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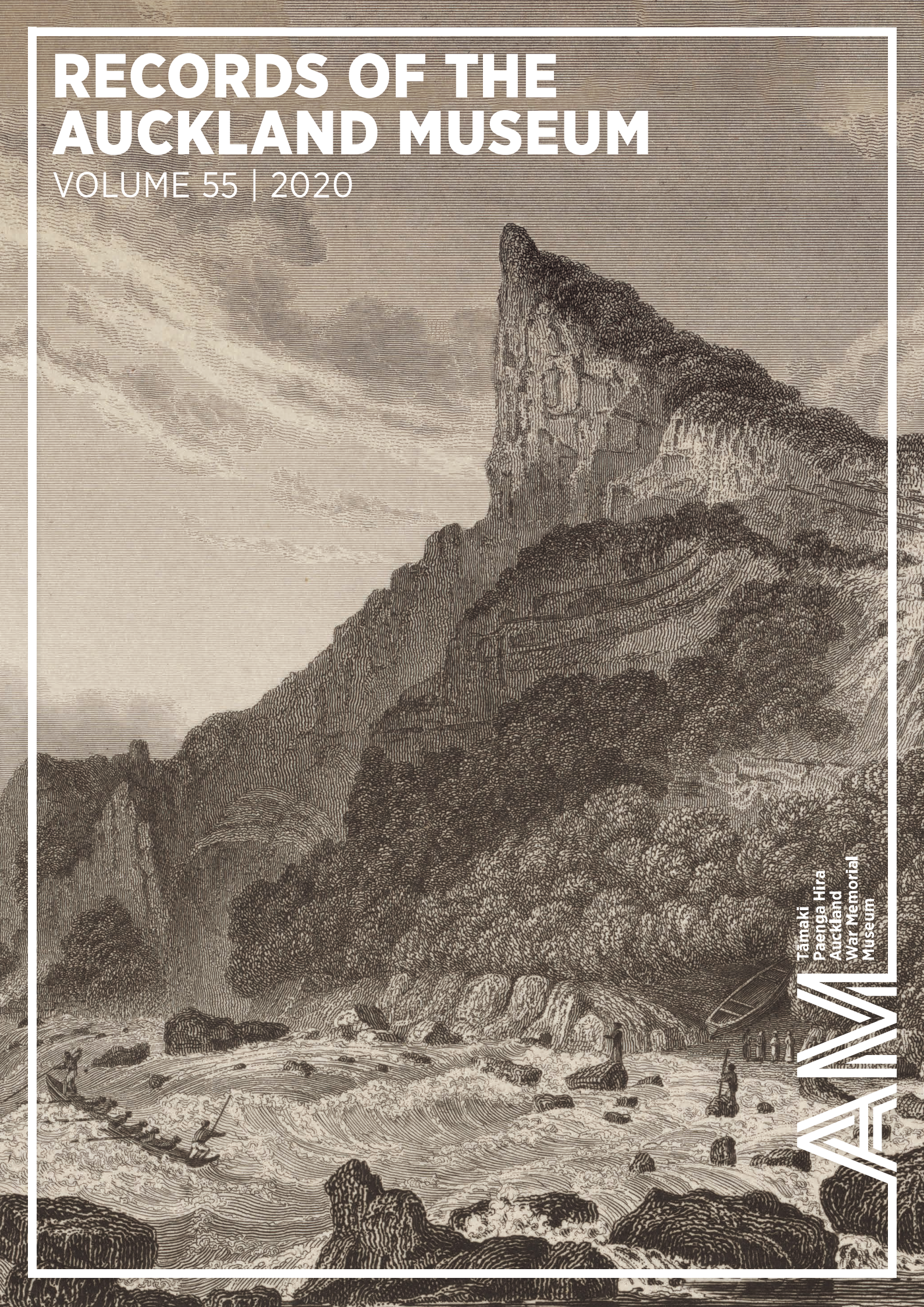

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# The Naturalised Flora of Niue

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**Abstract**

The Polynesian island of Niue is home to c. 160 flowering-plant species that have naturalised since European contact. Another 60 or so wild-growing species are either pre-European ('Polynesian') introductions or native plants favoured by today's disturbance-regimes. There are also four 'data deficient' species—recent introductions whose degree of naturalisation is as yet unclear. All these species, and some that seem likely to occur just in cultivation, are briefly characterised with respect to their history and ecology on Niue and other islands in the central Pacific Ocean region. A first appendix covers the history of botanical collecting on Niue. A second discusses whether European visitors to the Pacific prior to Cook might have spread weeds in this region.

**Keywords**

Niue Island; Polynesia; naturalised flora; new records; indigenous flora; conservation; James Cook.

## INTRODUCTION

The Polynesian island of Niue, the world's second-largest raised coral atolls (after Lifou in the Loyalty Is) lies isolated in the central tropical expanse of the Pacific Ocean, 19° south of the equator. Approximately five hundred kilometres to the west and northwest are the island groups of Tonga and Samoa, while the scattered islands of the Cook Islands Group are mostly situated twice that distance and more to the east.

Inland from its rugged coastline Niue once was forested by *Calophyllum*, *Dysoxylum*, *Planchonella*, *Pometia*, *Rhus*, *Syzygium* and *Terminalia* species. That forest has been greatly depleted and fragmented, first by a thousand years of Polynesian occupation and then by European-era logging and agricultural clearances, activities that intensified after World War II with the advent of the bulldozer and chainsaw (Wright and van Westerndorp 1965; Walter and Anderson 1995; Butler 2001; Pointer 2015). Forest now covers just a fifth of the island.

The altered terrain extends over nearly half the island, that is, c. 100 sq. km (Butler 2001). It comprises regenerating forest, scrub, *Nephrolepis*-dominated 'fernland', exhausted plantations, former pasture, roadsides, and waste ground. Limestone or coral sand is seldom far from the surface and the soils are generally drought-prone and somewhat deficient in potassium and nitrogen. Yearly rainfall is usually adequate for cultivation of the less-demanding crops, notably that of dryland 'talo' (*Colocasia esculenta*), but surface water is lacking. Introduced plants here find extensive opportunities but also a severe testing ground.

This article comprehensively records the species that in various ways and to various degrees have been able to naturalise on Niue and adds ecological and historical information relevant to these naturalisations. Note that all taxa treated are flowering plants; no naturalised pteridophytes or gymnosperms have ever been recorded.

Fifty years ago, when agriculture was of primary importance to the island's economy, it was useful to know something about at least the most deleterious of the island's weeds. Today, with a declining population and an increased interest in low-input land uses like honey and vanilla production, and ecotourism, the reasons for studying the introduced flora have taken on a scientific focus. In particular, observations in the present article may be relevant to the planning of rare-plant conservation and habitat-restoration projects. They may also help focus paleoecological research with respect to the identification of pre-European and early post-European plant material.

## PREVIOUS STUDIES

Because of Niue's isolation, and the quirks of history—no 19th C. missionary-collector like Samoa's Graeffe, Powell or Whitmee was ever stationed there—a long time elapsed between 1774, when the island was visited by James Cook and his botanists, and the first thorough examination of its flora by American botanist T.G. Yuncker in 1940. Between these dates only a few collections were made and these were generally of native species rather than introduced ones. (See Appendix 1 for a history of plant-collecting on Niue).

So the opportunity to document the original, pre-European flora of the island was lost, and modern authors have not always been able to decide on the status of its long-established introductions: are they Old World plants

that accompanied the Polynesians from island to island, or indigenous species that became weedy once humans created suitable habitat, or weeds that arrived more or less simultaneously with the Europeans and their imported goods, animals and bags of impure crop-seed, etc.?

Nevertheless, Yuncker's *Flora of Niue* (1943), written after more than a month's collecting (c. 600 numbers), together with the re-evaluation of his work by New Zealand botanist W. R. Sykes (1970) in an equally productive visit in 1965, provide a very adequate listing and ecological summary of the species introduced to Niue up until the latter time.

That baseline work has not been systematically updated, but additional records and commentary have been given by Whistler (1988), who compiled from the literature and herbarium collections a list of the flowering-plants he believed had naturalised in "Western Polynesia", that is, Wallis and Futuna, Niue, Tonga and Samoa. That list has several new records for Niue, most of which are based on collections Sykes had obtained in his second, 1975 visit, with one from a visit that Whistler himself had made in 1981. Later visits to Niue by each of these botanists (Sykes in 2006, Whistler in 1984, 1997, 2003 and 2013) have provided more information about its naturalised flora. Some of this, including nine new records, is published here for the first time.

