Proposed test plant list for the New Zealand biological control programme against *Tradescantia fluminensis*

Summary test plant list

1/ Family Commelinaceae
Tradescantia fluminensis (control)
T. pallida
T. zebrina
+ T. spathacea?
+ T. x *andersonia* or varietal?
Gibasis geniculata
Callisia repens
Tripogandra diuretica
Dichorisandra thyrsifolia
Aneilema brasiliense
Commelina benghalensis (or *C. diffusa* if it can be located)

2/ Add species from other families in the Order Commelinales only if necessary

3/ There are no native New Zealand plant species in the order Commelinales. Candidate biological control agents will almost certainly be rejected if they cannot be demonstrated to be host specific to at least the level of family. Consequently, we recommend that New Zealand native plants are not be included in at least the first stage of the host range testing programme being considered here.

Introduction
The testing procedure we propose follows the centrifugal system suggested by Wapshere (1999), although we would also use a hierarchy of testing procedures, starting with the simpler tests (that are likely to produce 'false positives') and moving on to more sophisticated (and costly) tests that suffer from the 'false positive' problem to increasingly lesser degrees. So for example we might start with no-choice feeding and/or development tests ('starvation tests) with an insects herbivore species, which can robustly eliminate non-suitable plant species and define the fundamental host range of plants that the insect can complete its development on in captivity. For many herbivorous insects this fundamental host range is much broader than realised host range under field conditions. If simple experiments to demonstrate that the fundamental host range in captivity show that the candidate biocontrol agent is sufficiently safe for release in New Zealand, then costly (and sometimes logistically difficult, or even impossible, field host range tests would not normally be considered necessary). In the case of *T. fluminensis*, this scenario could arise especially because there are no closely related New Zealand native plant species, and the only members of the plant family to which *T. fluminensis* belongs of any significance to New Zealand are several minor to very minor ornamental species (see Tables 1 & 2).

Taxonomy of the target weed
The target species, *Tradescantia fluminensis*, is a member of the Family Commelinaceae. There are no New Zealand native species in this family, or indeed in the Order Commelinales (see Appendix 1). It is hard to say what the closest relative to *T. fluminensis* might be amongst the New Zealand native plant flora, but Landcare Research botanists suggest it could be the nikau palm (in the family Arecaleae in the order Arecales). We do not propose testing any New Zealand native species in this programme because they are so unrelated to the target weed.

Whether to undertake host range testing in New Zealand quarantine or in Brazil?
If testing can be carried out in Brazil, then this is less costly and logistically simpler than importing and testing agents in quarantine in New Zealand. In addition, realistic testing to ascertain the field host range can only be carried out in Brazil. Therefore we propose completing as much host range testing in Brazil as possible under subcontract to the Universities of Parana and Vicosa.

Test plant species and the rationale for their selection
The classification of the family Commelinaceae on which the following rationale is based in shown in Table 1.

1/ Within genus* Tradescantia*: test most/all species of significance to New Zealand.

Tradescantia. fluminensis (controls – from various sources including New Zealand)
T. pallida (Robert has already acquired)
T. zebrina (Robert has already acquired)
Plus *T. spathacea (=Rhoeo discolor)* could be tested, especially if it is available as ornamental in Brazil (native range Mexico)
Plus some ornamental varietals of *Tradescantia* are available in Brazil, and it may be worth including some of these. Of particular significance might be *T.* x *andersonia* (+/- varieties that are probably either this hybrid, or of parent species of this hybrid) as this does seem to be quite widely listed as a horticultural plant in New Zealand and other countries.

Note that the current benefits of *Tradescantia* species (or cultivars) to New Zealand is limited to minor use as frost intolerant (often indoor) ornamentals, so testing of a comprehensive list of species/cultivars is not considered essential.

This selection of species/varieties does not consider the classification of *Tradescantia* into sections within the genus (Hunt 1981; Appendix 3) although it could be extended to involve this if necessary. However, the species above do in fact represent one species each from 5 of the 9 sections of the genus *Tradescantia* proposed by Hunt (1981; 1986).

