (Central Highlands, Western and South Western).

Juncus conglomeratus Native of Eur to NE Asia, N Afr. First recorded in Tas in 1974 (HO specimen). Means of introduction unknown. Notes: Recorded only from roadside ditches in one area around Leslie Vale and Longley (herbarium labels HO). Distrib: Localised. Tas (Western and South Western).

Juncus fontanesii subsp. *fontanesii* Native of S Eur, Turkey, northern Afr. First and only collection in Vic in 1979 (Walsh and Entwisle 1994). Means of introduction unknown. Notes: First and only collection made near Princetown, Vic in 1979 (Walsh and Entwisle 1994). Similar to *Juncus articulatus* and possibly overlooked for this reason. Distrib: Localised. Vic (K).

Juncus indescriptus Native of S Afr. Not listed in Hnatiuk (1990). First recorded in Tas in 1986 (HO specimen). Means of introduction unknown. Notes: This species is included in *Juncus capensis* in S Afr but Tasmanian plants do not match *J. capensis* material from NSW (Curtis and Morris 1994). Recorded from three coastal localities in south-west Tas. Herbarium labels (HO) list this species as locally frequent from roadsides in moist forest, Cockle Creek and scattered from damp patches in dunes, Cloudy Bay, Bruny Island. Distrib: Localised. Tas (Western and South Western).

Juncus inflexus HARD RUSH. Native of N Afr, India, Eurasia. First recorded as naturalised in Vic in 1985 (MEL specimen). Not listed in Hnatiuk (1990). Means of introduction unknown. Notes: Only known from Howqua River valley near Sheeppyard Flat (Walsh and Entwisle 1994). Distrib: Localised. Vic (S).

Juncus nodosus Native of Eur, Asia. First recorded as naturalised in 1990 (NSW specimen - listed as a new record for NSW in the 1989-90 annual report for the National Herbarium of NSW). Not listed in Hnatiuk (1990). Means of introduction unknown. Notes: Distrib: Localised. NSW (CC).

Juncus squarrosus Native of Eur, Iceland, Greenland, Morocco. Not listed in Hnatiuk (1990). First dated recorded from Tas is 1978 (HO specimen). Means of introduction unknown. Notes: Locally abundant, recorded from denuded slopes of mountains of the west coast as at the summit of Mt Owen (Curtis and Morris 1994). Distrib: Locally abundant. Tas (Western and South Western).

LEMNACEAE

Lemna minor Native of N Amer, Atlantic Islands, Eur, Afr Asia. First recorded as naturalised in Vic in ? (before 1986). Means of introduction unknown. Notes: Recorded from Melbourne, Doncaster and Stawell, all in Vic (Walsh and Entwisle 1994). Distrib: Localised. Vic (JN).

LILIACEAE

Agapanthus praecox subsp. *orientalis* AGAPANTHUS. Native of S Afr. First recorded as naturalised in Victoria at Batesford in 1972 (G. Carr pers. comm.) and collected near Winchelsea in 1979 (MEL specimen). Introduced as an ornamental. Notes: A serious environmental weed in Vic (Carr *et al.* 1992). Distrib: Widespread and sometimes abundant as a garden escape. Vic (EJKNPSTVW).

Agapanthus praecox subsp. *praecox* AGAPANTHUS. Native of S Afr. First recorded as naturalised in WA in 1986 (PERTH specimen). Introduced as an ornamental. Notes: Naturalised at Mt Clarence, Albany. Distrib: Localised. WA (Warren).

Lilium lancefolium [*Lilium tigrinum*] TIGER LILY. Native of E China, Japan, Korea. First recorded as naturalised in Vic in 1985 (R. Robinson pers. comm.). Not recorded in Walsh and Entwisle (1994) or Hnatiuk (1990). Introduced as an ornamental. Notes: Recorded from the Dandenong Ranges, Vic where locally abundant (R. Robinson pers. comm.). Distrib: Localised. Vic (N).

LIMNOCHARITACEAE

Hydrocleys nymphoides WATER POPPY. Native of trop. Amer. Grown in the Botanic Gardens in Sydney in 1899 (NSW specimen). First recorded as naturalised in Vic in 1979 (specimen collected from Maffra, refers to the species being planted upstream of collection area 10-15 years earlier; specimen from Castlemaine, collected in the same year, refers to few plants being present in 1973 and that the species was grown prior to this). Introduced as an ornamental. Notes: Reproduces by plantlets during autumn; also spreads by pieces. Attractive horticultural plant that has naturalised in isolated patches. Thrives in nutrient-rich stationary or flowing water to 1 m deep. An ornamental that has the potential to become a weed in eutrophic water. Naturalised in the Benalla, Yarra Glen and Valencia Creek (near Maffra) areas, where recorded mainly from farm dams and slow-moving rivers (Walsh and Entwisle 1994). Cultivated and now naturalised on the NSW north coast. Distrib: Localised. NSW (NC), Vic (NRSW).

POACEAE

Anthoxanthum aristatum ANNUAL VERNAL GRASS. Native of S Eur. First recorded as naturalised in Vic in 1990 (MEL specimen). Means of introduction unknown. Notes: Recorded from Yea, Burrowye and Beechworth (Walsh and Entwisle 1994). Distrib: Localised. Vic (NRV).

Brachiaria humidicola Native of Afr. First recorded as naturalised in Qld in 1981 (BRI specimen). First recorded as naturalised in WA in 1992 (PERTH specimen). Not recorded in Hnatiuk (1990). Introduced as a pasture species. Notes: Recorded from Kununurra, WA (PERTH specimen) and near Weipa in Qld (BRI specimen). Distrib: Localised. Qld (Cook, North Kennedy), WA (VB).

Calamagrostis epigejos [*Arundo epigejos*] Native of Eur, Asia, Afr. First recorded as naturalised in Tas in 1973 (HO specimen). Means of introduction unknown. Notes: Collected once from a roadside ditch near Copping, Tas (herbarium label, HO). Species eradicated as it causes problems overseas (D. Morris pers. comm.). Distrib: Localised (eradicated). Tas (North-eastern).

Cortaderia jubata PINK PAMPAS GRASS. Native of S Amer. First recorded as naturalised in Vic (Williamstown) in 1985 (G. Carr pers. comm.). First recorded as naturalised in Tas in 1987 (HO specimen).

Specimens of naturalised plants from NSW are at present on loan (loan 095/16). Introduced as an ornamental. Notes: Plants female only (but produce seed). May hybridise with *C. selloana*. Difficult to differentiate from *C. selloana*. This is the most aggressive of the *Cortaderia* species in Australia, and the most common weedy *Cortaderia* of the eastern States. More common in warmer areas than *C. selloana*, it grows on damp and/or sandy areas, especially near the coast. #Noxious in NSW (whole State), Tas. Distrib: Localised but spreading. NSW (CC), Vic (NPT), Tas (Western and South-western, North-eastern).

Digitaria ternata Native of Asia, Afr. Recorded as grown at the Botanic Gardens, Sydney, from seed purchased at Cooma in 1947 (NSW specimen). First recorded as naturalised in Tas in 1982 (HO specimen). First recorded as naturalised in NSW in 1987 (NSW specimen). Introduced as a pasture species to NSW and probably to Tas. Notes: Collected from a roadside at Nubeena, Tasman Peninsula (HO herbarium label, Curtis and Morris 1994). Grows in disturbed habitats in NSW (Harden 1993). Distrib: Localised. NSW (NT ST (no records from the ST at NSW)), Tas (North-eastern).

Diplachne uninervia [*Leptochloa uninervia*] Native of Amer. First recorded as naturalised in NSW in 1992 (NSW specimen - listed as a new record for NSW in the 1994-95 annual report for the National Herbarium of NSW). Not listed in Hnatiuk (1990). Means of introduction unknown. Notes: Growing in saline waterlogged land at Homebush Bay. *D. uninervia* is a major weed of irrigated crops in California, and potentially a major weed of rice in Aust. Distrib: Localised. NSW (CC).

Echinochloa polystachya ALEMEN GRASS. Native of trop. Amer. First recorded in Qld in 1990 (BRI specimen). First recorded as naturalised in WA in 1995. First recorded as naturalised in Qld in 1996 (BRI specimen). Not listed in Hnatiuk (1990). Introduced as a pasture species. Notes: Flowers but does not seem to set seed (Anon. 1989). Spreads by rhizomes and cuttings. Introduced ponded pasture species. Registered for use as a pasture species in 1988. Has potential to replace native aquatic species. Distrib: Localised. Qld (Cook, Port Curtis), WA (NK).

Glyceria plicata Native of Eur, W Asia, NW Afr. First recorded as naturalised in Vic in 1977 (MEL specimen). First recorded from Tas in 1986 (HO specimen). Not recorded in Hnatiuk (1990). Means of introduction unknown. Notes: Known from two sites in Vic, near Healesville and Gembrook and from

an overflow drain from a farm dam at Don Heads, Devonport, Tas (Walsh and Entwisle 1994, Curtis and Morris 1994). Distrib: Localised. Vic (NS), Tas (Western and South-western).

Hordeum bulbosum Native of Medit, trop Afr, W Asia. Recorded as grown at Dookie College in Vic in 1906 (MEL specimen). Grown in the Botanic Gardens in Sydney in 1932 (NSW specimen). Planted by Soil Conservation in NSW in 1955 (NSW specimens). First listed as naturalised in NSW in the 1986-87 annual report for the National Herbarium of NSW (reportedly naturalised in NSW but no naturalised specimens at NSW). Not recorded in Harden (1993). Introduced as a potential pasture species (MEL specimen). Notes: Planted in many locations but rarely recorded as naturalised. Distrib: Localised. NSW (SWS).

Hymenachne amplexicaule HYMENACHNE. Native of trop. America. First recorded in Qld in 1987. First recorded as naturalised in the NT in 1995 (DNA specimen). Cannot determine when this species was recorded as naturalised in Qld (BRI database). Not listed in Hnatiuk (1990). Introduced as a pasture species. Notes: Introduced as a pasture grass (Anon. 1989). Thrives in water to c. 1.5 m deep and provides feed as waterbodies dry during extended periods of no rain. Replaces native species from deeper water; threatens native wetland habitat. Distrib: Localised - spreading in wetlands. Qld (North and Central), NT (Darwin & Gulf).

Nassella charruana Native of Paraguay. First recorded as naturalised in Vic in 1995 (MEL specimen). Not listed in Hnatiuk (1990) or Walsh and Entwisle (1994). Means of introduction unknown. Notes: Recorded from Thomastown, Vic (MEL specimen). This species shows every indication of being an extremely serious agricultural and environmental weed. Distrib: Localised over several hectares but population large and actively recruiting in degraded native grassland. Vic (N).

Panicum racemosum Native of S Amer. First recorded as naturalised in Vic in 1991 (MEL specimen). Means of introduction unknown. Notes: This species has persisted as a troublesome weed around grain storage silos at Geelong, Vic (Walsh and Entwisle 1994). Distrib: Localised. Vic (P).

Paspalum virgatum CLYDE ROAD GRASS. Native of Amer. First recorded in Qld in 1957 (BRI specimen). First recorded as naturalised in Qld in 1988 (BRI specimen). Not listed in Hnatiuk (1990). Introduced as a pasture species. Notes: Minor roadside and

canefield weed in north coastal Qld. Distrib: Localised. Qld (Cook).

Phyllostachys aurea FISHPOLE BAMBOO, GOLDEN BAMBOO. Native of China. First recorded as naturalised in NSW in 1971 (NSW specimen). First recorded in Qld in 1990 (BRI specimen) but no records of naturalised plants at BRI. Introduced as an ornamental. Notes: Seldom seen flowering. Golden Bamboo can take over gardens and spread to neighbouring land if left unrestricted. Has also established in native bushland from garden refuse. Restrict spread by planting in containers. Distrib: Localised. NSW (NC CC).

Piptochaetium montevidense Native of S Amer. First recorded as naturalised in Vic in 1988 (Walsh and Entwisle 1994). Not listed in Hnatiuk (1990). Means of introduction unknown. Notes: Only known from a dense sward growing in native grassland near Altona, Vic (Walsh and Entwisle 1994). Distrib: Localised. Vic (N).

Polypogon chilensis Native of Chile, Argentina, Uruguay, S Brazil. First recorded for NSW in the 1993-94 annual report for the National Herbarium of NSW. According to S. Jacobs (NSW) the specimen has been misplaced but the date the species was recorded was around this time. Not listed in Hnatiuk (1990). Introduced as a pasture species? Notes: Distrib: Localised. NSW (NC).

Setaria poiretiana Native of trop Amer. Recorded as being grown at the Botanic Gardens, Sydney in 1900 (NSW specimen). First recorded as naturalised in NSW in 1987 (NSW specimen - listed as a new record for NSW in the 1991-92 annual report for the National Herbarium of NSW - a specimen was collected from Mereweather, a suburb of Newcastle in 1934 (NSW specimen) but without any indication that it was naturalised). Not recorded in Hnatiuk (1990) or Harden (1993). Means of introduction unknown. Notes: Distrib: NSW (NC).

Tribolium echinatum [*Lasiochloa echinata*] Native of S Afr. First recorded as naturalised in WA in 1981 (PERTH specimen). Means of introduction unknown. Notes: Species only ever recorded once. Distrib: Localised. WA (SWA).

DICOTYLEDONS

ACANTHACEAE

Barleria prionitis Native of trop. Asia, Afr. First recorded in the NT in 1963 but not considered naturalised at this time. First recorded as naturalised on the banks of the Ross River near Townsville in 1992 (S. Csurhes pers. comm.). Introduced as a garden ornamental. Notes: A popular garden ornamental. Small infestation near Townsville. Scattered plants have been detected near Darwin (I. Miller pers. comm.). Introduced as an ornamental. Distrib: Localised. Qld (North Kennedy).

Hygrophila difformis Native to SE Asia. ASIAN WISTERIA. Recently naturalised in the Townsville area (1996 - G. Sainty pers. comm.). Not listed in Hnatiuk (1990). Introduced for aquaria. Notes: Similar to *Hygrophila polysperma* an introduced aquatic weed in Florida. Now naturalised in the Townsville area. Distrib: Localised. Qld (North Kennedy).

Ruellia malacosperma [*Ruellia brittoniana*] Native of Mexico. Date first recorded as naturalised (before 1986 - Stanley and Ross 1986)? Introduced as an ornamental. Notes: Distrib: Localised. Qld (Cook, Leichardt, Moreton, Port Curtis, Wide Bay).

Sanchezia parvibracteata Native to trop. Amer. First mentioned as a weed in Qld in Humphries and Stanton (1992). Not listed in Hnatiuk (1990). Introduced as an ornamental. Notes: Isolated infestations in wet tropics of Qld. Invading riverbanks, creeks, wetlands near Cairns (D. Skarratt pers. comm., Humphries and Stanton 1992). Distrib: Localised. Qld (Cook).