The following list of naturalised species, then, can be regarded as being nearly up to date. The ecological information it contains, however, cannot because:

a) the notes of Yuncker and Sykes are now more than fifty years old;
b) several of the species Sykes said were common or abundant in 1965 have not been recollected, presumably because such plants do not get the attention that rarer ones do;
c) the label-notes of the collections made since 1965 only occasionally refer to island-wide distribution and abundance. Consequently, the Discussion below of the island's naturalised flora is offered in just a discursive kind of way.

## TERMINOLOGY AND PRESENTATION

What is a naturalised ('wild') plant? The list below includes all the slightly to very doubtful cases of Yuncker, Sykes, and later collectors, on the grounds that it is more useful just to state what a plant is doing in the way of growth and reproduction rather than to try to press it into some hard-to-define category. Generally, though, the conventional view of 'fully naturalised' is taken: it applies to an introduced plant that seems likely to be able to spread and persist indefinitely, either by seed or through some special vegetative feature. Growing vigorously, or 'seeding down' for a generation or two just at the place where it was planted, is not enough. Such plants can be termed 'casuals'—see the glossary of Sykes (1970: 299).

The term 'introduction' applies to a plant deliberately or accidentally brought to a place by humans. Niue's famine-food plants (*Amorphophallus paeoniifolius*, *Cordyline fruticosa*, *Dioscorea bulbifera* and *D. pentaphylla*, *Tacca pinnatifida*) in particular are so much at home in the island's natural vegetation that they might well be native species, but because some authors have supposed they might be 'ancient' (pre-European) introductions to some parts of Polynesia a liberal view has again been taken and these taxa have been included in the list, along with the evidence one way or the other. (Definite answers here though can only come from dating-studies—cf. the similar view taken by Clayton and Snow (2010: 5) about the status of Polynesian grasses).

Similarly, the list includes species that seem likely to be native to Western Polynesia but have a somewhat weedy lifestyle. This group includes at least the following: three grasses (*Chrysopogon acicularis*, *Eleusine indica*, *Miscanthus floridulus*), three climbers (*Abrus precatorius*, *Merremia peltata*, *Operculina turpethum*), a shrub (*Achyranthes aspera*) and three herbs (*Boerhavia diffusa* s.l., *Centella asiatica* and *Rorippa sarmentosa*).

At the other extreme are several species that are probably native to Western Polynesia but on Niue are found almost entirely just in cultivation: *Casuarina equisetifolia*, *Cocos nucifera*, *Cycas celebica* and *Phaleria disperma*. Except for the cycad (which is rare in gardens) these species too have been listed, the implicit question being, why have they not naturalised to a greater degree?

For some of the listed species comments are made, following the citation of the records and specimens, as to whether their naturalisation has been recorded elsewhere in the 'central Pacific Ocean region' (hereafter, CPO), that is, the islands from Fiji and Western Polynesia east to French Polynesia and the Pitcairn Islands. Generally, reliance has been placed on published sources, especially Whistler (1988) and Smith (1979–1991), but on-line databases, notably those included by the Consortium of Pacific Herbaria website (https://serv.biokic.asu.edu/pacific/), have been consulted too.

In making statements of a species' natural distribution, before it became a weed in the Pacific (and usually, elsewhere around the world), the historical and bibliographical information cited by Smith (1979–1991) has again been relied on. Indications of a species' preferred habitat can often be found in Sykes (2016), especially where the plant grows on the smaller islands of that archipelago, whose raised-coral ('makatea') terrain resembles that of Niue. For cultivated ornamental or otherwise useful species valuable ecological information will often be found in Staples and Herbst (2005).

Critical data as to whether an Indo-Malesian species might also have had a pre-European presence in the CPO are provided by the collections and records of the botanists of Cook's First, Second and Third Voyages in the latter part of the 18th C.—especially those of Banks

and Solander on the First Voyage (Society Islands only) and the Forsters on the Second Voyage (Society Islands and Tonga). In particular, if there is First Voyage material from the Societies, and Second Voyage material from Tonga, one has reason to think that the species might have long been widespread in the CPO. (Complications that could arise from the earlier presence of Europeans in the Pacific are addressed briefly in Appendix 2).

The invaluable monograph by Nicolson and Fosberg (2004) mainly concerns the collections made by J.R. and G. Forster on the Second Voyage (including those from Tanna, Vanuatu) but sometimes mentions Banks and Solander collections as well. Numerous references to Cook's Voyages 'material' (i.e., collections, and references published or in manuscript) can also be found in Seemann (1865–73), Drake (1892), and Smith (1979–91).

The nomenclature of the species-list largely follows Smith (1979–91), Nicolson and Fosberg (2004), and Sykes (2016).

Many of the determinations on the specimens of Yuncker, Sykes, Whistler and later collectors have been accepted at face value, but sometimes it has seemed that a check is advisable and in such cases it has been indicated whether or not this has been done. Taxonomic problems have brought an unavoidable vagueness to the entries for *Boerhavia*, *Leontodon*, *Oplismenus*, *Solanum* sect. *Lasiocarpum* (*S. repandum*), *Sorghum*, *Sporobolus*, and *Taraxacum.*

Where there are collections of a particular species subsequent to those obtained by Sykes in 1965 some or all of them have been cited, especially those with useful label notes. Quite a few notably weedy species said to be common in 1965 have not been collected subsequently, e.g., *Ageratum conyzoides*, *Commelina diffusa*, *Cyperus rotundus, Malvastrum coromandelianum*, *Mikania micrantha*, *Sida rhombifolia*, and *Spermacoce assurgens*. As noted above, this probably relates more to collectors' habits than to a decline in abundance.

The ecological notes in Yuncker (1943) and Sykes (1965) have been brought together ("Y, S — ") where it seems they might differ only by some chance or personal factor. Their actual words and phrases have generally been altered in the interests of brevity and clarity Sometimes the notes of the two authors can be only partly combined, thus: "*f*. Sykes". Where they differ substantially each is given.

Yuncker and Sykes often referred to the physical geography of the island, noting whether a collection came from one or other of the two coastal terraces, or from the 'inland basin', that is, the old lagoon floor that lies centrally in the island and comprises about a third of its area (Schofield 1959; Wright and van Westerndorp 1965; Terrey and Nunn 2003). Here just the latter term has been kept, with "on the coastal terraces" replaced by "(very) near the sea". Fig. 1, from Sykes (1970), shows most of the localities he cited but not the airport and golf course, which lie close together on the southwest side of the island.

Page numbers have generally been included in the references because the principal works consulted vary so much in the arrangement of their families and genera. The present article arranges the dicotyledons before the monocotyledons, their families alphabetically ordered. The composition of the latter is that of the latest (fourth) scheme of the Angiosperm Phylogeny Group (Byng *et al*. 2016), except that the family name Leguminosae is adhered to.

Only the best-attested Niuean plant names are cited (McEwen 1970; Sperlich 1997) and are given in italics following the binomial in the heading line for the species. Their pronunciation, variant spellings and sometimes their derivation can be found in the latter work.

## Abbreviations and codes

The heading for each of the following 235 entries is annotated as follows:

FNI fully naturalised introduction (from outside Western Polynesia). 99 spp.
CAS casual, incompletely naturalised introduction. 59 spp.
IND native to Niue or Western Polynesia, or at least an ancient (pre-European) introduction to the central Pacific Ocean region. 61 spp.
DD data-deficient, a recent introduction, whose status cannot yet be assessed. 4 spp.
ER introduced species apparently eradicated soon after discovery. 2 spp.
NN introduced species not considered to have naturalised at all. 11 spp.

S record of Sykes (1970)
Y record of Yuncker (1943)
esp. especially
*f.* according to
nr near
occ. occasionally
us. usually,
! specimen seen
*n.v.* specimen not seen

CPO central Pacific Ocean region, i.e., WP/F east to Pitcairn I. Gp, not incl. Hawaiian Islands
WP/F Western Polynesia (Samoa, Tonga, Niue, Wallis and Futuna) and Fiji and Rotuma

AK Auckland War Memorial Museum
BISH Bishop Museum, Hawaii
BM Natural History Museum, London
BRI Queensland Herbarium, Brisbane
CHR Allan Herbarium, Landcare Research, Lincoln New Zealand
HAW University of Hawaii
PTBG National Tropical Botanical Garden, Hawaii
US United States National Herbarium, Washington D.C.
WELT Museum of New Zealand Te Papa Tongarewa Herbarium, Wellington

