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Proposed plant host test list for assessing risk of biological control agents for *Parkinsonia aculeata* L. (Fabaceae: Caesalpinioideae)

M. A. Rafter, L. A. Kaye, A. W. White

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Background

This document presents a proposed test list of non-target plant species for inclusion in host-specificity testing experiments for potential biological control agents on *Parkinsonia aculeata* L. (Fabaceae: Caesalpinioideae, the "target weed") (Table 1). It was developed based on the relatively recent re-circumscription of the Fabaceae family by the Legume Phylogeny Working Group (LPWG) and the most recent phylogenetic information available in the literature (Azani et al. 2017; Koenen et al. 2020; Zhao et al. 2021), as supported by the Angiosperm Phylogeny Website (Stevens 2001 onwards).

The test species have been identified based on their phylogenetic relatedness to the target weed, according to the centrifugal phylogenetic method (Briese 2003; Gilbert et al. 2013; Wapshere, 1974). This method is underpinned by evidence that specialist herbivores are evolutionarily more likely to feed on non-target species closely related to the target weed, relative to species that are more distantly related. Within such a phylogenetic/evolutionary framework, an ecological emphasis is also placed on endemic species, species of economic importance and those that are likely to overlap biogeographically with the target weed, where possible.

The included test species differ marginally from previous lists developed for *P. aculeata* due to the recent major taxonomic revision of the legume family (Fabaceae, syn. Leguminosae) by the LPWG (Azani et al. 2017). The Fabaceae family has traditionally been divided into three subfamilies: Caesalpinioideae, Mimosoideae, and Faboideae (syn. Papilionoideae). The recent revision now recognises six subfamilies: the Mimisoideae is now considered a distinct clade nested within Caesalpinioideae (and is currently referred to informally as the mimosoid clade), four new subfamilies were described (Cercidoideae, Detarioideae, Duparquetioideae, and Dialioideae), whereas the Faboideae subfamily remains relatively unchanged (Azani et al., 2017). Only five of the six subfamilies are present in Australia; no species in subfamily Duparquetioideae occur in Australia. Relative to previous test lists, the new test list prioritises species in the mimosoid clade, which now sits as a sister clade to that of the target weed. Lower priority is given to those genera that were moved to relatively more distantly related subfamilies.

The test list includes one representative species from each of the native Australian genera in subfamily Caesalpinioideae except for *Paraserianthes* (Table 1, Fig. 1). The latter genus was excluded from the test list because it is restricted to the southern coastline of the Australian continent and does not overlap geographically with *P. aculeata.* There are no other *Parkinsonia* species native to Australia. Only one native Australian species, *Peltophorum pterocarpum* (DC.) Backer ex K.Heyne, shares the Peltophorum clade with *P. aculeata* (Table 1). However, there are numerous ornamental and streetscape species in this clade, and a representative species has been included in the test list (*Delonix regia* (Bojer ex Hook.) Raf.). Two *Acacia* species are included in the test list: one species with bipinnate leaves (*Acacia baileyana* F.Muell.), that has morphological

similarity to the target weed but does not overlap with it georaphically, and one species with phyllodes (*A. holosericea* A.Cunn. ex G.Don.) that overlaps geographically with the target weed (Fig. 1, top right). Individual representative species from the remaining four subfamilies in family Fabaceae (Faboideae, Dialioideae, Detarioideae, and Cercidoideae), as well as the economically significant species, *Cajanus cajan* (L.) Millsp. (pigeon pea) and *Vicia faba* L. (broad bean), are also included in the test list.

Any suggestions for plant species substitutions or additions are welcomed, but we kindly ask that they be justified within the phylogenetic/evolutionary framework approach taken to develop the host test list. We also kindly request that when proposing these additions/substitutions that you provide us with details as to where accessions of the plant species you would like added to this test list can be obtained. Feedback and comments on this proposed plant host test list can be addressed to Dr Michelle Rafter (michelle.rafter@csiro.au; 07 3833 5549).

Proposed plant host test list

Table 1: List of proposed plant species to be included in testing the proposed biological control agent for the target weed, *P. aculeata*.