Thunbergia laurifolia [*Thunbergia harrisii*] LAUREL CLOCK VINE. Native of India, Malaysia. First recorded as naturalised in Qld in 1987 (BRI specimen). Not listed in Hnatiuk (1990). Introduced as an ornamental. Notes: Prefers fertile, moist soils high in organic matter. Produces large blue flowers. Similar in appearance to *T. grandiflora*. Noticed as early as 1991 (M. Mongano pers. comm.) growing in coastal north Qld. Pest potential considered similar to *T. grandiflora* (Csurhes 1993). Declared in Qld (category P2) and subject of eradication campaign. Believed to be very localised. Distrib: Localised. Qld (Cook).

ACERACEAE

Acer negundo BOX ELDER. Native of N. Amer. First recorded as naturalised in NSW in 1987 (NSW specimen). First recorded as naturalised in Vic in 1989 (G. Carr pers. comm.). First recorded in Qld in 1995 (BRI specimen). Not recorded in George (1985). Introduced as an ornamental tree. Notes: Widely planted as an ornamental and invasive in bushland; it is seriously weedy in riparian environments and wet forests (Carr *et al.* 1992). Naturalised in Vic at Healesville, Bright, Dandenong Ranges and many Melbourne suburbs (G. Carr pers. comm.). Obviously present for a long time prior to first record of naturalisation. For example appeared to be naturalised around Armidale, NSW, prior to 1975 (B. Waterhouse pers. comm.). Distrib: Localised. Qld (?), NSW (NC CC NT ST), Vic (NRS).

Acer palmatum JAPANESE MAPLE. Native of Japan, Korea. First recorded as naturalised in Vic in 1985 (G. Carr pers. comm.). Not listed in Hnatiuk (1990). Introduced as an ornamental tree. Notes: Widely planted as an ornamental. Recorded from the Dandenong Ranges, Vic (G. Carr pers. comm.) but populations small. Distrib: Localised. Vic (N).

AIZOACEAE

Ruschia decumbens Native of southern Afr. First recorded as naturalised in WA in 1986 (PERTH specimen). Not recorded in George (1984) or Hnatiuk (1990). Means of introduction unknown. Notes: Naturalised around Albany, WA (PERTH specimen). Distrib: Localised. WA (WAR, JF).

AMARANTHACEAE

Alternanthera bettzickiana Native of Brazil. First recorded as naturalised on Thursday Island, Qld, in 1981 (QRS specimen). Introduced as an ornamental? Notes: Similar to other *Alternanthera* spp. and probably overlooked for this reason. Widespread species in coastal northern Queensland (Cook region), including Torres Strait Islands (B. Waterhouse pers. comm.). Ornamental forms of this species exist (Griffiths 1994). Distrib: Localised. Qld (Cook, Moreton, North Kennedy, Wide Bay).

Froelichia gracilis Native of Amer. First recorded as naturalised in NSW in 1982. Introduced as an ornamental. Notes: Occasionally naturalised (Harden 1990). Distrib: Localised. NSW (CC)

AMYGDALACEAE

Prunus lusitanica PORTUGUESE LAUREL. Native of SE Eur. First recorded as naturalised in NSW in 1985 (NSW specimen). First recorded as naturalised in Vic in 1980 (G. Carr pers. comm.). First recorded as naturalised in Tas in ? (no specimens at HO or MEL). Introduced as an ornamental. Notes: Cultivated but rarely naturalised (Harden 1990). Naturalised in Vic at Mt Macedon and in the Dandenong Ranges (G. Carr pers. comm.). Distrib: Localised. NSW (CT), Vic (N), Tas (no specimens at HO or MEL).

Prunus mahaleb MAHALEB CHERRY. Native of Eur. First recorded as naturalised in NSW in 1982 (NSW specimen - listed as a new record for NSW in the 1987-88 annual report for the National Herbarium of NSW). Introduced as an ornamental. Notes: Used as a stock for grafting other *Prunus* spp., occasionally naturalised (Harden 1990). Naturalised near Armidale, NSW (NSW specimen). Distrib: Localised. NSW (NT).

Prunus spinosa Native of Eur, W Asia. First recorded as naturalised in Tas in 1973 (HO specimen). Introduced for hedging material. Notes: Recorded from Tasmania on roadsides at Evandale and Relbia and from Glenora (HO herbarium labels). Probably introduced long before 1970 (D. Morris pers. comm.). Distrib: Localised. Tas (Western and South-western, North-eastern).

ANACARDIACEAE

Anacardium occidentale CASHEW. Native of trop Amer from Mexico to Peru and Brazil. First recorded in Qld in 1981 (BRI specimen). First recorded as naturalised in NT in 1988 (DNA specimen). Not recorded in George (1985) or Hnatiuk (1990). Introduced for edible fruit. Notes: Spread by fruit bats around Darwin. Grows on edge of monsoon forests near Darwin. Widespread on Melville Island (I. Miller pers. comm.). Although it was first recorded for the NT in 1988 it was believed to be naturalised before 1986 (I. Cowie pers. comm.). Naturalised and becoming invasive on Horn Island (Torres Strait) and used for mine rehabilitation around Weipa (B. Waterhouse pers. comm.). Recorded a weed in Caribbean and Cambodia (Holm *et al.* 1979). Distrib: Localised. Qld (Cook), NT (Darwin & Gulf).

Pistacia chinensis CHINESE PISTACHIO. Native from Afghanistan to Kashmir. First recorded as

naturalised by in NSW by J. Hosking in 1990 but obviously naturalised for many years prior to this date from the size of trees. Also reported to be naturalised around Armidale (J.M.B. Smith pers. comm.) and around Sydney (P. Dixon pers. comm.). First recorded in Qld in 1990 (BRI specimen). Not recorded in George (1985) or Hnatiuk (1990). Introduced as an ornamental. Notes: Often confused with *Toxicodendron succedaneam* and promoted as a replacement for this species. Distrib: Localised. NSW (NT NWS).

APIACEAE

Hydrocotyle ranunculoides Native of N Amer and doubtfully Eur. First recorded from near Perth in 1983 (PERTH specimen). Introduced as an aquarium plant. Notes: Roots prolifically at nodes. Dense growth may extend over static or slowly-flowing water. ?Overwinters in leafy form. Recently reported clogging a eutrophic tributary of the Canning River, Perth. Has potential to spread in nutrient-enriched waterways. Used by Asians as a culinary herb in place of *Centella asiatica*. #Noxious in WA (gazetted 1992). Distrib: Localised. WA (SWA)

Oenanthe pimpinelloides WATER DROPWORT. Native of W Medit. First recorded as naturalised in SA in 1971 (Kloot 1986). Means of introduction unknown. Notes: Limited to one locality near Meadows Creek, Mount Lofty Ranges, SA. Species readily grazed by cattle. #Noxious in SA. Distrib: Localised. SA (SL).

Tordylium apulum Native of Medit. First recorded as naturalised in SA in 1980 (Kloot 1986). Possibly introduced as an ornamental. Notes: Well established roadside population at Vale Park, SA, but considered to be of no significance in SA in 1986 (Kloot 1986). Distrib: Localised. SA (SL).

Torilis arvensis SPREADING HEDGE-PARSLEY. Native of Eurasia. First recorded as naturalised in Vic in 1988 (MEL specimen). Not recorded in Hnatiuk (1990). Means of introduction unknown. Notes: Recorded from roadsides in disturbed areas (MEL specimens). Distrib: Localised. Vic (NS).

APOCYNACEAE

Allamanda cathartica Native of trop S Amer. First recorded in Qld in 1933 (BRI specimen). First recorded as naturalised in Qld in 1988 (BRI

specimen). First recorded as naturalised in WA in 1993 (PERTH specimen). Introduced as an ornamental. Notes: Locally naturalised in wet tropical areas in Qld, for example next to the Bruce Highway between Cairns and Tully (NSW specimen). Distrib: Localised. Qld (North Kennedy, South Kennedy), WA (CK).

ASTERACEAE

Artemisia absinthium WORMWOOD. Native of Eur. First recorded as naturalised in WA in 1974 (PERTH specimen). No specimens at BRI. Introduced as an ornamental. Notes: Garden escape occurring on wasteland in SW WA. Distrib: Localised. Qld (Burnett), WA (AW).

Artemisia ludoviciana Native of W USA, Mexico. First recorded as naturalised in NSW in 1993 (NSW specimen - listed as a new record for NSW in the 1993-94 annual report for the National Herbarium of NSW). Not listed in Hnatiuk (1990). Introduced as an ornamental. Notes: Apparently naturalised in Oxley Park, Tamworth, but this population has now been removed in an area bulldozed to make a dam for the Tamworth Botanic Gardens. Distrib: Localised. NSW (NWS).

Carduus acanthoides Native of Eur. First recorded as naturalised in 1979 near the headwaters of the Murray River (Medd 1979). Not listed in Hnatiuk (1990). Means of introduction unknown. Notes: A serious weed in Canada, USA, NZ and S Amer, hybridises with *Carduus nutans*. Recorded at one location. Distrib: Localised. Vic (V?).

Carthamus leucocaulos GLAUCOUS STAR THISTLE. Native of Medit. First recorded in 1975 in WA (PERTH specimen). Means of introduction unknown. Notes: Autumn-winter germinating annual, dying after maturity in summer. Spiny leaves a contaminant of wool. #Noxious in WA (part). Distrib: Localised. WA (MAL AW).

Centaurea eriophora Native of Spain, Portugal. Only recorded once in SA in 1984 (Jessop and Toelken 1986). Means of introduction unknown, probably accidental. Notes: Collected from a road reserve at Cambrai, SA in 1984 (Jessop and Toelken 1986). Similar to *Centaurea melitensis*. At present considered to be of insignificant importance (Kloot 1986). Distrib: Localised, possibly eradicated. SA (MU).

Chromolaena odorata weedy form CHROMOLAENA, SIAM WEED. Native of W

Indies, tropical S Amer, Mexico. Not recorded in Australia until 1994 when it was found along the Tully River in North Qld (B. Waterhouse pers. comm.). Appears to have been present since the early 1970s. Not listed in Hnatiuk (1990). Likely to have been brought in as a pasture seed contaminant. Notes: Major weed in tropics. Toxic to stock. Potential to invade disturbed land is high. To date \$460,000 has been spent in an attempt to eradicate this weed (Queensland Department of Natural Resources records). #Noxious in Qld (whole State), NSW. Distrib: Localised - many hectares along Tully River. Qld (Cook).

Chromolaena odorata less weedy form. Native of S. Amer. Not recorded in Australia until 1995? (R. McFadyen pers. comm.). Not listed in Hnatiuk (1990). Likely to have been brought in as a pasture seed contaminant. Notes: Found on Tully River Station but does not appear to have spread. Probably brought in with typical form of *Chromolaena odorata*. Distrib: Localised. Qld (Cook).

Cineraria lyrata CINERARIA, AFRICAN MARIGOLD. Native of S Afr. First recorded as naturalised in NSW in 1984 (NSW specimen - listed as a new record for NSW in the 1983-84 annual report for the National Herbarium of NSW). Means of introduction unknown. Notes: Localised minor weed of pastures in Mudgee district. Present for some time prior to 1983. For more information on this species see Parsons and Cuthbertson (1992). #Noxious in NSW. Distrib: Localised. NSW (CWS).

Cosmos capitata [This name is not recognised in the current CD version of Index Kewensis] Probably native of Amer. First recorded as naturalised in Vic in 1987 (MEL specimen - collected by R. Adair). Not listed in Hnatiuk (1990). Introduced as an ornamental. Notes: Garden escape. Recorded from Bittern near Hastings, Vic (MEL specimen of R. Adair). Distrib: Localised. Vic (N).

Dimorphotheca ecklonis Native of S Afr. First recorded as naturalised in Vic in 1983 (G. Carr pers. comm.). First recorded as naturalised in WA in 1988. Not listed in Hnatiuk (1990). Introduced as an ornamental. Notes: Recorded from Anglesea, Vic (G. Carr pers. comm.). This species is spreading rapidly in WA (G. Keighery pers. comm.). Distrib: Localised. Vic (P), WA (SWA).

Elephantopus mollis TOBACCO WEED, ELEPHANT'S FOOT. Native of trop. Amer. First recorded in Qld in 1983 (BRI specimen). First record as naturalised in Qld in 1989 (BRI specimen and D.

Panetta pers. comm.). No records of this species at DNA. Not listed in Hnatiuk (1990). Introduced as an ornamental. Notes: Widespread weed in tropical areas. Only reported from two areas in Aust., both in Queensland, near Mackay and near Millaa Millaa (southern Atherton Tablelands). This weed is the subject of a containment program by Queensland Department of Natural Resources and Local Governments. It has potential to invade high rainfall areas of Qld. To date \$35,000 has been spent on control of *E. mollis* in Qld by the Department of Natural Resources. *E. mollis* is recorded as a major weed in the Pacific region. This species is often confused with other *Elephantopus* spp. Distrib: Localised. Qld (Cook, South Kennedy).

Felicia petiolata Native of S Afr. First recorded as naturalised in Vic in 1973 (G. Carr pers. comm.). Not listed in Hnatiuk (1990). Introduced as an ornamental. Notes: Recorded from Batesford, Vic (G. Carr pers. comm.) and collected near Halls Gap, Vic (in 1984 - MEL specimen). Distrib: Localised. Vic (JP).

Gamolepis chrysanthemoides [*Steirodiscus chrysanthemoides*] Native of S Afr. Cultivated specimens recorded from NSW in 1974 (NSW specimen). First recorded as naturalised in NSW in ~1991 (G. Sainty pers. comm.). Not recorded in Hnatiuk (1990) or Harden (1992). Introduced as an ornamental. Notes: Roadside weed between Wollongong and Sydney, NSW (G. Sainty pers. comm.). Distrib: Localised. NSW (CC).

Gazania linearis Native of S Afr. First recorded as naturalised in SA in 1973 (Kloot 1986). Recorded as naturalised in Vic in 1979 (G. Carr pers. comm.). First recorded as naturalised in WA in 1984 (PERTH specimen). Introduced as an ornamental. Notes: Widespread and common in coastal and inland Vic. Now found on wasteland, beaches and verges between Perth and Esperance (Keighery 1995). Distrib: Widespread. Vic (CDEJKNPT), SA (MU, YP, SL), WA (SWA, ESP, GS, COO).

Gymnocoronis spilanthoides SENEGAL TEA. Native of C Amer. First reported as naturalised on an island in the Manning River in February 1980 (NSW specimen - listed as a new record for NSW in the 1984-85 annual report for the National Herbarium of NSW). First herbarium record of naturalised plants in Qld in 1995 (BRI specimen). Introduced to Australia (from India) for the aquarium trade about the mid 1970s (Parsons and Cuthbertson 1992), possibly 1974. Notes: Recently (1980s) naturalised in the Sydney and Newcastle region, now extending its range; has the potential to become significant aquatic

weed. First recorded as naturalised near Brisbane (Redland Bay) in January 1994 (S. Csurhes pers. comm.). It was cultivated and widely sold after 1974 by Pisces Enterprises, based in Brisbane, one of Australia's biggest producers of aquarium plants (S. Csurhes pers. comm.). Mechanical removal, unless complete, may aid spread. At present confined to the area between Taree and Dapto in NSW and Redland Bay in Queensland. #Noxious Qld (Moreton), NSW (whole State), SA, Tas. Distrib: Localised. Qld (Moreton), NSW (NC CC).

