

ASPARAGACEAE

Cordyline rubra Otto & A.Deitr. * palm lily
Islington Bay, near causeway, ex bach site,
Department of Conservation, Apr 2005, AK 290634;
coastal track between Islington Bay Wharf and
the Causeway, *S.P. Benham*, 15 Sep 2014, AK
354387. Associated taxa: *Freesia refracta*, *Astelia
banksii*, *Rhamnus alaternus*, mapou, karamu.
Abundance: suckering clump of 10-15 stems, no
higher than 400 mm.

Eucomis comosa Hort. ex Wehrh. * pineapple lily
Steve Benham, March 2013. One plant recorded at
Islington Bay bach site in the open.

Muscari armeniacum Baker * grape hyacinth
Islington Coastal Track to causeway, *S.P. Benham* 1
Sep 2015, AK 358412. One plant under pohutukawa
canopy.

Scilla peruviana L. * Portuguese squill
Edge of coastal track between Islington Bay Wharf
and the Causeway, *S.P. Benham* 15 Sep 2014, AK
354388. A flowering specimen. Associated taxa:
Freesia refracta, *Astelia banksii*, mapou, karamu.
Abundance: 2 flowering and 25 juvenile specimens.
Another clump with approximately 30 juvenile and 2
flowering specimens was recorded within 10 m of
original clump.

References

Wilcox, M.D. (ed.) 2007: *Natural History of Rangitoto Island*. Auckland Botanical Society Bulletin 27. 192p.

CYPERACEAE

Carex inversa R.Br. creeping lawn sedge
Behind Bach 114, Islington Bay, *M.D. Wilcox*, 8 Nov
2007, AK 301095.

HEMEROCALLIDACEAE

Dianella latissima Heenan & de Lange
Summit Track, *P.J. de Lange*, *T.J. de Lange* & *R.O.
Gardner*, 1 Sep 2007, AK 300546.

ORCHIDACEAE

Cymbidium cultivar. *
Bach site, Yankee Wharf, *S.P. Benham*, 24 Sep 2012,
AK 333842-44. Collected from lavafield in semi-shade
between Islington Bay Coastal track and bach 65.
Two mature and 6 juvenile plants.

POACEAE

Aira caryophyllea subsp. *multiculmis* (Dumort.)
Bonnier & Layens *
Flax Point on open lava, *M.D. Wilcox*, 21 Sep 2005,
AK 299380.

Acknowledgements

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Further notes on the botany of some of the islands of Ipipiri (the eastern Bay of Islands), northern New Zealand

Barbara Parris

Introduction

The islands of the eastern Bay of Islands are now known locally as Ipipiri. Beaver et al. (1984) provide an account of the botany of the larger islands. Their account is based on visits by Alan Esler in 1973 to Urupukapuka, Moturua and Okahu, and by Ross Beaver and Antony Wright in 1980 to Urupukapuka, Motuarohia, Waewaetorea, Motukiekie and Okahu.

Young (2009) visited Urupukapuka, Moturua and Okahu as a member of the Department of Conservation (DoC) team setting up vegetation monitoring plots prior to the eradication of rats from the islands, and also visited the small islands Poroporo and Motungarara. She provided an update

on the state of the vegetation of Urupukapuka, Moturua and Okahu, added new species to the list, discussed some of the records and commented on the vegetation of Poroporo and Motungarara. Both Beaver et al. (1984) and Young (2009) provide a map showing the location of the islands and the names of the major bays and headlands.

This article extends the accounts of Beaver et al. (1984) and Young (2009). It reports on visits from 2009 to 2015 to the six islands covered by Beaver et al. (1984) and to Poroporo, visited by Young (2009). Its aim is to list the flora around the time of pest eradication in winter 2009 up to August 2015, together with a check on the survival of species

recorded by Beever et al. (1984) and a record of planted native and exotic species (see Table 1 and Appendix).

The Guardians of the Bay of Islands is a community group involved in revegetating the islands with native forest species to provide habitat for the reintroduction of native birds, reptiles and insects. The Guardians have planting projects on three islands: Waewaetorea (2003 to 2011), Urupukapuka (2009 to present) and Moturua (2012 to present). Almost all of the species planted have been grown from seed collected in the Bay of Islands.

The islands

Urupukapuka: More than 30 days were spent here during 2009-2015, mostly in the southern part of the island. Young (2009) discusses the current state of the vegetation. Post-Young records include the natives *Lycopodium volubile*, *Hypolepis dicksonioides*, *Tmesipteris lanceolata*, *Coprosma propinqua*, *Sophora chathamica*, *Orthoceras novae-zeelandiae* and *Schoenus tendo*, adventives associated with camp sites in Cable Bay and Urupukapuka Bay, and exotics and adventives in the cultivated areas in Otehei Bay.

Moturua: More than 20 days were spent here in 2009-2015, in Waiiti, Waipao, Mangahewa and Otupoho Bays and their catchments. Young (2009) discusses the current state of the vegetation. Post-Young records include the natives *Adiantum fulvum*, *Asplenium haurakiense*, *Blechnum chambersii*, *Lastreopsis glabella*, *L. microsora*, *Dodonaea viscosa*, *Elatostema rugosum*, *Rhabdothamnus solandri*, *Tetragonia tetragonioides* and *Apodasmia similis*, together with adventives in the DoC-managed part of the island and adventives and exotics in privately owned property in Hahangarua Bay.

Motuarohia: About eight hours were spent on the island in 2009-2015, in the area administered by DoC **on the isthmus at Lagoon Bay, and the Lowes' property at the eastern end of the bay.** New records include the natives *Piper excelsum* and *Tetragonia tetragonioides*, and numerous adventives and exotics, particularly from the gardens.

Waewaetorea: About ten hours were spent here in 2009-2014, on Otawake Beach, Stingray Bay (the northern beach), Stockyard Bay and the ridge between Stockyard Bay and Stingray Bay. Beever et al. (1984) describe a small area of raupo swamp in poor condition behind Otawake Beach as apparently drying out and being invaded by *Erechtites valerianifolia*, *Polypogon monspeliensis* and *Rumex conglomeratus*. The swamp, examined in April 2010, has dried out, at least in summer, and there is no sign of the invading species nor of *Typha orientalis* (raupo). Instead, there is a dense growth of *Bolboschoenus fluviatilis* at the lowest level,

Schoenoplectus tabernaemontani above it and *Crocasmia ×crocosmiiflora* at the margin. Both the *Schoenoplectus* and *Crocasmia* zones are full of *Lotus pedunculatus* and *Cenchrus clandestinus*. Another swampy area further up the seasonal stream that drains into the main swamp supports a dense growth of *Persicaria decipiens*, *Ranunculus repens*, *Rumex conglomeratus* and *Eleocharis acuta*. Beever et al. (1984) also comment that the area around the stockyards at Stockyard Bay was supporting a diverse and well established adventive flora. After the cattle were removed in the 1980s the stockyard was dismantled and re-assembled in Otehei Bay, Urupukapuka (Dene Harrison *pers. comm.* 2014). By July 2009 little evidence of the stockyards remained, only a few timbers and pieces of concrete. The diverse and well-established adventive flora has disappeared under regenerating bush, with the exception of *Foeniculum vulgare* and *Rumex crispus* remaining near the beach. Regeneration is most pronounced within a few metres of the Stockyard Bay and Otawake Beach seasonal streams, where *Coprosma macrocarpa*, *C. rhamnoides*, *Geniostoma ligustrifolium*, *Leucopogon fasciculatus*, *Meliccytus ramiflorus*, *Myrsine australis*, *Piper excelsum*, *Pittosporum crassifolium*, *Pseudopanax lessonii* and *Gahnia lacera* (a new record for the island) form a fairly dense strip of vegetation in the valley floors. On the valley sides well away from water a low canopy of *Kunzea robusta* (kanuka) and *Leptospermum scoparium* (manuka) shelters scattered *Coprosma rhamnoides* and *Leucopogon fasciculatus*, with a ground cover including *Adiantum hispidulum*, *Blechnum parrisiae* and *Centella uniflora*. Other new records include the natives *Asplenium flaccidum*, *Deparia petersenii* and *Tetragonia tetragonioides* and the adventives *Oenanthe pimpinelloides*, *Ornithopus pinnatus*, *Oxalis pes-caprae*, *Freesia refracta* and *Gladiolus undulatus*. The native plantings made between 2003 and 2011 above the northern beach are discussed later.

Motukiekie: About four hours were spent here in April 2009, from Sunset Bay to the northern part, then along the main ridge of the island to the huts above Kiekie Cove. Motukiekie is the most extensively planted island in the eastern Bay of Islands and is the only one that is completely privately owned. The Goodwin family planted about 70,000 plants between 1958 and 1964, but few survived the harsh conditions and sadly depleted soil (Anthea Goodwin, *pers. comm.* 2009). Exotic species planted by the Goodwin family between 1958 and 1964 are included in the species list in the Appendix. Those reported as surviving by Anthea Goodwin are included as pIG, those thought by Anthea Goodwin to have died are included as (pIG) – they have all been included in the species list because a few of the species thought to have died have actually survived, and are recorded as pIGP. Beever et al. (1984) mention a number of exotic and native species

Table 1. Statistics of the vascular flora of seven islands of the eastern Bay of Islands by island.

U = Urupukapuka, **MR** = Moturua, **MA** = Motuarohia, **W** = Waewaetorea, **MK** = Motukiekie, **O** = Okahu, **P** = Poroporo. pl = planted. Numbers in brackets are from Beever (1984).

GROUP	U	MR	MA	W	MK	O	P	TOTALS
Native lycophytes	3	3(1)		1(1)	1(1)			4(2)
Non-native lycophytes	1	1						1
Native ferns	31(20) +1pl	33(20)	22(21)	21(19)	22(16) +2pl	19(17)	12	40(29) +3pl
Non-native ferns	1 +1pl	1pl	2 pl		1pl		1pl	1 + 4pl
Native gymnosperms	1 +6pl	3(1) +5pl		2pl	1 (1pl)	2	2	3(1) +5pl(1pl)
Non-native gymnosperms	2(1) +2pl	3 +5pl	3(2) +1pl		4(1) +2pl			4(2) +7pl
Native dicotyledons	106(82) +35pl	78(37) +30pl	53(47) +7pl(2pl)	60(56) +24pl	57(46) +25pl(6pl)	46(33)	31	131(109) +39pl(7pl)
Non-native dicotyledons	158(91) +53pl	84(44) +21pl	66(48) +34pl(1pl)	81(71) +3pl	52(41) +25pl(4pl)	61(53) +1pl(1pl)	24 +9pl	186(127) +82pl(5pl)
Native monocotyledons	63(55) +6pl	54(39) +1pl	32(29)	43(38) +2pl	27(24) +5pl	37(35)	21	78(66) +7pl
Non-native monocotyledons	65(45) +22pl	39(26) +10pl(1pl)	33(23) +22pl	38(34) +2pl	18(15) +2pl	31(27)	11 +7pl	80(54) +37pl(2pl)
TOTAL NATIVES	204(157) +48pl	171(98) +36pl	107(97) +7pl(2pl)	125(113) +28pl	108(87) +33pl(4pl)	104(85)	66	256(207) +53pl(8pl)
TOTAL NON-NATIVES	227(157) +78pl	127(70) +37pl(1pl)	102(73) +59pl(1pl)	119(105) +5pl	74(57) +30pl(4pl)	92(80) +1pl(1pl))	35 +17pl	272(183) +130pl(7pl)
OVERALL TOTALS	431(314) +126pl	298(168) +73pl	209(170) +66pl(3pl)	244(218) +33pl	182(144) +63pl(8pl)	196(165) +1pl(1pl)	101 +17pl	528(390) +186pl(15pl)

planted by the Goodwins in their account of Motukiekie; the fate of these can be seen in the Appendix. The current owners, the Lockwood family, have made additional plantings between 2008 and 2013. The native and exotic plantings are discussed in more detail below. New records include the natives *Blechnum filiforme*, *Histiopteris incisa*, *Lygodium articulatum*, *Paesia scaberula*, *Pteris tremula*, *Tmesipteris lanceolata*, *Hypericum pusillum*, *Leucopogon fraseri* and *Lepidosperma laterale*, and numerous adventives.