2/ Within sub-tribe Tradescantiinae: test at least one species in each genus containing species of significance to New Zealand, using a species of significance to New Zealand where possible.

There are no species of high significance to New Zealand, but the following genera contain species of minor ornamental use:
Gibasis – suggest *G. geniculata*
Callisia – suggest *C. repens* (Robert has already acquired)
Tripogandra – suggest *T. multiflora* (this species appears to be native to Costa Rica, so perhaps replace with another that is recorded from Brazil e.g. *T. diuretica* – see site details in Appendix 2)

3/ Within the tribe Tradescantieae: test a species in a represenative genus of the other subtribes, potentially ignoring subtribes with no species of significance to New Zealand.

There are no species of high significance to New Zealand, but the following genus contain species of minor ornamental use:
subtribe Dischorisandrinae:
Dichorisandra – suggest *D. thyrsifolia* (Robert has already acquired)

Suggest ignoring species in other subtribes, as they are of no relevance to New Zealand i.e. Palisotinae, Streptoliriinae, Cyanotinae, Coleotrypinae, Thyrsantheminae.

4/ Within the other tribes in the family Commelinaceae (Cartonemateae, Triceratellae, Commelineae) test a species from representative genera that contain plants of significance to New Zealand.

There are no species of high significance to New Zealand, but the following genera contain species of minor ornamental use:
Tribe Commelineae:
Aneilema – suggest locating a species found in Brazil e.g. *Aneilema brasiliense* – see site details in Appendix 2)
Commelina – suggest using a species available in Brazil e.g. *C. benghalensis* and/or *C. erecta* both of which Robert has already located, but perhaps see if *C. diffusa* could be located – see Appendix 2)

Suggest ignoring species in other tribes, as they are of no relevance to New Zealand i.e. Cartonemateae, Triceratellae.

Use of surrogate species

There are no plant species within the family Commelinaceae of high economic importance to New Zealand (other than *T. fluminensis* as a significant weed). However, in general plant species selected for testing using the above criteria should where possible be those species of some significance to New Zealand. In some cases (e.g. for *Aneilema* and *Commelina* see above), a closely related, surrogate species can be considered if testing the species of significance to New Zealand is logistically difficult or impossible.

Inclusion of Australian Commelinaceae

There are several native Australian species in the Commelinaceae (in genera marked in Table 1) and if there was a realistic risk that biocontrol agents introduced into New Zealand could accidentally cross the Tasman Sea, then testing some of these species might be considered (given HSNO Act requirement to take into account international considerations when assessing risk). For insect herbivores we consider this risk to be negligible, but it might need to be considered further for some groups of pathogens such as rusts.

Testing plants outside the family Commelinaceae

Prospective biological control agents that included most or all plant species tested in the family Commelinaceae in their realised host range would probably not be considered further. However, given the lack of New Zealand native plant species in the entire order Commelinales, the testing in theory could proceed onto other plant families. If this was the case, then testing would move onto plant species found in New Zealand in the families shown in Table 2. The two species in the Pontederiaceae could be tested in Brazil as they are native to that country. However, they are both floating aquatic plants, so testing many prospective biological control agents (e.g. terrestrial insect herbivores) would probably be restricted to feeding trials (as many herbivores would be highly unlikely to rear through on these test plants because of the aquatic habitat). One species in the Haemodoraceae has been recorded from Acre, Brazil (Table 2) so in theory might be available for testing. Other species do not appear to be available in Brazil, so any testing of these would likely have to be conducted in quarantine confinement in New Zealand. Before undertaking this procedure (noting that we consider it an unlikely event that a testing programme would proceed to this stage anyway), it would probably be worth extending the testing to additional plant families in related plant orders in Brazil (see Appendix 1).

Potential for multi-targeting species in the Commelinaceae for biological control: might we be preventing future weeds?