Helianthus debilis Native of S USA. First recorded as naturalised in WA in 1981 (PERTH specimen). Reported to occur in NSW in Hnatiuk (1990) but not listed in Harden (1992). Introduced as an ornamental. Notes: Weed of wasteland in Perth (Keighery 1995). Distrib: Localised. NSW (?CC), WA (SWA).

Montanao hibiscifolia ANZAC FLOWER. Native of southern N Amer (Mexico to Guatemala and Costa Rica). No specimens databased at BRI. Date first recorded as naturalised? Introduced as an ornamental. Notes: Distrib: Localised. Qld (Cook, Moreton).

Osteospermum fruticosum Native of S Afr. First recorded as naturalised in SA in 1982 (AD specimen). Introduced as an ornamental? Notes: Mainly found around Adelaide suburbs. One record from Troubridge Island, off Yorke Peninsula, SA (AD specimen). Distrib: Localised. SA (SL YP).

Praxelis clematidea Native of S Brazil, Bolivia, Paraguay, northern Argentina. First recorded from Qld in 1993 (B. Waterhouse pers. comm.) but was probably present for some time prior to this. Not listed in Hnatiuk (1990). Likely to have been brought in as a pasture seed contaminant at the same time as *Chromolaena odorata*. Notes: Problem in sugar cane and pastures in northern Queensland. Expected to become a serious pest of sugar cane (S. Csurhes pers. comm.). Spreading rapidly along roadsides and railway lines from Tully area to the Atherton Tablelands (B. Waterhouse pers. comm.). Commonly confused with *Ageratum conyzoides*. Distrib: Localised. Qld (Cook).

Senecio glastifolius Native of S Afr. First recorded as naturalised in WA in 1986 (PERTH specimen). Not listed in Hnatiuk (1990). Introduced as an ornamental. Notes: Spread by seed. On sandy soils. Potentially serious environmental weed, now spreading in *Banksia* woodlands near Albany, WA. Distrib: Localised. WA (WAR JF).

Tragopogon hybridus Native of S Eur. First recorded as naturalised in SA in 1987 (AD specimen). Not listed in Hnatiuk (1990). Means of introduction unknown, possibly introduced as a contaminant but has not done well (Cooke 1987). Notes: Only known from Salter Springs and Wasleys in SA (Cooke 1987). Distrib: Localised. SA (NL, SL).

Wedelia trilobata Native of South America. First specimen collected in the NT in 1971 but not believed to have naturalised until some time prior to 1984 (I. Cowie pers. comm.). First recorded in Qld in 1980 (BRI specimen). First recorded as naturalised in the NT in 1984 (DNA specimen). First record as naturalised in Queensland in 1986 (BRI specimen). First recorded as naturalised in NSW in 1991 (NSW specimen - listed as a new record for NSW in the 1993-94 annual report for the National Herbarium of NSW). Not listed in Hnatiuk (1990). Introduced as an ornamental. Notes: Deliberately planted as a roadside and railway embankment stabiliser in Queensland (B. Waterhouse pers. comm.). Heavily promoted by nurseries in the mid 1970s (S. Csurhes pers. comm.). Now common along the coast of Queensland, in tropical and sub-tropical areas (S. Csurhes pers. comm.). In south-east Qld, it appears capable of invading coastal sand-dune vegetation, where it may compete with native groundcover species while, in north Qld, it can form dense infestations along disturbed edges of rainforests (S. Csurhes pers. comm.). John Clarkson says he warned of its weedy nature in the late 1970s (B. Waterhouse pers. comm.). Distrib: Localised. Qld (Cook, Moreton, North Kennedy, Port Curtis, Wide Bay), NSW, NT ().

BASELLACEAE

Basella alba Native of Afr, SE Asia. First recorded in Qld in 1984 (BRI specimen). First recorded for NSW in the 1989-90 annual report for the National Herbarium of NSW (specimen not in the general collection as at 28 August 1996). Additional species recorded at end of Harden (1993). No records of naturalised plants at BRI. Not listed in Hnatiuk (1990). Probably had its origins in Asian food markets (B. Waterhouse pers. comm.). Notes: Used as a spinach substitute/equivalent in Asian cooking (B. Waterhouse pers. comm.). The fruit appears to be bird-dispersed and plants root from nodes (B. Waterhouse pers. comm.). Distrib: Localised. Qld (Cook), NSW (NC).

BERBERIDACEAE

Berberis vulgaris COMMON BARBERRY. Native of Eur, Asia. First recorded as naturalised in NSW in 1988 (NSW specimen). Not recorded in Hnatiuk (1990). Introduced as an ornamental. Notes: Cultivated, sometimes naturalised. Host for wheat stem rust fungus. Distrib: Localised. NSW (ST).

Mahonia leschenaultii Native of India, E Asia. First recorded as naturalised in NSW in 1987 (NSW specimen). Introduced as an ornamental. Notes: Occasionally naturalised in gullies of the Blue Mountain and in the Southern Tablelands. Distrib: Localised. NSW (CC ST).

BETULACEAE

Alnus glutinosa ALDER. Native of NW Eur to W Asia. First recorded as naturalised in Vic in 1992 (R. Robinson pers. comm.). No specimens available at NSW. Not listed in Hnatiuk (1990). Introduced as an ornamental. Notes: Recorded as abundant at Eltham North, Vic (R. Robinson pers. comm.). Problem around lake shores in Canberra (G. Sainty pers. comm.). Distrib: Localised. NSW (ST), Vic (N).

Betula nigra RED BIRCH. Native of N Amer. First recorded as naturalised in WA in 1986 (PERTH specimen). Not listed in Hnatiuk (1990). Introduced as an ornamental. Notes: Spreads by seed. Naturalised alongside wetlands in Porongurup National Park and at Pemberton, WA. Distrib: Localised. WA (Warren).

Betula pubescens BIRCH. Native of Eur to Siberia. First recorded as naturalised in Vic in 1981 (G. Carr pers. comm.). Not listed in Hnatiuk (1990). Introduced as an ornamental. Notes: Recorded as naturalised in Vic at Yallourn, Cockatoo and Mt Macedon (G. Carr pers. comm.). Distrib: Localised. Vic (NT).

BIGNONIACEAE

Campsis radicans Native of E USA. First recorded as naturalised in WA in 1988 (PERTH specimen). No specimens of naturalised plants found in the collection at NSW (cultivated plants back to 1912 from Vic are in the NSW collection). Not listed in Hnatiuk (1990). Introduced as an ornamental. Notes: Persists in wetlands in WA (Keighery 1988). Distrib: Localised. NSW (?CC), WA (SWA).

Pithecoctenium cyanchoides Native from Brazil to Argentina. First recorded as naturalised in NSW in 1993 (NSW specimen - listed as a new record for NSW in the 1993-94 annual report for the National Herbarium of NSW). First recorded as naturalised in Qld in 1994 (NSW duplicate of a BRI specimen). Not listed in Hnatiuk (1990). Introduced as an ornamental. Notes: Climber recorded as naturalised at Beecroft, Turramurra and Lane Cove in NSW and at Indooroopilly in Qld. Distrib: Localised. Qld (Moreton), NSW (CC).

Spathodea campanulata AFRICAN TULIP TREE. Native of trop Afr. First recorded in Qld in 1933 (BRI specimen). First recorded as naturalised in Qld in 1992 (BRI specimen) although from size of naturalised plants the species was naturalised many years earlier. Not listed in Hnatiuk (1990). Introduced as an ornamental. Notes: Widely cultivated. Reported spreading in rainforest near Darwin (I. Miller pers. comm.). Escaping/naturalised around Brisbane and in far northern Queensland e.g. at Kuranda (B. Waterhouse pers. comm.). There have been some moves by local residents to have the species declared on the local council weed list (B. Waterhouse pers. comm.). The species only appears to have weed potential in either tropical or sub-tropical rainforest/ex-rainforest areas. Distrib: Localised. Qld (Cook, Moreton), NT (Darwin & Gulf).

Tecoma capensis [*Tecomaria capensis*] CAPE HONEYSUCKLE. Native of S Afr. First recorded in Qld in 1912 (BRI specimen). First recorded as naturalised in NSW in 1990 (NSW specimen - listed as a new record for NSW in the 1989-90 annual report for the National Herbarium of NSW). Recorded as naturalised in Qld in 1994 (BRI specimen with duplicate at NSW). Introduced as an ornamental. Notes: Ornamental, sometimes naturalised in coastal urban areas. Distrib: Localised. Qld (Moreton), NSW (NC CC).

BORAGINACEAE

Amsinckia menziesii Native of W USA. First recorded for Vic in 1986 (Parsons and Cuthbertson 1992). Not listed in Hnatiuk (1990). Means of introduction unknown. Notes: Recorded for Carwarp in the Victorian mallee (Parsons and Cuthbertson 1992). Distrib: Localised. Vic (A).

Cynoglossum creticum Native of S Eur. Recorded as cultivated in the Botanic Gardens, Sydney in 1898 (NSW specimen). First recorded as naturalised in NSW in 1976 (NSW specimen - listed as a new record

for NSW in the 1988-89 annual report for the National Herbarium of NSW). Not listed in Hnatiuk (1990). Means of introduction not recorded. Notes: Naturalised in the Eden district (Harden 1992). Barbed spines on mericarps (segments of fruit) catch on wool and aid dispersal. Distrib: Localised. NSW (SC).

Echium candicans Native of Madeira. First recorded as naturalised in Vic in 1996 (G. Carr pers. comm.). Not listed in Hnatiuk (1990). Introduced as an ornamental. Notes: Recorded from Warrnambool, Vic (G. Carr pers. comm.). Distrib: Localised. Vic (E or K).

Trachystemon orientalis EASTERN BORAGE. Native of E Eur. First recorded as naturalised in Vic in 1995 (G. Carr pers. comm.). Not listed in Hnatiuk (1990). Introduced as an ornamental. Notes: Recorded for Mt Macedon township, Vic (G. Carr pers. comm.). Distrib: Localised. Vic (N).

BRASSICACEAE

Alliaria petiolaris Native of Eur. First recorded as naturalised in Vic in 1995 (G. Carr pers. comm.). Not listed in Hnatiuk (1990). Means of introduction unknown. Notes: Recorded for Mt Macedon township, Vic (G. Carr pers. comm.). Distrib: Localised but abundant. Vic (N).

Calepina irregularis [*Calepina corvini*] Native of Eur. First recorded from Yorke Peninsula, SA, in 1985 (Cooke 1987). Not listed in Hnatiuk (1990). Means of entry unknown but likely to have been a contaminant. Notes: Weed of poor crop land. Identified at Yorke Peninsula in SA in 1985; now spread to area of at least 600 ha and probably ~1500 ha, potentially a serious weed (Animal and Pest Control Commission records, SA). Distrib: Localised. SA (EP).

Cheiranthus cheiri WALL FLOWER. Native of C and S Eur. First recorded as naturalised in SA in 1974 (Kloot 1986). Not covered in Jessop and Toelken (1986). Not listed in Hnatiuk (1990). Introduced as an ornamental. Notes: One collection from Inneston (abandoned) township but other patches are believed to be established (Kloot 1986). Distrib: Localised. SA ().

Diplotaxis tenuisiliqua Native of Morocco, Algeria. First recorded as naturalised in SA in ? (Salisbury 1991). Not listed in Hnatiuk (1990). Means of introduction unknown. Notes: Distrib: Localised. SA (MU).

Malcolmia africana MALCOLMIA Native of S Eur. First recorded as naturalised in SA in 1988 (Cooke 1989). Not listed in Hnatiuk (1990). Means of introduction unknown. Notes: Noxious in America. Only recorded from Orroroo in SA (Cooke 1989). Probably already present in 1978 (A. Catford pers. comm.). Distrib: Localised. SA (FR).

Succowia balaerica. Native of Medit. First recorded as naturalised in WA in 1992 (PERTH specimen). Not listed in Hnatiuk (1990). Introduced by a Botanic Gardens as an example of a Mediterranean plant. Notes: Grown in the Mediterranean garden of Kings Park and Botanic Garden (Keighery 1996). Naturalised in bushland near Kings Park, Perth and also found below Reabold Hill in Bold Regional Park, 8 km west of Perth (Keighery 1996). A potentially serious weed to much of the vegetation of the western side of the Swan Coastal Plain and should be eradicated before further spread occurs (Keighery 1996). Distrib: Localised. WA (SWA).

Teesdalia nudicaulis SHEPHERD'S CRESS. Native of Eur. First recorded as naturalised in Tas in 1973 (HO specimen). Means of introduction unknown. Notes: Locally common near Bothwell, also at Hallow Tree (Curtis and Morris 1975). Herbarium specimens from HO and CANB dated 1973 (George 1982a). None earlier at HO. Distrib: Localised. Tas (Central Highlands, North-eastern).

BUDDLEJACEAE

Buddleja asiatica Native of E Indies. First recorded for Vic in 1986 (R. Robinson pers. comm.). Not listed in Hnatiuk (1990). Introduced as an ornamental. Notes: Recorded as abundant over one hectare in Yarra Bend Park, in inner suburban Melbourne, Vic (R. Robinson pers. comm.). Distrib: Localised. Vic (N).

Buddleja dysophylla Native of S Afr. First recorded as naturalised in Vic in 1985 (G. Carr pers. comm.) but mentioned as an occasional garden escape in a note by Willis (1972) under the name *Chilianthus dysophyllus*. Not listed in Hnatiuk (1990). Introduced as an ornamental. Notes: Recorded from near Drouin and at Richmond, Vic (G. Carr pers. comm.). Distrib: Localised. Vic (NT).

CABOMBACEAE

Cabomba caroliniana CABOMBA. Native to Amer. First recorded as naturalised in NSW in 1981 (NSW specimen). Earliest record in Qld is 1967 (J. Swarbrick in prep.). Not considered naturalised in Qld until 1989. First recorded as naturalised in Vic in 1989 (MEL specimen). Introduced as an aquarium plant. Notes: A serious aquatic weed elsewhere in the world (Harden 1990). Will continue to grow free-floating. Spreads by stem or root pieces. Seed production not reported in Aust. Thrives in nutrient-rich water and now well established in NSW and coastal Qld. Spread should be prevented. #Noxious in Qld. Distrib: Spreading in rivers. Qld (coast and Atherton), NSW (NC CC), Vic (MT).

CACTACEAE

This family of succulent plants is rarely collected (and difficult to dry) and few specimens have been lodged with herbaria prior to recent times.