Taxonomy				Test species	Relationship to target weed	Taxon status[1]	Geographic overlap with *P. aculeata*[2]	No. Australian species[3] (native/ naturalised)	Percentage coverage of the genus present in Australia
Family	Subfamily	Clade							
Family Fabaceae	Subfamily Caesalpinioideae	Peltophorum clade		*Parkinsonia aculeata* L.	Target weed				
				Peltophorum pterocarpum (DC.) Backer ex K.Heyne	Same clade	Native	Yes	1/0	100 %
				Delonix regia (Bojer ex Hook.) Raf.	Same clade	Ornamental	Yes	0/1	NA
		Dimorphanda Group B clade		*Erythrophleum chlorostachys* (F.Muell.) Baill.	Sister clade	Native	Yes	1/0	100 %
			Informal mimosoid clade	*Acacia baileyana* F.Muell.	Sister clade	Native	Limited	> 1000	0.2 %
				Acacia holosericea A.Cunn. ex G.Don	Sister clade	Native	Yes	> 1000	0.2 %
				Adenanthera abrosperma F. Muell.	Sister clade	Native	Yes	1/1	100 %
				Albizia lebbeck (L.) Benth.	Sister clade	Native	Yes	5/0	20 %
				Archidendron hendersonii (F.Muell.) I.C.Nielsen	Sister clade	Native	Yes	10/0	10 %
				Archidendropsis basaltica (F.Muell.) I.C.Nielsen	Sister clade	Native	Yes	3/0	33 %
				Cathormion umbellatum subsp. *moniliforme* (DC.) Brummitt	Sister clade	Native	Yes	1/0	100 %
				Dichrostachys spicata (F.Muell.) Domin	Sister clade	Native	Yes	2/0	50 %
				Entada phaseoloides (L.) Merr.	Sister clade	Native	Limited	2/0	50 %
				Leucaena leucocephala (Lam.) de Wit	Sister clade	naturalised	Yes	0/1	NA
				Neptunia major (Benth.) Windler	Sister clade	native	Yes	5/1	20 %

Taxonomy Family	Subfamily	Clade	Test species	Relationship to target weed	Taxon status[1]	Geographic overlap with *P. aculeata*[2]	No. Australian species[3] (native/ naturalised)	Percentage coverage of the genus present in Australia
			Pararchidendron pruinosum (Benth.) I.C.Nielsen	Sister clade	native	Yes	1/0	100 %
			Senegalia albizioides[4] (Pedley) Pedley	Sister clade	Native	Limited	3/2	33 %
			Vachellia bidwillii (Benth.) Kodela	Sister clade	Native	Yes	9/3	11 %
		Cassieae clade	*Chamaecrista nomame* (Siebold) H.Ohashi	Same subfamily	Native	Yes	12/1	8.3 %
			Senna artemisioides subsp. *artemisioides* (Gaudich. ex DC.) Randell	Same subfamily	Native	Yes	~ 50/7	2 %
			Cassia brewsteri (F.Muell.) Benth.	Same subfamily	Native	Yes	2/2	50 %
		Caesalpinieae clade	*Caesalpinia bonduc* (L.) Roxb.	Same subfamily	Native	Yes	4/1	25 %
			Mezoneuron scortechinii F.Muell.	Same subfamily	Native	Limited	5/0	20 %
	Subfamily Faboideae		*Hovea acutifolia* A.Cunn. ex G.Don	Sister subfamily	Native	Limited	34/0	2.9 %
			Cajanus cajan (L.) Huth	Sister subfamily	Cultivated	NA	16/2	NA
			Vicia faba L.	Sister subfamily	Cultivated	NA	0/9	NA
	Subfamily Dialioideae		*Petalostylis labicheoides* R.Br.	Same family	Native	Yes	2/0	50%
	Subfamily Detarioideae		*Tamarindus indica* L.	Same family	Naturalised/ cultivated	Yes	1/0	100 %
	Subfamily Cercidoideae		*Lysiphyllum hookeri* (F.Muell.) (syn. *Bauhinia hookeri* F.Muell.)	Same family	Native	Yes	6/4	16.7 %

[1]Taxon status derived from the Australian Plant Census (APC) (APC, 2022). [2]Geographic overlap with *P. aculeata* derived from distribution records downloaded from the Atlas of Living Australia (ALA) (ALA, 2022). [3]Number of Australian species consistent with the APC (2022). [4]*Senegalia albizioides* is a rare endemic species restricted to the Cape York Peninsula. If experimental plants are unable to be sourced, this species may be substituted by one of the *Senegalia* species naturalised in Australia, as also recommended in Taylor and Dhileepan (2019).