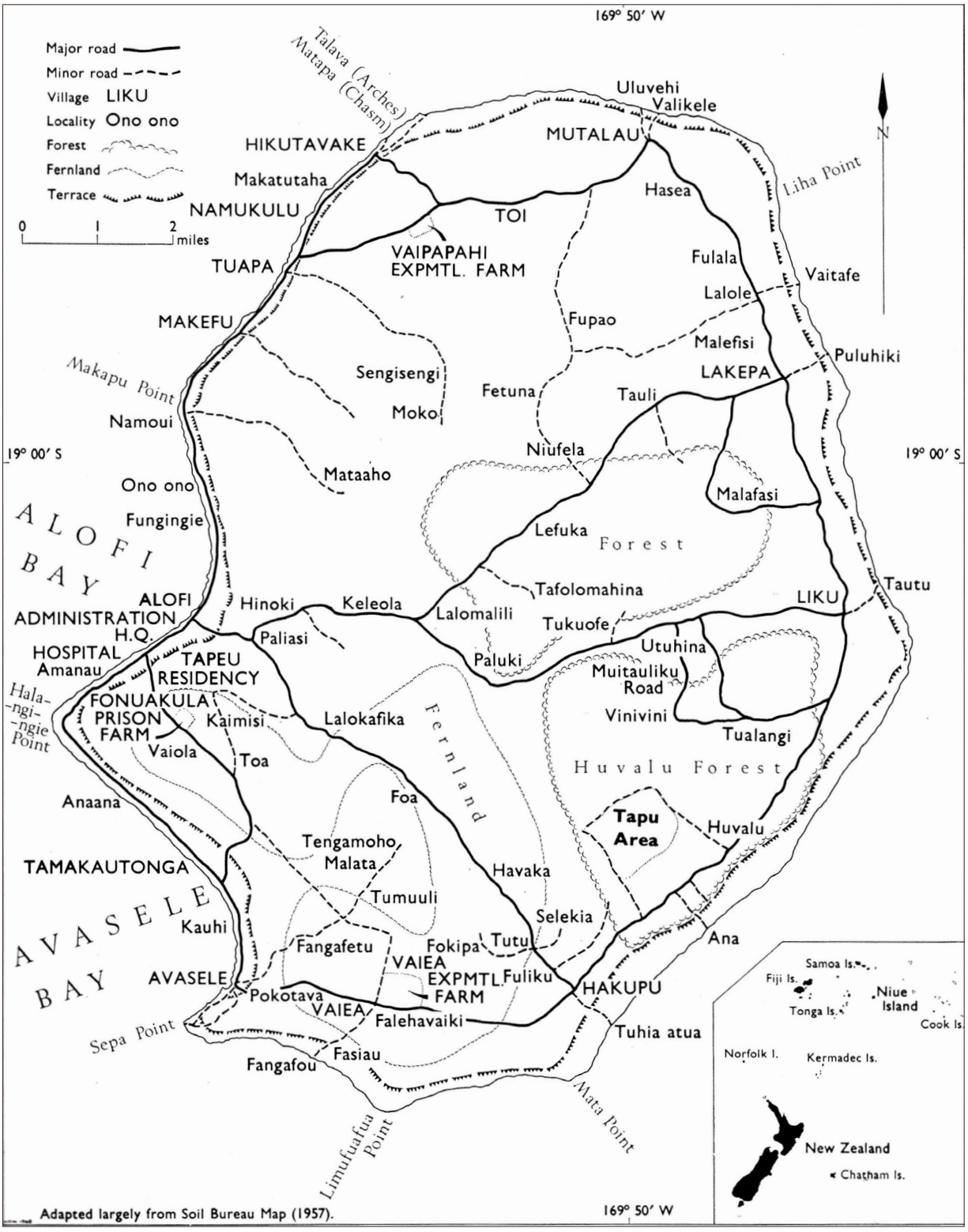


Figure 1. Map of Niue Island showing the collecting localities. Source: Sykes (1970, fig. 1).

## SPECIES LIST

## DICOTYLEDONS

### ACANTHACEAE

***Asystasia gangetica* (L.) T.Anderson** **FNI**
Y — cultivated ornamental. S — in waste, us. nr houses. A later collection is *Sykes* 1644/N CHR 654742, coll. 2006, Alofi South, on coral rubble, very common locally.
• This New World subshrub appears to have been present in Western Polynesia and Fiji for nearly a century (Whistler 1988: 5) but is still just a minor weed of the CPO.

***Hemigraphis alternata* (Burm.f.) T.Anderson** **FNI**
Y as *H. colorata* (Bl.) Hallier f. — cultivated ornamental, and wild along roadsides and in waste. S — in several places nr the west coast, in disturbed forest. There are no later collections.
• This low-growing Malesian herb is a fairly recent introduction to Western Polynesia; Whistler (1988: 5) notes its abundance here locally in disturbed forest and on roadsides.

***Ruellia prostrata* Poir.** **FNI**
Recorded by Whistler (1988: 5), on the basis of *Sykes* 1384/N CHR 282433, coll. 1975, Amanau, in mown lawn. A later collection is *Sykes* 1406a/N CHR 658697, coll. 2006, Alofi North, abundant at old house site and a short way along track.
• This mat-forming Malesian herb also appears to be a recent introduction to Western Polynesia, but perhaps arrived accidentally rather than as a garden plant. It is said by Whistler (1988: 5) to flourish in pasture and under tree crops.

***Thunbergia fragrans* Roxb.** **CAS**
Y — cultivated ornamental. S — in grassy waste ground, an "escape from cultivation" (Sykes 1970: 39). There are no later collections.
• Whistler (1988: 6) noted that in Tonga this Indo-Malesian vine was a fairly recent introduction that was "becoming weedy" in waste places. Sykes (2016: 382) describes it as a common weed in the Cook Islands, twining on low shrubs and grasses in waste land, etc.

### AMARANTHACEAE

***Achyranthes aspera* L.** *talamoa fiti* **IND**
Y, S — locally common in plantations and waste, esp. nr tracks. The only later collection is *Gardner* 10731 AK 292170, coll. 2005, Matapa, on coral rubble, uncommon on island.
• This weedy Old World subshrub is also an ancient species of the CPO—Nicolson and Fosberg (2004: 262) cite Cook's Voyages material from the Society Islands and there are early post-European collections from Fiji, Tonga and Samoa (Smith 1981: 290; Whistler 1988: 6). The absence of Cook's Second Voyage collections from Tonga and Vanuatu is surprising.

***Amaranthus lividus* L.** **CAS**
Recorded by Whistler (1988: 6), on the basis of *Sykes* 341/N CHR 169886, coll. 1965, Alofi Radio Station, by wall, det. P.W. Michael 1974. There are no later collections.
• This weedy herb, also known as *A. blitum* L., may be native to the Old World. It seems to have appeared in Western Polynesia only in the last half-century or so (Whistler 1988: 6).

***Amaranthus viridis* L.** **FNI**
Y — occ. in plantations, around houses and in waste. S — common esp. nr Alofi. A later collection is *Sykes* 1335/N CHR 282381, coll. 1975, Amanau, weed in plant container.
• This short-lived weedy herb is sometimes thought to be native to the New World. The first record for Western Polynesia was made in Samoa in 1839 (Whistler (1988: 7), while Smith (1981: 286, as *A. gracilis* Desf.) has noted mid-19th C. collections from Fiji. According to Merrill (1917: 212) this plant was present on Amboina in the mid-17th C.

***Gomphrena globosa* L.** **CAS**
Y — Cultivated ornamental. S — cultivated nr houses and occ. in waste nearby. There are no later collections. The earliest collection is *Moore* 382, US 1216080, coll. 1899.
• It seems that in all the time this New World subshrub has been growing on Niue it has just remained a casual. Whistler (1988) does not list it as a Western Polynesian weed.

### APIACEAE

***Apium leptophyllum* (Pers.) F.Muell. ex Benth.** **FNI**
Y — common roadside weed. S — fairly common in waste (perhaps mostly nr houses) and on roadsides, less so in old plantations. There are no later collections.
• This New World herb is now a near-cosmopolitan weed of warm-temperate and tropical regions. It is uncommon in Fiji (Smith 1985: 658), and in Western Polynesia too, despite first being recorded here in 1888 (Whistler 1988: 38). Similarly, in the Cook Islands it is said to be "often very local and rare, although not a recent introduction" (Sykes 2016: 405, as *Cyclospermum leptophyllum* (Pers.) Sprague).

***Centella asiatica* (L.) Urb.** *tono* **IND**
Y, S — common to abundant in waste and plantations. There are no later collections.
• This mat-forming Indo-Malesian herb is generally considered to be native to some western part of the CPO too, or at least an ancient introduction here. Seemann (1866: 113) and Nicolson and Fosberg (2004: 271, as *Hydrocotyle* sp.) have noted Cook's Second Voyage material from New Caledonia.
• The uniformity of the plant's name in Western Polynesia and Fiji (Whistler 1988: 38; Smith 1985: 655) must signify a long-held and continuous familiarity with this plant. It has a distinctive appearance, is sometimes

an abundant weed of cultivated ground, and is also a common ingredient of Polynesian herbal medicines, a practice which can be traced back to Asia a very long time ago (Burkill 1966: 1230, as *Hydrocotyle asiatica* L.).

