

# Weeds in the Burdekin Rangelands: Invasion processes

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## Means of Introduction

The essential first step in an invasion by an alien plant is its introduction to the area. Plants that are currently weeds in the Burdekin Rangelands, were introduced either deliberately or accidentally (Table 1 pages 3–4 on this information sheet). Some species that were deliberately introduced into Australia and that now are serious weeds in the Burdekin Rangelands, include chinee apple, rubber vine, prickly acacia, parkinsonia and hymenachne. Some of these species, for example rubber vine and chinee apple, were introduced to the area over 100 years ago. Prickly acacia was introduced in the 1890s, and during the 1920s was being promoted by the Queensland Department of Primary Industry as a fodder tree, particularly for the Mitchell grasslands. Indian couch was introduced in the 1930s. Others are relatively recent introductions. For example, Hymenachne was not introduced until the 1980s. This means that different species have had different amounts of time in which to become weeds.

## Phases of invasion

A species may pass through a series of general phases in becoming a significant invader (Hobbs and Humphries 1994) (Figure 1). Following introduction, an incipient weed becomes naturalised and is likely to exist for some time as a single or small number of localised populations. The concept of a “sleeper” has been applied to species that are present in an area for an extended period, perhaps several decades, before becoming a significant weed there. At some point, however, the weed will enter a period of rapid expansion, both in terms of total population size and the number and size of individual infestations. Finally, the weed will reach a stage at which it presents major problems across much

of its potential range. This diagrammatic representation is not meant to definitively describe the details of particular invasions. For example, the invasion is not necessarily a smooth process and major episodes of population expansion may be punctuated by uneventful periods. Moreover, the rate at which a species may go through these phases depends on many factors, including:

- The scale of initial introduction
- The number of sites at which introduction occurred
- The distribution of sites at which introduction occurred
- The abundance and spatial arrangement of suitable habitat
- The plant’s natural dispersal mechanisms and the extent to which natural dispersal is augmented by human activities in the area
- The suitability of the climate
- Human activities that promote or counter invasion

In general, species that are introduced on a large scale and/or introduced to a large number of sites which are in close proximity to suitable habitat, are likely to colonise relatively quickly. The opportunities for effective weed management will differ between the various phases of invasion.

## Time-course of invasions

There has been little work done to document the time-course of spread and increase in abundance of weeds in the Burdekin Rangelands. Some information is available in relation to the invasion patterns of rubber vine and chinee apple within the Dalrymple Shire as a result of a broad survey covering over 2000 1ha sites between 1990 and 1994 (Rogers et al 1999) These two species

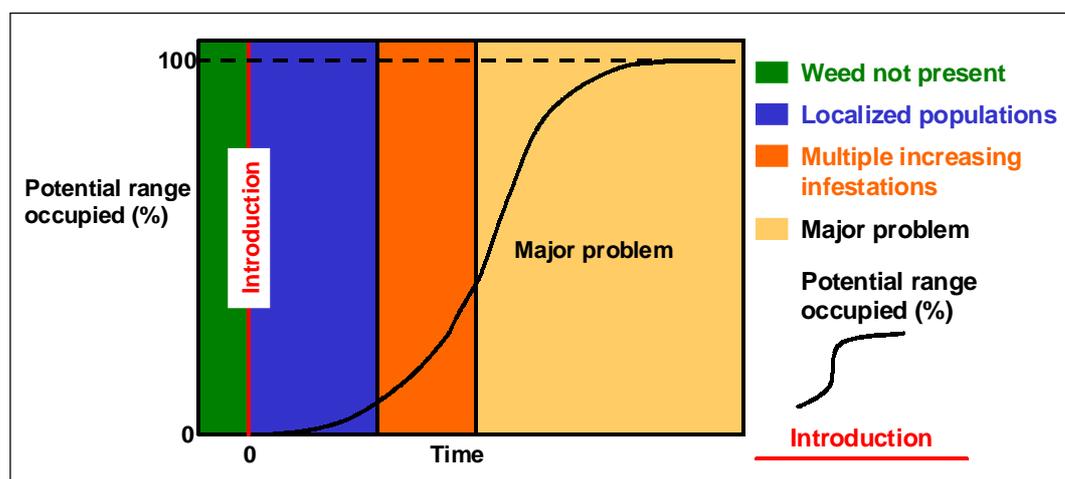


Figure 1  
Diagrammatic representation of generalised phases of weed invasion (after Hobbs & Humphries 1994).