Okahu: About 1 hour was spent on the island, in 2009-2010. Limited time (c. 30 minutes per visit) permitted only a quick examination of the beach and the area immediately behind it. Young (2009) discusses the current state of the vegetation. Additional records include the native *Adiantum aethiopicum* and the adventive *Gladiolus undulatus*.

Poroporo: Five hours were spent on the island, in 2012, around the old house and garden site at the south-eastern end. Young (2009) briefly describes the current vegetation. Post-Young records include the natives *Psilotum nudum*, *Dicksonia squarrosa*, *Dichondra repens*, *Haloragis erecta*, *Carex inversa*, *C. virgata*, *Poa anceps* and the adventives *Nephrolepis cordifolia*, *Eriobotrya japonica*, *Pyracantha angustifolia*, *Solandra maxima*, and *Hedychium gardnerianum*. *Hedera helix* cv. 'Parsley Crested' is spreading aggressively and seeding here.

Threatened plants

Young (2009) discusses the following threatened plants, amongst others:

Daucus glochidiatus (native carrot) was reported by Beever et al. (1984) to be particularly abundant in 1980 amongst weeds and grasses colonising a burnt area of tea-tree scrub above Stockyard and Otawake

Bays on Motukiekie. This area was not visited in 2009 or 2010, but was observed from the ridge between Stockyard Bay and Stingray Bay - it has reverted to tea-tree scrub.

Calystegia marginata was recorded by Beever et al. (1984) for Motukiekie, growing in an extensive grassland sward of almost pure *Microlaena stipoides* in the northeast sector of the island. It is no longer present in this area, which is still dominated by *M. stipoides* (now associated with *Rumex sagittatus*), but grows alongside and over the steps leading up from the house in Sunset Bay to the garden and orchard near the ridge line above it. Beever et al. (1984) also recorded it from Moturua, where it still grows in Waipao Bay.

Lobelia physaloides was recorded on Motukiekie Island by Anthea Goodwin (Beever et al. 1984). Anthea informs me that it grew above Kiekie Cove (Anthea Goodwin *pers. comm.* 2009) in a part of the island not visited in 2009. In 2011-2013 three colonies were located on Moturua, one on the track between Otupoho Bay and Waiwhapuku Bay, one on the track from Waiti Bay to Mangahawea Bay and one scattered along the east bank of the creek in Waiti Bay; a solitary plant was found on the left branch of Mangahawea Bay creek in 2014. It has also been planted on Moturua, along Frenchmans line in a side valley running north west from the track from Waipao Bay to Otupoho Bay, in Waiti valley and in Otupoho Bay, and planted on Urupukapuka behind the hide lake in Entico Bay and in Otehei Bay. Young (2009) reports a single plant on Urupukapuka in the catchment of the southern stream in Entico Bay. This could be a survivor of material planted in Entico Bay c. 1958 (Goodwin *pers. comm.* 2009).

Tetragonia tetragonioides, was reported by Beever et al. (1984) from Motukiekie and by Young (2009) from Urupukapuka and Okahu. It was not found on Motukiekie in 2009 because, apart from the severely modified Sunset Bay, no beaches were visited. It was, however, found on Moturua, Motuarohia and Waewaetorea (as well as Urupukapuka and Okahu) in 2009 and 2010. In 2012 to 2015 it was noted as absent from beaches on Urupukapuka (Otehei Bay, Paradise Bay) and Moturua (Waipao Bay) where it had previously been seen.

Changes

A number of genera recorded by Beever et al. (1984) as native or adventive were not seen in 2009-2015. They include *Acaena**, *Achillea**, *Chenopodium**, *Daucus*, *Digitalis**, *Gaultheria*, *Kickxia**, *Parietaria*, *Picris*, *Rorippa**, *Symphytum**, *Torilis**, *Tragopogon**, *Aira**, *Avena**, *Cynosurus**, *Echinochloa**, *Echinopogon* and *Microtis*. *Trifolium** is currently known from three species, but six species were listed by Beever et al. (1984). Most of the

pasture grasses and herbs have probably been smothered by *Cenchrus clandestinus* (kikuyu) as suggested by Young (2009), who notes that kikuyu is much more common now than when Beever et al. (1984) visited the islands. Some taxa, e.g. *Gaultheria*, may be in sites not visited during 2009-2012; others, e.g. *Microtis*, may have been smothered by kikuyu. *Ficinia (Desmoschoenus) spiralis*, reported by Beever et al. (1984) in Opunga Bay, Moturua, as "will probably be obliterated by kikuyu grass" may have suffered this fate, as it was not seen there from 2009 to 2011. However, it was planted in the bay during summer 2012-2013.

Both Beever et al. (1984) and Young (2009) regard *Ficus carica* as adventive, but all plants seen appear to have been cultivated, so the species is treated here as planted. Several other species recorded by them as adventive are actually in old garden sites and are reported here as planted.

Beever et al. (1984) include a 1959 aerial photograph showing Moturua, Motukiekie, Waewaetorea, Urupukapuka and part of Okahu, which shows that the most of the land apart from cliffs was in pasture. Since then there has been colonisation of pasture by tea-tree, most significantly on Moturua and Urupukapuka (Fig. 1). Tea-tree is now present on the parts of Motukiekie where natives and exotics have not been planted. On Waewaetorea the southwest slopes of Stockyard and Otawake Bays were scrub-covered; the Stockyard Bay catchment is now almost completely filled with scrub. Native vegetation is also spreading into the kikuyu on Okahu (Young 2009).



Fig. 1. Urupukapuka: Entico Bay and dam lake from eastern cliff track. Photo: Barbara Parris, March 2009.

There has been a significant increase in native species since the visits by Beever et al. (1984) in 1973 and 1980 and a continued increase since Young's visit in 2009. New records for Ipipiri include *Adiantum fulvum*, *Blechnum chambersii*, *Hypolepis dicksonioides*, *Lastreopsis glabella*, *L. microsora*, *Tmesipteris elongata*,

Alternanthera nahui, *Coprosma propinqua*, *C. rigida*, *Cotula australis*, *Drosera auriculata*, *Elatostema rugosum* and *Rhopalostylis sapida*.

Adventive species recruitment is also proceeding apace and new records for Ipipiri include *Selaginella kraussiana*, *Azolla pinnata*, *Amaranthus deflexus*, *A. lividus*, *Campsis* × *tagliabuana*, *Capsella bursa-pastoris*, *Cardamine hirsuta*, *Cerastium glomeratum*, *Chamaesyce maculata*, *Crassula decumbens*, *Fatsia japonica*, *Hibiscus syriacus*, *Hydrocotyle tripartita*, *Impatiens walleriana*, *Lactuca virosa*, *Lantana camara*, *Lythrum junceum*, *Malva nicaeensis*, *Medicago sativa*, *Myosotis discolor*, *M. sylvatica*, *Nicotiana tabacum*, *Ornithopus pinnatus*, *Osteospermum fruticosum*, *O. jucundum*, *Oxalis incarnata*, *O. latifolia*, *O. pes-caprae*, *Passiflora edulis*, *Pericallis* × *hybrida*, *Persea americana*, *Potentilla indica*, *Prunus campanulata*, *Psidium cattleianum*, *Pyracantha angustifolia*, *Ranunculus parviflorus*, *Ruscus aculeatus*, *Sagina procumbens*, *Senecio vulgaris*, *Stellaria media*, *Stachys arvensis*, *Tropaeolum majus*, *Veronica persica*, *V. serpyllifolia*, *Allium triquetrum*, *Alocasia brisbanensis*, *Aloe maculata*, *Amaryllis belladonna*, *Asparagus aethiopicus*, *A. scandens*, *Cyperus eragrostis*, *Freesia refracta*, *Gladiolus undulatus*, *Iris foetidissima*, *Rytidosperma pilosum*, *Sisyrinchium "blue"* and *Tradescantia fluminensis*. Some are weeds of cultivation in gardens, some are established garden escapes, others have been dispersed by wind, birds or water.

Native plantings

A number of New Zealand species not native to Ipipiri have been planted on various islands (abbreviated as follows: Motuarohia (MA), Motukiekie (MK), Moturua (MR), Urupukapuka (U), Waewaetorea (W)). They include: *Blechnum discolor* (MK), *Ptisana salicina* (MK), *Rumohra adiantiformis* (U, on *Dicksonia squarrosa* trunks), *Agathis australis* (MK, MR, U), *Dacrydium cupressinum* (MR, U, W), *Libocedrus plumosa* (MK, MR, U), *Prumnopitys ferruginea* (MK, MR, U), *P. taxifolius* (MR), *Ackama rosifolia* (MR, U), *Alectryon excelsus* (MA, MK, MR, U), *Alseuosmia banksii* (MR), *Aristolelia serrata* (MR, U), *Ascarina lucida* (MR), *Beilschmiedia tarairi* (MK, MR, U, W), *B. tawa* (MR), *Carpodetus serratus* (MK, MR, U), *Clianthus puniceus* (MA, MR, U), *Coprosma lucida* (MK, U), *Corokia buddleioides* (U, W), *C. cotoneaster* (MR, U), *Fuchsia excorticata* (MR, U), *Hebe acutiflora* (W), *Knightia excelsa* (MK, MR, U, W), *Melicope ternata* (MR, U, W), *Melicytus macrophyllus* (MR, U), *Meryta sinclairii* (MA, MK, MR, U, W), *Metrosideros albiflora* (MR), *M. fulgens* (MK, MR), *M. robusta* (MR, U), *Olearia albida* (MK), *O. rani* (MR, U), *O. solandri* (U, W), *Parsonsia capsularis* (MR, U), *Piper excelsum* subsp. *psittacorum* (U), *P. melchior* (MK), *Pittosporum cornifolium* (MK), *P. eugenioides* (MK, MR, U), *P. tenuifolium* (MK, MR, U), *Pomaderris kumeraho* (MK ex Albany),

Pseudopanax arboreus (MK, MR, U, W), *P. discolor* (MK), *Rubus australis* (MR), *R. schmidelioides* (MR, U), *Streblus banksii* (MR, U, W), *Syzygium maire* (MR, U), *Austroderia fulvida* (W), *Carex comans* (MK, U), *C. secta* (U), *Cordyline kaspar* (MK), *C. pumilio* (MR, U), *Freycinetia banksii* (MK), *Libertia ixioides* (MK), *Poa cita* (U) and *Xeronema callistemon* (MK, U). Several of these species have established from seed. *Pomaderris kumeraho* has established a small population on Motukiekie and has spread to an adjacent area of Urupukapuka. On Urupukapuka *Corokia cotoneaster*, *Meryta sinclairii*, *Piper excelsum* subsp. *psittacorum* and *Poa cita* have seeded around the Otehei resort buildings; *Meryta sinclairii* and *Piper excelsum* subsp. *psittacorum* have also established at the margins of adjacent regenerating scrub. *Meryta sinclairii* has also seeded in a garden on Motuarohia.

A number of other species native to some islands have been planted on other islands where they were not known in the wild. These include *Dacrydium cupressinum* (MA, MK, U), *Phyllocladus trichomanoides* (MK, U), *Podocarpus totara* (MK, W), *Brachyglottis kirkii* var. *angustior* (U), *Carmichaelia australis* (U, W), *Coprosma propinqua* (MR), *Coriaria arborea* (W), *Corynocarpus laevigatus* (MA, MK, W), *Dodonaea viscosa* (W), *Dysoxylum spectabile* (MA, MK, U, W), *Hedycarya arborea* (MK, U, W), *Hoheria populnea* (MK), *Melicytus novae-zelandiae* (MA, MR), *Metrosideros perforata* (MR), *Myoporum laetum* (MK, W), *Nestegis apetala* (U), *Ozothamnus leptophyllus* (U, W), *Pittosporum umbellatum* (MK), *Planchonella costata* (MK, W, (U,)), *Pseudopanax crassifolius* (W), *Schefflera digitata* (MA, U, W), *Solanum aviculare* (U, W), *Sophora chathamica* (MK, W), *Vitex lucens* (MA, MK, U, W), *Weinmannia silvicola* (W), *Astelia hastata* (MK), *Rhopalostylis sapida* (MK, U, W) and *Ripogonum scandens* (U).