***Foeniculum vulgare* Mill.** **CAS**
Y — occ. on roadsides. S — sparingly wild around houses, esp. in Alofi, Avasele, and Liku. There are no later collections.
• This perennial Northern Hemisphere herb, a weed mainly of temperate and subtropical places, is known elsewhere in the CPO just as a rare weed in Fiji (Smith 1985: 659). It may have been deliberately introduced to Niue for its culinary value, or perhaps accidentally, most likely from New Zealand, where it has long been abundant in the wild.

**ANACARDIACEAE**
***Mangifera indica* L.** *mago* **CAS**
Y, S — Cultivated and occ. wild along roadsides. There are no later collections.
• Fruit-bats (*Pteropus tonganus*) ought to be able to disperse this well-known Indian tree into scrub and forest across the island, but these animals are now uncommon here.

**APOCYNACEAE**
***Catharanthus roseus* (L.) G.Don** **CAS**
Y as *Lochnera rosea* (L.) Reichb. ex Steud. — cultivated for ornament and wild about houses, along roadsides and in waste. S — plentiful locally around houses and plantations. A later collection is *Sykes* 1645/N CHR 659743, coll. 2006, Alofi South, a very common spontaneous plant in and around gardens.
• Whistler (1988) overlooked the weediness of this familiar Old World (Madagascar) shrub, a widespread escape from cultivation in Western Polynesia and in the CPO at large.

***Nerium oleander* L.** **NN**
Y — cultivated ornamental and wild in thickets. S — common ornamental, not seen wild.
• The oleander, a shrub native to the Mediterranean region and eastwards into Asia, seems unlikely to naturalise on Niue, since this island lacks the necessary streamside habitat (cf. Gardner 2016). But it is known in the wild in Fiji (Smith 1988: 103), a voucher being *Smith* 4431 US 1155027, coll. 1947, Viti Levu, Mt Evans Range, along creek in forest.

**ASTERACEAE**
***Achillea millefolium* L.** **CAS**
New record, based on *Sykes* 1199/N CHR 282248, coll. 1975, Vaipapahi, in mown grass.
• There are no later collections of this Northern Hemisphere temperate-zone weedy herb. In other parts of the world, e.g., southern England (Grime *et al.* 1990), it is generally associated with *Plantago lanceolata*, which suggests it should be looked for on Niue in places where the latter is particularly abundant.

***Adenostemma viscosum* J.R.Forst & G.Forst.** **IND**
Y, S, as *A. lavenia* non (L.) Kuntze — apparently a very rare plant, not seen. Only two specimens seem to be known: *Smith* 97 AK 89524, coll. 1901, "*pupulele*", and *Cockerill* WELT *n.v.*, coll. c. 1924.
• This weedy Old World herb is an ancient species of the CPO—Nicolson and Fosberg (2004: 289) cite Cook's Second Voyage material from the Society Islands. Throughout its range it is generally found in rather damp and sheltered sites, like forest clearings, but even in such places it seems to have declined considerably, e.g., in the Cook Islands (Sykes 2016: 441).

***Ageratum conyzoides* L.** **FNI**
Y — occ. along roadsides. S — only locally common, mainly in fairly open places inland. There are no later collections.
• It has been suggested that this New World herb could be one of the rare plants introduced to the CPO prior to Cook's Voyages—Nicolson and Fosberg (2004: 290) cite Second Voyage material from Vanuatu only, and say that "just one pre-1774 ship leaving behind some ballast or baggage could have introduced this aggressive weed". Certainly, the species was present in Amboina, not far to the west, in the mid-17th C. (Merrill 1917: 497). But regardless of source, its presence in Vanuatu seems not to have resulted in it getting to Western Polynesia and Fiji in time to be found by the U.S. Exploring Expedition in 1839–40 (Whistler 1988: 9; Smith 1991: 296).

***Aster subulatus* Michx.** **FNI**
New record, based on two *Sykes* collections made in 1975 from waste areas: 1248/N CHR 282297, Amanau, and 1301/N CHR 282347, Halagigie Point. A later collection is *Sykes* 1428/N CHR 659522, coll. 2006, Alofi North, waste ground in gravel.
• According to Smith (1991: 304) this New World herb is likely to be a recent introduction to Fiji, perhaps in ship's ballast, and might not have persisted there. In the CPO it is known otherwise just from the Cook Islands, as a recent introduction that is rapidly spreading (Sykes 2016: 439, as *Symphyotrichum subulatum* (Michx.) G.L. Nesom).

***Bidens pilosa* L.** *kofetoga* **FNI**
Y, S — common along roadsides and in plantations. One of only two later collections is *Whistler* 4950 CHR 433621, Niue Hotel, in grassy area.
• This weedy New World herb seems to have become widespread in the CPO early in the 19th C. (Gardner 1985; Whistler 1988: 9). The Niuean plants are veritable *Bidens pilosa*, not the very similar Old World species *B. biternata* (Lour.) Merr. & Sherff, which was collected on Tonga for the first and only time during Cook's Second Voyage (Sherff 1937: 392; Nicolson and Fosberg 2004: 294), and, apparently, once in Fiji, in 1860 (*Seemann* 270 *p.p.*, cited by Sherff 1937: 395).

***Conyza sumatrensis* (Retz.) E.Walker** **FNI**
S as *C. canadensis* non (L.) Cronquist — common in plantations, esp. on exposed soil. A later collection

is *Sykes* 1454/N CHR 659548, coll. 2006, Avatele, common in old quarry.
• This weedy herb, presumably native to the New World, is a fairly recent arrival in the CPO. It was recorded by Whistler (1988: 9) as *C. canadensis* var. *pusilla* (Nutt.) Cronq.

***Cosmos sulphureus* Cav.** **CAS**
Y, S — introduced ornamental, occ. persisting locally by seed. There are no later collections.
• An annual herb from Central America often grown for ornament this plant is just a casual weed elsewhere in the CPO, e.g., in Fiji (Smith 1991: 284).

***Crassocephalum crepidioides* (Benth.) S.Moore FNI**
S — local, mainly in the western part of the island. Another collection is *Falasne* CHR 188453, coll. 1968, *sine loc.,* spreading rapidly in plantation. There are no later collections.
• This African herb has spread through the CPO in the last seventy or so years, mainly in rather damp, fertile places (Whistler 1988: 10; Smith 1991: 317).

***Eclipta prostrata* (L.) L.** **FNI**
S — seen once, in a damp place. The only later collection is *Sykes* 1119/N CHR 282169, coll. 1975, Alofi wharf, in rain-wash channel in waste ground.
• This weedy New World herb seems to be a fairly recent arrival to Western Polynesia (Whistler 1988: 10) but was known from Fiji in the mid-19th C. (Smith 1991: 275). It prefers relatively damp sites.

***Eleutheranthera ruderalis* (Sw.) Sch.Bip.** **FNI**
Recorded by Whistler (1988: 10), on the basis of *Sykes* 1121/N CHR 282171, coll. 1975, Alofi wharf, on heap of coral sand. A later collection is *Sykes* 1425/N CHR 659519, coll. 2006, Alofi North, one plant among graves.
• This weedy New World herb seems to be a fairly recent arrival to Western Polynesia (Whistler 1988: 10). It was first found in Fiji in the 1930s (Smith 1991: 275).

***Emilia sonchifolia* (L.) DC.** *pupu lele* **FNI**
Y — common in plantations, waste and on roadsides. S — locally common in plantations, esp. on the western side of the island. There are no later collections.
• This weedy Asian herb has been known in the CPO for slightly more than a hundred years (Smith 1991: 319). Its tolerance extends to dry shaded habitats.

***Leontodon taraxacoides* (Vill.) Willd. ex Mérat *s.l.*** **FNI**
S — A few plants in short turf, Fonuakula golf course. A later collection is *Waterhouse* 7084 CHR 551751, coll. 2004, Kaimiti [Alofi Radio Station], common here and around airport and golf club, and occ. around the island's settlements.
• There seem to be no other CPO occurrences of this temperate-zone European herb.

***Mikania micrantha* Kunth** *fue saina* **FNI**
Y — common in plantations and waste. S — abundant weed of cleared areas, esp. nr forest. There are no later collections of this pernicious New World vine, first recorded in the CPO from Fiji in 1907 (Smith 1991: 298) and then from Samoa in 1924 (Whistler 1988: 11).

***Pseudelephantopus spicatus* (B.Juss. ex Aubl.) Rohr ex Gleason** **FNI**
S — uncommon in waste at Alofi and Makefu. The only later collection is *Sykes* 1133/N CHR 282183, coll. 1975, Fonuakula, roadside.
• A 1945 collection from Fiji seems to be the earliest record from the CPO of this very weedy New World herb. It favours relatively dry sites and can be abundant in mown grass.