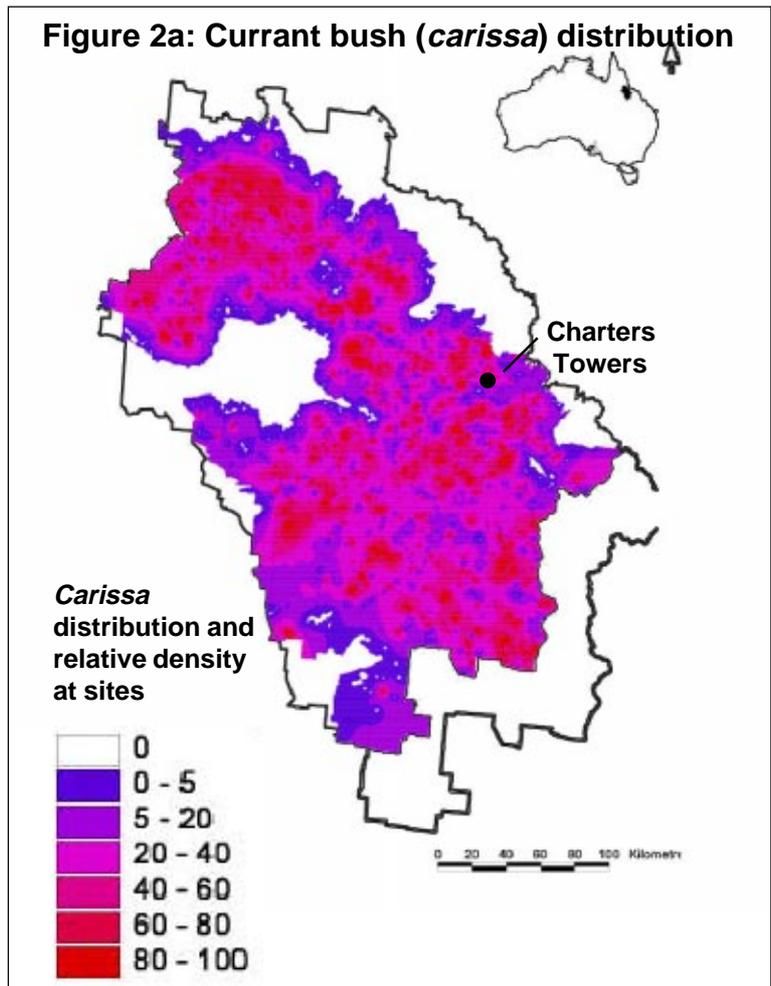


have been in the region for similar lengths of time and both were apparently introduced to many, widely scattered sites. Although both species are now serious weeds in the Dalrymple Shire, they were reported at only a small proportion of sites.