Epiphyllum phyllanthus var. *hookeri* [*Epiphyllum strictum*] Native of S Mexico and Guatemala to Panama. First recorded as naturalised in Qld in 1985 (Forster 1988). Not listed in Hnatiuk (1990). Introduced as an ornamental. Notes: Recorded from an abandoned garden in the Gatton area, Qld, where it was probably spreading vegetatively over fences and trees within an area encompassing under 100 m² (Forster 1988). Distrib: Qld (Moreton).

Opuntia bergeriana Native of Americas (precise origin unknown - only known from cultivation). First recorded as naturalised in Vic in 1981 (G. Carr pers. comm.). Not recorded in Hnatiuk (1990) or George (1984). Introduced as an ornamental. Notes: Recorded as naturalised in Kew, a suburb of Melbourne (Stajsic and Carr 1996). Distrib: Localised. Vic (N).

Opuntia erinacea Native of SW USA. First recorded as naturalised in SA in 1980 (Kloot 1986). Not recorded as naturalised in George (1984). Introduced as an ornamental. Notes: Distrib: Localised. SA (MU).

Opuntia leucotricha Native of Mexico. Not recorded in Kloot (1986) but recorded in Jessop and Toelken (1986) for SA. No specimens at AD. First recorded as naturalised in Vic in 1994 (MEL specimen). Not recorded in George (1984). Introduced as an ornamental. Notes: Recorded from Merbein West and Hattah, Vic (Stajsic and Carr 1996). Distrib: Localised. Vic (A), SA (MU).

Opuntia lindheimeri Native of NE Mexico and adjacent USA. First collection with a date appears to have been made in 1978 (George 1984), collected in Vic. Introduced as an ornamental. Notes: A picture of this species is shown in Mann (1970) but no details are given. Distrib: Localised. Vic (A), SA (FR MU).

Opuntia pachypus Native of Peru. Not recorded in Kloot (1986) but recorded in Jessop and Toelken (1986) for SA. No specimens at AD. Not recorded in George (1984). Introduced as an ornamental. Notes: Distrib: Localised. SA (FR EA).

Opuntia phaeacantha Native of Mexico, SW USA. Not recorded in Kloot (1986) but recorded in Jessop and Toelken (1986) for SA. No specimens at AD. Not recorded in George (1984). Introduced as an ornamental. Notes: Distrib: Localised. SA (MU).

Opuntia schickendantzii Native of N Argentina. First recorded as naturalised in Vic in 1993 (MEL specimen). Not recorded in George (1984) or Hnatiuk (1990). Introduced as an ornamental. Notes: Naturalised from garden-derived plants (Stajsic and Carr 1996). Occurs on roadsides at South Morang and Greta West and along a rail-line near Prahran and at Clifton Hill on Merri Creek (Stajsic and Carr 1996). Distrib: Localised. Vic (NR).

Opuntia tunicata Native of Mexico and Ecuador to Chile. First recorded as naturalised in SA in 1980 (Kloot 1986). First recorded as naturalised in Vic in 1995 (MEL specimen). Not recorded as naturalised in George (1984). Introduced as an ornamental. Notes: Distrib: Localised. SA (MU).

CARYOPHYLLACEAE

Dianthus plumarius Native of C Eur. First recorded as naturalised in Tas in 1991. Not listed in Hnatiuk (1990). Introduced as an ornamental. Notes: Recorded as naturalised at Dunalley Beach, Dunalley. Distrib: Localised. Tas (North eastern).

Silene dioica RED CAMPION. Native of Eur, Medit. First recorded as naturalised in NSW in 1982 (NSW specimen - listed as a new record for NSW in the 1987-88 annual report for the National Herbarium of NSW). Not recorded in Kloot (1986). Introduced as an ornamental. Notes: Hybridises with *S. pratensis*. Apparently recorded by Eichler for SA in 1965 (Jessop and Toelken 1986) but no specimens at AD. Collected as a garden weed in the Mt Tomah area in NSW (NSW specimen). Distrib: Localised. NSW (CT).

Silene tridentata Native of Algeria. First recorded as naturalised in NSW in 1986 (NSW specimen). Not listed in Hnatiuk (1990). Introduced as an ornamental? Notes: Addition to Flora of NSW in Volume 4 (Harden 1993). Recorded as a rare herb on a sandstone ridge W of Lake Ballyrogan, NSW (NSW specimen). Distrib: Localised. NSW (SWP).

CELASTRACEAE

***Euonymus* sp.** SPINDLE TREE. Native of Japan? First recorded as naturalised in Vic in 1988 (G. Carr pers. comm.). Not listed in Hnatiuk (1990). Introduced as an ornamental. Notes: Recorded from Branxholme, Vic. Distrib: Localised. Vic (D).

CHENOPODIACEAE

Chenopodium macrospermum Native of S Amer. First recorded as naturalised in WA in 1978 (PERTH specimen). Means of introduction unknown. Notes: Common weed of summer-dry wetlands from Perth to Bunbury. Distrib: Localised. WA (SCP).

Kochia scoparia [*Scoparia dulcis*] KOCHIA. Native of Eurasia. First recorded as naturalised in WA in 1990 (Australian Weeds Committee report). Not recorded in George (1984) or Hnatiuk (1990). Introduced for forage and ornamental purposes. Notes: Forage form and ornamental form. Ornamental form possibly still sold in some localities. Forage form introduced to WA by seed merchant and planted in salt-affected areas in 1990/91 (Australian Weeds Committee report). It spread rapidly to non-salt-affected areas and roadsides and was considered a threat to agriculture. In 1992 it was proclaimed as a declared plant in WA. May be confused with Roly-Poly *Salsola kali*, and Amaranths *Amaranthus* spp. Kochia changes from green to yellowish or brown with age. Dead plants break-off and blow around in the wind, thereby spreading seed. Hardy salt-tolerant species adapted to arid areas. Contains nitrates, and if the plant contains more than 1.5% by dry matter of nitrate it may be toxic. Studies show that wheat yields are reduced c. 20% by a density of 6 Kochia plants per sq. metre. Is an allelopath, i.e. produces substances that suppress the growth of other plants (Anon. 1992). #Noxious in WA. Distrib: Localised. WA (AW, ESP).

Monolepis spathulata Native of N Amer. First recorded as naturalised in SA in 1981 (Kloot 1986). Means of entry unknown. Notes: Found in northern SA in pastoral zone. Distrib: Localised. SA (SE).

CLUSIACEAE

Hypericum grandifolium Native of Madeira, Canary Is. First recorded as naturalised in Vic in 1977. Not listed in Hnatiuk (1990). Introduced as an ornamental. Notes: Recorded from Mt Napier State Park, south of Hamilton, Vic. Distrib: Localised. Vic (D).

CONVOLVULACEAE

Cuscuta planiflora Native of Medit. First recorded from WA in 1976 (NSW specimen). First recorded as naturalised in SA in 1982 (Kloot 1986). Possibly introduced as a seed contaminant to SA (Kloot 1986). Notes: Recorded from a few locations in WA (NSW & PERTH specimens). Only recorded from Fairview Conservation Park in SA but possibly overlooked elsewhere (Kloot 1986). Distrib: Localised. SA (SE), WA (MUR, COO).

Ipomoea alba Native of trop Amer. First recorded in Qld in 1948 (BRI specimen). First recorded as naturalised in Qld in 1985 (BRI duplicate specimen lodged at NSW). No naturalised specimens from NSW at NSW. Introduced as an ornamental. Notes: Garden escape. Minor weed of bushland. Distrib: Localised. Qld (Moreton, Port Curtis, Wide Bay), NSW (NC).

CORNACEAE

Cornus capitata EVERGREEN DOGWOOD. Native of Himalayas. First recorded as naturalised in Vic in 1984 (G. Carr pers. comm.). Not recorded in Willis (1972) or Hnatiuk (1990). Introduced as an ornamental. Notes: Environmental weed of tall open forest between Bright and Mt Beauty and at Sherbrooke Forest in Victoria. Distrib: Localised. Vic (NR).

CRASSULACEAE

Aeonium arboreum Native of Canary Islands. First recorded as naturalised in SA in 1974 (Kloot 1986). First recorded as naturalised in WA in 1982 (PERTH specimen). First recorded as naturalised in Vic in 1994 (MEL specimen). Introduced as an ornamental. Notes: Ornamental and garden escape usually found near disused buildings. Slowly spreading from garden refuse on beaches between Perth and Albany

(Keighery 1995). Distrib: Localised. Vic (P), SA (SL), WA (WAR).

Aeonium castello-paivae Native of Canary Islands. First recorded as naturalised in WA in 1986 (PERTH specimen). Date first recorded as naturalised in SA? Not recorded in Kloot (1986) but recorded in Jessop and Toelken (1986). Introduced as an ornamental. Notes: There is doubt regarding the identity of this species in Australia. Most of the specimens may be *Aeonium haworthii* (H. Toelken pers. comm.). Distrib: Localised. SA (YP SL) WA (WAR).

Aeonium haworthii Native of Teneriffe. First recorded as naturalised in Vic in 1988 (G. Carr pers. comm.). Not listed in Hnatiuk (1990). Introduced as an ornamental. Notes: Recorded from Vic at Western Beach (Geelong), Avalon, Corio, Comadai, Kew and Ivanhoe (G. Carr and V. Stajsic pers. comm. and MEL specimen). Distrib: Localised. Vic (NP).

Bryophyllum beauverdii [*Kalanchoe beauverdii*] Native of Madagascar. First recorded as naturalised in Qld in 1991 (Forster 1992). Not listed in Hnatiuk (1990). Introduced as an ornamental. Notes: Occurs in disturbed areas away from habitation (Forster 1992). Distrib: Localised. Qld (Moreton).

Bryophyllum fedtschenkoi [*Kalanchoe fedtschenkoi*] Native of Madagascar. First recorded as naturalised in Qld in 1980 (Forster 1992). Introduced as an ornamental. Notes: This species is established in areas where garden rubbish is dumped (Forster 1992). Distrib: Localised. Qld (Moreton).

Crassula ciliata Native of S Afr. First recorded as naturalised in 1981 in SA (Kloot 1986). Introduced as an ornamental. Notes: Minor weed. Well established near Yankalilla, but possibly elsewhere (Kloot 1986). Distrib: Localised. SA (SL).

Crassula ericoides Native of S Afr. First recorded as naturalised in Vic in >1971? Not listed in Hnatiuk (1990). Introduced as an ornamental. Notes: Recorded from near Anakie, Vic (MEL specimen lost). Distrib: Localised. Vic (N).

Crassula sarmentosa Native of S Afr. First recorded as naturalised in Vic in 1985 (MEL specimen). Not listed in Hnatiuk (1990). Introduced as an ornamental. Notes: Recorded from Vic at Blackburn Lake (Blackburn), Comadai (near Bacchus Marsh) and Mallacoota (MEL specimens). Distrib: Localised. Vic (NZ).

Crassula spathulata Native of S Afr. First recorded as naturalised in Vic in 1995 (MEL specimen). Not listed in Hnatiuk (1990). Introduced as an ornamental. Notes: Recorded from Vic at Comadai (near Bacchus Marsh) and Geelong (MEL specimens). Distrib: Localised. Vic (NP).

Sedum forsterianum Native of W Eur. First recorded as naturalised in Tas in 1980 (HO specimen). Introduced as an ornamental. Notes: Recorded from the roadside at Judbury, Tas (HO herbarium label). Distrib: Localised. Tas (Judbury).

Sedum reflexum Native of Eur. First recorded as naturalised in Tas in 1982 (HO specimen). Introduced as an ornamental. Notes: Recorded from roadsides in Hobart, Kettering and Southport (HO herbarium labels). Distrib: Localised. Tas (Western and south-western).

ERICACEAE

Erica melanthera ERICA. Native of S Afr. First recorded as naturalised in Vic in 1985 (R. Robinson pers. comm.). Not listed in Hnatiuk (1990). Introduced as an ornamental. Notes: Recorded from Langwarrin, Vic (R. Robinson pers. comm.). Distrib: Localised. Vic (P).

Erica quadrangularis ERICA. Native of S Afr. First recorded as naturalised in Vic in 1988 (MEL specimen). Not listed in Hnatiuk (1990). Introduced as an ornamental. Notes: Recorded from Vic at Langwarrin Military Reserve and Kilsyth (MEL specimens). Carr *et al.* (1992) rank it a serious environmental weed in Vic. Distrib: Localised. Vic (NP).

Erica scoparia Native of S France. First recorded as naturalised in Tas in 1983 (HO specimen). Introduced as an ornamental. Notes: Recorded from alongside Ecclestone Road, Launceston (HO label). Distrib: Localised. Tas (North-eastern).

EUPHORBIACEAE

Euphorbia characius* ssp. *wulfenii Native of Eur, Balkans, Turkey. First recorded as naturalised in Vic in 1991 (MEL specimen). Not listed in Hnatiuk (1990). Introduced as an ornamental. Notes: Recorded from ?, Vic (MEL specimen - on card file system at present, not in collection yet). Distrib: Localised. Vic (?).

Euphorbia dendroides Native of Medit. First recorded as naturalised in WA in 1975. Not recorded in Klot (1986). Recorded by Black (1909) but not since collected in SA (Jessop and Toelken 1986). Introduced as an ornamental. Notes: Garden escape. This species is not included in the calculations of species naturalised between 1971 and 1995. This species is an example of one that appears to die out and then, at a later date, re-establish elsewhere in Australia. Distrib: Localised. SA (YP SL), WA (SWA JF MAL AW).

Euphorbia tirucalli Native of Afr. First recorded as naturalised in Qld in 1981 (Forster 1992). Introduced as an ornamental. Notes: Self-fertile plant that spreads by both seed and vegetatively by stem segments (Forster 1992). First record for this species persisting away from cultivation is for a plant collected alongside the road between Hivesville and Proston, Wondai Shire, Qld (Forster 1992). Distrib: Localised. Qld (Burnett).

Hura crepitans SANDBOX TREE. Native of W Indies, Costa Rica, S Amer. Not listed in Hnatiuk (1990). First recorded as naturalised in the NT in 1988. Introduced for forestry. Notes: In the mid to late 1960s it was planted in a CSIRO forestry plot at Middle Point 50 km east of Darwin. In June 1988 populations of the plant were discovered in native vegetation surrounding the trial plot. Distrib: Localised. NT (Darwin & Gulf).

Manihot flabellifolia Native of trop. Amer. Recorded as cultivated at the Botanic Gardens, Sydney in 1913 (NSW specimen). First recorded for NSW in the 1988-89 annual report for the National Herbarium of NSW. No specimens at BRI. Not listed in Hnatiuk (1990). Introduced as an ornamental. Notes: Widely cultivated in warmer districts, occasionally naturalised (Harden 1990). Distrib: NSW (NC CC NWS).