***Sonchus oleraceus* L.** *pupu lele* **FNI**
Y — common in plantations and waste. S — mostly in plantations. There are no later collections.
• This familiar Old World herb is an abundant weed of disturbed, often rather damp and fertile, places in temperate-zone regions around the world. Its annual life-cycle allows it to evade droughty periods.

***Synedrella nodiflora* (L.) Gaertn.** **FNI**
Y — common in plantations and waste. S — very common in plantations, less so in waste. There are no later collections.
• This weedy New World herb was first collected in the CPO in Samoa in 1905 (Whistler 1988: 12).

***Tagetes erecta* L.** **CAS**
Y — cultivated ornamental, occ. escaping along roadsides. S — rarely cultivated, occ. casual in villages. The label notes on later specimens, e.g., CHR 659642, suggest that this New World herb can persist locally by seed for a while.

***Tagetes patula* L.** **CAS**
Y — cultivated ornamental, occ. escaping along roadsides. S — fairly common in all the villages, and a casual in waste places. There are no later collections of this New World herb.

***Taraxacum officinale* (L.) Weber ex F.H.Wigg. *s.l.*** **FNI**
S —in waste at Fonuakula Farm and nearby at golf course. Later collections (CHR *n.v.*) of this Old World weed, the dandelion, are from the airport in 1975 and Vaipapahi Farm in 2006.
• The earliest specimen, *Sykes* 131/N CHR 1700427, coll. 1965, was determined in 1979 by A. J. Richards as *Taraxacum argutifrons* A.J.Richards. A comment on the nomenclature of the dandelion species-complex is made by Smith (1991: 268), along with the observation that in Fiji the plant is uncommon and found only at higher altitudes. It is also a rare weed of grassy places in Tonga, where it was first collected in 1953 (Whistler 1988: 12).

***Tithonia diversifolia* (Hemsl.) A.Gray** **FNI**
S — forming large stands, mainly in the Alofi area, also around Tuapa and Mutalau. A later collection is *Sykes* 1386/N CHR 282435, coll. 2006, airport, in rough pasture.
• This ornamental Mexican subshrub was first seen in the CPO in Samoa and Fiji at the start of the 20th C. (Whistler 1988: 12; Smith 1991: 280).

***Vernonia cinerea* (L.) Less.** **FNI**
Y, S — common throughout, in plantations, lawns and waste. A later collection is *Whistler* 4946 CHR 433650, coll. 1981, Alofi South, common on roadsides.
• This weedy Old World herb, sometimes called *Cyanthillium cinereum* (L.) H. Rob., has been known in the CPO for more than a hundred years (Whistler 1988: 13; Smith 1991: 262). It was present in Amboina in the mid-17th C. (Merrill 1917: 497).

***Youngia japonica* (L.) DC.** **FNI**
Recorded by Whistler (1988: 13) on the basis of a collection made in 1975, presumably by Sykes. I have not been able to locate that specimen. A later collection is *Sykes* 1463/N CHR 658696, coll. 2006, Alofi, common around old house site.
• This weedy Indo-Malesian herb was collected in Fiji in 1894 (Smith 1991: 267) but seems to have been slow in getting to the rest of Western Polynesia (Whistler 1988: 13). A recent arrival to the Cooks, it grows there in disturbed, shaded or moist places (Sykes 2016: 468).

***Zinna violacea* Cav.** **CAS**
***Zinnia elegans* Jacq.**
Y — cultivated ornamental. S — persisting in small groups, mostly near houses. A later collection, which does seem to indicate a further degree of naturalisation by this New World herb, is *Sykes* 1548/N CHR 659643, Lakepa, spontaneous plants at side of track in forest.

**BALSAMINACEAE**
***Impatiens balsamina* L.** **CAS**
S — Small populations in waste nr most of the villages, perhaps not cultivated now but persisting slightly by seed. There are no later collections.
• This somewhat weedy ornamental Asian herb is apparently a recent introduction to the CPO, e.g., to Fiji (Smith 1985: 630).

**BASELLACEAE**
***Anredera cordifolia* (Ten.) Steenis** **FNI**
Y as *Boussingaultia baselloides* Kunth, S as *B. cordifolia* Ten. — cultivated ornamental, spreading into coastal vegetation at several places.
• Whistler (1988) does not include this New World vine as a weed in West Polynesia. On Niue's rocky terrain this persistent, tuber-bearing, all-smothering plant will only be eliminated through biological control measures.

**BRASSICACEAE**
***Brassica juncea* (L.) Czern.** **CAS**
Y — along roadsides and in waste. S — uncommon on roadsides. There are no later collections of this weedy Old World herb.

***Brassica pekinensis* Skeels** **CAS**
S — cultivated, rarely wild. There are no later collections of this leafy Old World food-plant.

***Lepidium didymum* L.** **FNI**
Y — along roadsides and on rocky cliffs. S — locally common in plantations, rare elsewhere.
There are no later collections of this mat-forming South American herb, which is now a cosmopolitan weed, though mainly in temperate to subtropical regions.

***Lepidium virginicum* L.** **FNI**
Y — rare, in plantations. S — common locally in waste, particular near Alofi, Fonuakula and Vaiola. There are no later collections.
• This North American temperate-zone weedy herb seems to be known elsewhere in the CPO just from Tonga, where it was first collected in 1926. It also occurs in the Tokelau Islands, where it was first collected in 1980 (Whistler 1988: 16).

***Rorippa sarmentosa* (DC.) J.F.Macbr.** *holofa* **IND**
Y — roadsides, plantations. S — uncommon on rocky cliffs, seen mostly in the chasms of the west coast, also seen once on the south-east coast: *Sykes* 787/N CHR 170267, coll. 1965, Hakupu–Tuhia'atua, a single plant among the track's coral pebbles, det. W.R. Sykes 2013. The only later collection is *Whistler* 12993, coll. 2013, shallow pockets of soil near the sea inside Avaiki cave (Whistler 2013: 28).
• This inconspicuous short-lived herb is ancient in the CPO—Nicolson and Fosberg (2004: 346) cite Cook's Voyages material from the Tuamotu and Society Islands. Its distribution currently extends from the Solomon Islands and New Caledonia east to French Polynesia and Hawaii. As a weed it is seen (usually rather infrequently) on the edges of wetland taro gardens, etc.

**CAPPARIDACEAE**
***Cleome viscosa* L.** **CAS**
S — in a taro plantation at Fonuakula; a recent introduction? There are no later collections.
• This weedy Asian herb seems to have arrived in the CPO a hundred or so years ago (Whistler 1988: 8). It was present on Amboina in the mid-17th C. (Merrill 1917: 241).

**CARICACEAE**
***Carica papaya* L.** *loku* **FNI**
Y, S — cultivated, and extensively wild around houses, in scrubby ravines, waste ground, etc.
• In late 1830 or early 1831 this familiar New World fruit-tree, the pawpaw, was introduced to Niue by the island's first missionaries (Smith 1902: 95; Langdon 1989: 12). Seeds from that time on might be preserved in cave shelters, middens, subsoils and coprolites.
• The pawpaw's Niuean name has clearly (*pace* Langdon) been transferred from that of the ancient Polynesian food-plant *Solanum repandum*—see further below.

**CASUARINACEAE**

***Casuarina equisetifolia* L.** *toa* **IND**

Y — a few plantings along the road on the west side of the island. S — planted in all the villages and common around schools. A later collection, which shows that this familiar CPO tree can sometimes naturalise on Niue, is *Sykes* 1460/N CHR 659585, coll. 2006, Vaiea, Hakupu Road, a few young trees in low roadside scrub, a parent tree (planted?) nearby.

• The original range of this coastal tree (Southeast Asia, Malesia and northern Australia as well as some part of the western Pacific?) may have been extended eastwards by humans in both ancient and modern times.

**CONVOLVULACEAE**

***Ipomoea cairica* (L.) Sweet** **CAS**

Y as *Ipomoea* sp. — collected once, in waste nr Hikutavake. S — rare plantation weed. There are no later collections.

• This Old World vine may have been introduced relatively late to the CPO as an garden plant but in Fiji at least it occurs just as a fairly common weed (Smith 1991: 67).

***Ipomoea fimbrisepala* Choisy** **DD**

New record, based on *Flynn* 6702 PTBG 30173, coll. 2000, Vahaha NE of Hakupu, in scrub.

• This vine, now with a nearly pantropical distribution, seems to be a fairly recent arrival in the CPO. It is currently abundant in New Caledonia and French Polynesia.