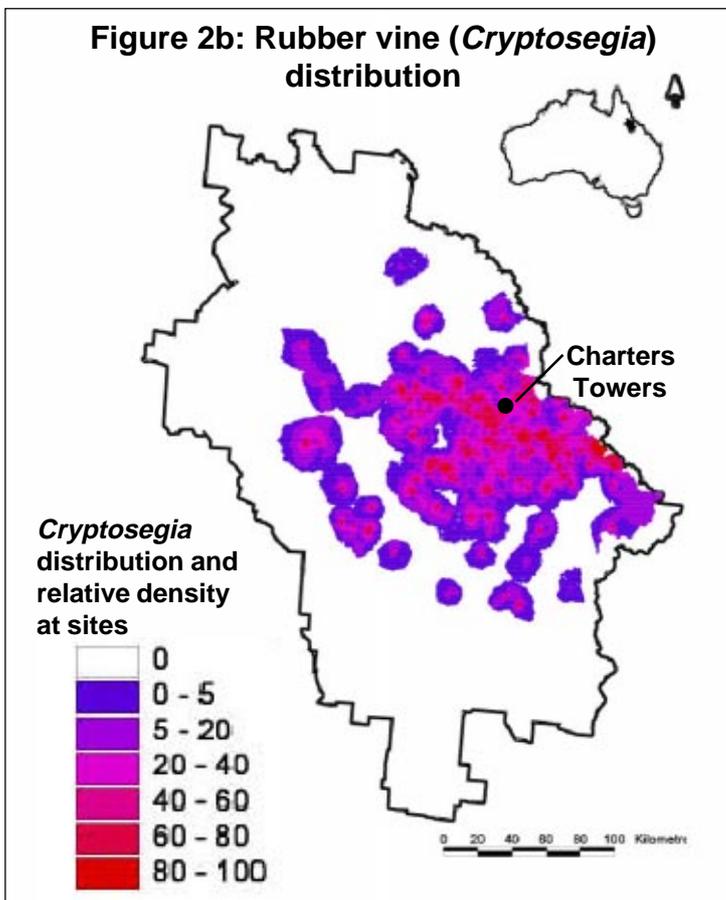
In contrast, the native 'woody weed' currant bush (*Carissa* spp.) was reported at more than 50 per cent of sites across the Shire and was generally far more widespread than the alien species, being recorded in all 21 catchments (Grice, Radford and Abbott 2000) (Figure 2a). Rubber vine and chinee apple were recorded at 10 per cent and 5 per cent of sites respectively. Moreover, they were very unevenly spread across the Shire. For example, rubber vine was present at 50 per cent of sites within 20 km of Charters Towers, but only 5 per cent of sites between 60 and 120 km from Charters Towers (Figure 2b). Rubber vine was recorded in 14 of the 21 sub-catchments defined within Dalrymple Shire, and in three sub-catchments (Hann Creek, Fanning River/lower Burdekin, and an unnamed sub-catchment) was present at more than 30 per cent of sites.

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**Figure 2a: Currant bush (*carissa*) distribution**



**Figure 2b: Rubber vine (*Cryptosegia*) distribution**



**Figure 2a and 2b**

Relative abundance (% of sites surveyed) of (a) the native woody weed currant bush and (b) the alien woody weed rubber vine in Dalrymple Shire (from Grice et al. 2000).



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**Table 1 Alien species occurring within the Burdekin Rangelands**