Other species are native to the islands where they have been planted. They include *Cyathea dealbata* (MK), *Dicksonia squarrosa* (U), *Pteris comans* (MK), *Dacrydium cupressinum* (MR), *Phyllocladus trichomanoides* (MR), *Podocarpus totara* (MK, MR, U), *Brachyglottis kirkii* var. *angustior* (MR), *B. repanda* (MK, MR, U), *Carmichaelia australis* (U), *Clematis paniculata* (MK), *Coprosma arborea* (MR, U), *C. macrocarpa* (MR, U, W), *C. propinqua* (U), *C. repens* (MK, U, W), *C. rhamnoides* (MR, U, W), *C. rigida* (U), *C. robusta* (MK, MR, U, W), *Corynocarpus laevigatus* (MR, U), *Dodonaea viscosa* (MK, MR, U), *Dysoxylum spectabile* (MR), *Entelea arborescens* (MR, U, W), *Geniostoma ligustrifolium* (MK, MR, U, W), *Haloragis erecta* (W), *Hebe ligustrifolia* (U), *H. stricta* (MK, MR, U, W), *Hedycarya arborea* (MR), *Hoheria populnea* (MR, U, W), *Kunzea robusta* (U, W), *Leptospermum scoparium* (U, W), *Leucopogon fasciculatus* (W), *Lobelia physaloides* (MR, U), *Melicytus ramiflorus* (MK, MR, U, W), *Metrosideros excelsa* (MK, MR, U, W), *Muehlenbeckia complexa*

(U), *Myoporum laetum* (U), *Myrsine australis* (MK, MR, U, W), *Olearia furfuracea* (MK, MR, U, W), *Piper excelsum* (MK, MR, U, W), *Pittosporum crassifolium* (MK, MR, U, W), *P. umbellatum* (MR, U), *Pseudopanax crassifolius* (MK, U), *P. lessonii* (MK, U, W), *Schefflera digitata* (MR), *Sophora chathamica* (MR, U), *Vitex lucens* (MR; plants in Hahangarua Bay sourced from Duncan & Davies, New Plymouth (Marion Goodfellow, pers. comm. 2009)), *Weinmannia silvicola* (MR, U), *Apodasmia similis* (U), *Arthropodium cirratum* (MA, MK, U, W), *Astelia banksii* (MK, U), *Carex flagellifera* (U), *Cordyline australis* (MA, MK, U, W), *Cyperus ustulatus* (U), *Dianella latissima* (MK, U), *Phormium tenax* (MA, MK, MR, U, W), *Rhopalostylis sapida* (MR) and *Ripogonum scandens* (MR).

Ururupakapuka native plantings have been made at various periods in several localities, mostly in Otehei Bay, where some may date from the time of Zane Grey's fishing camp, set up in the 1920s. Other plantings in Otehei Bay range from one to c. 60 years old. *Podocarpus totara*, *Corokia cotoneaster*, *Corynocarpus laevigatus*, *Meryta sinclairii*, *Pseudopanax lessonii*, *Sophora chathamica*, *Vitex lucens* and *Arthropodium cirratum* have self-seeded from plantings in Otehei Bay. Plantings in Cable Bay and Ururupakapuka Bay appear to be between 20 and 30 years old. *Corynocarpus laevigatus* and *Pittosporum crassifolium* have self-seeded in Ururupakapuka Bay. Guardians of the Bay plantings in Entico Bay date from 2009 to 2015, planting in Ihumatea Bay was from 2012 to 2014, planting in Otehei Bay was in 2014, and planting in Squid Bay began in 2015.

On Moturua, the Goodfellow plantings of natives in Hahangarua Bay date, at least in part, from the 1950s and were sourced, at least in part, from **Duncan & Davies' nursery in New Plymouth (Marion Goodfellow pers. comm. 2009)**. The plantings by Craig Heatley in Opunga Bay are much more recent. Guardians of the Bay plantings are in Frenchmans line (2012-2015), a valley running northwest from the Waiiti Bay to Otupoho Bay track before the watershed, Waiiti Bay (2014-2015) and Otupoho Bay (2015).

Guardians of the Bay plantings on Waewaetorea date from 2003 to 2011 and are above Stingray Bay.

On Motukiekie, native species include the Goodwin plantings (1958-1964), mostly above Woolshed Bay, and the Lockwood plantings (post-2000), around and above the house in Sunset Bay. The former are discussed and/or listed in Beever et al. (1984). A few of these were located in 2009 and are listed as pIGP in the Appendix; they include *Podocarpus totara*, *Dysoxylum spectabile*, *Parsonsia* sp., *Pittosporum eugenioides* and *Rhopalostylis sapida*. Some of the

same species have also been planted by the Lockwoods, owners of the island c. 2008 to present, e.g. *Agathis australis*, *Podocarpus totara*, *Dysoxylum spectabile*, *Knightia excelsa*, *Olearia albida*, *Planchonella costata*, *Pseudopanax arboreus* and *Freycinetia banksii*. Goodwin plantings are listed as pIG and Lockwood plantings are listed as pIL in the Appendix.

Exotic plantings

Most exotics were not listed by Beever et al. (1984) unless they were adventives. Exotics have been planted (and have survived) on all of the islands discussed here. Those that have not spread by seed or vegetative means are documented as planted in Table 1 and the Appendix. When planted taxa have spread by seed and/or vegetative means they are treated as adventives in Table 1 and the Appendix.

Ururupakapuka: exotics have only been planted in Otehei Bay. Some of the earliest plantings probably date from the establishment of Zane Grey's fishing camp in the 1920s. Plantings include *Araucaria heterophylla*, *Campsis × tagliabuana*, *Wisteria* sp. and *Hedychium gardnerianum*, which has spread extensively through the Otehei Bay catchment and further afield on the island, and some other potentially serious weeds, e.g. *Hedera helix*, *Jasminum polyanthum*, *Phyllostachys aurea* and *P. nigra*. Numerous seedlings of *Hedera helix* have already been found on Ururupakapuka.

Moturua: the exotics in private plantings in Hahangarua Bay have not been completely documented. The Goodfellow plantings in this bay date, at least in part, from the 1950s. A group of *Phoenix dactylifera* in Mangahawea Bay (Fig. 2) is derived from a single plant, probably from a discarded date stone as there is no indication that it is associated with an old house site (Andrew Blanshard, pers. comm. 2012).

Motuarohia: the exotics in plantings on the privately owned western part of the island have not been documented. Those at the eastern end of Lagoon Bay include well-established plants of *Araucaria heterophylla*, *Pinus pinaster*, *Eucalyptus* spp., *Ficus macrophylla*, *Bambusa oldhamii*, *Furcraea foetida* and *Phoenix canariensis*, together with a number of shade tolerant and/or drought resistant ornamental ground cover species and several fruit trees. The earliest plantings at the eastern end date from the 1930s, with additions in the 1950s (Terri Cottier pers. com. 2010).

Waewaetorea: there is a very small plant of *Nerium oleander* in Stingray Bay (associated with *Narcissus tazetta* cv. 'Star') and a much larger one at Otawake beach, where plantings were made after the young American millionaire William Reynolds bought the island in 1967 (Anthea Goodwin pers. comm. 2009).

A few other plants still survive from his garden, including *Corymbia ficifolia*, *Melaleuca hypericifolia* and *Crinum ×powellii*. *Freesia refracta* has naturalised on the cliffs of Stockyard Bay.

Motukiekie: *Araucaria heterophylla* has flourished on Motukiekie, giving the island its very distinctive sky-line, and seedlings are numerous. Other imposing exotic trees from the Goodwin plantings include *Cryptomeria japonica*, *Cupressus macrocarpa*, *Pinus radiata*, *Sequoia sempervirens*, *Erythrina ×sykesii*, *Eucalyptus* spp., *Ficus macrophylla* and *Quercus robur*. Numerous *Eucalyptus* species were planted, but the survivors need to be identified. The more recent (post-2000) Lockwood plantings, mostly near the ridge line above the house in Sunset Bay, are of fruit-bearing trees, shrubs and herbs, except for *Asplenium ×lucrosum*, presumably bought as the native *A. bulbiferum*.

Okahu: only *Ficus carica* is regarded as exotic. Beever et al. (1984) and Young (2009) treat it as adventive, but it is evidently planted.

Poroporo: the southern end contains the best preserved abandoned garden site of Ipipiri. Potentially serious weeds include *Nephrolepis cordifolia*, *Crassula multicava*, *Hedera helix* (particularly cv. 'Parsley Crested'), *Jasminum polyanthum*, *Pyracantha angustifolia*, *Agapanthus praecox*, *Agave americana*, *Arundo donax*, *Chlorophytum comosum* and *Crocasmia ×crocsmiiflora*. Some of Young's (2009) records have been recorded here as planted, rather than wild, because they are growing only in the old garden site and have not spread by seed or vegetative means.



Fig. 2. Moturua: *Phoenix dactylifera* in Mangahawea Bay. Photo: Barbara Parris, August 2015.

Discussion

The vegetation of the two largest islands, Urupukapuka and Moturua, has been reasonably well documented in 2007-2015, except for the plantings on privately owned land on Moturua. Okahu was fairly well covered by Young (2009). Parts of Motuarohia (the extensive privately owned western area), Motukiekie and Waewaetorea have not been surveyed since 1980 and merit further visits, as does Poroporo.

The native vegetation of the island group is at present best developed on shaded cliffs and in valleys, particularly near temporary or permanent water courses. That on the shaded cliffs has hardly **changed since Beever et al.'s (1984) visit in 1980**, presumably because it was neither accessible to stock nor burnt. Regeneration in the valleys following stock removal is largely of understory plants under a mainly *Kunzea robusta* canopy; it includes *Coprosma* spp., *Dysoxylum spectabile*, *Entelea arborescens*, *Geniostoma ligustrifolium*, *Hoheria populnea*, *Melicytus ramiflorus*, *Myrsine australis*, *Piper excelsum*, *Pittosporum crassifolium*, *P. umbellatum*, *Pseudopanax crassifolius*, *P. lessonii*, *Schefflera digitata*, *Vitex lucens*, *Weinmannia silvicola* and *Cordyline australis*.

Regeneration on ridges is almost entirely of slow-growing scrub, mostly *Kunzea robusta*, and scattered *Leptospermum scoparium*, with very sparse ground cover, usually with *Coprosma rhamnoides*, on north-facing slopes and denser cover on south-facing slopes which includes *Coprosma* species, *Geniostoma ligustrifolia*, *Melicytus ramiflorus*, *Myrsine australis*, *Pittosporum crassifolium* and *Pseudopanax lessonii*. On Moturua a dry north-facing ridge crest under a high canopy of *Acacia mearnsii* has a ground cover of *Asplenium flaccidum*, *A. oblongifolium*, *A. polyodon*, *Microsorium pustulatum* and *Pyrrosia eleagnifolia*, with a scattered subcanopy of *Melicytus ramiflorus*, *Myrsine australis* and *Pseudopanax lessonii*. *Dodonaea viscosa* thrives in high light and is regenerating in thin grassland and on old sand dunes on Moturua.

A limited number of canopy species are now naturally established on the islands, some in very low numbers: *Dacrydium cupressinum*, *Phyllocladus trichomanoides*, *Podocarpus totara*, *Corynocarpus laevigatus*, *Dysoxylum spectabile* and *Vitex lucens*. Native (i.e. not planted) *Dysoxylum spectabile* and *Vitex lucens* are self-seeding on Moturua, the former in the Mangahawea, Waiiti and Waipao catchments, the latter in the Mangahawea catchment. Regeneration of these two broadleaf canopy species is limited to sheltered sites, usually in valleys. *Podocarpus totara* is more tolerant of harsh conditions and, at least on Moturua and Urupukapuka, has established in dry scrub as well as in other plant communities.

The Mangahawea Bay catchment, on the western side of Moturua, supports a diverse native flora including several mature trees of *Vitex lucens* with associated seedlings and numerous *Dysoxylum spectabile* saplings and seedlings, no doubt spread from the three old *Dysoxylum* trees on the nearby coast between Wairaka Bay and Waiti Bay. The only records of *Blechnum chambersii* and *Elatostema rugosum* on Ipipiri are from here. Other species include *Carmichaelia australis*, *Dodonaea viscosa*, *Entelea arborescens*, *Hoheria populnea*, *Lobelia physaloides* and *Pittosporum umbellatum*, together with all of the shrub species common on Ipipiri. It would be interesting to see how the plant community of this catchment develops if there was no planting of native species by the Guardians of the Bay.