***Ipomoea hederifolia* L.** **DD**

New record, based on *Sykes* 1422/N CHR 659516 *n.v.,* Alofi, coll. 2006, among tall shrubs. There are no later collections.

• This New World vine was first found in the CPO in Tonga, in 1874 (Whistler 1988: 14).

***Ipomoea indica* (Burm.) Merr.** **IND**

Recorded by Whistler (1988: 14, as *I. congesta* R.Br.), on the basis of *Sykes* 1093/N CHR *n.v.*, coll. 1975. There are no later collections.

• This well-known weedy vine, native to the Old World (including Australia) and perhaps some way east into the Pacific too, was found in Vanuatu during Cook's Second Voyage (Nicolson and Fosberg (2004: 373). Whistler (1988: 14) mistook such "Tanna" material as relating to Tonga.

• St John (1976) cited an 1876 *Jensen* collection from Niue, but this represents the kumara plant, *I. batatas* (L.) Lam. (BM 1011120, det. G. S. Staples; Whistler 1984).

***Merremia peltata* (L.) Merr.** *fue*, *fue vao* **IND**

Y, S — abundant in secondary and primary forest. There are no later collections.

• On forest edges this large-leaved weedy Old World liane can overwhelm regrowth communities and established trees alike. It is though an ancient plant of the CPO—Nicolson and Fosberg (2004: 375) cite Cook's Second Voyage material from the Society Islands.

***Merremia tuberosa* (L.) Rendle** **CAS**

Y as *Ipomoea tuberosa* L. — cultivated for its attractive seed pods. S — wild nr Alofi Radio Station, not seen elsewhere. A later collection of this New World liane is *Sykes* 1584/N CHR 659680, coll. 2006, Amanau, rampant in a field.

***Operculina turpethum* (L.) Silva Manso** **IND**

S — on an exposed coastal slope at Tautu (CHR 169783 *n.v.*). There are no later collections.

• This Old World vine can be a weed in other parts of the Pacific, e.g., Fiji (Smith 1991: 45), but it is an ancient species of the CPO—Nicolson and Fosberg (2004:375) cite Cook's Second Voyage material from the Society Islands, Tonga and Vanuatu.

***Operculina ventricosa* (Bertero) Peter** **CAS**

New record, based on *Sykes* 1354/N CHR 282400, coll. 1975, Lakepa–Puluhiki, in windswept coastal scrub. A later collection from the same place is *Sykes* 1558/N CHR 659653, coll. 2006, a few plants.

• This New World vine is said to be a recent arrival in Samoa and Tonga (Smith 1991: 45).

**CRASSULACEAE**

***Kalanchoe pinnata* (Lam.) Pers.** **FNI**
***Bryophyllum pinnatum* (Lam.) Oken**

Y, S — widespread and often abundant in open rocky ground, mainly nr the coast. There are no later collections.

• This shrubby African succulent, sometimes grown as an ornamental, has been a weed in dry disturbed places in Samoa and Fiji for c. 100 years (Whistler 1988: 15; Smith 1991: 36).

CUCURBITACEAE

***Cucumis melo L. subsp. agrestis (Naudin) Pangalo*** **IND**

Y, S, apparently as *C. anguria* L. — cultivated and occ. wild in waste. S as *C. sativus* L. — cultivated, and a rare casual in waste. There are no later collections.

• Both Yuncker and Sykes gave the name *atiu* ["*asiu*"] for the plants they saw, which accords with the usual Polynesian name for the 'island melon', the wild subspecies of the Old World *Cucumis melo* L. This scrambling vine was cultivated anciently in the CPO (Nicolson and Fosberg 2004: 383) and in this region is said to have edible fruits the size of a walnut (Whistler 1991: 22; 2000: 159).

• Two *Sykes* collections from Niue in 1965 lack fruit but without doubt represent *C. melo* subsp. *agrestis*: CHR 170280 !, Toa nr Vaiola, nr house, probably cultivated, and CHR 170281 !, Amanau, waste place. The latter was recorded by Sykes (1970: 78) as *C. sativus* while the former went unnoted.

• A complication is that Yuncker (1943: 114) described the fruit of the Niuean plant as being ellipsoidal, c. 5 cm long, and sometimes striped [with green, *f.* Sykes], that is, more like the fruit of *C. anguria* L., the gherkin. I have not seen either of his vouchers (*Yuncker* 9794, 10010), nor that for Sykes's *C. anguria* record (CHR 169895). So, the possibility remains that some of the

material of those collectors is actually *C. anguria*. This species seems not be known to be wild elsewhere in the CPO but has become so in Australia (Telford 1982: 190).
• *Cucumis melo* subsp. *agrestis* is now a very rare plant in the CPO, e.g., see Whistler (1991: 22) for its occurrence in Tonga. But it may still exist on Niue, in the seed bank—cf. the "resurrection" of the rare cucurbit *Diplocyclos palmata* on Norfolk Island when the soil is disturbed by vegetation clearance or harrowing (Green 1994: 129; O. Evans, pers. comm).

***Luffa cylindrica* (L.) M.Roem. var. *cylindrica*** **NN**
S — cultivated in several of the villages: "the seeds are sown near to an available tree and the plants left to climb unchecked ... fruit 30 cm or more long" (Sykes 1970: 79).
• The variety *insularum* Cogn. of this long-domesticated Old World vine has fully-ripe fruit c. 5 cm long (Seemann 1866: 105) and is an ancient food-plant of the CPO—Nicolson and Fosberg (2004: 384) cite Cook's Voyages material from the Society Islands. Smith (1981: 682) said this variety had naturalised in Fiji and elsewhere but he seems not to have realized that it is distinguished mainly by its small fruits, so his statement cannot be considered reliable, and there is no reason to think it has grown on Niue, at least in the European era.

***Momordica charantia* L.** **NN**
S — in a few plantations in the central part of the island, perhaps not truly wild. Nor does a later *Sykes* collection (CHR 659580, coll. 2006) indicate even a casual naturalisation.
• Seemann (1866: 105) stated that this long-domesticated Old World food-plant had been collected in Tahiti on Cook's First Voyage. Nicolson and Fosberg (2004: 384) do not mention such an occurrence, only that there might be Second Voyage material from the Atlantic Ocean's Cape Verde Islands. The lack of evidence that *M. charantia* was generally known to the ancient Polynesians makes one doubt the correctness of Seemann's statement.

## CUSCUTACEAE

***Cuscuta campestris* Yunck.** **FNI**
S — apparently a recent arrival at Fonuakula, on various weeds in a taro plantation. A later specimen of this slender, parasitic New World vine is *Sykes* 1508/N CHR 659603, coll. 2006, Fonuakula, fairly common in waste ground.

## EUPHORBIACEAE

***Acalypha indica* L.** **FNI**
S as *Laportea interrupta* non (L.) Chew — rare in plantations and waste on the west side of the island. There are several later collections, e.g., from forested roadsides.
• This Old World herb was first found in the CPO in Samoa, in 1905 (Whistler 1988: 17).
• On Niue *A. indica* (and *A. lanceolata*, see below) appear to have two Niuean names, *mangiho* and *hongohongo/ongoongo*. Respectively, these would have formerly belonged just to the island's two native urticaceous plants, the tree nettle *Dendrocnide harveyi* and the herb *Laportea interrupta*. The latter and the two acalyphas are very much alike in the shape of their leaves and their inconspicuous flowers, bristly indument, and weediness.

***Acalypha lanceolata* Willd. *A. boehmerioides* Miq.** **FNI**
Y — occ. in plantations and on roadsides. S — only seen in a plantation near Mutalau. There are no later collections.
• There are early post-European collections of this weedy Old World herb from Samoa and Tonga (Whistler 1988: 17). It is probably declining on Niue, just as it seems to be in the Cook Islands (Sykes 2016: 557). For comment on this plant's Niuean names see *A. indica* above.

***Aleurites moluccanus* (L.) Willd.** *tuitui* **IND**
Y, S — Common in the villages and along the principal tracks.
• The ancient Polynesians are well-known to have cultivated (and presumably, distributed) this Indo-Malesian village tree. Predation of its seeds might be stopping it from becoming a common member of Niue's scrub and secondary forest communities.

***Chamaesyce hirta* (L.) Millsp.** **FNI**
***Euphorbia hirta* L.**
Y, S — common in plantations and waste. There are no later collections.
• This weedy low-growing herb, a probable native of the New World, was an early post-European introduction to Western Polynesia (Whistler 1988: 16). It was present in mid-17th C. Amboina (Merrill 1917: 328).

***Chamaesyce hypericifolia* (L.) Millsp.** **CAS**
***Euphorbia glomerifera* (Millsp.) L.C.Wheeler**
S — in waste at Amanau. The single later collection of this New World herb (CHR 282301, coll. 1975), from the same place, does not suggest an extensive local naturalisation.