Common name	Scientific name	Family	Life form
Prickly acacia	<i>Acacia nilotica</i>	Mimosaceae	shrub/tree
Star burr	<i>Acanthospermum hispidum</i>	Asteraceae	short-lived forb
Budda pea	<i>Aeschynomene indica</i>	Fabaceae	short-lived forb
Billy goat weed	<i>Ageratum conyzoides</i>	Asteraceae	short-lived forb
Aloe (unknown species)	<i>Aloe spp.</i>	Liliaceae	succulent
Joyweed	<i>Alternanthera bettzikiana</i>	Amaranthaceae	short-lived forb
Khaki weed	<i>Alternanthera pungens</i>	Amaranthaceae	perennial forb
—	<i>Amaranthus interruptus</i>	Amaranthaceae	short-lived forb
Green amaranth	<i>Amaranthus viridis</i>	Amaranthaceae	short-lived forb
Mexican poppy	<i>Argemone ochroleuca</i>	Papaveraceae	short-lived forb
Red head cotton bush	<i>Asclepias currassavica</i>	Asclepiadaceae	perennial forb
Spanish needles	<i>Bidens bipinnata</i>	Asteraceae	short-lived forb
Cobbler's peg	<i>Bidens pilosa</i>	Asteraceae	short-lived forb
Creeping bluegrass	<i>Bothriochloa insculpta</i>	Poaceae	stoloniferous grass
Indian couch	<i>Bothriochloa pertusa</i>	Poaceae	stoloniferous grass
Humidicola	<i>Brachiaria humidicola</i>	Poaceae	stoloniferous grass
Paragrass	<i>Brachiaria mutica</i>	Poaceae	stoloniferous grass
Mother-of-millions	<i>Bryophyllum tubiflorum</i>	Crassulaceae	succulent
Bird pepper	<i>Capsicum annuum</i>	Solanaceae	short-lived forb
Buffel grass	<i>Cenchrus ciliaris</i>	Poaceae	tussock grass
Mossman River grass	<i>Cenchrus echinatus</i>	Poaceae	tussock grass
Asthma plant	<i>Chamaesyce hirta</i>	Euphorbiaceae	short-lived forb
Goosefoot	<i>Chenopodium carinatum</i>	Chenopodiaceae	short-lived forb
Purpletop Rhodes grass	<i>Chloris barbata</i>	Poaceae	annual grass
Callide Rhodes grass	<i>Chloris gayana</i>	Poaceae	tussock grass
Purpletop Rhodes grass	<i>Chloris inflata</i>	Poaceae	stoloniferous grass
Feathertop Rhodes grass	<i>Chloris virgata</i>	Poaceae	stoloniferous grass
Fleabane	<i>Conyza sp.</i>	Asteraceae	short-lived forb
—	<i>Corchorus tridens</i>	Tiliaceae	short-lived forb
Gambia Pea	<i>Crotalaria goreensis</i>	Fabaceae	short-lived forb
Bird flower	<i>Crotalaria laburnifolia</i>	Fabaceae	shrub
—	<i>Crotalaria lanceolata</i>	Fabaceae	short-lived forb
<b>Rubber vine</b>	<i>Cryptostegia grandiflora</i>	Asclepiadaceae	shrub/vine
Couch	<i>Cynodon dactylon</i>	Poaceae	stoloniferous grass
<b>Downy thornapple</b>	<i>Datura innoxia</i>	Solanaceae	short-lived forb
<b>Common thornapple</b>	<i>Datura stramonium</i>	Solanaceae	short-lived forb
Summer grass	<i>Digitaria ciliaris</i>	Poaceae	stoloniferous grass
Harrisia cactus	<i>Eriocereus martini</i>	Cactaceae	succulent
Gomphrena	<i>Gomphrena celosioides</i>	Amaranthaceae	short-lived forb
Hymenachne	<i>Hymenachne amplexicaule</i>	Poaceae	stoloniferous grass
Hyptis	<i>Hyptis suaveolens</i>	Lamiaceae	short-lived forb
Lantana	<i>Lantana camara</i>	Verbenaceae	shrub
Peppercress	<i>Lepidium sp.</i>	Brassicaceae	forb/shrub
Siratro	<i>Macroptilium atropurpureum</i>	Fabaceae	perennial forb

**Data sources:** Townsville Field Training Area (Grice, 1999); Dalrymple National Park (Bean 1992); Mt Fox section of Lumholtz National Park (Williams and Cumming 1999); Cardigan grazing study site (CSIRO, unpublished data); Hillgrove grazing study site (CSIRO, unpublished data); Dregghorn-Cameron study site (CSIRO, unpublished data); Allan Hills study site (CSIRO, unpublished data). Bold characters indicate species that are declared noxious under legislation over all or part of the Burdekin Rangelands.