Following rat eradication in 2009, there has been a huge increase in native seedling numbers, particularly in the valleys where weeds such as *Hedychium gardnerianum* have been eliminated. *Coprosma* species, *Geniostoma ligustrifolium*, *Melicytus ramiflorus*, *Myrsine australis*, *Piper excelsum* and *Pseudopanax lessonii* are the most common taxa.

Several native species not yet present on Ipipiri, or only occurring as planted specimens, have been found in one or more of the following localities: the un-named islet off Cape Brett Peninsula (Cameron 1982), Motukokako (also known as Piercy, or Hole in the Rock Island) off Cape Brett, and Cape Brett Scenic Reserve (Cameron & Taylor 1991). The species in these three localities that are not known to be native to Ipipiri include *Arthropteris tenella*, *Alectryon excelsus*, *Beilschmiedia tarairi*, *B. tawa*, *Griselinia lucida*, *Knightia excelsa*, *Litsea calicaris*, *Melicope ternata*, *Nestegis lanceolata*, *Pisonia brunoniana*, *Rorippa divaricata*, *Rubus cissoides*, *Carex testacea*, *Freycinetia banksii* and *Microlaena polynoda*. These may be dispersed to the islands in future by wind or birds and the chances of seed survival are likely to be much higher, now that rats have been eradicated.

A few other species are native to the island group, but have only been collected on minor islands, so are not listed in the Appendix. All collections were made by A Wright in 1980. They are as follows:

Native ferns

Asplenium northlandicum, Jojo Island (AK 150994), near Motukiekie.

Cheilanthes sieberi, Kuiamokimoki Island (AK 220024), & Pakatahi Island (AK 220026), both near Moturua.

Native dicotyledons

Linum monogynum, Pakatahi Island (AK 151386) near Moturua & Te Ao Island (AK 151398) near Urupukapuka.

Spergularia tasmanica, Motutara (AK 151154), near Motukiekie.

Native monocotyledons

Lachnagrostis littoralis, Split Island, near Urupukapuka (AK 151137). (Young (2009) included this record for Urupukapuka in error).

These bring the number of native ferns to 42, the number of native dicotyledons to 133, the number of native monocotyledons to 80, the total natives to 262 and the overall totals to 534(395).

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Appendix. Vascular plant flora of seven islands in the eastern Bay of Islands.

AK = Herbarium at Auckland Museum; **U** = Urupukapuka; **MR** = Moturua; **MA** = Motuarohia; **W** = Waewaetorea; **MK** = Motukiekie; **O** = Okahu; **P** = Poroporo. Brackets around species names indicate pre-2000 plantings whose survival has not been verified; these are not included in the totals in Table 1 above. Some column errors in Young (2009) are corrected here.

Key

*	=	adventive or exotic species	L	=	Lockwood plantings on Motukiekie
+	=	specimen in AK herbarium	P	=	sight records of Parris 2007-2015 including Guardians of the Bay plantings
AH	=	collected by A Hinkle et al. (AK 293872) in 2005	pl	=	planted, including pre-2000 and post-2000 plantings whose survival has not been verified
AR	=	sight record of Adriana Rogowski in 2011	(pl)	=	presumed non-surviving pre-2000 plantings or those that have been removed
B	=	Beever et al. 1984 published records and collections in AK	RBr	=	record of Rod Brown in 2013
CC	=	collected by C J Crow (AK 226275) in 1996	S	=	sight record of Sandra Scowen in 2013
F	=	collected by Lisa Forester (AK 291196-99) in 2003	TA	=	images from Tim Armitage in 2014
G	=	recorded by Anthea Goodwin in 1959 or <i>in litt.</i> 2009.	TC	=	sight record of Terri Cottier in 2012
KR	=	Katie Reynolds in correspondence to Ross Beever	TH	=	collected by Terry Hatch (AK 300836) in 1999
KU	=	sight record of Katrina Upperton in 2011	Y	=	Young 2009

	AK	U	MR	MA	W	MK	O	P
Lycophytes								
<i>Lycopodiella cernua</i>		PY						
<i>Lycopodium deuterodensum</i>			Y					
<i>Lycopodium volubile</i>		P	PY			B		
<i>Phlegmariurus varius</i>	+	Y	BP		B			
<i>Selaginella kraussiana</i> *		P	P					
Ferns								
<i>Adiantum aethiopicum</i>	+	Y		B			P	
<i>Adiantum capillus-veneris</i> *		plP						
<i>Adiantum cunninghamii</i>	+	BPY	BP	B	BP	BP	B	PY
<i>Adiantum fulvum</i>			P					
<i>Adiantum hispidulum</i>		BPY	BP	BP	BP	BP	BPY	PY
<i>Asplenium australasicum</i> *				plP				
<i>Asplenium flaccidum</i>		BPY	BP	P	P	B		
<i>Asplenium haurakiense</i>	+	BPY	P	B	BP	B	B	
<i>Asplenium × lucrosum</i> *				plP		plLP		
<i>Asplenium oblongifolium</i>	+	BPY	BP	B	BP	BP	B	BPY
<i>Asplenium polyodon</i>		B	BP	B				
<i>Azolla pinnata</i> *		P						
<i>Blechnum chambersii</i>			P					
<i>Blechnum discolor</i>						plLP		
<i>Blechnum filiforme</i>	+	P	PY	BP		P		PY
<i>Blechnum membranaceum</i>	+		BP					
<i>Blechnum novae-zelandiae</i>	+	BPY	BPY	BP	BP	BP	B	PY
<i>Blechnum parrisiae</i>	+	BPY	BPY	BP	BP	BP	BPY	PY
<i>Cheilanthes distans</i>			B				Y	
<i>Cyathea dealbata</i>	+	BPY	BPY	BP	BP	BPplLP	BY	PY
<i>Cyathea medullaris</i>	+	BPY	BPY	BP	BP	BP	BPY	PY
<i>Deparia petersenii</i>	+	BPY	BP	BP	P			
<i>Dicksonia squarrosa</i>		BPYplP	PY	BP	BP	G	BY	P
<i>Diplazium australe</i>	+	PY	PY	B	B			
<i>Histiopteris incisa</i>		PY	BP		BP	P		
<i>Hypolepis ambigua</i>		PY	BP					
<i>Hypolepis dicksonioides</i>		P						
<i>Lastreopsis glabella</i>			P					
<i>Lastreopsis microsora</i>			P					

	AK	U	MR	MA	W	MK	O	P
<i>Lindsaea linearis</i>		Y	Y					
<i>Lygodium articulatum</i>			PY			P		
<i>Microsorium pustulatum</i>		BPY	BP	BP	BP	B	BY	
<i>Nephrolepis cordifolia</i> *		PpIPY						pIP
<i>Paesia scaberula</i>	+	BPY	BP	BP	B	P	B	
<i>Platycterium bifurcatum</i> *			pIP					
<i>Pneumatopteris pennigera</i>		BP	BP		B		B	
<i>Polystichum neozelandicum</i>	+	PY		B	BP	B	BY	
<i>Polystichum wawranum</i>	+	B						
<i>Psilotum nudum</i>		Y						P
<i>Pteridium esculentum</i>		BPY	BP	BP	BP	BP	BY	PY
<i>Pteris comans</i>	+		PY	B	BP	BPpILP	B	
<i>Pteris macilenta</i>	+	BP				B		
<i>Pteris tremula</i>	+	BPY	BP	BP	BP	BP	BY	
<i>Ptisana salicina</i>						pILP		
<i>Pyrosia eleagnifolia</i>	+	BPY	BP	BP	BP	B	BPY	PY
<i>Rumohra adiantiformis</i>		pIP						
<i>Tmesipteris elongata</i>			P					
<i>Tmesipteris lanceolata</i>		P	PY			P		
Gymnosperms								
<i>(Abies grandis</i> *)						(pIG)		
<i>Agathis australis</i>		pIP	pIPY			pIGLP		
<i>(Araucaria cunninghamii</i> *)						(pIG)		
<i>Araucaria heterophylla</i> *	+	PpIPY	PYpIP	pIP		PpIGP		
<i>(Callitris calcarata</i> *)						(pIG)		
<i>(Calocedrus decurrens</i> *)						(pIG)		
<i>Cedrus atlantica</i> *			pIP					
<i>(Cedrus deodara</i> *)						(pIG)		
<i>Chamaecyparis lawsoniana</i> *		pIP						
<i>Cryptomeria japonica</i> *						pIGP		
<i>(Cupressus arizonica</i> *)						(pIG)		
<i>Cupressus macrocarpa</i> *			pIP	PpIP		PpIGP		
<i>Cupressus sempervirens</i> *			pIP					
<i>Dacrycarpus dacrydioides</i>		pIP	pIP		pIP	(pIG)		
<i>Dacrydium cupressinum</i>		pIP	YpIP	pITC		pIGL		
<i>Ginkgo biloba</i> *			pIP			(pIG)		
<i>Juniperus chinensis</i> *		pIP						
<i>Libocedrus plumosa</i>		pIP	pIP			pIGL		
<i>Phyllocladus trichomanoides</i>		pIP	YpIP			pIG	Y	PY
<i>Pinus pinaster</i> *	+	B	PY	BP		BpIG		
<i>Pinus radiata</i> *			PY	BP		PpIGP		
<i>Podocarpus totara</i>		PYpIP	BPpIP		pIP	PpIBGLP	Y	PY
<i>Prumnopitys ferrugineus</i>		pIP	pIP			pIG		
<i>Prumnopitys taxifolius</i>			pIP					
<i>(Pseudotsuga menziesii</i> *)						(pIG)		
<i>Sequoia sempervirens</i> *			pIP			pIGP		
<i>(Thuja plicata</i> *)						(pIG)		
Dicotyledons								
<i>(Acacia baileyana</i> *)						(pIG)		
<i>(Acacia dealbata</i> *)						(pIG)		
<i>(Acacia elata</i> *)						(pIG)		
<i>Acacia longifolia</i> *			PY			(pIG)		

	AK	U	MR	MA	W	MK	O	P
<i>Acacia mearnsii</i> *			BP			BP		
<i>Acacia melanoxylon</i> *	+			B		pIBGP		
<i>Acaena novae-zelandiae</i>			B	B		B		
<i>Acca selloana</i> *		pIP		pIP		pILP		
<i>Acer palmatum</i> *				pIP				
(<i>Acer pseudoplatanus</i> *)						(pIG)		
<i>Achillea millefolium</i> *		B						
<i>Ackama rosifolia</i>		pIP	pIP					
<i>Actinidia arguta</i> *						pILP		
<i>Actinidia deliciosa</i> *						pILP		
<i>Aeonium arboreum</i> *		pIP		pIP				
<i>Aeonium haworthii</i> ? *		pIP						
<i>Ageratina adenophora</i> *	+	BPY	BP	B	B			
<i>Ageratina riparia</i> *	+	BPY	BP	BP	P	BP	Y	
<i>Ajuga reptans</i> *		pIP		pIP				
(<i>Allantherus altissima</i> *)						(pIG)		
<i>Alectryon excelsus</i>		pIP	pIP	pIP		pIGL		
<i>Alseuosmia banksii</i>			pIP					
<i>Alternanthera nahui</i>	+	P						
<i>Alternanthera sessilis</i>	+	BPY			B			
<i>Amaranthus deflexus</i> *		P						
<i>Amaranthus lividus</i> *		P						
<i>Amaranthus powellii</i> *	+			B				
<i>Anagallis arvensis</i> *	+	BPY	BP	BP	BP	BP	BP	PY
<i>Anemone xhybrida</i> *			pIP					
(<i>Angophora lanceolata</i> *)						(pIG)		
<i>Annona cherimola</i> *						pILP		
<i>Anthriscus cerefolium</i> *		P						
<i>Apium prostratum</i>	+	B	P		BP	B	BPY	
<i>Apium "white denticles"</i>	+	BP			B			
<i>Araujia hortorum</i> *		PY	PY	P			S	
<i>Armoracia rusticana</i> *		pIP						
<i>Aristolelia serrata</i>		pIP	pIP			(pIG)		
<i>Ascarina lucida</i>			pIP					
<i>Atriplex prostrata</i> *	+	BPY	BP	P	BP	B	BY	Y
<i>Avicennia marina</i>		BPY						
<i>Banksia integrifolia</i> *								pIPY
(<i>Banksia serrata</i> *)						(pIG)		
<i>Beilschmiedia tarairi</i>		pIP	pIP		pIP	pIL		
<i>Beilschmiedia tawa</i>			pIP			(pIG)		
<i>Bellis perennis</i> *	+	BPY						
<i>Bidens frondosa</i> *		B	P					
<i>Blackstonia perfoliata</i> *	+	BP			B	B	B	BPY
<i>Bougainvillea glabra</i> *		pIP		pIP				
(<i>Brachychiton populnea</i> *)						(pIG)		
<i>Brachyglottis kirkii</i> var. <i>angustior</i>	+	pIP	FPYpIP					
<i>Brachyglottis kirkii</i> var. <i>kirkii</i>	+	B		B				
<i>Brachyglottis repanda</i>		BPYpIP	PYpIP		B	BPpIGP		
<i>Brugmansia candida</i> *		pIP						
(<i>Buddleia davidii</i> *)						(pIG)		
<i>Cakile maritima</i> *	+	BP	PY	P	BP		BPY	
<i>Callistemon rigidus</i> *		pIP						
<i>Callitriche muelleri</i>	+	BPY	PY					