Synadenium grantii Native from Uganda to Zimbabwe. First recorded as naturalised in Qld in 1991 (Forster 1992). Not listed in Hnatiuk (1990). Introduced as an ornamental. Notes: Commonly cultivated in gardens in Qld and established and persisting at several localities in SE Qld where garden rubbish has been dumped (Forster 1992). Distrib: Localised. Qld (Moreton).

FABACEAE

CAESALPINIACEAE

Delonix regia POINCIANA. Native of Madagascar. The first specimen was recorded at DNA in 1969 but the species was not considered naturalised in the NT until 1975 (DNA specimen). First recorded as naturalised in NSW in 1982 (NSW specimen - listed as a new record for NSW in the 1981-82 annual report for the National Herbarium of NSW). Not recorded for the NT in Hnatiuk (1990). First recorded in Qld in 1990 (BRI specimen). First recorded as naturalised in Qld in 1994 (BRI specimen). First recorded as naturalised in WA in 1993 (PERTH specimen). Introduced as an ornamental. Notes: Infestation to c. 6 ha near Darwin (I. Miller pers. comm.). Common on near-suburban hillsides around Cairns, and well established in gullies on Murray (Mer) Island in far north-eastern Torres Strait (B. Waterhouse pers. comm.). Naturalised along watercourses in NSW (Harden 1991). Recorded from Koolan Island in WA (Keighery 1995). Distrib: Localised. Qld (Cook, Moreton), NSW (NWP), NT (Darwin & Gulf), WA (CK).

FABOIDEAE

Anagyris foetida Native of S Eur, Middle East. First recorded as naturalised in SA in 1990 (Cooke 1991). Not listed in Hnatiuk (1990). Introduced as an ornamental. Notes: Has persisted in pasture near Auburn for at least 30 years (Cooke 1991). Distrib: Localised. SA (NL).

Desmodium intortum GREEN-LEAVED DESMODIUM. Native of trop Afr. Scrambling herb. First recorded in Qld in 1963 (BRI specimen). First recorded as naturalised in Qld in 1971 (BRI specimen). First recorded as naturalised in NSW in 1991 (NSW specimen). Introduced for pasture. Notes: Introduced as a pasture plant now naturalised particularly along roadsides. First record at DNA is for 1960 but the species is not considered to be naturalised in the NT (I. Cowie pers. comm.). Distrib: Localised. Qld (Cook, Moreton, Wide Bay), NSW (NC).

Erythrina crista-galli Native of S Amer. First recorded in Qld in 1924. First recorded as naturalised in NSW in 1991 (NSW specimen - listed as a new record for NSW in the 1990-91 annual report for the National Herbarium of NSW). Not considered to be

naturalised in Qld. Not listed in Hnatiuk (1990). Introduced as an ornamental. Notes: Commonly cultivated, occasionally naturalised in coastal districts (Harden 1991). Distrib: Localised. NSW (NC).

Genista tinctoria* ssp. *depressa Native of Eur. First recorded as naturalised in Vic in 1992 (MEL specimen). Not listed in Hnatiuk (1990). Introduced as an ornamental. Notes: Recorded from Buckley Falls, Barwon River near Geelong, Vic (MEL specimen). Distrib: Localised. Vic (P).

***Genista* hybrid** [*G. monspessulana* X *G. sp.*] Developed by nursery trade. First recorded as naturalised in Vic in 1995 (MEL specimen). Not listed in Hnatiuk (1990). Introduced as an ornamental. Notes: Recorded from Langwarrin, Vic (MEL specimen). Distrib: Localised. Vic (P).

Indigofera decora Native from Japan to C China. Recorded as cultivated at the Botanic Gardens, Sydney in 1898 (NSW specimen). First recorded in Qld in 1932 (BRI specimen). First recorded as naturalised in Qld in 1978 (BRI specimen). First recorded as naturalised in NSW in the 1987-88 annual report for the National Herbarium of NSW (specimen not available on 28 August 1996). Not recorded in Harden (1991, 1993) or Stanley and Ross (1983). Introduced as an ornamental. Notes: Distrib: Localised. Qld (Moreton), NSW (CC).

Indigofera oblongifolia Native of India. First recorded as naturalised in WA in 1992 (PERTH specimen). Not listed in Hnatiuk (1990). Introduced as a pasture species. Notes: Naturalised in the Pilbara, south of Port Headland, WA (G. Keighery pers. comm.). To date this species has not been recorded as naturalised in Qld, NSW or the NT. Distrib: Localised. WA (PIL - south of Port Headland).

Lathyrus odoratus SWEET PEA. Native of Crete, Italy, Sicily. First recorded as naturalised in Tas in 1975 (MEL specimen). First recorded as naturalised in Vic in 1981 (MEL specimen). First recorded as naturalised in NSW in 1985 (J. Hosking specimen - NSW specimen discarded - duplicate at NE). First recorded as naturalised in Vic in 1986 (G. Carr pers. comm.). Not listed in Hnatiuk (1990). Introduced as an ornamental. Notes: Naturalised in disturbed areas. Recorded as naturalised in Tas on Mount Chappell Island, Furneaux Group (MEL specimen), in Vic at Nhill and Port Campbell (MEL specimens) and in NSW at Tamworth and north of Jenolan Caves in NSW (NE specimen and J. Hosking pers. comm.) and at Port Campbell in Vic (G. Carr pers. comm.). Widely

known and possibly rarely collected for this reason. Distrib: Localised. NSW (NWS, CT), Vic (CK), Tas (Bass Strait).

Lathyrus sativus Native of Eur. First recorded as naturalised in SA in 1971 (Kloot 1986). Possibly earlier in Qld but no specimens at BRI. Possibly introduced as fodder (Kloot 1986). Notes: One collection from Reynella (Kloot 1986). Distrib: Localised. Qld (Darling Downs), SA (EP).

Lotus creticus CRETAN TREFOIL. Native of Medit, Portugal. First recorded as naturalised in Vic in 1980 (G. Carr pers. comm.) and collected at Queenscliff in 1984 (MEL specimen). Not listed in Hnatiuk (1990). Introduced for coastal soil stabilisation by the former Soil Conservation Authority, Vic (R. Adair pers. comm.). Notes: Recorded as naturalised in Vic at Anglesea, Queenscliff and Point Lonsdale (G. Carr pers. comm.). Considered to be a serious environmental weed in Vic (Carr *et al.* 1992). Distrib: Localised. Vic (P).

Lupinus polyphyllus RUSSELL LUPIN. Native of Calif. to British Columbia. First recorded in Vic in 1983 (G. Carr pers. comm.). First recorded as naturalised in NSW in 1990 (NSW specimen - listed as a new record for NSW in the 1992-93 annual report for the National Herbarium of NSW). Introduced as an ornamental. Notes: Locally abundant at Cabramurra so probably present in this area for many years (G. Sainty collection). Locally common and spreading in Vic at Falls Creek and Mt Buffalo (G. Carr pers. comm.). Distrib: Localised. NSW (ST), Vic (RV).

Medicago arborea Native of S Eur. First recorded in Qld in 1920 (BRI specimen). First recorded as naturalised in Tas in 1984 (HO specimen). No records of plants obviously naturalised at BRI. Not recorded in Stanley and Ross (1983). Introduced as an ornamental. Notes: A few plants recorded as escaping from a garden in Currie, King Island (HO herbarium record). Distrib: Localised. Qld (Darling Downs), Tas (King Island).

Mucuna pruriens* subsp. *pruriens* var. *utilis [*Stizolobium deeringianum*] Native of Asia. First recorded in Qld in 1959 (BRI specimen). First recorded as naturalised in Qld in 1974 (BRI specimen). Introduced to Queensland as a silage/green mature crop. Notes: Naturalised on many Torres Strait Islands and appears to have the potential to be a serious invader, climbing and choking other vegetation (B. Waterhouse pers. comm.). Distrib: Localised. Qld (Cook, South Kennedy).

Podalyria sericea SILVER PODALYRIA. Native of S Afr. First recorded as naturalised in Vic in 1982 (G. Carr pers. comm.). First recorded as naturalised in WA in 1989 (PERTH specimen). Not listed in Hnatiuk (1990). Introduced as a ornamental. Notes: Recorded as locally abundant in Vic at Mt Clay near Portland and on the Mornington Peninsula (G. Carr pers. comm.) and also recorded on Raymond Island near Bairnsdale (MEL specimen). In WA most populations have arisen from dumping plants (G. Keighery pers. comm.). A potentially serious environmental weed in Vic (Carr *et al.* 1992). Distrib: Localised. Vic (EPW), WA (JF WAR).

Stylosanthes hamata CARIBBEAN STYLO. Native of S Amer. First recorded in the NT in 1960 (DNA specimen). First recorded in Qld in 1964 (BRI specimen). First recorded as naturalised in the NT in 1973 (DNA specimen). First recorded as naturalised in Qld in 1979 (BRI specimen). First recorded as naturalised in WA in 1985 (PERTH specimen). Introduced as a pasture species. Notes: Distrib: Localised. Qld (Cook), NT (Darwin & Gulf), WA (DL, CK, OVB).

Stylosanthes scabra Native of trop S Amer. First recorded in Qld in 1965 (BRI specimen). First recorded in the NT in 1969 (DNA specimen). First recorded as naturalised in WA in 1976 (PERTH specimen). First recorded as naturalised in Qld in 1981 (BRI specimen). First recorded as naturalised in the NT in 1986 (DNA specimen). Introduced as a pasture species. Notes: Seems to be one of the commonest roadside weeds around Mareeba at the moment (B. Waterhouse pers. comm.). Two cultivars, Seca and Fitzroy, were released in 1977 and 1980 respectively. Distrib: Localised. Qld (Cook), NT (Darwin & Gulf), WA (DL, CK, VB).

Stylosanthes viscosa Native of trop S Amer. First recorded in Qld in 1965 (BRI specimen). First recorded in the NT in 1969 (DNA specimen). First recorded as naturalised in the NT in 1973 (DNA specimen). First recorded as naturalised in Qld in 1992 (BRI specimen). First recorded as naturalised in WA in 1993 (PERTH specimen). Introduced as a pasture species. Notes: Naturalised in disturbed woodland, Kalumburu, WA (Keighery 1995). Also recorded from Jabiru in the NT (BRI specimen) and Heathlands Ranger Base on Cape York, Qld (BRI specimen). Distrib: Localised. Qld (Cook), NT (Darwin & Gulf), WA (NK).

Tephrosia inandensis Native of S Afr. First recorded as naturalised in NSW in 1971 (NSW specimen). Means of introduction unknown. Notes: Only

recorded from Point Clare, NSW (Harden 1991). Distrib: Localised. NSW (CC).

Trifolium uniflorum Native of S Eur, Turkey. First recorded from Tas in 1978 (HO specimen). Probably introduced as a pasture species. Notes: Collected from gravel roadside, King Island airport (HO herbarium record - one specimen only). Distrib: Localised. Tas (King Island).

Trifolium vesiculosum Native of S Eur. First recorded as naturalised in Vic in 1993 (MEL specimen). Not listed in Hnatiuk (1990). Probably introduced as a pasture species. Notes: Recorded as naturalised in the Little Desert where growing in a wheat crop sown in 1992. Naturalised over several hectares and possibly intentionally sown in previous years for seed or green manure (herbarium label), Vic (MEL specimen). Distrib: Localised. Vic (C).

MIMOSOIDEAE

Acacia catechu CUTCH TREE. Native of India. First recorded as naturalised in the NT in 1978 (DNA specimen). Not listed in Hnatiuk (1990). Introduced by botanic gardens. Notes: Recorded from Darwin Botanic gardens and has subsequently spread away from the gardens (I. Miller pers. comm.). Source of good timber and chemicals for tanning. Invades open areas and readily spreads from roots forming clumps, impeding stock movement. First record at DNA was from before 1887 but first recorded as naturalised in the NT in 1978. #Noxious in NT and Qld (category P1, potential weed of Qld). Distrib: Localised. NT (near Darwin).

Acacia karoo MIRROS ACACIA. Native of Afr. Not recorded as naturalised yet. Spreading from around Carrington, Newcastle in 1988 (label on slide). Possibly escaping from plantings in SA in 1992 (R. Carter pers. comm.). Planted as an ornamental. Notes: Recorded a serious weed in South Africa. Potentially a major woody weed. Recorded near Viveash near Perth and seedlings have/are being eradicated. Also recorded at Melbourne and Dubbo Zoos (J. Dodd pers. comm., S. Csurhes 1994). Reported as escaping from plantings at Port Augusta, SA (R. Carter pers. comm.). # Category P1 potential weed of Qld. Distrib: Localised. Qld (Moreton), NSW (CC), SA (EP).

FAGACEAE

Quercus canariensis ALGERIAN OAK. Native of N Afr, Iberian Peninsula. First recorded as naturalised in Vic in 1988 (G. Carr pers. comm.). Not listed in Hnatiuk (1990). Introduced as an ornamental. Notes: Recorded as naturalised along Merri Creek, Vic (G. Carr pers. comm.). Distrib: Localised. Vic (N).

Quercus ilex HOLM OAK. Native of Medit. Date first recorded as naturalised? Not listed in Hnatiuk (1990). Introduced as an ornamental. Notes: Naturalised in the ACT. Distrib: Localised. NSW (ST).

Quercus suber CORK OAK. Native of N Afr, S Eur. First recorded as naturalised in Vic in 1990 (G. Carr pers. comm.). Not listed in Hnatiuk (1990). Introduced as an ornamental. Notes: Bark used for cork. Recorded as naturalised in St Kilda, an inner suburb of Melbourne (G. Carr pers. comm.) where it is locally abundant on a railway cutting being naturalised from a park planting. Distrib: Localised. Vic (N).

FLACOURTIACEAE

Dovyalis caffra KEI APPLE. Native of Afr. First recorded as naturalised in NSW in 1982 (NSW specimen - listed as a new record for NSW in the 1982-83 annual report for the National Herbarium of NSW). Introduced for hedging. Notes: Occasionally naturalised, often persisting around habitations (Harden 1990). Sometimes planted as a thorny hedge (herbarium labels). Distrib: Localised. NSW (NC CC).

GERANIACEAE

Geranium palmatum Native of Madeira. First recorded as naturalised in Vic in 1979 (MEL specimen). Introduced as an ornamental. Notes: Recorded as naturalised in Ferntree Gully National Park, Vic, where growing "as a self established weed along edges of wet track" (MEL specimen label). Distrib: Localised Vic (N).

Geranium rubescens Native of Madeira. First recorded as naturalised in Vic in 1981 (G. Carr pers. comm.) and collected in 1984 (MEL specimen). Not listed in Hnatiuk (1990). Introduced as an ornamental. Notes: Recorded as naturalised in Vic in the Dandenong Ranges, for example at The Patch and Kallista (G. Carr pers. comm.). Distrib: Localised. Vic (N).