An analysis of data in the Global Compendium of Weeds (Randall, 2002) suggests that worldwide the family Commelinaceae contains 14 species that have become invasive alien weeds when introduced outside their native range (Table 1, and Appendix 4). A further 12 species have naturalised in various countries but are not recorded as weeds. Quite a large number of species in the family are recorded as weeds of agriculture in their native ranges (Appendix 4). New Zealand has only one weedy species in the Commelinaceae, namely the target of this programme *T. fluminensis*. Three other species, *T. cerinthoides*, *T. virginiana* and *Gibasis schiediana* are recorded as naturalised in New Zealand. There are no reports of these species naturalising or becoming weeds in any other countries.

Acccording to the LCR databases, and recent web searches, New Zealand may have a further 30 species of the Commelinaceae in cultivation. Five of these species are reported as invasive alien weeds in other parts of the world (excluding *T. fluminensis*). However, most of these appear to be invasive in regions with generally warmer climates than New Zealand, so they may not represent a current weed risk, or if they do then it would only be in the most northerly parts of New Zealand (and especially the Kermadec Islands). A further three species of Commelinaceae present in New Zealand have naturalised (but are not reported as alien weeds) in other countries.

Overall little can be concluded regarding the value of multi-targeting potential weeds in the Commelinaceae in New Zealand, although given that uses of this plant family in New Zealand are limited to minor ornamental use (and often indoors), then there don't appear to be any strong reasons to insist on high levels of host specificty of potential biological control agents e.g. to species, genus or subtribe/tribe.

Table 1. The classification of the Family Commelinaceae (nb. subtribe level only included for the Tribe Tradescantieae). Subfamily, tribes, subtribes and genera according to Faden & Hunt (1991) and Stevens (2005).

Subfamily	Tribe	Subtribe	Genus	Species present in New Zealand (A – genus includes species native to Australia) + = naturalised	Species found or available in Brazil	Species recorded as weeds in other countries (see Appendix 4 for countries where weedy)
Cartonematoideae	Cartonemateae		*Cartonema*	A		
	Triceratellae		*Triceratella*			
Commelinoideae	Tradescantieae	Palisotinae	*Palisota*			
		Streptoliriinae	*Streptolirion*			
			Spatholirion			
			Aetheolirion			
		Cyanotinae	*Belosynapsis*			
			Cyanotis	A		
		Coleotrypinae	*Coleotrype*	*C. natalensis*		
			Amischotolype			
		Discorisandrinae	*Siderasis*		Yes (Corcovado!)	
			Dichorisandra	*D. reginae* (uncommon cult., glasshouse), *D. thyrsifolia*	*D. thyrsifolia**	
			Cochliostema			
			Geogenanthus		Yes	
		Thyrsantheminae	*Tinantia*		Yes	
			Thyrsanthemum			
			Gibasoides			
			Weldenia	*W. candida*		
			Elasis			
			Matudanthus			
		Tradescantiinae	*Gibasis*	*G. geniculata, G. pellucida* (uncommon cult., glasshouse), *G. schiediana*+	*G. geniculata* and others	*G. pellucida*
			Tradescantia	*T. cerinthiodes*+, *T. crassula, T. navicularis, T. sillamontana, T. zanonia, T.* x *andersonia*[1], *T. alba*[2], *T. pallida, T. zebrina, T. virginiana*+, *T. discolor*[3], *T. spathacea, T. fluminensis*+, *T. albida*[4], *T. albiflora*[4], plus other varieties mentioned e.g. 'Jazz, Lilac twist, Osprey'[5]	*T. pallida**, *T. zebrina**	*T. spathacea, T. zebrina, T. fluminensis*
			Callisia	*C. elegans, C. repens* (both uncommon cult., glasshouse), *C. navicularis*	*C. repens**, *C. warsewicziana**	*C. fragans, C. repens*