	AK	U	MR	MA	W	MK	O	P
<i>Callitriche stagnalis</i> *		B						
<i>Calystegia marginata</i>	+		BPY			BP		
<i>Calystegia sepium</i>	+	BPY	BP		BP	B		
<i>Calystegia soldanella</i>	+	BP	BP	BP	BP	B	BPY	
<i>Camellia sasanqua</i> *			pIP					pIPY
<i>Camellia</i> sp.*								pIP
<i>Campsis</i> × <i>tagliabuana</i> *		PpIP						
<i>Capsella bursa-pastoris</i> *		P						
<i>Cardamine debilis</i>		B						
<i>Cardamine hirsuta</i> *		P			P			
<i>Carduus pycnocephalus</i> *		BP						
<i>Carica pubescens</i> *		pIP	pIP			(pIG)		
<i>Carmichaelia australis</i>		BpIP	P		pIP			
<i>Carpodetus serratus</i>		pIP	pIP			pIL		
(<i>Castanea sativa</i> *)						(pIG)		
<i>Casuarina</i> sp. *			pIP	pIP				
(<i>Ceanothus</i> sp. *)						(pIG)		
<i>Centaurium erythraea</i> *	+	BPY	BP	B	B	BP	B	PY
<i>Centella uniflora</i>		BPY	BP		BP	BP	BY	
<i>Cerastium glomeratum</i> *		P	P		P			
(<i>Chamaecytisus palmensis</i> *)						(pIG)		
<i>Chamaesyce maculata</i> *		P						
<i>Chenopodium ambrosioides</i> *		B	B		B		B	
<i>Chenopodium murale</i> *	+			B				
<i>Chenopodium pumilio</i> *	+				B		B	
<i>Chenopodium trigonon</i>	+							B
<i>Ciclospermum leptophyllum</i> *	+	P	B		B			
<i>Cirsium arvense</i> *			B					
<i>Cirsium vulgare</i> *	+	BPY	PY	BP	BP	BP	B	
<i>Citrus aurantifolia</i> *		pIP		pIP		pILP		
<i>Citrus limon</i> *		pIP	pIP	pIP				
<i>Citrus paradisi</i> *		pIP		pIP		(pIG)		
<i>Citrus reticulata</i> *		pIP				(pIG)		
<i>Citrus sinensis</i> *				pIP		(pIG)		
<i>Citrus</i> × <i>tangelo</i> *				pIP				
<i>Clematis cunninghamii</i>		BPY	PY	B	B	G		
<i>Clematis paniculata</i>	+	PYpIP	PYpIP	B		BPpILP		
<i>Clianthus puniceus</i>		pIP	pIP	pRBr		(pIG)		
<i>Coleonema</i> sp.*				pIP				
<i>Convolvulus cneorum</i> *		pIP						
<i>Conyza parva</i> *		BY						
<i>Conyza sumatrensis</i> *	+	BPY	BP	BP	BP	BP	BPY	Y
<i>Coprosma arborea</i>	+	BPYpIP	BPYpIP	P	B			
<i>Coprosma areolata</i>		B						
<i>Coprosma grandifolia</i>		PY						
<i>Coprosma lucida</i>	+	pIP				pIB		
<i>Coprosma macrocarpa</i>	+	BPYpIP	BPYpIP	BP	BPpIP	BP	BPY	BPY
<i>Coprosma propinqua</i>		PpIP	pIP					
<i>Coprosma repens</i>	+	BPYpIP	BP	BP	BPpIP	BPpILP	BP	
<i>Coprosma rhamnoides</i>	+	BPYpIP	BPYpIP	BP	BPpIP	BP	Y	PY
<i>Coprosma rigida</i>		PpIP						
<i>Coprosma robusta</i>		BPYpIP	PYpIP	P	PpIP	PpIP	P	
(<i>Coprosma</i> sp. ex west coast)						(pIG)		

	AK	U	MR	MA	W	MK	O	P
<i>Coriaria arborea</i>	+	BP	B		pIP	B		PY
<i>Corokia buddleiodes</i>		pIP			pIP	(pIG)		
<i>Corokia cotoneaster</i>		P*pIP	pIP					
<i>Corymbia ficifolia</i> *	+			pIP	pIP	(pIG)		
<i>Corynocarpus laevigatus</i>		BPpIP	YpIP	P*pIP	pIP	pILP	B	
<i>Cotula australis</i>		P						
<i>Cotula coronopifolia</i>		PY					Y	
<i>Crassula arborescens</i> *		pIP		pIP				
<i>Crassula decumbens</i> *	+	P						
<i>Crassula multicava</i> *		PpIPY	P	TCpIP				PYpIP
<i>Crassula sieberiana</i>						B		
<i>Crepis capillaris</i> *		BP	BP	B	BP	B	B	
<i>Cyphomandra betacea</i> *		pIP				pILP		
<i>Daucus carota</i> *					B			
<i>Daucus glochidiatus</i>	+	B			B			
<i>Delairea odorata</i> *		PY						
<i>Dichondra repens</i>		BPY	BPY	BP	B	BP	BY	P
<i>Digitalis purpurea</i> *					B			
<i>Diospyros kaki</i> *			pIP			pILP		
<i>Disphyma australe</i>		BPY		B	BP	B	BY	
<i>Dittrichia graveolens</i> *	+	B			BP			
<i>Dodonaea viscosa</i>	+	PpIP	PpIP	B	pIP	BPpIGL		
<i>Dracophyllum lessonianum</i>			Y					
<i>Drosera auriculata</i>		P	P					
<i>Dysoxylum spectabile</i>		pIP	PYpIP	TCpIP	pIP	pIGLP		
<i>Echeveria elegans</i> *		pIP						
<i>Elatostema rugosum</i>			P					
<i>Entelea arborescens</i>		BPpIP	BPYpIP		BpIP	BP		
<i>Epilobium ciliatum</i> *	+	BP			B			
<i>Epilobium nummulariifolium</i>	+	B			B			
<i>Epilobium pallidiflorum</i>		B						
<i>Epilobium rotundifolium</i>	+			B				
<i>Erechtites valerianifolia</i> *	+	BPY	BP		B	P	Y	
<i>Erica lusitanica</i> *		B	PY					
<i>Erigeron karvinskianus</i> *		PY						
<i>Eriobotrya japonica</i> *				PpITC		pILP	BP	P
<i>Erythrina crista-gallii</i> *		pIP						
<i>Erythrina</i> × <i>sykesii</i> *		pIP				pIGP		
<i>Eucalyptus</i> spp. *			pIP	pIP		pIGP		
(<i>Eucalyptus botryoides</i> *)						(pIG)		
(<i>Eucalyptus caliginis</i> *)						(pIG)		
<i>Eucalyptus cinerea</i> *		pIP				(pIG)		
(<i>Eucalyptus diversicolor</i> *)						(pIG)		
(<i>Eucalyptus eugenioides</i> *)						(pIG)		
(<i>Eucalyptus globulus</i> var. <i>maidenii</i> *)						(pIG)		
(<i>Eucalyptus gomphocephala</i> *)						(pIG)		
(<i>Eucalyptus leucoxydon</i> *)						(pIG)		
(<i>Eucalyptus microcorys</i> *)						(pGI)		
(<i>Eucalyptus paniculata</i> *)						(pIG)		
(<i>Eucalyptus pilularis</i> *)						(pIG)		
(<i>Eucalyptus sieberi</i> *)						(pIG)		
<i>Euchiton audax</i>	+	B		B	B	B		
<i>Euchiton japonicus</i>	+	BP	BP		B		B	

	AK	U	MR	MA	W	MK	O	P
<i>Euchiton sphaericus</i>		P					B	
<i>Euphorbia peplus</i> *	+	BP			BP	BP	BPY	BP
<i>Euphorbia trigona</i> *		pIP						
<i>Fatsia japonica</i> *		P						
<i>Ficus benjamina</i> *		pIP						
<i>Ficus carica</i> *		pIP	pIP	pIBP		pILP	pIBYP	
<i>Ficus macrophylla</i> *			pIP	pIP		pIGP		
<i>Foeniculum vulgare</i> *	+	B	PY		BP			
<i>Fragaria</i> × <i>ananassa</i> *						pILP		
(<i>Fraxinus</i> sp. *)						(pIG)		
<i>Fuchsia excorticata</i>		pIP	pIP			(pIG)		
<i>Fuchsia procumbens</i>	+	TH						
<i>Fumaria muralis</i> *	+	P		P				B
<i>Galium aparine</i> *		BP	P	P	P			
<i>Galium divaricatum</i> *		BP			B		B	
<i>Galium palustre</i> *		P	B					
<i>Gamochaeta calviceps</i> *	+	B						
<i>Gamochaeta coarctata</i> *	+	BP	P	P	B	B	B	
<i>Gamochaeta simplicicaulis</i> *	+	BP	BP	B		BP	B	
<i>Gaultheria antipoda</i>	+					B		
<i>Gazania linearis</i> *		pIP						
<i>Gazania</i> cv. 'Silver Filigree' *		pIP						
<i>Geniostoma ligustrifolium</i>	+	BPpIP	BPYpIP	BP	BPpIP	BPpILP	BY	PY
<i>Geranium gardneri</i> *	+	B	BP	B	B	P	BY	
<i>Geranium homeanum</i>	+	BP	BP	BP	BP		Y	
(<i>Gleditsia triacanthos</i> *)						(pIG)		
<i>Gomphocarpus fruticosus</i> *				TC			Y	
<i>Gonocarpus incanus</i>		BPY	PY					
<i>Graptopetalum paraguayense</i> *				pIP				
(<i>Grevillea robusta</i> *)						(pIG)		
<i>Grevillea</i> sp.*		pIP						
(<i>Griselinia littoralis</i>)						(pIG)		
<i>Hakea salicina</i> *		P	PY					
<i>Hakea sericea</i> *		BP	PY	B		B	B	Y
<i>Haloragis erecta</i>	+	BPY	PY	BP	BPpIP	BP	BPY	P
<i>Hebe acutiflora</i>					pIP			
<i>Hebe ligustrifolia</i>	+	PYpIP	FPY	BP	P	P	PY	BPY
(<i>Hebe macrocarpa</i>)						(pIG)		
(<i>Hebe parviflora</i>)						(pIG)		
<i>Hebe stricta</i>		BPpIP	BPpIP		BpIP	BpIL	BY	
<i>Hedera helix</i> *		PpIP						PYpIP
<i>Hedycarya arborea</i>		pIP	YpIP		pIP	pIG		
<i>Helichrysum lanceolatum</i>				B				
<i>Helminthotheca echioides</i> *			P		BP			
<i>Hibiscus rosa-sinensis</i> * hybrids		pIP	pIP	pIP				
<i>Hibiscus syriacus</i> *		PpIP						
(<i>Hibiscus</i> sp. *)						(pIG)		
<i>Hoheria populnea</i>	+	PpIP	PpIP	B	BpIP	pIBGL		
<i>Hydrangea macrophylla</i> *		pIP				pIG		
<i>Hydrocotyle moschata</i>	+	BP						
<i>Hydrocotyle tripartita</i> *		P						
<i>Hymenosporum flavum</i> *		pIP						
<i>Hypericum pusillum</i>	+	BPY	PY			P		