Pelargonium alchillemoides Native of S Afr. First recorded as naturalised in WA in 1981 (PERTH specimen). Not listed in Hnatiuk (1990)? Introduced as an ornamental. Notes: Recorded from Hamelin Bay, WA (PERTH specimen). Potentially a very serious weed of coastal woodland in southern Australia (G. Keighery pers. comm.). Distrib: Localised. WA (WAR).

Pelargonium quercifolium OAK-LEAVED GERANIUM. Native of S Afr. First recorded as naturalised in Vic in 1983 (G. Carr pers. comm.). Not listed in Hnatiuk (1990). Introduced as an ornamental. Notes: Recorded from Anglesea, Vic (G. Carr pers. comm.). Distrib: Localised. Vic (P).

GROSSULARIACEAE

Ribes sanguineum Native of western N Amer. First recorded from a garden in Queenstown, Tas in 1978 (HO specimen). First recorded as naturalised in Hobart in 1985. Not listed in Hnatiuk (1990). Introduced as an ornamental. Notes: Recorded from gardens and from a creek bank in Tas. Distrib: Localised. Tas (Western and south-western).

JUGLANDACEAE

Juglans regia WALNUT. Native of SE Eur to China. First recorded as naturalised in Vic in 1993 (R. Robinson pers. comm.). Not listed in Hnatiuk (1990). Introduced for edible nuts. Notes: Recorded as abundant along the Mitchell River, Dargo, Vic (R. Robinson pers. comm.). Distrib: Localised. Vic (W).

LAMIACEAE

Ajuga reptans Native of Eur. First recorded in Tas in 1978 (HO specimen). Persisting around an old house in Tas in 1990. Not listed in Hnatiuk (1990). Introduced as an ornamental. Notes: Only record for naturalisation of this species is for plants around an old house at Mole Creek, Tas (HO specimen). Distrib: Localised. Tas (Western and south-western).

Hyptis pectinata Native of trop Amer. First recorded in Qld in 1935 (BRI specimen). Possibly first recorded as naturalised in 1984 (BRI specimen). Not listed in Hnatiuk (1990). Introduced as an ornamental. Notes: One record at BRI from the Daintree area. Since 1990 it has been recorded and/or collected from west of the township of Daintree, north and south of

Mossman, and near Mount Molloy (B. Waterhouse pers. comm.). Occurs in Fiji and Hawaii (Holm *et al.* 1979). Distrib: Localised. Qld (Cook).

Lamium galeobdolon forma *argentatum* Native of Eur to W Asia. First recorded as naturalised in Vic in 1993 (MEL specimen). Not listed in Hnatiuk (1990). Introduced as an ornamental. Notes: Recorded from Yarragon, Vic (MEL specimen). Distrib: Localised. Vic (T).

Plectranthus ciliatus Native of S Afr. Oldest specimen at NSW was collected in the Grampians, Vic in 1911 (specimen without any additional notes). First recorded as naturalised in NSW in 1972 (NSW specimen). First recorded as naturalised in Vic in 1992 (MEL specimen). Introduced as an ornamental. Notes: Recorded from Lavers Hill, Vic (MEL specimen). Distrib: Localised. NSW (CC), Vic (T).

Plectranthus ecklonii Native of S Afr. Recorded as cultivated in the Botanic Gardens, Sydney in 1904 (NSW specimen). First recorded as naturalised in NSW in ~1994 (G. Sainty pers. comm.). Not recorded in Harden (1992 or 1993) or Hnatiuk (1990). Introduced as an ornamental. Notes: Spreading in shady damp land, Killara (G. Sainty pers. comm.). Distrib: Localised. NSW (CC).

Teucrium scorodonia Native of Eur. First recorded as naturalised in Tas in 1993 (HO specimen). Not listed in Hnatiuk (1990). Introduced as an ornamental. Notes: Recorded from pine plantation and edge of paddock alongside forest, at Frankford, in 1992 and 1993 (HO specimens), possibly the same location. Distrib: Localised. Tas (North-eastern).

LAURACEAE

Laurus nobilis BAY LAUREL. Native of Medit. First recorded as naturalised in Vic in 1996. Introduced for ornament and culinary uses. Notes: Commonly cultivated in temperate SE Australia. Recorded from Ivanhoe, Vic, where a small but expanding population is naturalised. Distrib: Localised. Vic (N).

LINACEAE

Linum bienne Native of W Eur, Medit. First recorded as naturalised in Tas in 1990 (HO specimen). Not listed in Hnatiuk (1990). Means or reason for introduction unknown. Notes: Recorded from a number of disturbed areas in Tas (HO specimens).

Distrib: Localised. Tas (Central Highlands, Western and South-western).

LOBELIACEAE

Lobelia erinus LOBELIA. Native of S Afr. Earliest specimen (and only specimen) at AD was collected in 1990 (however the species was listed in Jessop and Toelken 1986). First recorded in Vic in 1986 (G. Carr pers. comm.). Introduced as an ornamental. Notes: Recorded as locally common on dunes near Robe, SA (Jessop and Toelken 1986). Recorded from Harmer's Haven, Wonthaggi, Vic (G. Carr pers. comm.). Distrib: Localised. Vic (P), SA (SE).

LYTHRACEAE

Rotala rotundifolia Native of S and SE Asia. First recorded in Qld in 1974 (BRI specimen). Only collection mentioned in George (1990) is for Brisbane in 1985. First recorded as naturalised in NSW in 1992 (NSW specimen - listed as a new record for NSW in the 1992-93 annual report for the National Herbarium of NSW). Not listed in Hnatiuk (1990). Introduced as an ornamental. Notes: Water-garden escape. Potential serious invader of wetlands. Collected from the Brisbane and Cairns districts. Distrib: Localised. Qld (Cook, Moreton), NSW (CC).

MALACEAE

Cotoneaster bullatus Native of China. Date first recorded as naturalised? Not listed in Hnatiuk (1990). Introduced as an ornamental. Notes: Distrib: Localised. Vic (N).

Cotoneaster divaricatus COTONEASTER. Native of China. First recorded as naturalised in Vic in 1986 (MEL specimen). Not listed in Hnatiuk (1990). Introduced as an ornamental. Notes: Used for hedging. Recorded as naturalised in Vic at Nunawading (MEL specimen) and in the Dandenong Ranges (G. Carr pers. comm.). A serious environmental weed in Vic (Carr *et al.* 1992). Distrib: Localised. Vic (N).

Cotoneaster franchetii Native of China. First recorded for NSW in 1984 (NSW specimen - listed as a new record for NSW in the 1987-88 annual report for the National Herbarium of NSW). First recorded as naturalised in Tas in 1985 (HO specimen). First recorded as naturalised in Vic in 1995 (MEL

specimen). Not listed in Hnatiuk (1990). Introduced as an ornamental. Notes: Recorded from the Dandenong Ranges National Park and Mt Macedon Regional Park. Distrib: Localised. NSW (NT ST), Vic (N), Tas (Huon River).

Cotoneaster horizontalis Native of China. First recorded as naturalised in Vic in 1988 (G. Carr pers. comm. - first specimen at MEL collected in 1993). Not listed in Hnatiuk (1990). Introduced as an ornamental. Notes: Recorded from Mt Buffalo, Vic (G. Carr pers. comm.) as a garden escape and removed in 1995. A potentially serious environmental weed (Carr *et al.* 1992), being eradicated at Mt Buffalo in 1993. Distrib: Localised. Vic (R).

Cotoneaster lacteus Native of China. First recorded as naturalised in NSW in 1986 (NSW specimen - listed as a new record for NSW in the 1990-91 annual report for the National Herbarium of NSW). Not listed in Hnatiuk (1990). Introduced as an ornamental. Notes: Locally common in open forest on University of New England campus, Armidale (NSW specimen). Distrib: Localised. NSW (NT).

Cotoneaster microphyllus Native of Himalayas. First recorded as naturalised in NSW in 1972 (NSW specimen). First recorded as naturalised in Vic in 1988 (G. Carr pers. comm.). Not listed in Hnatiuk (1990). Introduced as an ornamental. Notes: Naturalised on the Southern Tablelands, NSW (Harden 1990) and at Mt Buffalo, Vic (G. Carr pers. comm.). Distrib: Localised. NSW (ST), Vic (R).

Cotoneaster pannosus COTONEASTER. Native of China. First recorded as naturalised in Vic in 1973 (G. Carr pers. comm. - oldest specimen at MEL was collected in 1975). First recorded as naturalised in NSW in 1976 (NSW specimen). First recorded as naturalised in Tas in 1985 (HO specimen). First recorded as naturalised in WA in 1986 (PERTH specimen). First recorded in Qld in 1987 (BRI specimen) but no specimens of naturalised plants at BRI. Introduced as an ornamental. Notes: Common ornamental. Naturalised in urban bushland and roadsides near planted shrubs. A serious environmental weed in Vic (Carr *et al.* 1992). Distrib: Localised. NSW (CC NT CT ST NWS), Vic (DEJKMNPRSTWXZ), Tas (Western and South-western, North-eastern), WA (WAR JF).

Cotoneaster serotinus Native of China. Date first recorded as naturalised? No specimens at NSW, need to check at CANB. Not listed in Hnatiuk (1990). Introduced as an ornamental. Notes: Naturalised in the ACT. Distrib: Localised. NSW (ST).

Crataegus laevigata [*Crataegus oxyacantha* in nursery trade] HAWTHORN, MAY. Native of Eur, N Afr. First recorded as naturalised in Qld in 1976 (under name *Crataegus oxycarpus*). Not listed in Hnatiuk (1990). Introduced as an ornamental. Notes: Spread by seed. Similar to *Crataegus monogyna* but having higher numbers of seeds per fruit. Locally common as escape from Castlemaine Botanic Gardens, Vic (D. Cameron pers. comm.). #Noxious in Vic, SA. Distrib: Qld (), Vic (N).

Photinia serratifolia Native of China. First recorded in Qld in 1912. First recorded as naturalised in NSW in 1985 (J. Hosking specimen - discarded by NSW but duplicate at NE). Not listed in Hnatiuk (1990). Introduced as an ornamental. Notes: Increasing in open woodland near urban areas such as Tamworth. Distrib: Localised. NSW (CC NWS).

Pyracantha koidzumii PYRACANTHA, FIRETHORN. Native of Taiwan. First recorded in Qld in 1972 (BRI specimen - probably naturalised at this time). Not listed in Stanley and Ross (1983) but listed in Hnatiuk (1990). Introduced as an ornamental. Notes: Bird-dispersed. Resembles *Pyracantha rogersiana* (Griffiths 1994). Distrib: Qld (Moreton).

Spiraea cantonensis SPIRAEA. Native of China, Japan. First recorded as naturalised in Vic in >1971 (MEL specimen). First recorded as naturalised in NSW in 1993 (J. Hosking pers. comm.). Not listed in Hnatiuk (1990). Introduced as an ornamental. Notes: Known to persist from old plantings (possibly last century) but not spreading far from these plantings (J. Hosking pers. comm.). Distrib: Localised. NSW (NWS), Vic (?).

MYRSINACEAE

Ardisia crenata Native from Japan to N India. First recorded as naturalised in NSW in 1994 (NSW specimen - listed as a new record for NSW in the NSW in the 1994-95 annual report for the National Herbarium of NSW). Not listed in Hnatiuk (1990). Introduced as an ornamental. Notes: Three plants were present at the collection area (~700 m along Mullumbimby road from its junction with the Pacific Highway - plants were seeding profusely (notes on NSW specimen). Distrib: Localised. NSW (NC).

MYRTACEAE

Psidium guajava YELLOW GUAVA Native of trop. Amer. First recorded in Qld in 1887 (BRI specimen). No specimens of naturalised plants at BRI or QRS. The species is listed as naturalised in Dunphy (1988). Introduced for edible fruit. Notes: Naturalised in moist coastal areas of northern Qld (B. Waterhouse pers. comm.). Has potential to spread (I. Miller pers. comm.). Distrib: Localised. Qld (Cook, North Kennedy, Port Curtis, South Kennedy, Wide Bay), NSW (NC).

NANDINACEAE [sometimes included in Berberidaceae]

Nandina domestica Native from Japan to India. First recorded as naturalised in NSW in 1992 (NSW specimen - listed as a new record for NSW in the 1992-93 annual report for the National Herbarium of NSW). Not listed in Hnatiuk (1990). Introduced as an ornamental. Notes: Naturalised in two locations in Oxley Park, Tamworth. Distrib: Localised. NSW (NWS).

OLEACEAE

Fraxinus ornus FLOWERING ASH. Native of Medit, S Eur, Turkey. First recorded as naturalised in Vic in 1992 (G. Carr pers. comm.). Not listed in Hnatiuk (1990). Introduced as an ornamental. Notes: Recorded from Werribee, Vic (G. Carr pers. comm.). Potential environmental threat in Vic (Carr *et al.* 1992). Distrib: Localised. Vic (N).

Phillyrea latifolia Native of Medit. First recorded as naturalised in Vic in 1996 (V. Stajsic and D. Cameron pers. comm.). Not listed in Hnatiuk (1990). Introduced as an ornamental. Notes: Recorded from Castlemaine, Vic (V. Stajsic and D. Cameron pers. comm.) where locally abundant; naturalised from a planting at Castlemaine Botanic Garden. Distrib: Localised. Vic (N).

ONAGRACEAE

Epilobium hirsutum Native of Eurasia, N Afr. First recorded as naturalised in Vic in 1990 (G. Carr pers. comm.). Not listed in Hnatiuk (1990). Introduced as an ornamental. Notes: Naturalised in Vic on the edge of the Barwon River at Chilwell and at Point Henry

near Geelong. This species has every indication of becoming a very serious wetland weed (G. Carr pers. comm.). Distrib: Localised. Vic (P).

Ludwigia longifolia Native of S Amer. First recorded as naturalised in NSW in 1991 (NSW specimen - listed as a new record for NSW in the 1993-94 annual report for the National Herbarium of NSW). Not recorded in George (1990) or Hnatiuk (1990). Introduced as an ornamental. Notes: Recently naturalised near Sydney. Distrib: Localised. NSW (CC).

Ludwigia peruviana PRIMROSE WILLOW. Native of N and S Amer. First recorded as naturalised in NSW in 1971 (NSW specimen). Introduced as an ornamental. Notes: In some areas the number of seeds below dense *L. peruviana* exceeds 500 000 per m². Seeds germinate in 4 days in shallow clear water or mud; at least 80% of seed being capable of germinating. Seeds will germinate while floating. Germination appears to be limited by depth of soil, few growing to the surface in sand 1 cm deep. *L. peruviana* may form small floating islands, producing numerous pneumatophores; it is one of few shrubby species to disperse when mature. Maintenance of canopy is mostly by vegetative means. Fallen stems produce new shoots along the stem, eventually taking root. *L. peruviana* thrives in saturated soils or free water. It has the potential to become a major weed. Probably spread by birds, seeds readily adhering to feathers. *L. peruviana* has poor wildlife value, excluding all other vegetation. One infestation in the Botany Wetlands, Sydney, covers c. 30 ha. Identified as a major threat to Australia by Csurhes (1991). For more information on *L. peruviana* see Parsons and Cuthbertson (1992). Distrib: Localised. NSW (CC).