			Tripogandra	*T. multiflora* (listed by one NZ nursery)	Yes	
		Uncertain	*Sauvallea*	`		
	Commelineae		*Stanfieldiella*			
			Floscopa	A	Yes	
			Buforrestia		Yes	
			Murdannia	A		*M. keisak, M. loriformis, M. nudiflora, M. simplex, M. spirata*
			Anthericopsis			
			Tricarpelema			
			Pseudoparis			
			Polyspatha			
			Dictyospermum			
			Pollia	A		
			Aneilema	*A. gramineum* (uncommon cult.)	Yes	
			Rhopalephora			
			Commelina	*C. diffusa* (uncommon cult.), *C. tuberosum* (listed by one nursery), *C. coelestis, C. communis, C. dianthifolia, C.erecta*	*C. benghalensis*, C. erecta**	*C. benghalensis, C. diffusa, C. virginica*

*Species that have already been acquired by Robert Baretto

[1]This hybrid is reported to have several parent species, most probably *T. virginiana, T. ohiensis* and *T. subaspera*

[2]This probably refers to a white form of *T.* x *andersonia* or *T. ohiensis*

[3]This appears to be a synonym for *T. spathacea* which was formerly known as *Rhoeo discolor*

[4]These may well be incorrectly applied names to *T. fluminensis*

[5]The varieties appear to be large flowered and are probably also developed from USA species and hybrids (*T.* x *andersonia* etc)

Table 2. Other families in Order Commelinales, and potential species in New Zealand/Brazil that could be tested if results show that a prospective bioliogical control agent does not show host specificity confined within the family Commelinaceae. Information provided by the Landcare Research Herbarium (P. Heenan pers. comm.) and from the New York Botanical Gardens Herbarium website.

Order	Family	Genus	Species	Status in New Zealand
Commelinales	Philydraceae	-	-	
	Pontederiaceae	*Eichornia*	*crassipes*	Naturalised (native to Brazil)
		Pontederia	*cordata**	uncommon cult (native to Brazil)
	Haemodoraceae	*Anigozanthos*	*flavidus**	common cult (Australian native)
		Blancoa		Uncommon cult (Australian native)
		Xiphidium caeruleum		Not in New Zealand – collected in Acre, Brazil (New York Botanical Gardens Herbarium)
		Wachendorfia	*thrysiflora**	Naturalised (native to South Africa)
	Hanguanaceae	-	-	

Appendix 1. Composition of the subclass Commelinids

The commelinids comprise the following four orders and one family (APG 2003) although the relationships between the main groups are unclear (Stevens 2005):

Order Commelinales
Order Zingiberales
Order Poales
Order Arecales
Family Dasypogonaceae

New Zealand has no native plant species in the Zingiberales or family Dasypogonaceae, and only one in the Arecales, the endemic nikau palm. However, there are many New Zealand native plants in the large order Poales including members of the families Typhaceae, Juncaceae, Cyperaceae, Restionaceae and Poaceae. Any testing of these would need to carried out in quarantine in New Zealand, but surrogate species could be used in Brazil. Candidates for testing in the Zingiberales in Brazil could include some well known species: Musaceae - *Musa* sp (bananas); Cannaceae – *Canna* sp (canna lily); Zingiberaceae – *Zingiber* sp (ginger). Clearly there would be a wide choice of surrogate species in the Arecales and Poales.

Appendix 2. Data from the New York Botanic Garden Herbarium on selected genera of the Commelinaceae

Taxon	Collection Date	Province/State	District/County	Precise Location	Habitat
Aneilema brasiliense C. B. Clarke	20-Apr-73	Minas Gerais		15 km by road W of Januária on road to Serra das Araras	Hill of raw, jagged limestone and tall forest at its base
Aneilema brasiliense C. B. Clarke	Jun-80	Bahia		Estaçao da Mata. Cachoeira/Bahia. Vale dos Rios. Paraguaçu e Jacuipe	
Commelina diffusa Burm. f.	13-May-53	Santa Catarina	Florianópolis	Rio Tavares, Ilha S. Catarina	Restinga
Commelina diffusa Burm. f.	26-May-57	Santa Catarina	Joinville	Estrada Dona Francisca	Beira da estrada
Commelina diffusa Burm. f.	4-Feb-57	Santa Catarina	Pôrto Uniao	Between Fazenda Frei Rogério and Rio Pintado, southeast of Pôrto Uniao	Bog
Commelina diffusa Burm. f.	24-Mar-79	Bahia	Ilhéus	CEPEC, km 22 da Rodovia Ilhéus/Itabuna. Quadra E&apo, recentemente limpa de toda sua vegetaçao	
Commelina diffusa Burm. f.	25-Jan-68	Goiás		50 km N. of Corumbá de Goiás on road to Niquelândia, valley of Rio Maranhão. Serra dos Pirineus.	Rooted in mud beneath shallow water. Forested calcareous outcrop.
Commelina diffusa Burm. f.	4-Aug-64	Goiás		W bank of Rio Tocantins, 8km N of Filadélfia.	