	AK	U	MR	MA	W	MK	O	P
<i>Hypocharis radicata</i> *	+	BPY	BP	BP	BP	BP	BPY	
<i>Impatiens sodenii</i> *	+			BP				
<i>Impatiens walleriana</i> *			PpIP	PpIP				
<i>Ipomoea cairica</i>	+	BP						
<i>Jacobaea vulgaris</i> *	+	BPY		B				
<i>Jasminum mesnyi</i> *		pIP						
<i>Jasminum polyanthum</i> *		pIP		pIP				pIPY
(<i>Juglans ailanthifolia</i> *)						(pIG)		
<i>Juglans regia</i> *			pIP			(pIG)		
<i>Justicia carnea</i> *				pIP				
<i>Kalanchoe blossfeldiana</i> *		pIP						
<i>Kickxia elatine</i> *	+	B						
<i>Knightia excelsa</i>		pIP	pIP		pIP	pIGLP		
<i>Kunzea robusta</i>	+	BPYpIP	BPY	BP	BPpIP	BP	BPY	PY
<i>Lactuca saligna</i> *	+	B					B	
<i>Lactuca serriola</i> *		P	P		B			
<i>Lactuca virosa</i> *		P	P					
<i>Lagenophera lanata</i>	+	PY	PY					
<i>Lagenophera pumila</i>	+	B						B
(<i>Lagunaria patersonii</i> *)						(pIG)		
<i>Lamium galeobdolen</i>		pIP						
<i>Lantana camara</i> *		P						
<i>Lavandula spicata</i> *		pIP						
(<i>Leionema nudum</i>)						(pIG)		
<i>Leonotis leonurus</i> *		pIP						
<i>Leontodon saxatilis</i> *	+	BPY	B			B		Y
<i>Lepidium didymum</i> *		BP				P		
<i>Lepidium pseudotasmanicum</i> *	+	Y			B			
<i>Leptecophylla juniperina</i>	+	BPY		B				PY
<i>Leptospermum scoparium</i>		BPYpIP	BPY	B	BPpIP	BP	B	PY
<i>Leucodendron argenteum</i> *	+					BpIBG		
(<i>Leucodendron decorum</i> *)						(pIG)		
<i>Leucopogon fasciculatus</i>	+	BPY	BPY	B	BPpIP	BP	BY	PY
<i>Leucopogon fraseri</i>	+	BPY		B		P	Y	
<i>Ligustrum lucidum</i> *			pIP			(pIG)		
<i>Lilaeopsis novae-zelandiae</i>	+	BP			B	B		
<i>Limosella lineata</i>							Y	
<i>Linum bienne</i> *	+	P						B
<i>Linum trigynum</i> *	+	BY	B		B	B	BY	
(<i>Litsea calicaris</i>)						(pIG)		
<i>Lobelia anceps</i>	+	BPY	BP	BP	BP	BP	BPY	
<i>Lobelia physaloides</i>	+	YpIP	PYpIP			G		
<i>Lonicera hildebrandiana</i> *	+	pIP						
(<i>Lophomyrtus bullata</i>)						(pIG)		
<i>Lotus angustissimus</i> *	+	BY	B		B	B	B	P
<i>Lotus pedunculatus</i> *		BP	P	B	BP		BP	
<i>Lotus suaveolens</i> *	+	BPY	BP	B	B		B	
<i>Lotus</i> sp. *			B					
<i>Ludwigia palustris</i> *		PY						
<i>Lythrum hyssopifolia</i> *		P			B			
<i>Lythrum junceum</i> *					P			
<i>Macadamia tetraphylla</i> *		pIP	pIP	pIP		(pIG)		
<i>Magnolia figo</i> *	+			pICC				

	AK	U	MR	MA	W	MK	O	P
<i>Magnolia grandiflora</i> *				pIP				
<i>Malus × domestica</i> *	+			pIP		pIB		
<i>Malva nicaeensis</i> *		P						
<i>Marrubium vulgare</i> ? *	+	P						
<i>Medicago arabica</i> *		B				B	B	
<i>Medicago lupulina</i> *	+	BP	BP	B	B		B	BP
<i>Medicago nigra</i> *	+	B	BP	P	B	B	B	
<i>Medicago sativa</i> *		P						
<i>Melaleuca hypericifolia</i> *					pIP			
<i>Melianthus major</i> *	+			BP				
<i>Melicope ternata</i>		pIP	pIP		pIP	(pIG)		
<i>Melicytus macrophyllus</i>		pIP	pIP					
<i>Melicytus novae-zelandiae</i>	+		pIP	pIB	B			
<i>Melicytus ramiflorus</i>	+	BPYpIP	BPYpIP	BP	BPpIP	BPpILP		
<i>Melilotus indicus</i> *	+	BP	BP	BP	BP	B	BPY	PY
<i>Mentha pulegium</i> *	+	B			B			
<i>Mentha spicata</i> *		pIP						
<i>Mentha suaveolens</i> *		BpIP						
<i>Meryta sinclairii</i>	+	P*pIP	pIP	P*pIP	pIP	pILP		
<i>Metrosideros albiflora</i>			pIP					
<i>Metrosideros carminea</i>	+	B					KR	
<i>Metrosideros excelsa</i>	+	BPYpIP	BPYpIP	BP	BPpIP	BPpIGLP	BPY	PY
<i>Metrosideros fulgens</i>			pIP			pIG		
<i>Metrosideros perforata</i>		YpIP	pIP			G		
<i>Metrosideros robusta</i>		pIP	pIP					
<i>Modiola caroliniana</i> *	+	BP	BP	B	B	P	BY	
<i>Morus nigra</i> *						pILP		
<i>Muehlenbeckia australis</i>		BP						
<i>Muehlenbeckia complexa</i>	+	BPYpIP	BP	BP	BP	BP	BP	PY
<i>Myoporum laetum</i>		BpIP			pIP	pIL		
<i>Myoporum serratum</i> *						pIBG		
<i>Myosotis discolor</i> *	+	P						
<i>Myosotis sylvatica</i> *		P	P					
<i>Myrsine australis</i>	+	BPYpIP	PYpIP	BP	BPpIP	PpIL		PY
<i>Nandina domestica</i> *			pIP					
<i>Nerium oleander</i> *		pIP	pIP	pIP	pIP	(pIG)		pIPY
<i>Nasturtium officinale</i> *		B						
<i>Nertera dichondrifolia</i>		PY	PY					
<i>Nestegis apetala</i>	+	pIP		B		GpIL		
<i>Nicotiana tabacum</i> *	+	P						
<i>Oenanthe pimpinelloides</i> *	+	P	P	P	P	B	B	
<i>Olea europaea</i> *	+			pIP				
<i>Olearia albida</i>						pILP		
<i>Olearia furfuracea</i>	+	BPYpIP	PYpIP	BP	BpIP	GPpIL	BY	PY
<i>Olearia rani</i>		pIP	pIP					
<i>Olearia solandri</i>		pIP			pIP			
<i>Origanum onites</i> *		PpIP						
<i>Ornithopus pinnatus</i> *					P			
<i>Orobanche minor</i> *		BP	P	B	BP	B	B	
<i>Osteospermum fruticosum</i> *	+	P						
<i>Osteospermum jucundum</i> *	+	PpIP						
<i>Oxalis corniculata</i> var. <i>corniculata</i> *		BP	BP		BP	BP	BP	
<i>Oxalis exilis</i>	+	P		B				Y

	AK	U	MR	MA	W	MK	O	P
<i>Oxalis incarnata</i> *		P						
<i>Oxalis latifolia</i> *		P						
<i>Oxalis pes-caprae</i> *		P	P		P			
<i>Oxalis rubens</i> *	+		BY			B		
<i>Ozothamnus leptophyllus</i>	+	pIP			pIP	B		
<i>Paraserianthes lophantha</i> *		BPY	BP					PY
<i>Parentucellia viscosa</i> *	+	BP		B	B	B	BY	
<i>Parietaria debilis</i>	+	B						
<i>Parsonsia capsularis</i>		pIP	pIP					
<i>Parsonsia heterophylla</i>					B			
<i>Parsonsia</i> sp.						pIGP		
<i>Passiflora edulis</i> *		KU	AR			(pIG)		
<i>Passiflora</i> sp.* (banana)			P					
<i>Pelargonium × domesticum</i> *		pIP						
<i>Pelargonium × hortorum</i> *			pIP	pIP				
<i>Pelargonium inodorum</i>		B			B			
<i>Pelargonium peltatum</i> *		pIP	pIP					
<i>Peperomia urvilleana</i>		BPY	BP	B	BP	B	PY	Y
<i>Pericallis × hybrida</i> *		P		P				
<i>Persea americana</i> *		PpIP		pIP		pILP		
<i>Persicaria decipiens</i>	+	BP	P		BP		Y	
<i>Persicaria hydropiper</i> *		B	B					
<i>Petroselinum crispum</i> *		P						
<i>Physalis peruviana</i> *	+	BPY	PY	BP	B	P	PY	Y
(<i>Phytolacca dioica</i> *)						(pIG)		
<i>Phytolacca octandra</i> *	+	BP	BP	BP	BP		Y	
<i>Picris burbridgeae</i>					B			
<i>Pimelea prostrata</i>		BPY	B	B	B	B	BY	
<i>Piper excelsum</i> subsp. <i>excelsum</i>	+	BPYpIP	BPpIP	P	BPpIP	BPpIL	BPY	
<i>Piper excelsum</i> subsp. <i>psittacorum</i>		P*pIP						
<i>Piper melchior</i>						pILP		
<i>Pisonia brunoniana</i> var. <i>variegata</i>		pIP						
<i>Pittosporum cornifolium</i>						pIL		
<i>Pittosporum crassifolium</i>		BPYpIP	PYpIP	BP	BPpIP	BPpILP	BPY	
<i>Pittosporum eugenioides</i>		pIP	pIP			pIGP		
<i>Pittosporum pimelioides</i>		KR						
<i>Pittosporum tenuifolium</i>		pIP	pIP			pILP		
<i>Pittosporum umbellatum</i>	+	BPpIP	PYpIP	BP		pILP	BY	
<i>Plagianthus divaricatus</i>		BPpIP						
<i>Planchonella costata</i>		pIP	KRpIP		pIP	pIGL		
<i>Plantago lanceolata</i> *	+	BPY	BP	BP	BP		B	PY
<i>Plantago major</i> *		BPY			B			
<i>Plantago raoulii</i>	+				B			
<i>Platanus acerifolia</i> *			pIP			(pIG)		
<i>Plectranthus grandis</i> *				pIP				
<i>Polycarpon tetraphyllum</i> *		BP	P	B	B	B	B	
<i>Polygala myrtifolia</i> *	+	BPY	PY	BP		BP	Y	PY
<i>Pomaderris amoena</i>	+	BPY	P	B		B	BY	B
<i>Pomaderris kumeraho</i>	+	PY				BP*pIBG		
<i>Populus nigra</i> *			pIP					
(<i>Populus</i> sp. *)						(pIG)		
<i>Portulacca oleracea</i> *		P		B				