OXALIDACEAE

Oxalis obtusa SURING. Native of S Afr. First recorded as naturalised in Vic in 1989 (MEL specimen). Not listed in Hnatiuk (1990). Introduced as an ornamental. Notes: Recorded from Buckley Falls, Barwon River near Geelong, Vic (MEL specimen). Listed as a potential environmental threat in Vic (Carr *et al.* 1992). Distrib: Localised. Vic (P).

PAPAVERACEAE

Romneya trichocalyx Native of California. First recorded as naturalised in WA in 1978 (PERTH specimen). First recorded for NSW in the 1991-92 annual report for the National Herbarium of NSW

(specimen not available on 28 August 1996). Introduced as an ornamental. Notes: Naturalised in wasteland near Bridgetown (Keighery 1995). Distrib: Localised. NSW (SWS), WA (Menzies).

PIPERACEAE

Peperomia pellucida Native of trop. Afr, Amer. First recorded in Qld in 1981. First recorded as a nursery seed contaminant in WA in 1981. Notes: Weed of nurseries and potting mix in Broome, WA (PERTH specimen). Common in nursery pots, shade houses etc. throughout northern Queensland (B. Waterhouse pers. comm.). Recorded at DNA in 1961 but there are no records of this species being naturalised in the NT (I. Cowie pers. comm.). Distrib: Localised. Qld (Cook, Moreton), NT (Darwin & Gulf - according to Hnatiuk (1990)), WA (DL).

PITTOSPORACEAE

Pittosporum crassifolium KARO. Native of New Zealand. First recorded as naturalised in Vic in 1984 (G. Carr pers. comm.). Introduced as an ornamental. Notes: Recorded as naturalised in Vic at Port Campbell and several other coastal locations (G. Carr pers. comm.). A potentially serious environmental weed (G. Carr pers. comm.). Distrib: Localised. Vic (KP).

Pittosporum eugenioides LEMONWOOD. Native of New Zealand. First recorded as naturalised in Vic in 1986 (MEL specimen). Not listed in Hnatiuk (1990). Introduced as an ornamental. Notes: Recorded as naturalised in Vic at Red Hill, and Icy Creek near Noojee (MEL specimen). A potentially serious environmental weed (G. Carr pers. comm.). Distrib: Localised. Vic (PS).

Pittosporum tenuifolium KOHUHU. Native of New Zealand. First recorded as naturalised in Vic in 1987 (G. Carr pers. comm., first specimen at MEL was collected in 1988). Not listed in Hnatiuk (1990). Introduced as an ornamental. Notes: Recorded from near Red Hill (G. Carr pers. comm.) and Cressy (MEL specimen), Vic. A potentially serious environmental weed (G. Carr pers. comm.). Distrib: Localised. Vic (JP).

PLANTAGINACEAE

Plantago arenaria Native of S, C & E Eur. First recorded as naturalised in Vic in 1984 (MEL specimen). Not listed in Hnatiuk (1990). Means of introduction unknown. Notes: Collected from a wheat crop, over ~1 ha at time of collection (MEL specimen). Distrib: Localised. Vic (B).

Plantago australis Native of S Amer. First recorded as naturalised in Tas in 1973 (HO specimen). First recorded as naturalised in SA in 1978 (AD specimen). First recorded as naturalised in Vic in 1976 (G. Carr pers. comm.). Earlier in SA? Means of introduction unknown. Notes: Recorded from a few locations in Tas and on King Island (HO herbarium labels). Only collected once in SA (Jessop and Toelken 1986). Common at Glen Aire, Otway Ranges in pasture. May be confused with *Plantago myosuroides*. Distrib: Localised. Vic (KN), Tas (Western and South-western), SA (SL).

PLANTANACEAE

Plantanus x acerifolia LONDON PLANE TREE. Tree of nursery origin. First recorded as naturalised in Vic in 1983 (G. Carr pers. comm.). First recorded as naturalised in WA in ? Not listed in Hnatiuk (1990). Introduced as an ornamental. Notes: Recorded from Clifton Hill, a suburb of Melbourne, on the banks of the Merri Creek (G. Carr pers. comm.). Also grows along seepages on the Swan River (G. Keighery pers. comm.). Distrib: Localised. Vic (N), WA (SWA).

POLYGONACEAE

Fallopia japonica [*Polygonum japonicum*] Native of E Asia. First recorded as naturalised in Tas in 1979 (HO specimen). Not listed in Hnatiuk (1990). Probably introduced as an ornamental. Notes: Recorded as a single colony spreading by rhizomes, Ilfraville roadside (HO specimen). Distrib: Localised. Tas (North-eastern).

RANUNCULACEAE

Aquilegia vulgaris COLUMBINE. Native of Eur. First recorded as naturalised in Vic in 1988 (G. Carr pers. comm.). Not listed in Hnatiuk (1990). Introduced as an ornamental. Notes: Recorded from Mt Buffalo, Vic (G. Carr pers. comm.) as well as Bogong Village area

and Mt Buller, both also in Vic (CANB, NSW, MEL specimens). Distrib: Localised. Vic (RSV).

Clematis flammula Native of S Eur, NAfr, Syria, Iran, Turkey. First recorded from SA in 1987 (AD specimen, duplicate at MEL). First recorded as naturalised in Vic in 1990. Not listed in Hnatiuk (1990). Introduced as an ornamental. Notes: Separated from *Clematis vitalba* by N. Walsh (MEL). Distrib: Localised. Vic (P), SA ().

Ficaria verna Native of Eur. First recorded as naturalised in Vic in 1986 (Walsh and Entwisle 1996). Notes: Recorded as growing within lawn adjacent to Lake Wendouree, Ballarat (Walsh and Entwisle 1996). Distrib: Localised. Vic (J).

RESEDACEAE

Reseda phyteuma RAMPION MIGNONETTE. Native of N Afr, S Eur. The species was first recorded from Nagambie, Victoria in 1985 but is thought to have been eradicated from this area (Carter 1993). More recently a number of vineyards have been affected in the Clare district of SA. This species is not listed in Hnatiuk (1990). The Nagambie infestation is thought to have been due to contaminated lucerne seed imported in 1980 (note attached to MEL herbarium specimen). The source of the Clare infestation is unknown but possibly carried by visitors from vineyards in Europe. It is also possible that it was the result of reversion from escaped garden *Reseda odorata*, the cultivated derivative of *R. phyteuma*. Notes: This species is difficult to control if the area is disturbed but appears to die out if areas not disturbed. The Clare infestation was reported to cover 38 ha by 1990 (Carter 1993). Sometimes confused with *R. alba*. #Noxious in SA. Distrib: Localised. SA (SL), Vic (M?).

RHAMNACEAE

Hovenia dulcis JAPANESE RAISIN TREE. Native of China, Korea, Japan. Recorded as a cultivated plant in NSW in 1974 (NSW specimen). First recorded in Qld in 1978 (BRI specimen - probably naturalised at this time). First recorded as naturalised in NSW in 1986 (NSW specimen - listed as a new record for NSW in the 1989-90 annual report for the National Herbarium of NSW). Not recorded in Stanley and Ross (1986). Introduced for edible fruit. Notes: Cultivated, occasionally naturalised (Harden 1990). Distrib: Localised. Qld (Moreton), NSW (NC).

ROSACEAE

(See also Amygdalaceae and Malaceae).

Rubus pyramidalis BLACKBERRY. Native of Eur. First recorded as naturalised in NSW in 1975 (NSW specimen). Introduced for edible fruit. Notes: Uncommon. Part of the *Rubus fruticosus* species-aggregate and commonly confused with other species in the aggregate. For more details on this species-aggregate see Parsons and Cuthbertson (1992). #Noxious in NSW, Vic, Tas, SA and parts of Qld and WA. Distrib: Localised. NSW (SC).

RUBIACEAE

Coffea arabica COFFEE. Native of trop Afr. First recorded in Qld in 1934 (BRI specimen). First recorded as naturalised in Qld in 1973 (BRI specimen). Introduced for fruit used to make coffee. Notes: Major source of coffee and main species grown in S Amer. Naturalised in rainforest on the Atherton Tablelands and around Brisbane. Distrib: Localised. Qld (Cook, Moreton).

Galium palustre Native of Eur. First recorded as naturalised in Tas in 1990 (HO specimen). Not listed in Hnatiuk (1990). Means of introduction unknown. Notes: Collected from river bank at St Helens, Tas (HO herbarium label). Distrib: Localised. Tas (North-eastern).

RUTACEAE

Coleonema pulchrum DIOSMA. Native of S Afr. First recorded as naturalised in Vic in 1983 (G. Carr pers. comm.). Not listed in Hnatiuk (1990). Introduced as an ornamental. Notes: Recorded from heath at Anglesea, Vic, where locally frequent (G. Carr pers. comm.). It is a potentially serious environmental weed (Carr *et al.* 1992). Distrib: Localised. Vic (P).

Murraya paniculata Native of India, Malasia. Recorded as cultivated at the Botanic Gardens, Sydney in 1898 (NSW specimen). First recorded for NSW in the 1990-91 annual report for the National Herbarium of NSW (NSW specimen not available on 28 August 1996). May be confusion with the use of this name in various States. Introduced as an ornamental. Notes: Commonly cultivated, rarely naturalised, recorded from Coocoomback Island in the Manning River (Harden 1991). Distrib: Localised. NSW (NC), possibly other States.

Ruta graveolens RUE. Native of SE Eur, Balkan Peninsula. First recorded as naturalised in Vic in 1971 (G. Carr pers. comm.). Not listed in Hnatiuk (1990). Introduced as an ornamental. Notes: Recorded from Mt Langhi Ghiran, near Ararat, Vic where localised in a small area (G. Carr pers. comm.). Distrib: Localised. Vic (J).

SALICACEAE

Populus tremula ASPEN. Native of Eur, Medit, Asia, Japan. First recorded as naturalised in Vic in 1995 (G. Carr pers. comm.). Not listed in Hnatiuk (1990). Introduced as an ornamental. Notes: Recorded from Mt Macedon, Vic (G. Carr pers. comm.) where reproducing by vegetative means only (suckers). Distrib: Localised. Vic (N).

Populus x jackii [*Populus candicans*] BALM OF GILEAD. Native of C & E N Amer. First recorded as naturalised in Vic in 1994 (G. Carr pers. comm.). Not listed in Hnatiuk (1990). Introduced as an ornamental. Notes: May be a hybrid of *Populus balsamifera* and *Populus deltoides* (Wright 1984). Recorded from Chilwell, Barwon River, Vic, and probably more widespread (G. Carr pers. comm.). Reproduction is probably by vegetative means only. Distrib: Localised. Vic (P).

Salix species WILLOWS. Only *Salix alba*, *S. babylonica*, *S. cinerea* and *S. fragilis* were recorded as naturalised in 1982 (George 1982a). Taxonomy used for *Salix* spp. generally follows Griffiths (1994). Many of the willows listed below have been naturalised and spreading for many years but these species are difficult to identify, and have rarely been collected, prior to recent interest in willows as weeds.

Salix alba var. *vitellina* GOLDEN UPRIGHT WILLOW. Native of Eur. First recorded as naturalised in Vic in 1994 (G. Carr pers. comm.). Not listed in Hnatiuk (1990). Introduced as an ornamental. Notes: Recorded from Merri Creek, Melbourne and numerous other locations in southern and northern Vic (Carr 1996). Distrib: Localised. Vic (DEJKMNPRSTVWYZ).

Salix alba X *S. matsudana* MATSUDANA HYBRID WILLOW, NZ HYBRID. Plant of nursery origin. First recorded as naturalised in Vic in 1994 (G. Carr pers. comm.). Not listed in Hnatiuk (1990). Introduced as an ornamental and for shelter. Some 9 male and female clones have been introduced from NZ in the last decade. Notes: Recorded from Ararat and Bacchus Marsh, Vic but populations currently very

small (V. Stajsic and G. Carr pers. comm.). This taxon has the potential to become seriously weedy (V. Stajsic and G. Carr pers. comm.). Distrib: Localised. Vic (JN).

Salix caprea PUSSY WILLOW, GOAT WILLOW. Native of ? Date first recorded as naturalised? Introduced as an ornamental. Notes: Distrib: Localised. NSW (NT ST).

Salix fragilis var. *fragilis* X *S. matsudana* cultivar 'Tortuosa' A 'natural' hybrid, arising *in situ* where both parents are planted and/or naturalised. First recorded as naturalised in Vic in 1996 (G. Carr pers. comm.). Not listed in Hnatiuk (1990). Introduced as an ornamental. Notes: Recorded from Buchan, and Robinvale, Vic (G. Carr pers. comm.) where populations are currently small and restricted. Distrib: Localised. Vic (FW).

Salix fragilis var. *fragilis* X *S. nigra* A 'natural' hybrid, arising *in situ* where both parents are planted and/or naturalised. First recorded as naturalised in the ACT in 1995 (G. Carr pers. comm.). Not listed in Hnatiuk (1990). Introduced as an ornamental. Notes: Recorded from along a river, near Canberra (G. Carr pers. comm.) and expected to appear in various locations in SE Australia where its parents occur. Distrib: Localised. NSW (ST).

Salix fragilis var. *furcata* Native of Eur. First recorded as naturalised in Vic in 1994 (G. Carr pers. comm.). Not listed in Hnatiuk (1990). Introduced as an ornamental. Notes: Recorded from south Gippsland, Vic, in the catchment of the Tarwin river where abundant (G. Carr pers. comm.); reproducing by vegetative means only. Distrib: Localised. Vic (T).

Salix humboldtiana var. *pyramidalis* PENCIL WILLOW. Native of Amer. First recorded as naturalised in NSW in 1992 (NSW specimen). Not listed in Hnatiuk (1990). Introduced as an ornamental. Notes: Recorded from Bellinger River at Bellingen (G. Sainty pers. comm.). Distrib: Localised. NSW (NC).

Salix matsudana cultivar 'Tortuosa' TORTURED WILLOW. Native of China. First recorded as naturalised in Vic in 1994 (V. Stajsic pers. comm.). Not listed in Hnatiuk (1990). Introduced as an ornamental. Notes: Widely planted. Recorded from Bairnsdale, near Linton, and Yarrowee River, Ballarat, Vic (G. Carr and V. Stajsic pers. comm.). Populations are currently small and naturalised by vegetative means only – all plants are female. Distrib: Localised. Vic (JNW).

Salix matsudana* X *chrysochroma GOLDEN WEEPING WILLOW. Plant of garden origin? First recorded as naturalised in NSW in 1995 (NSW specimen). Not listed in Hnatiuk (1990). Introduced as an ornamental. Notes: Recorded from near Blayney. Distrib: Localised. NSW (CT).