Common name	Scientific name	Family	Life form
Phasey bean	<i>Macroptilium lathyroides</i>	Fabaceae	short-lived forb
Red Natal grass	<i>Melinis repens</i>	Poaceae	tussock grass
Common sensitive plant	<i>Mimosa pudica</i>	Mimosaceae	perennial forb
Tree tobacco	<i>Nicotiana glauca</i>	Solanaceae	shrub
<b>Prickly pear</b>	<i>Opuntia stricta</i>	Cactaceae	succulent
Guinea grass	<i>Panicum maximum</i>	Poaceae	tussock grass
Parkinsonia	<i>Parkinsonia aculeata</i>	Caesalpinaceae	shrub
Parthenium	<i>Parthenium hysterophorus</i>	Asteraceae	short-lived forb
Water couch	<i>Paspalum paspalodes</i>	Poaceae	stoloniferous grass
Stinking passion flower	<i>Passiflora foetida</i>	Passifloraceae	perennial vine
Corky passion vine	<i>Passiflora suberosa</i>	Passifloraceae	perennial vine
Red-ink weed	<i>Phytolacca octandra</i>	Phytolaccaceae	perennial forb
Pig weed	<i>Portulaca pilosa</i>	Portulacaceae	succulent
Mesquite	<i>Prosopis pallida</i>	Mimosaceae	shrub
Brazil calla lily	<i>Richardia brasiliensis</i>	Rubiaceae	short-lived forb
Castor oil plant	<i>Ricinus communis</i>	Euphorbiaceae	shrub
—	<i>Rotala mexicana</i>	Lythraceae	short-lived forb
<b>Sicklepod</b>	<i>Senna obtusifolia</i>	Caesalpinaceae	shrub
Coffee senna	<i>Senna occidentalis</i>	Caesalpinaceae	short-lived forb
Spiny head sida	<i>Sida acuta</i>	Malvaceae	shrub
Paddy's lucerne	<i>Sida rhombifolia</i>	Malvaceae	shrub
Spiny sida	<i>Sida spinosa</i>	Malvaceae	shrub
Spiked sida	<i>Sida subspicata</i>	Malvaceae	shrub
—	<i>Solanum americanum</i>	Solanaceae	shrub
Wild tobacco tree	<i>Solanum mauritianum</i>	Solanaceae	shrub
Devil's fig	<i>Solanum torvum</i>	Solanaceae	shrub
Common sowthistle	<i>Sonchus oleraceus</i>	Asteraceae	short-lived forb
Parramatta grass	<i>Sporobolus indicus</i>	Poaceae	tussock grass
American rat's-tail grass	<i>Sporobolus jacquemontii</i>	Poaceae	tussock grass
<b>Giant rat's-tail grass</b>	<i>Sporobolus pyramidalis</i>	Poaceae	tussock grass
Jamaican snakeweed	<i>Stachytarpheta jamaicensis</i>	Verbenaceae	short-lived forb
Verano	<i>Stylosanthes hamata</i>	Fabaceae	perennial shrub
Townsville stylo	<i>Stylosanthes humilis</i>	Fabaceae	short-lived forb
Seca stylo	<i>Stylosanthes scabra</i>	Fabaceae	shrub
Tamarind	<i>Tamarindus indicus</i>	Caesalpinaceae	tree
Grader grass	<i>Themeda quadrivalvis</i>	Poaceae	annual grass
Yellow oleander	<i>Thevetia peruviana</i>	Apocynaceae	shrub
Goathead burr	<i>Tribulus terrestris</i>	Zygophyllaceae	short-lived forb
Tridax daisy	<i>Tridax procumbens</i>	Asteraceae	short-lived forb
—	<i>Triumfetta pentandra</i>	Tiliaceae	short-lived forb
—	<i>Triumfetta pilosa</i>	Tiliaceae	short-lived forb
Urena burr	<i>Urena lobata</i>	Malvaceae	short-lived forb
Sabi grass	<i>Urochloa mosambicensis</i>	Poaceae	stoloniferous grass
Liverseed grass	<i>Urochloa panicoides</i>	Poaceae	stoloniferous grass
Purple-top	<i>Verbena bonariensis</i>	Verbenaceae	perennial forb
<b>Noogoora burr</b>	<i>Xanthium occidentale</i>	Asteraceae	short-lived forb
Chinee apple (Indian jujube)	<b>Ziziphus mauritiana</b>	<b>Rhamnaceae</b>	shrub



Chinese apple was recorded at 32 per cent of sites within 20 km of Charters Towers but at less than 5 per cent of sites between 60 and 120km from Charters Towers. It was reported at sites in only three of the 21 sub-catchments (Fanning River/lower Burdekin, Campaspe and an unnamed sub-catchment), with the highest proportion within a single sub-catchment being 13 per cent.

Various factors have probably contributed to these patterns and to the differences in frequency of the two alien species. Charters Towers may have been a centre of introduction. In addition, the disturbance regimes in the vicinity of this long-established mining and service town may have suited the establishment and spread of the weeds. High levels of disturbance have probably included clearing of timber, heavy grazing and mechanical disturbance of the soil. The grazing properties in the immediate vicinity of Charters Towers are on average small when compared to the rest of the Shire, a phenomenon that has been associated with higher levels of disturbance and so, perhaps, a greater susceptibility to weed invasion.

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## References

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