***Chamaesyce prostrata* (Aiton) Small** **FNI**
***Euphorbia prostrata* Aiton**
Y, S — common in lawns, plantations and waste. There are no later collections.
• This mat-forming New World herb was first collected in the CPO in Samoa in 1893 (Whistler 1988: 18). It is generally thought to grow best in sandy soils.

***Codiaeum variegatum* (L.) Blume** *talaposi* **CAS**
Y, S — introduced ornamental, perhaps occ. wild in scrub. There are no later collections.
• Both authors comment on the variety of leaf shape and variegation they saw. A form of this small Malesian tree, var. *moluccanum* (Decne) Müll.Arg., has uniformly green, non-lobed, lanceolate leaves. It occurs wild in dry forest in Fiji and might be a pre-European introduction there (Smith 1981: 550). It seems to be absent from Niue.

***Euphorbia cyathophora* Murr.** **FNI**
S — apparently recently introduced as a cultivated ornamental; spreading rapidly in waste places around the perimeter of the island. A later collection of this familiar New World subshrub, the poinsettia, is *Sykes* 1534/N CHR 659629, coll. 2006, Hakupu–Tuhia'atua trackside, in low forest.

***Euphorbia heterophylla* L.** **CAS**
Recorded by Whistler (1988: 14), on the basis of *Sykes* 1251/N CHR 282300, coll. 1975, Amanau, waste place on cliff edge. A later collection is *Whistler* 4957 CHR 433648, coll. 1981, Alofi South, on the roadside and in other disturbed areas.
• Like *E. cyathophora* (and similarly known as poinsettia) this New World subshrub may have come to Niue quite recently as a garden plant. It is not recorded from the wild elsewhere in Western Polynesia (Whistler 1988: 18), nor in Fiji (Smith 1981).

***Ricinus communis* L.** **FNI**
Y, S — common in scrub and waste. A later collection is *Sykes* 1376/N CHR 282426, coll. 1975, Huvalu, in pasture near forest.
• Smith (1981: 499) thought that this familiar weedy African shrub, the castor-oil plant, might be an ancient introduction to Fiji, but this seems very unlikely—there is no Cook's Voyages material from the CPO, nor were collections made from Tonga, Samoa or Fiji by the United States Exploring Expedition in 1839–40 (Whistler 1988: 19; Smith *loc. cit.*).

LAMIACEAE
***Clerodendrum buchananii* (Roxb.) Walp. var. *fallax* (Lindl.) Bakh.** **CAS**
Y as *C. fallax* Lindl., S as *C. speciosissimum* van Geert — sparingly cultivated, occ. wild in forest, waste and along tracksides in plantations. The only later collection of this ornamental Asian shrub is *Flynn* 6694 PTBG 15790, coll. 2000, Fonuakula, at entry to golf course.

***Clerodendrum chinense* (Osbeck) Mabb.** **CAS**
S as *C. philippinum* Schauer — rare in cultivation but abundant at Tamakautonga in a coconut grove, all plants there the double-flowered form [sterile but spreading widely by rhizomes]. Neither the voucher (CHR 169882) for this record, nor any later collection of this ornamental Asian shrub, have been located.

***Leonurus sibiricus* L.** **FNI**
Y — occ. along roadsides and in waste. S — around houses, esp. near Alofi. A later collection is *Waterhouse* 7076 CHR 551718, coll. 2004, Alofi, in waste along main road.
• This weedy herb, native to temperate parts of Asia, appears to be uncommon in Tonga and has failed to establish in Samoa (Whistler 1988: 20). In saying that this plant "was to be anticipated" in Fiji Smith (1991: 218) was unaware of *B.E.V. Parham* 10940 CHR 181978, coll. 1967, Viti Levu, Nadroga, Lawaqa, weed in flower bed, det. W.R. Sykes.

***Leucas decemdentata* (Willd.) R.Br. L. *flaccida* R.Br.** **IND**
Y, S — local in plantations, waste, tracksides in open forest. There are no later collections.
• This wide-ranging herb of drier parts of the Indo-Malesian and Australian tropics is also indigenous to the CPO or at least a pre-European introduction there—Nicolson and Fosberg (2004: 466) cite Cook's Voyages material from the Society Islands. Its small stature and lack of medicinal value, etc., make it an unmemorable plant, and its names across Polynesia (Rensch and Whistler 2009: 654) seem to be just the result of local improvisation.

***Orthosiphon aristatus* (Blume) Miq.** **CAS**
S — on roadside at Tapeu, perhaps after having been introduced to the nearby Residency as an ornamental. There are no later collections of this Indo-Malesian subshrub.

***Plectranthus scutellarioides* (L.) R.Br.** **CAS**
***Coleus blumei* Benth.**
Y, S — locally abundant along roadsides; not cultivated. A later collection is *Waterhouse* 7081 CHR 551724, coll. 2004, Alofi–Mana road, around graves, naturalised or persistent?
• This erect semi-succulent herb is native to the region between Asia and Australia and has long been cultivated (for its variegated leaves) here and elsewhere (Smith 1991: 222, as *Solenostemon scutellarioides* (L.) Codd). It is not clear that it spreads much by seed (Sykes 2016: 669), and Whistler (1988) does not mention it as being weedy in Western Polynesia.

***Salvia coccinea* Buc'hoz ex Etl.** **FNI**
Y, S — common throughout in plantations and waste. There are no later collections of this ornamental New World subshrub.

***Salvia occidentalis* Sw** **FNI**
Y, S — common throughout in plantations and waste. There are no later collections.
• This weedy New World herb is infrequent in Western Polynesia (Whistler 1988: 21) and unknown in Fiji (Smith 1991).

***Teucrium vesicarium* Mill.** **IND**
Y as *T. inflatum* Sw. — occ. along roadsides. Sykes (1970: 105) confirmed this record, the only one known, which is based on *Yuncker* 10075 (BISH *n.v.).*
• The status of this small weedy New World herb as an ancient species of the CPO rests just on Cook's Second Voyage material from Tonga (Nicolson and Fosberg (2004: 470). But its apparent absence from the rest of the region until about a century later, and its continued extreme rarity here (except perhaps in New Caledonia; McKee 1985: 66) would seem to require a special explanation: might it have been introduced to Tonga by Abel Tasman in 1643? Unfortunately for this hypothesis, there is no indication that the plant could have been an

abundant weed of Tasman's starting point at Batavia; that is, it is not mentioned by Merrill (1917) as present on Amboina in the mid-17th C.
• The Niuean name *hongohongo*, as recorded for *Yuncker 10075*, is one that in Polynesia refers particularly to urticaceous herbs, notably *Laportea interrupta*. The resemblance between this and the teucrium is considerable, and the latter lacks any distinctive physical qualities or medicinal uses, etc., that might have enabled it to acquire a name of its own.

**LEGUMINOSAE**

***Abrus precatorius* L.** *matakamea, pōmea mataila* **IND**
Y, S — common in open scrub.
• Sykes (1970: 144) said that this scrambling bush or vine mostly grew near villages and in disturbed coastal forest. Finding it in such habitats might have been why he thought it was not a native plant. Nevertheless, the CPO was part of the extensive range of this Old World species—Nicolson and Fosberg (2004: 432) cite Cook's Voyages material from the Society Islands, and the U.S. Exploring Expedition got it in Tonga, Samoa and Fiji in 1839–40.
• Oddly, then, its two recorded Niuean names are very different from the name (in the forms *matamoho* and *matamoso* respectively) found in Tonga and Samoa (Rensch and Whistler 2009: 619). Both Niuean names seem to refer to the seeds. The first apparently just means something like "appearing bluish". The second means "like *Adenanthera pavonina* [*pomea*] but the seeds with a blotch". Since that tree is a post-European introduction (see below) this name must also be a recent one.

***Adenanthera pavonina* L.** *pōmea* **FNI**
Y, S — common in thickets and secondary forest.
• This Indo-Malesian tree is now widely naturalised in the CPO. Smith (1985: 57) thought, because of the lack of early to mid-19th C. collections in Fiji, that it might be a fairly recent introduction there. Whistler (1988) omitted the species as a Western Polynesian weed but later called it an introduction, e.g., to Samoa (Whistler 2000: 178).
• Kinsky and Yaldwyn (1981: 31) note that Niue's fruit-doves eat the seed of this tree.
• The name for this tree in Tonga and Samoa is a very different one, *lopa* (Rensch and Whistler 2009: 620).

***Alysicarpus vaginalis* (L.) DC.** **CAS**
Recorded by Whistler (1988: 21), citing *Whistler* 4965, coll. 1981, *n.v.* A later collection is *Sykes* 1469/N CHR 659564, coll. 2006, Alofi South, edge of old lawn.
• This low-growing Old World herb is a fairly recent weed in Western Polynesia, perhaps after having been introduced as a fodder plant (Whistler 1988: 21; Smith 1985: 199).