Salix nigra BLACK WILLOW. Native of USA. First recorded as naturalised in Vic in 1994 (E. Thexton pers. comm.). Not listed in Hnatiuk (1990). Introduced as an ornamental and for stream bank stabilisation. Notes: Recorded from Kiewa River and several other locations in NE Vic (E. Thexton pers. comm.). Common in freshwater tributaries of the Hawkesbury River (G. Sainty pers. comm.). Distrib: Localised. NSW (CC), Vic (RVW).

Salix purpurea PURPLE OSIER. Native of Eur to Japan. First recorded as naturalised in Vic in 1994 (E. Thexton pers. comm.). Not listed in Hnatiuk (1990). Introduced for soil stabilisation. Notes: Recorded from Kiewa River, Cann River and several other locations in Vic (E. Thexton pers. comm.). Distrib: Localised. Vic (RVWX).

Salix viminalis COMMON OSIER. Native of Eur. First recorded as naturalised in NSW in ? Not listed in Hnatiuk (1990). Introduced for soil stabilisation. Notes: Naturalised in mountains. Distrib: Localised. NSW (ST).

Salix X pendulina Plant of garden origin. First recorded as naturalised in Vic in 1995 (G. Carr pers. comm.). Not listed in Hnatiuk (1990). Introduced as an ornamental. Notes: Recorded from Glen Waverley, a suburb of Melbourne (G. Carr pers. comm.). Distrib: Localised. Vic (N).

Salix X reichardtii PUSSY WILLOW. Natural hybrid of Eur origin. First recorded as naturalised in Vic in 1993 (G. Carr pers. comm.). Not listed in Hnatiuk (1990). Introduced as an ornamental. Notes: Recorded from Yarrowee River, Ballarat (V. Stajsic pers. comm.) and many other locations in southern Vic (Carr 1996). Distrib: Localised. Vic (JNPSTWV).

Salix X rubra Natural hybrid of Eur origin. First recorded as naturalised at Thredbo, NSW in 1994 (G. Carr pers. comm.). Not listed in Hnatiuk (1990). Introduced for soil stabilisation. Notes: Used for soil stabilisation but it is not known whether Australian plants were introduced or the hybrid arose *in situ* where both parents (*S. purpurea* and *S. viminalis*) are planted for soil stabilisation. Distrib: Localised in the Mt Kosciusko area. NSW (ST).

Salix X sepulcralis* var. *chrysocoma Plant of garden origin. First recorded as naturalised in Vic in 1994 (G. Carr pers. comm.). Not listed in Hnatiuk (1990). Introduced as an ornamental. Notes: Recorded from Merri Creek, Melbourne (G. Carr pers. comm.) and numerous other locations in southern, and NE Vic. Distrib: Localised. Vic (DEFMNPRSTVWXZ).

Salix X sepulcralis* var. *sepulcralis Plant of garden origin. First recorded as naturalised in Vic in 1994 (G. Carr pers. comm.). Not listed in Hnatiuk (1990). Introduced as an ornamental. Notes: Recorded from Yarra Glen, Vic (G. Carr pers. comm.) and numerous other locations in southern and NE Vic. Distrib: Localised. Vic (NTVWZ).

SCROPHULARIACEAE

Bacopa caroliniana [*Bacopa amplexicaulis* misapplied] Native of SE USA. First recorded as naturalised in NSW in 1981 (NSW specimen). Introduced as an ornamental. Notes: Naturalised in Bulahdelah district. *B. caroliniana* is a potential weed of wetlands. Distrib: Localised. NSW (NC).

***Linaria* sp.** Native of Eur. First recorded as naturalised in 1995 from NSW (NSW, AD specimen). Introduced as an ornamental. Notes: Abundant along railway line at Tenterfield railway station and apparently spreading. G Sainty had an earlier slide of the same species naturalised in western Sydney (the species had been incorrectly identified). Distrib: Localised. NSW (CC NT).

Maurandya barclaiana Native of S Mexico. First recorded as naturalised in WA in 1994 (PERTH specimen). All specimens at NSW are from cultivated plants. Introduced as an ornamental. Notes: Showy ornamental. Occasional escape in moist coastal bushland. Listed as apparently naturalised in the Moreton district (Stanley and Ross 1986). Also recorded as spreading into *Acacia* scrub on Garden Island in WA (PERTH specimen). Distrib: Localised. Qld (Moreton), NSW (NC), WA (SWA).

Nuttallanthus canadensis [*Linaria canadensis* var. *canadensis*] BLUE TOADFLAX. Native of N Amer. Record at ID counter at NSW (according to note under *Linaria canadensis* details were to follow - possibly they never did). Not listed in Hnatiuk (1990). Introduced as an ornamental. Notes: Naturalised in mining rehabilitation area at Tomago (north of Newcastle), NSW. Distrib: Localised. NSW (NC).

Orobanche ramosa [*Phelipaea ramosa*, *Kopsia ramosa*, *Orobanche mutelii*] BRANCHED BROOMRAPE, HEMP BROOMRAPE. Native of S Eur. First recorded as naturalised in 1911 but died out and was next recorded in 1992 in South Australia. Means of introduction unknown. Notes: This species has not been included in the calculations as it was first recorded as naturalised in 1911. A major weed overseas. Seeds germinate near susceptible plants, the seedling attaching to the roots of the host plant. A single infestation about 300 square metres between Murray Bridge and Bowhill was reported in SA in 1992 (Carter 1993). A total area of less than 3000 square metres including 5 infestations within 2 km in 1995 (Animal and Plant Control Commission records). Distrib: Localised. SA (MU).

Veronica officinalis COMMON SPEEDWELL. Native of Eur. First recorded as naturalised in Vic in 1996 (V. Stajsic and G. Carr pers. comm.). Not listed in Hnatiuk (1990). Apparently introduced as an ornamental. Notes: Recorded from Mt Macedon, Vic where locally abundant in one location (V. Stajsic and G. Carr pers. comm.). Distrib: Localised. Vic (N).

Veronica scutellata Native of N Amer, Eur, Asia. First recorded as naturalised in Tas in 1974 (HO specimen). Means of introduction unknown. Notes: Collected from wet areas around Deloraine and Cressy, Tas (HO herbarium labels). Distrib: Localised. Tas (Central Highlands).

SOLANACEAE

Cestrum nocturnum LADY-OF-THE-NIGHT. Native of C Amer. Specimen from NSW is on loan. Date first recorded as naturalised? Date of NSW specimen recorded in George (1982b) is 1974. Introduced as an ornamental. Notes: Uncommon garden escape. Distrib: Localised. Qld (Moreton), NSW (NC).

Solanum abutiloides Native of NW Argentina, S Bolivia. First recorded as naturalised in Qld in 1985 (Symon and Swarbrick 1986). Probably introduced to Mt Coot-tha Botanic Garden in the past. Notes: Only known from heavily disturbed woodland in stage two of the Mt Coot-tha Botanic Garden (Symon and Swarbrick 1986). Distrib: Localised. Qld (Moreton).

TAMARICACEAE

Tamarix ramosissima [*Tamarix pentandra*] SALT CEDAR. Native of E Eur to C & E Asia. Recorded from Deniliquin, NSW in 1916 (NSW specimen - with no notes). Recorded as naturalised in Vic in 1985 (MEL specimen). First recorded as naturalised in NSW in 1985 (NSW specimen - listed as a new record for NSW in the 1990-91 annual report for the National Herbarium of NSW). Not listed in Hnatiuk (1990). Introduced as an ornamental. Notes: Recorded as naturalised in the Spence Bridge Education Area, Barmah Forest, Vic (MEL specimen) and from near Wakool in NSW. This species is a major problem along waterways in SW USA and is also naturalised in parts of Australia (Parsons and Cuthbertson 1992). Distrib: Localised. NSW (SWP), Vic (M).

ULMACEAE

Ulmus procera ENGLISH ELM. Native of England. First from Bowral, NSW in 1950 (NSW specimen - oldest record at NSW). First recorded as naturalised in NSW in 1983 (NSW specimen - listed as a new record for NSW in the 1987-88 annual report for the National Herbarium of NSW). First recorded as naturalised in WA in 1987 (PERTH specimen). Recorded in Willis (1972) as a frequent avenue and garden tree but not naturalised or spreading (comment repeated in George (1989)). Not listed in Hnatiuk (1990). Introduced as an ornamental. Notes: Commonly planted. Suckers from disturbed roots. Naturalised in Porongorup National Park in WA in 1987 and at Armidale and Wollombi in NSW (NSW specimens). Distrib: Localised. NSW (NT), WA (JF).

8.2 Taxa introduced to Australia and likely to be weeds but not recorded to date

MONOCOTYLEDONS

ALISMATACEAE

Echinodorus cordifolius BURHEAD. Native of USA, Mexico. Species used in aquarium trade in Australia. A potential weed. *Echinodorus berteroi* is a troublesome weed in rice in California (Fischer 1990).

ASPHODELACEAE

Aloe ferox Native of S Afr. Recorded Royal Botanic Gardens, Melb, and Tas garden. Introduced as an ornamental. Notes: Significant weed overseas, recorded from gardens in Australia but not known to be naturalised (Csurhes 1994).

DICOTYLEDONS

ACANTHACEAE

Barleria cristata and its cultivars are sold by nurseries (Csurhes 1994). This species is likely to be weedy.

ANACARDIACEAE

Harpephyllum caffrum AFRICAN PLUM Native of S. Afr. First recorded in Qld in 1962 (BRI specimen) but no indication that this species has naturalised in Qld. Not listed in George (1985) or Hnatiuk (1990). Introduced as an ornamental. Notes: Fruit used in jellies. Naturalised on Lord Howe Island. Distrib: ?

ASTERACEAE

Achillea ptarmica Native of ? Notes: Only recorded as a garden specimen in Tas. Significant weed overseas (Csurhes 1994).

Mikania sp. MIKANIA VINE. Native of ? First record of this species in Qld in 1996 (S. Csurhes pers. comm.). Introduced as an ornamental. Notes: An unknown species of *Mikania* vine was being sold by a major wholesale nursery near Brisbane (at Gatton). The source of the plants is unknown, but *Mikania* was identified as a major threat to Australia (Csurhes 1991).

BETULACEAE

Alnus rubra [*Alnus oregana*] Native of ? Recorded in Tas garden. (Csurhes 1994).

CACTACEAE

Cereus triangularis Native of Amer. Introduced as an ornamental. Notes: Believed to have been approved for importation in the 1970s (imported under an erroneous name and hence permitted entry) (W. Wright, pers. comm., April 1993). This species should not have been approved for importation since all species of *Cereus* are classed as prohibited imports under Proclamation 58P (*Quarantine Act*). The plants were believed to be held as garden specimens at three locations: (i) Kamarunga Research Station (QDPI) - Atherton tablelands, (ii) Mr Colin Gray - Cape Tribulation (iii) Mr Alan Carle - North of Mossman. Investigation by Qld Department of Natural Resources regional staff in April/May 1993 failed to locate any plants and it is not known whether the plants had a chance to spread. Distrib: not recorded as naturalised to date.

Cereus oncamponensis [*Hylocereus oncamponensis*] Native of Amer. Introduced as an ornamental. Notes: Believed to have been approved for importation in the 1970s (imported under an erroneous name and hence permitted entry) (W. Wright, pers. comm., April 1993). This species should not have been approved for importation since all species of *Cereus* are classed as prohibited imports under Proclamation 58P (*Quarantine Act*). The plants were believed to be held as garden specimens at three locations: (i) Kamarunga Research Station (QDPI) - Atherton tablelands, (ii) Mr Colin Gray - Cape Tribulation (iii) Mr Alan Carle - North of Mossman. Investigation by Qld Department of Natural Resources regional staff in April/May 1993 failed to locate any plants and it is not known whether the plants had a chance to spread. Distrib: not recorded as naturalised to date.

FABACEAE

FABOIDEAE

Sesbania punicea Native of ? First detected growing in a Queensland garden, on the Gold Coast, in ? Believed to have been propagated by a wholesale nursery in Brisbane (Troika Pty Ltd). Source unknown (highly likely that this plant was sourced from overseas by the nursery trade). May highlight quarantine deficiency (i.e. apparent ease with which a nursery can obtain potential weeds from overseas). Identified as a major threat to Australia by Csurhes (1991). Declared category P1, potential weed in Qld (Csurhes 1994). Weed in Americas and S Afr. (Holm *et al.* 1979).

MIMOSOIDEAE

Acacia boliviensis Native of tropical S Amer. Notes: Exists in Mt. Coot-tha Botanic Gardens. Potential environmental problem. Possibly the same species as that listed below.

Acacia boliviana [*Acacia angustissima*] Native of tropical S Amer. Notes: Currently under evaluation as a potential fodder tree by QDPI's "Browsenet program". Seed collected in 1965 by Ron Williams of CSIRO. Highlights fact that the seed of thousands of exotic plants has been collected and stored for "future assessment" as fodder plants (imported without any assessment of propensity to become weeds). *A. boliviana* is being tested as an alternative to *Leucaena* (which DPI considers "not aggressive enough" along the coast!). *Leucaena* has become naturalised in many areas of coastal Qld and has been declared noxious in some Local Government areas. Category P1 potential weed of Qld.

Acacia xanthophloea YELLOW-FEVER TREE. Native of southern Africa. Notes: Detected growing in garden at Mt Tamborine near Brisbane in March

1993 by Beaudesert Shire Council (Mr Nick Van'hos, Declared Plants Inspector). Garden owner had immigrated from South Africa and may have brought seed of this tree into Australia with him. The owner has removed the plant following action by Queensland Department of Natural Resources and Beaudesert Shire Council. Distrib: not known to have naturalised in Australia.

Inga affinis [*Pithecellobium dulce*, *Mimosa dulcis*] MANILA TAMARIND. MADRAS THORN. Native of Brazil. Not recorded as naturalised. Introduced as an ornamental. Notes: Woody weed of pastures in Hawaii (Holm *et al.* 1979). Declared category P1 potential weed in Qld. Was planted in Cairns and Brisbane Botanic gardens (Csurhes 1994).

RHAMNACEAE

Ziziphus mucronata Native of trop Afr. Notes: Fruit said to be edible but not palatable. Various parts of the plant are used medicinally. Recorded in Royal Botanic Gardens, Melbourne (Csurhes 1994). Major weed in Rhodesia (Holm *et al.* 1979). Not known to be naturalised in Aust. at present.

TAMARICACEAE

Tamarix gallica Native of Eur., Asia, Afr. Garden weed in Tas. Weed in Iran and USA (Holm *et al.* 1979). Not considered naturalised in Australia.

VERBENACEAE

Clerodendrum philippinum [*Clerodendron fragrans*] Native of E Asia. Introduced as an ornamental. Notes: Garden ornamental in Qld. Recorded as a weed in Polynesia (Holm *et al.* 1979, Csurhes 1994) and naturalised throughout the tropics. Not recorded as naturalised in Australia.