Commelina diffusa Burm. f.	20-Aug-86	Acre		Cruzeiro do Sul, along Rio Moa, a few kilometers upstream from Ri|4o Jurua|4, North of Cruzeiro do Sul; Fazenda Da|4rcio Rosas & vicinity; Elevation 150 m; Varzea forest along river.	
Tripogandra diuretica (Mart.) Handlos	19-Apr-83	Sao Paulo	Cananéia	Parque Estadual da Ilha do Cardoso. Mata dos Andradas.	Na margem, da picada.
Tripogandra diuretica (Mart.) Handlos	22-Mar-92	Rio Grande do Sul	Imigrante	Imigrante - Bugenfelz	Entre rochas
Tripogandra diuretica (Mart.) Handlos	26-Feb-93	Rio Grande do Sul	Caxias do Sul	Bairro Santa Fé	Junto ao caminho
Tripogandra diuretica (Mart.) Handlos	30-Mar-93	Rio Grande do Sul	Sao Vendelino		Em beira de estrada
Tripogandra diuretica (Mart.) Handlos	27-Dec-94	Rio Grande do Sul	Agudo		Junto ao riacho
Tripogandra diuretica (Mart.) Handlos	26-Mar-58	Santa Catarina	Garuva	Mina Velha, Garuva, Sao Francisco do Sul	Mata
Tripogandra diuretica (Mart.) Handlos	26-May-57	Santa Catarina	Joinville	Estrada Dona Francisca	Beira da estrada
Tripogandra diuretica (Mart.) Handlos	21-Apr-49	Paraná	Foz do Iguaçu	Parque Nacional do Iguaçú	
Tripogandra diuretica (Mart.) Handlos	21-Apr-80	Rio de Janeiro	Rio de Janeiro	Jacarepaguá. Vargem Grande. Mata de Lagoa	
Tripogandra diuretica (Mart.) Handlos	18-Apr-62	Rio de Janeiro	Teresópolis	Perto da entrada do Parq. Nac. da Serra dos Orgaos	Em lugar muito úmido
Tripogandra diuretica (Mart.) Handlos	6/3/962	Rio de Janeiro	Itatiaia	Planalto	

Tripogandra diuretica (Mart.) Handlos	2-4-946	Rio de Janeiro	Rio de Janeiro	Jardim Botânico (sub-espontâneo)	
Tripogandra diuretica (Mart.) Handlos	13-Jan-55	Sao Paulo		Serra da Bocaina	Da mata
Tripogandra diuretica (Mart.) Handlos	11/3/906	Sao Paulo	Sao Paulo	Pinheiros	
Tripogandra diuretica (Mart.) Handlos	28-Mar-16	Paraná	Jaguariaíva	Jaguariahyva	In fruticetis
Tripogandra diuretica (Mart.) Handlos	26-Mar-31	Sao Paulo	Sao Paulo	Parque do Estado	
Tripogandra diuretica (Mart.) Handlos	23-Mar-47	Rio de Janeiro	Rio de Janeiro	Tijuca	Restinga
Tripogandra diuretica (Mart.) Handlos	28-Dec-91	Bahia	Abaíra	Estrada nova Abaíra - Catolés, near São José	Afloramento de rochas areníticas.