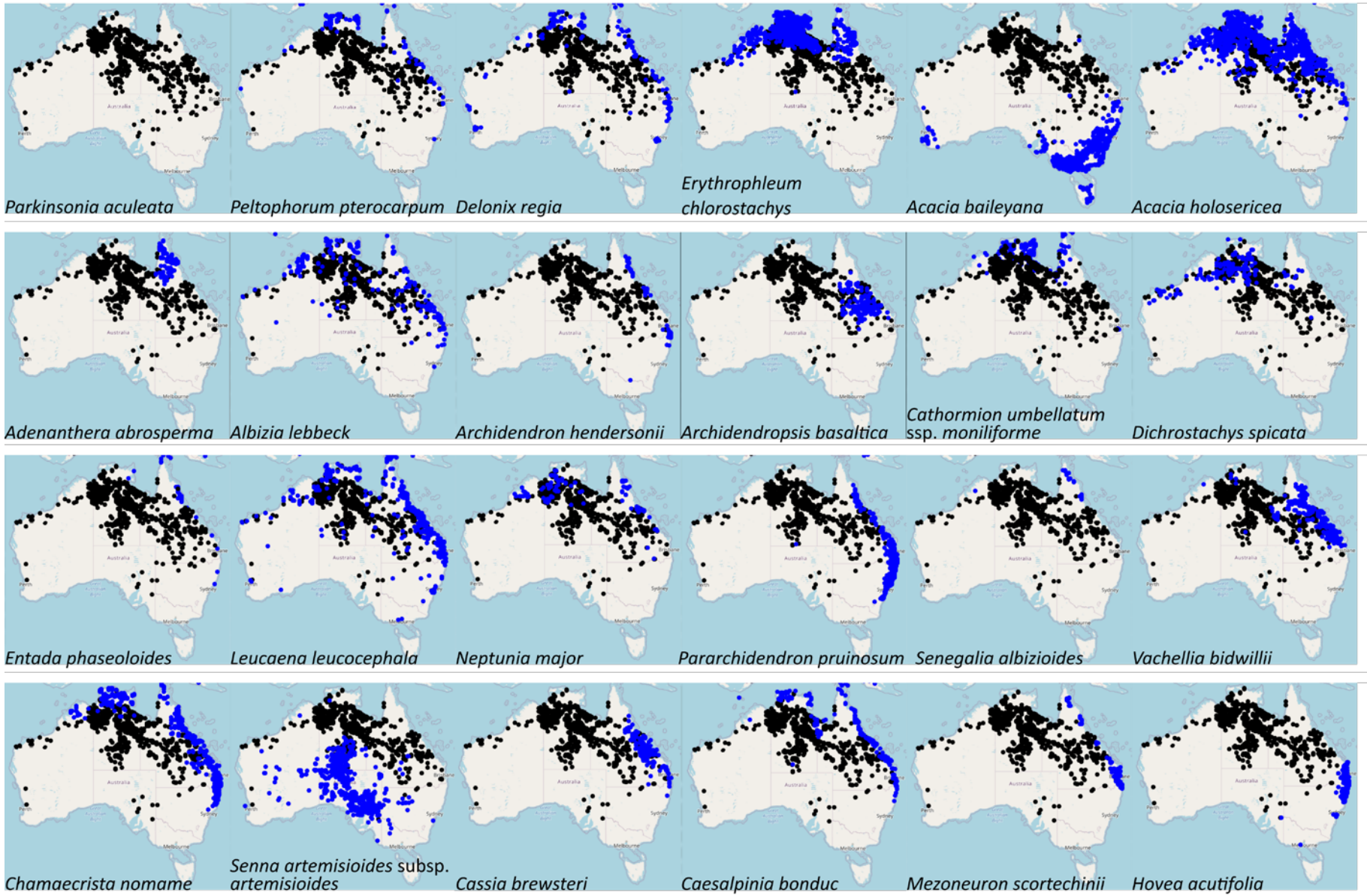

Figure 1. The spatial distribution of host test list species (blue) in relation to the target weed, *Parkinsonia aculeata* (black). Species records from the ALA (2022).

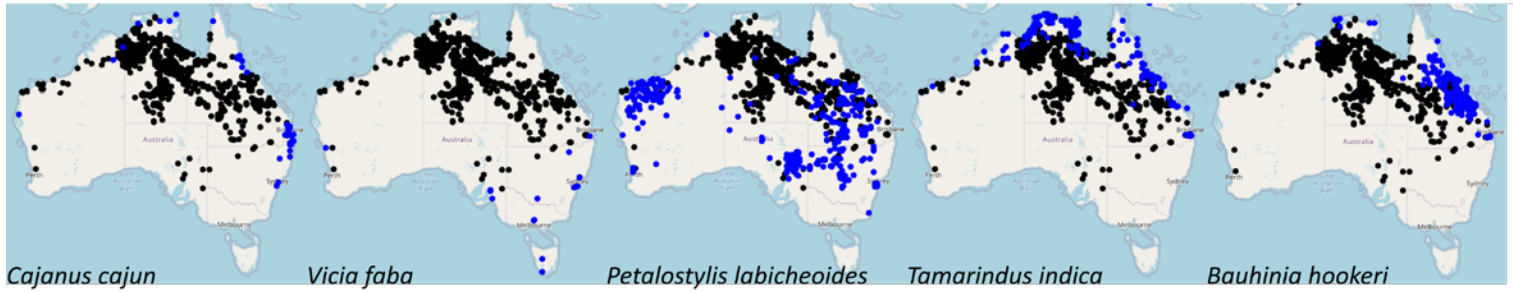

Figure 1. [Continued.]

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Contact us

1300 363 400
+61 3 9545 2176
csiroenquiries@csiro.au
csiro.au

For further information

H**ealth & Biosecurity**

Michelle Rafter
+61 7 3833 5549
michelle.rafter@csiro.au
https://research.csiro.au/weed-biocontrol/