	AK	U	MR	MA	W	MK	O	P
<i>Potentilla indica</i> *				P				
<i>Primula vulgaris</i> *		pIP						
<i>Prunella vulgaris</i> *		BP	P	BP		B		
<i>Prunus campanulata</i> *		P				P		
<i>Prunus xdomestica</i> *		pIP	pIP	pIP		pILP		
<i>Prunus persica</i> *		BPpIP	pIP	pIP	B	(pIG)		
<i>Pseudognaphalium luteoalbum</i>	+	BP	PY		B	BP	BY	
<i>Pseudopanax arboreus</i>	+	pIP	pIP		pIP	pIBGL		
<i>Pseudopanax crassifolius</i>		BPpIP	P		pIP	BpIG		
<i>Pseudopanax discolor</i>	+					pIB		
<i>Pseudopanax lessonii</i>	+	BPYpIP	PY	BP	BPpIP	BPpILP	BPY	BPY
<i>Psidium cattleianum</i> *		PpIP				(pIG)		
<i>Psidium guajava</i> *						pILP		
<i>Pyracantha angustifolia</i> *		P						pIP
<i>Pyrus communis</i> *		pIP				pILP		
(<i>Quercus ilex</i> *)						(pIG)		
<i>Quercus robur</i> *						pIGP		
<i>Ranunculus acaulis</i>		B	B					
<i>Ranunculus amphitrichus</i>		B						
<i>Ranunculus parviflorus</i> *		P						
<i>Ranunculus reflexus</i>	+	BY	P		B			B
<i>Ranunculus repens</i> *	+	BPY		BP	P			
<i>Ranunculus sardous</i> *		B						
<i>Ranunculus urvilleanus</i>	+	PY	B					
<i>Raphanus raphanistrum</i> *	+	BPY	BP	B	BP	BP	BPY	
<i>Rhabdothamnus solandri</i>	+	BPY	P	B	B	B		
<i>Ricinus communis</i> *		P						
<i>Rosa</i> sp. *		pIP				(pIG)		
<i>Rubus australis</i>			pIP					
<i>Rubus loganobaccus</i> *						pILP		
<i>Rubus schmidelioides</i>		pIP	pIP					
<i>Rubus ulmifolius</i> *	+		BP					
<i>Rumex acetosella</i> *	+	BP		B	BP	B		
<i>Rumex brownii</i> *	+	BP	BP		B	B		
<i>Rumex conglomeratus</i> *	+	BP	B	B	BP	B	B	
<i>Rumex crispus</i> *	+	BP	B	B	BP	B	B	
<i>Rumex obtusifolius</i> *			P	P				
<i>Rumex pulcher</i> *		P					B	
<i>Rumex sagittatus</i> *	+	P	PY	BP		P		
<i>Ruscus aculeatus</i> *		PpIP						
<i>Sagina apetala</i> *			P		B			
<i>Sagina procumbens</i> *		P						
<i>Salix babylonica</i> *		pIP						
(<i>Salix</i> sp. *)			(pIG)			(pIG)		
<i>Salsola kali</i> *		BP	B		B		B	
<i>Salvia officinalis</i> *		pIP						
<i>Samolus repens</i>		BPY	PY	BP	BP	B	BPY	PY
<i>Sarcocornia quinqueflora</i>		BPY	BP	B	BP		B	PY
<i>Schefflera actinophylla</i> *		pIP						
<i>Schefflera arboricola</i> *		pIP						
<i>Schefflera digitata</i>	+	pIP	BPYpIP	pIP	pIP			
(<i>Schinus molle</i> *)						(pIG)		
<i>Scleranthus biflorus</i>	+							B

	AK	U	MR	MA	W	MK	O	P
<i>Selliera radicans</i>		BP	B	B			B	
<i>Senecio bipinnatisectus</i> *	+	BPY	PY	B	BP	P	BY	
<i>Senecio diaschides</i> *	+	BP	P	B		P		
<i>Senecio glomeratus</i>	+	BP						
<i>Senecio hispidulus</i>	+	B	Y	BP				Y
<i>Senecio lautus</i>		BY		P	BP		BY	
<i>Senecio minimus</i>		BPY	BP	B	B			
<i>Senecio quadridentatus</i>								Y
<i>Senecio repangae</i>	+	B	B					
<i>Senecio vulgaris</i> *		P						
(<i>Senna multiglandulosa</i> *)						(pIG)		
<i>Silene gallica</i> *	+	B	P	B	B	B	B	
<i>Silybum marianum</i> *	+	BP		B	B		B	
<i>Sison amomum</i> *		PY		P				
<i>Solandra maxima</i> *								pIP
<i>Solanum aviculare</i>		pIP	PpIP		pIP	(pIG)		
<i>Solanum linnaeanum</i> *	+	BPY	BP	B	BP		B	
<i>Solanum lycopersicum</i> *		P						
<i>Solanum mauritianum</i> *		PY	BP	P	BP	P		
<i>Solanum nigrum</i> *	+	BPY	BP	B	B		BP	
<i>Solanum nodiflorum</i>	+	BP	BP	BP	BP	BP	BPY	Y
<i>Sonchus asper</i> *		B	P		B			P
<i>Sonchus oleraceus</i> *		BPY	BP	BP	BP	B	BPY	PY
<i>Sophora chathamica</i>	+	PpIP	BPpIP		pIP	pIBGLP		B
<i>Stellaria media</i> *		P						
<i>Stachys arvensis</i> *		P						
<i>Streblus banksii</i>		pIP	pIP		pIP			
<i>Symphyotrichum subulatum</i>		BP	Y		B		B	
<i>Symphytum xuplandicum</i> *		B						
(<i>Syncarpia laurifolia</i> *)						(pIG)		
<i>Syzygium maire</i>		pIP	pIP					
<i>Syzygium smithii</i> *				pIP				
(<i>Tamarix gallica</i> *)						(pIG)		
<i>Taraxacum officinale</i> *		BPY	P	P				
(<i>Tecomanthe speciosa</i>)						(pIG)		
<i>Tetragonia implexicoma</i>	+				B	B		
<i>Tetragonia tetragonioides</i>		PY	P	P	P	B	PY	Y
<i>Torilis arvensis</i> *	+				B			
<i>Tragopogon porrifolius</i> *	+					B	B	
<i>Trifolium dubium</i> *		BP	P		BP	B	B	
<i>Trifolium glomeratum</i> *	+	B			B	B	B	
<i>Trifolium pratense</i> *		BP						
<i>Trifolium repens</i> *		BPY	P	BP	BP	BP	BP	
<i>Trifolium resupinatum</i> *	+				B			
<i>Trifolium subterraneum</i> *		B			B		B	
<i>Tropaeolum majus</i> *		P						
<i>Ulex europeus</i> *		BPY	BPY	BP	BP	BP	BY	PY
<i>Ulmus</i> sp.*	+					pIB		
<i>Vaccinium corymbosum</i> *						pILP		
<i>Verbascum blattaria</i> *		B			B		B	
<i>Verbascum creticum</i> *		P			P		Y	
<i>Verbena bonariensis</i> *	+	BPY	BP					
<i>Verbena brasiliensis</i> *	+	B						

	AK	U	MR	MA	W	MK	O	P
<i>Verbena litoralis</i> *	+	BPY	P	BP	BP	P		BP
<i>Veronica arvensis</i> *		BP		B	B			
<i>Veronica persica</i> *		P						
<i>Veronica plebeia</i>	+	BPY	BP	B	P		Y	
<i>Veronica serpyllifolia</i> *		P						
<i>Vicia sativa</i> *	+	P				B		
<i>Vinca major</i> *		PpIP	BPpIP					
<i>Viola odorata</i> *		pIP		pIP				
<i>Viola</i> cv. 'Prince Rupert' *		pIP						
<i>Vitex lucens</i>		P*pIP	BPpIP	pIBP	pIP	pIGLP		
<i>Vitis vinifera</i> *		pIP				pILP		pIPY
<i>Wahlenbergia vernicosa</i>	+	Y		B	B			Y
<i>Wahlenbergia violacea</i>		BPY	PY		B	B	B	
<i>Weinmannia silvicola</i>	+	BPYpIP	PYpIP		pIP	BP		
<i>Wisteria</i> sp. *		PpIP						
Monocotyledons								
<i>Acianthus sinclairii</i>			Y					
<i>Aechmea</i> sp. *				pIP				
<i>Agapanthus praecox</i> *		PYpIP	pIP	BPpIP		BPpIP		PYpIP
<i>Agave americana</i> *		pIPY		PpIP				PYpIP
<i>Agave angustifolia</i> *								pIP
<i>Agave attenuata</i> *		pIP		pIP				
<i>Agrostis capillaris</i> *	+	BPY	B	P	BP		BY	
<i>Agrostis stolonifera</i> *	+	BP						
<i>Aira caryophyllacea</i> subsp. <i>caryophyllacea</i> *	+	B	B	B	B	B	B	
<i>Aira caryophyllacea</i> subsp. <i>multiculmis</i> *	+	B			B			
<i>Aira praecox</i> *	+			B				
<i>Allium triquetrum</i> *	+			P				
<i>Allium vineale</i> *		BP	BP	BP	BP	B	B	
<i>Alocasia brisbanensis</i> *		PpIP	PpIP					
<i>Aloe arborescens</i> *		pIP	pIP	pIP				
<i>Aloe ciliaris</i> *		pIP						
<i>Aloe maculata</i> *		pIP		PpIP				
<i>Alpinia zerumpet</i> *	+	pIP		pIP				pIB
<i>Amaryllis belladonna</i> *		P	pIP	pIP				
<i>Anigozanthus</i> cv. 'Bush Pearl' *		pIP						
<i>Anthosachne kingiana</i> subsp. <i>multiflora</i>	+	BP		B	B		B	B
<i>Anthosachne scabra</i> *	+	B		B	B	B	B	
<i>Anthoxanthum odoratum</i> *		BPY	BP	BP	BP	B	BY	P
<i>Apodasmia similis</i>		BPYpIP	P		B	B		
<i>Archontophoenix cunninghamiana</i> *						pILP		
<i>Arthropodium cirratum</i>	+	BPYpIP	BP	BPpIP	BPpl	BPpILP	BPY	PY
<i>Arum italicum</i> *		pIP						
<i>Arundo donax</i> *		pIP	BPY					pIPY
<i>Asparagus aethiopicus</i> *		P						
<i>Asparagus scandens</i> *		P						
<i>Astelia banksii</i>	+	BPYpIP	BPY	BP	BP	BPpILP	BY	Y
<i>Astelia hastata</i>			B			pILP		Y
<i>Austraderia fulvida</i>					pIP			
<i>Austrostipa stipoides</i>	+	BPY		BP				BPY

	AK	U	MR	MA	W	MK	O	P
<i>Avena barbata</i> *	+	B	B	B	B	B	B	
<i>Axonopus fissifolius</i> *		B	Y					
<i>Bambusa dolichoclada</i>	+	pIP						
<i>Bambusa oldhamii</i> *	+	pIP	pIP	pIP		pIGP		
<i>Beschorneria yuccoides</i> *		pIP						pIP
<i>Bilbergia nutans</i> *				pIP				
<i>Bolboschoenus fluviatilis</i>			BP		BP			
<i>Bothriochloa macra</i> *	+	BY	BPF	B	B	B	B	
<i>Briza maxima</i> *					P		B	
<i>Briza minor</i> *	+	BPY		B	B	B	B	
<i>Bromus diandrus</i> *	+	B	BP	P	B		B	
<i>Bromus hordeaceus</i> *		BP			B		B	
<i>Bromus willdenowii</i> *	+	BP	BP	B	B		B	
<i>Butia capitata</i> *			pIP					
<i>Canna xgeneralis</i> *		pIP		pIP				
<i>Carex breviculmis</i>		BP			B		BY	Y
<i>Carex dissita</i>		BP			B			
<i>Carex divisa</i> *		P	B					
<i>Carex divulsa</i> *	+	BPY		P	BP		B	
<i>Carex flacca</i> *		PY						
<i>Carex flagellifera</i>	+	BPYpIP	B	B	BP	B	BY	PY
<i>Carex inversa</i>	+	BPY	BP	BP	B		BY	P
<i>Carex lambertiana</i>	+	BP	BP	BP				P
<i>Carex longibrachiata</i> *	+	BPY						
<i>Carex ochrosaccus</i>		BY	Y					
<i>Carex pumila</i>	+	BPY	BP		BP	B	BPY	
<i>Carex secta</i>		pIP						
<i>Carex spirostris</i>	+			BP				
<i>Carex uncinata</i>	+	BPY	B	B	B		B	Y
<i>Carex virgata</i>	+	BPY	PY	BP	BP		B	P
<i>Cenchrus clandestinus</i> *		BPY	BPY	BP	BP	G	BPY	PY
<i>Chionochloa bromoides</i>	+	BPY	BP	BP	BP	B	BPY	PY
<i>Chlorophytum comosum</i> *		PpIP	PpIP	PpIP				PYpIP
<i>Clivia miniata</i> *				pIP				
<i>Colocasia esculenta</i> *		BPpIP	BG	B	B	(pIG)		
<i>Cordyline australis</i>		BPYpIP	BP	BPpIP	BPpIP	BpIP	BPY	PY
<i>Cordyline banksii</i>	+		BP			B		
<i>Cordyline fruticosa</i> *	+	pIAH						
<i>Cordyline obtecta</i>						pIL		
<i>Cordyline pumilio</i>		pIP	pIP					
<i>Cortaderia jubata</i> *			P					
<i>Cortaderia selloana</i> *		BPY	BP		BP	P	PY	PY
<i>Crinum xpowellii</i> *					pIP			
<i>Critesion marinum</i> *	+	BP	B	B	B		B	
<i>Crococsmia xcrocosmiiflora</i> *					PpIP			PYpIP
<i>Ctenanthe compressa</i> *				pIP				
<i>Ctenanthe</i> cv. 'Grey Star' *				pIP				
<i>Cynodon dactylon</i> *	+	BP	B	B	B		B	
<i>Cynosurus cristatus</i> *	+	B						
<i>Cyperus brevifolius</i> *	+	BPY		B	B		BY	
<i>Cyperus eragrostis</i> *			P					
<i>Cyperus ustulatus</i>	+	BPYpIP	BP	B	BP	BP	BPY	
<i>Dactylis glomerata</i> *		BPY	BP	BP	BP	BP	BPY	