Taxon	Collector Name	Collection Date	Province/State	District/County	Precise Location
Gibasis geniculata (Jacq.) Rohweder	J. S. Blanchet	s.d.			Circa bahia
Gibasis geniculata (Jacq.) Rohweder	R. Reitz	2.1.1954	Santa Catarina	Araquari	Barra do Sul
Gibasis geniculata (Jacq.) Rohweder	L. B. Smith	31-Mar-57	Santa Catarina	Porto Belo	Eastern shore of the Ilha Joao da Cunha
Gibasis geniculata (Jacq.) Rohweder	S. A. Mori	15-Mar-79	Bahia	Barra do Choça	Rodovia BA-265, trecho Caatiba/Barra do Choça, a 8 km a W de Caatiba

Gibasis geniculata (Jacq.) Rohweder	S. A. Mori	19-Sep-78	Bahia	Itamaraju	Fazenda Pau-Brasil, ca. 5 km a NW de Itamaraju. Folha SE-24(17-40d)
Gibasis geniculata (Jacq.) Rohweder	R. M. Harley	21-Mar-74	Bahia	Porto Seguro	Fonte dos Protomartires do Brasil
Gibasis geniculata (Jacq.) Rohweder	G. Jönsson	13-Aug-14	Paraná	Jaguariaíva	Jacarehy
Gibasis geniculata (Jacq.) Rohweder	A. Löfgren	22 Mar 1899	Sao Paulo	Araraquara	
Gibasis geniculata (Jacq.) Rohweder	J. C. de Moraes Vasconcelos	9/10/1958	Paraíba	Areia	Esc. Agron. do Nordeste n. 1850
Gibasis geniculata (Jacq.) Rohweder	S. C. de Sant&apoAna	23-Sep-00	Bahia	Uruçuca	Uruçuca: Area da EMARC. Reserva Gregório Bondar
Gibasis geniculata (Jacq.) Rohweder	R. de Mello-Silva	21-Jun-96	Espírito Santo	Itapemirim	Estrada Marataízes-Piúma, ca. 4 km ao norte da ponte sobre o Rio Itapemirim.

Appendix 3. Sub-generic classification of *Tradescantia* into sections according to Hunt (1981, 1986).

Species in bold are those proposed to be tested.

Section 1. Cymbispatha
T. commelinoides
T. coscomateplecana
T. cymbispatha
T. deficiens
T. gracillima
T. plusiantha
T. tonalamonticola
T. venezuelensis

Section 2. Coholomia
T. guatemalensis

Section 3. Austrotradescantia
T. anagallidea
T. blossfeldiana
T. cerinthiodes
T. crassula
T. fluminensis (= *T. albiflora* as referred to by nurseries in NZ and as a weed in Australia*?*)

Section 4. Tradescantia
Series I. Virginianae
T. bracteata
T. canaliculata
T. edwardsiana
T. ernestiana
T. gigantea
T. hirsuticaulis
T. hirsutiflora
T. humilis
T. longipes
T. occidentalis
***T. ohiensis*[1]**
T. ozarkana
T. reverchonii
T. roseolans
T. subacaulis
***T. subaspera*[1]**
T. tharpii
***T. virginiana*[1]**
*([1]*the likely parents of ***T.* x *andersonia****)*

Series II. Sillamontanae
T. rozynskii
T. sillamontana

Series III. Tuberosae
T. pinetorum
T. wrightii
T. cirrifera
T. nuevoleonensis
T. potosina
T. maysellesii
T. subramosa
T. subtilis
T. monsperma

T. stenophylla

Series IV. Orchidophyllae
T. mirandae
T. orchidophylla

Section 5. Setcreasea
T. brevifolia
T. buckleyi
T. hirta
T. leiandra
T. pallida

Section 6. Separotheca
T. pygmaea

Section 7. Mandonia
T. ambigua
T. burchii
T. crassifolia
T. llamasii
T. peninsularis
T. tepoxtlana
T. velutina

Section 8. Parasetcreasea
T. andrieuxii

Section 9. Rhoeo
T. spathacea

Section 9. Campelia
T. zanonia

Section 10. Zebrina
T. huehueteca
T. schippii
T. zebrina

Section 11. Corinna
T. soconuscana

Appendix 4. Assessing the prospects for multi-targeting of biological control in the Commelinaceae in New Zealand

The list of Commelinaceae from the Global Compendium of Weeds (Randall 2002) contains many species records that do not appear to represent invasive alien weeds – e.g. the plant is a weed in its native range (and this is only occasionally stated explicitly), or it's a weed only on one of several global databases (which appears, in the absence of other records, to indicate that the species is a a productive sector weed in it's native range), some names confused (e.g. Australia referring to *T. albiflora* when it seems highly likely that this is the same as *T. fluminensis* in NZ). The following analysis has excluded all such dubiously weedy species.

Table 3. Commelinaceae recorded as invasive alien weeds or as merely naturalised different countries. Data mostly from Randall (2002).

Invasive weed species	**Countries where recorded and comments**
T. fluminensis	Weed in New Zealand, Australia, Portugal, USA (Florida). Agricultural weed in native range in Brazil. Naturalised in California and Japan.
T. spathacea	weed in Florida, also in Australia?
T. zebrina	Pacific islands (status?), NSW (naturalised?), weed in Florida [note – definitely naturalised in Brazil, and really has to be weedy given what we saw]
Callisia fragans	naturalised USA (invasive in Florida)
C. repens	Weed in Central America and Australia?
Gibasis. pellucida	Weedy/naturalised in Florida/USA
Murdannia. loriformis	weed in Japan
M. nudiflora	weed in Australia, N. America (Florida), Thailand (native?), Brazil, New Guinea (native?)
M. simplex	Taiwan (weed of lawns etc!) – native to Australia!
M. spirata	weed in Florida (and as ?native in Indonesia – rice)
M. keisak	Invasive in Virginia, Tennesee, weed in Japan
Commelina benghalensis	weed in Pacific Islands, Surinam etc, Southern Africa, Australia, Argentina, Chile, Brazil, USA, Japan, as well as in ?native range in Asia
C. diffusa	weed in Pacific Islands, Cuba, South Africa, USA, Sudan, Brazil, Taiwan, Japan, Peru, Ecuador.
C. virginica	weed in Argentina and Brazil
Species naturalised but not considered weeds:	
Tradescantia cerinthoides	naturalised in New Zealand
T. ohiensis	naturalised in Japan
T. pallida	naturalised in Florida
T. virginiana	naturalised in New Zealand
Gibasis geniculata	naturalised in Japan
G. schiediana	naturalised in New Zealand
Dichorisandra thyrsiflora	naturalised (and potentially weedy?) in Australia
Commelina caroliniana	naturalised in Florida
C. communis	USA (naturalised?), native weed in Asia?
C. forskaolii	exotic in Florida (naturalised)
C. gambiae	exotic in Florida (naturalised)
C. nigritana	naturalised in USA

Table 4. Commelincaeae recorded as present in New Zealand (LCR Allplants database) and the potential for multi-targeting species by biological control

Genera in NZ (9 of 38 found worldwide)	**Numbers of plant species that are:**				
	Present in NZ	**Weeds in NZ**	**Other species in NZ that are recorded as weeds elsewhere**	**Naturalised in NZ (exc. Weeds)**	**Naturalised in NZ and are weeds elsewhere**
Coleotrype	1	0	0	0	
Dichorisandra	2	0	0	0	
Weldenia	1	0	0	0	
Gibasis	3	0	1, *G. pellucida*	1, *G. schiediana*	0
Tradescantia	12	1	2, *T. spathacea*, *T. zebrina*	2, *T. cerinthiodes*, *T. virginiana*	0
Callisia	3	0	1, *C.repens*	0	
Tripogandra	1	0	0	0	
Aneilema	1	0	0	0	
Commelina	6	0	1, *C. diffusa*	0	
TOTAL	30	1	4	3	0
%		3.3% of total spp.	17% of NZ non-weedy spp.	10% of NZ non-weedy spp.	0%

References

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