	AK	U	MR	MA	W	MK	O	P
<i>Dianella caerulea</i> *				pIP				
<i>Dianella latissima</i>		PpIP	PY	P	PpIP	PpILP		
<i>Dianella nigra</i>	+	BY	B	B	B	B	BY	Y
<i>Dichelachne crinita</i>	+	BP	B	B	B	B	B	P
<i>Dichelachne micrantha</i>	+	BP		B		B		
<i>Dierama pulcherrimum</i> ? *								pIP
<i>Echinochloa crus-galli</i> *		B						
<i>Echinopogon ovatus</i>	+	B			B		B	
<i>Eleocharis acuta</i>		BPY	BP		P		BY	
<i>Eragrostis brownii</i> *		B						
<i>Ficinia nodosa</i>	+	BPY	BP	BP	BP	BP	BP	PY
<i>Ficinia spiralis</i>			BpIP					
<i>Freesia refracta</i> *					P			
<i>Freycinetia banksii</i>						pIGLP		
<i>Furcraea foetida</i> *		pIP		PpIP				
<i>Gahnia lacera</i>	+	BPY	BPY	BP	P	BP	BPY	BPY
<i>Gahnia setifolia</i>			Y					
<i>Gastridium ventricosum</i> *	+	B			B		B	
<i>Gladiolus undulatus</i> *		P	P	P	P		P	
<i>Hedychium coronarium</i> *				pIP				
<i>Hedychium gardnerianum</i> *		PYpIP	P					P
<i>Hemerocallis</i> sp.*				pIP				
<i>Holcus lanatus</i> *		BPY	BP	B	B		Y	
<i>Howea forsterana</i> *				pIP		(pIG)		
<i>Iris foetidissima</i> *			P					
<i>Iris germanica</i> *	+			BPpIP				
<i>Isachne globosa</i>	+	BPY	B		P			
<i>Isolepis cernua</i>	+	BP	BP		BP	B	BY	
<i>Isolepis inundata</i>		?Y	B					
<i>Isolepis prolifer</i>		B						
<i>Isolepis reticularis</i>	+				B			
<i>Isolepis sepulcralis</i> *	+	BY			B	B		
<i>Juncus acuminatus</i> *		Y						
<i>Juncus articulatus</i> *		BP			B			
<i>Juncus australis</i>		B	B		BP		Y	
<i>Juncus bufonius</i> var. <i>congestus</i> *	+	B			B			
<i>Juncus edgariae</i>	+	BPY	B		BP		B	
<i>Juncus effusus</i> *		BPY	B		BP			
<i>Juncus kraussii</i>		B						
<i>Juncus microcephalus</i> *	+		B					
<i>Juncus planifolius</i>		B						
<i>Juncus sarophorus</i>		BPY					Y	
<i>Juncus usitatus</i>	+	BPY		BP			BP	
<i>Kniphofia uvaria</i> *		PpIP	pIP					PYpIP
<i>Lachnagrostis billardierei</i>	+	BP	B	B	B	B	BY	
<i>Lachnagrostis littoralis</i>		BP			BP		B	
<i>Lagurus ovatus</i> *		BP	BP	BP	BP	B	BPY	
<i>Lepidosperma australe</i>		Y	Y					
<i>Lepidosperma laterale</i>			Y			P		
<i>Leucojum aestivum</i> *		pIP	pIP					
<i>Libertia ixioides</i>						pILP		
<i>Libertia grandiflora</i>	+			B				
(<i>Lilium formosanum</i> *)						(pIG)		

	AK	U	MR	MA	W	MK	O	P
<i>Lolium perenne</i> *		BP	B		B		B	
<i>Machaerina articulata</i>		BPY	B					
<i>Machaerina juncea</i>		B					BY	
<i>Machaerina rubiginosa</i>		BY	B					
<i>Machaerina teretifolia</i>			Y					
<i>Microlaena stipoides</i>	+	BPY	BP	B	BP	BP	BY	
<i>Microtis</i> sp.				B	B	B		
<i>Monstera deliciosa</i> *		pIP		pIP				
<i>Morelotia affinis</i>	+	BY	B			B		Y
<i>Musa acuminata</i> *			pIP	pIP		(pIG)		
(<i>Narcissus pseudonarcissus</i> *)						(pIG)		
<i>Narcissus tazetta</i> *			pIP	pIP	pIP			
<i>Oplismenus hirtellus</i>	+	BPY	BP	BP	BP			
<i>Orthoceras novae-zeelandiae</i>		P				B		
<i>Parapholis incurva</i> *		BP			B		B	
<i>Paspalum dilatatum</i> *	+	BPY	BP	B	BP	BP	BY	PY
<i>Paspalum distichum</i> *	+	B	B		B	B	Y	
<i>Paspalum orbiculare</i>	+	B	BP				B	
<i>Paspalum vaginatum</i> *	+	BP						
<i>Phoenix canariensis</i> *		pIP	TA	PpIP				
<i>Phoenix dactylifera</i> *	+		PY					
<i>Phormium tenax</i>		BPYpIP	BPpIP	BPpIP	BPpIP	BPpIP	BPY	PY
<i>Phyllostachys aurea</i> *		PpIP						
<i>Phyllostachys nigra</i> *		PpIP						
<i>Poa anceps</i>	+	BY	B	B	B	B	B	P
<i>Poa annua</i> *		BP						
<i>Poa cita</i>		PpIP						
<i>Poa trivialis</i> *		B	B					
<i>Poa</i> sp.				B				
<i>Polypogon monspeliensis</i> *		BP			BP		B	
<i>Pseudosasa japonica</i> ? *		PpIP						
<i>Potamogeton cheesemanii</i>		PY						
<i>Rhopalostylis sapida</i>		pIP	PpIP		pIP	P*pIGLP		
<i>Ripogonum scandens</i>		pIP	PYpIP					
<i>Rytidosperma biannulare</i>		B			B			
<i>Rytidosperma penicellatum</i> *		B	B				B	
<i>Rytidosperma pilosum</i> *	+	P						
<i>Rytidosperma racemosum</i>	+	BP	BP	B	B	B	B	P
<i>Rytidosperma unarede</i>	+	B			B		B	
<i>Sasa</i> ? *	+							pIP
<i>Schedonorus arundinaceus</i> *	+	P	PY	BP				
<i>Schoenoplectus tabernaemontani</i>	+	BPY	B		P		B	
<i>Schoenus apogon</i>		BY	Y					
<i>Schoenus maschalinus</i>	+	PY	Y					
<i>Schoenus tendo</i>	+	P	PY					
<i>Sisyrhynchium "blue"</i> *		P						
<i>Spinifex sericeus</i>		BP	BP	P	BP		BPY	
<i>Sporobolus africanus</i> *	+	BPY	BP	B	BP	BP	BPY	Y
<i>Stenotaphrum secundatum</i> *		BPY	BP	B	BP	B	B	
<i>Strelitzia nicolai</i> *		pIP						
<i>Strelitzia reginae</i> *		pIP		pIP				
<i>Syagrus romanzoffiana</i> *		pIP				(pIG)		
<i>Thelymitra longifolia</i>	+	B		B	B	B	B	

	AK	U	MR	MA	W	MK	O	P
<i>Thelymitra pauciflora</i> agg.		PY						
<i>Tradescantia fluminensis</i> *		P						
<i>Triglochin striata</i>		BPY	B		B			
<i>Typha orientalis</i>		BP	BP		B		BY	
<i>Vulpia bromoides</i>	+	BP	BP		B		B	
<i>Washingtonia filifera</i> *				plP				
<i>Watsonia bulbifera</i> *	+	P	P			B		
<i>Xeronema callistemon</i>		plP				plLP		
<i>Yucca elephantipes</i> *				plP				
<i>Yucca gloriosa</i> *		plP						plPY
(<i>Yucca</i> sp. *)						(plG)		
<i>Zantedeschia aethiopica</i> *		PpIP	PY					
<i>Zostera muelleri</i>	+	BPY	P	P				

The nectaries of *Xeronema* and *Phormium*

Rhys Gardner

Introduction

Lucy Moore's description of the Poor Knights lily, *Xeronema callistemon*, in the second volume of Flora of New Zealand (Moore & Edgar 1970), favours this lovely plant with some "extra-taxonomic" touches. In particular, she mentions how its red, upright flowers accumulate nectar in the three concavities at the top of their 3-locular ovary. I illustrate this in a photograph (Fig. 1). I illustrate this in a photograph (Fig. 1). A fuller picture of ovary structure, including the location of the seeds and the splitting of the ripened capsule down the prominent midline of each locule, is to be found in Moore & Irwin (1978); my Fig. 2 shows this later stage.

The nectaries

It can be assumed that the nectar of *Xeronema* is formed by glandular tissue of the ovary's three septae (radial walls), and opens to each exterior concavity by a pore or slit. Such "septal nectaries" are mentioned by Moore & Edgar (1970: 27, 46) for two related genera: *Astelia* has "nectaries 3, slit-like, below and between [i.e. alternate with] the stigmatic surfaces", and *Cordylina* has "nectaries slit-like, one over upper part of each septum".

In the 1970s, *Xeronema*, *Astelia* and *Phormium* were placed in the Liliaceae, with *Cordylina* not far distant in the Agavaceae. Today these genera are grouped together in the day-lily family, Hemerocallidaceae (with some slight reservation about *Xeronema*). This family is located within the order Asparagales, whose members have septal nectaries (Kubitzki 1998: 245). These structures are

not found in the Liliales; nectaries here are associated with the bases of the tepals or stamens.

What then of *Phormium*, the New Zealand flax? It produces more nectar than any other native plant, but our Floras are silent on its origin, and even the sharp-eyed Moore and Irwin (1978: 180) just say that "When the flower opens drops of sweet nectar accumulate at the base of the long ovary and attract birds ...". *Phormium* does have septal nectaries though (Fig 3; Gardner 2007). Note that the Moore and Edgar (1970) description of its ovary as superior in position is only half correct; the lower part of the ovary, where the nectar-producing septal tissue has "proliferated", lies below the fused bases of the tepals and stamens. (Try squeezing a flower at this level, to make nectar emerge from the septal pores).

Epilogue

I had thought my *Phormium* work was new, but a Google search deflates: the plant's septal nectaries have been known to German botany for more than a century (Schnieuwind-Thies 1897; not seen, cited by Weberling 1992: 200).

The authors of the Hemerocallidaceae account in the prestigious "Kubitzki" volume, which came out in 1998, also overlooked the old German work and the 1992 mention of it. They even say in their description of the family that septal nectaries do not occur in *Phormium*, but make no suggestion as to where its nectar might come from.