***Bauhinia monandra* Kurz** **NN**
Y — introduced ornamental, occ. wild in thickets. S — rarely cultivated, not seen wild.
• This New World tree is not known to naturalise elsewhere in the CPO (Whistler 1988; Smith 1985: 120), so Yuncker's record probably applies just to relics of cultivation.

***Centrosema pubescens* Benth.** **CAS**
S — introduced as a pasture plant in 1955 and collected wild in at least one place in 1965. A later collection is *Sykes* 1456/N CHR 659550, coll. 2006, Fuata Road, scrub by old plantation.
• This low-growing New World perennial herb is a fairly recent weed in Western Polynesia, perhaps after being introduced here as a fodder plant (Whistler 1988: 22; Smith 1985: 232).

***Chamaecrista nictitans* (L.) Moench. var. *glabrata* (Vogel) H.S.Irwin & Barneby** **FNI**
S as *Cassia mimosoides* L. — mainly seen as a wayside weed near Lalole. A later collection is *Sykes* 1484/N CHR 659579, coll. 2006, Vaiea, track in scrubby forest.
• This weedy New World subshrub seems to have first appeared in the CPO in Samoa in 1921 (Whistler 1988: 22). In Fiji it is abundant on Viti Levu's drier coasts (Smith 1985: 118).

***Crotalaria micans* Link** **FNI**
Y, S as *C. anagyroides* Kunth — introduced for soil improvement c. 1940, now widely naturalised in waste and open scrub, esp. (*f.* Sykes) on the west side of the island. A later collection is *Sykes* 1524 CHR 659619, coll. 2006, Hakupu, in low scrub.
• This New World shrub is a fairly recent weed in Western Polynesia, perhaps after being introduced as a cover plant and green manure (Smith 1985: 271).

***Crotalaria pallida* Aiton** **FNI**
Y as *C. saltiana* non Andrews — common along roadsides and in waste, esp. on the eastern side of the island. S as *C. mucronata* Desv. — common throughout. There are no later collections.
• Whistler (1988: 22) recorded this weedy African subshrub as first seen in Samoa in 1920 and then in Tonga in 1926. For Fiji, Smith (1985: 270, as var. *obovata* (G. Don) Polhill) gives a similar date of entry and notes that it is Fiji's only abundantly naturalised crotalaria.
• In my opinion, a glaucescent-leaved 1965 *Sykes* collection (CHR 150543 !) also represents this species.

***Crotalaria verrucosa* L.** **FNI**
Y as *C. angulosa* Lam. — occ. along roadsides and in waste. S — occ. in small wayside populations in the west, from Alofi to Tuapa. The single later collection is *Fullerton* AK 219427, coll. 1975, nr Makefu, roadside.
• This Asian subshrub was first found in the CPO in Samoa in 1905 (Whistler 1988: 23).

***Desmodium heterocarpon* (L.) DC.** **IND**
S — seen in only one inland place, at Tukuofe nr Tafalomahina. There are no earlier collections, nor any later ones.
• This Indo-Malesian subshrub is an ancient weed of the CPO—Nicolson and Fosberg (2004: 436) cite Cook's Voyages material from the Society Islands. It is now rare in the CPO and mostly grows in cultivated areas and disturbed scrub. For the Cook Islands Sykes (2016:

602) describes it as found mainly in fernland on the volcanic slopes of Rarotonga and Mangaia, so perhaps it is not a calcicole.

***Desmodium incanum* DC.** **CAS**
S as *D. canum* (J.F.Gmel.) Schinz & Thell. — on a grassy slope in Alofi, apparently from an earlier introduction in a forage-plant trial. A later specimen of this New World herb, perhaps representing a wild plant, is *Sykes* 1136/N CHR 282186, coll. 1975, Fonuakula, in waste.

***Desmodium triflorum* (L.) DC.** **FNI**
S —common among low grasses and herbs. A first collection is *Wright* CHR 90056, coll. 1949, Fonuakula Farm. A later collection is *Sykes* 1184/N CHR 282234, Mutalau, in waste.
• This clover-like weedy herb, having found wide use as a green manure, etc., is now a pantropical species. Its original range is unclear but probably did not include the CPO, e.g., it was first collected in Western Polynesia (Samoa) only in 1894 (Whistler 1988: 24).

***Desmodium uncinatum* (Jacq.) DC.** **FNI**
S as *D. adscendens* non (Sw.)DC. — introduced as a forage plant in 1961, and not seen wild. A later specimen, which does represent a naturalisation, is *Sykes* 1571/N CHR 659667, coll. 2006, Alofi South, Peleni's Guest House, common in edge of lawn, and seen elsewhere.
• This sprawling New World subshrub is also a fairly recently naturalisation in Tonga (Whistler 1988: 24) and in Fiji too (Smith1985: 192).
• Included here (on the grounds that the taxa are insufficiently distinct from one another) is the single Niuean specimen that has been determined as *D. intortum*(Mill.) Urb.: *Sykes* 1128/N CHR 282178 *n.v.,* coll. 1975, airport, near runway, det. G. P. Lewis 1985.

***Glycine tabacina* (Labill.) Benth.** **FNI**
S — rare, just seen in a grazed coconut grove. A later collection is *Sykes* 1139/N CHR 282189, coll. 1975, Fonuakula, in mown turf at edge of golf course.
• Smith (1985: 229) noted that "the tetraploid form" of this small perennial scrambler is found in Asia and Japan and eastward to New Caledonia, Fiji and Tonga. He considered it indigenous to Fiji and cited an 1860 collection by Seemann. Its status on Niue then is very unclear. It has been indicated in this entry as fully naturalised but it may actually be a native species that reappears sporadically from the seed bank.

***Indigofera hirsuta* L.** **CAS**
S — introduced as a pasture-improvement plant (1960s?) and said to be growing well (Wright and van Westerndorp 1965: 68). A later specimen, perhaps indicating only that the plant persists once sown, is *Sykes* 1241/N CHR 282290, Vaiola, rare in old rough pasture.
• This Old World subshrub is known elsewhere in Western Polynesia (Samoa) and in Fiji too but it seems not to have naturalised in these places (Whistler 1988: 25; Smith 1985: 184).

***Indigofera suffruticosa* Mill.** **CAS**
Recorded by Whistler (1988: 25), on the basis of *Sykes* 1127/N CHR 282177, coll. 1975, small colony by airport runway. There are no later collections.
• This New World shrub is said to have been introduced to Fiji some time before 1860, to provide indigo dye (Smith 1985: 183), and there are similar dates for naturalisations in Tonga and Samoa (Whistler 1988: 25).

***Lablab purpureus* (L.) Sweet** **IND**
***Dolichos lablab* L.**
Y — occ. in thickets. S — in a few widely separated areas, mainly on the west side of the island, in scrub and forest towards the coast. There are no later collections.
• This vine, an Indo-Malesian food plant, might be a deliberate ancient introduction across the CPO—Smith (1985: 236) says "present in Tahiti at the time of Cook's visits", apparently relying on the record of Seemann (1865: 62, as *Lablab vulgaris* Savi var. *albiflorus* DC.). Nicolson and Fosberg (2004) make no reference to this species.

***Leucaena leucocephala* (Lam.) de Wit** *pepe* **FNI**
Y as *L. glauca* (L.) Benth. — occ. in thickets near the sea. S — common in disturbed waste, esp. near the sea on the western coast. A later collection is *Gardner* 10469, AK 293556, –7, coll. 2005, Opaahi sea-cliffs, abundant above the *Schleinitzia* zone.
• Smith (1985: 64) notes that in Fiji in 1860 Seemann had found this South American tree in use as a hedge plant. It is now familiar as one of the CPO's most conspicuous weeds.

***Macroptilium atropurpureum* (DC.) Urb.** **FNI**
S as *Phaseolus atropurpureus* DC. — growing well in a trial and making much seed. A later collection is *Sykes* 1294/N CHR 282340 coll. 1975, Halagigie Point, roadside, scrambling on forest edge.
• Widely introduced through the tropics as a cover crop and pasture legume, this creeping New World perennial is a recent introduction to the CPO and has begun to naturalise widely here (Whistler 1988: 25; Smith 1985: 247).

***Macroptilium lathyroides* (L.) Urb.** **CAS**
S as *Phaseolus lathyroides* L. — in waste at Paliasi. There are no later collections.
• A New World subshrub of value as a pasture legume, this species too has recently begun to appear as a weed in Western Polynesia (Whistler 1988: 26) and Fiji (Smith 1985: 247).

***Mimosa pudica L.*** ***ER***
Y — not seen but claimed by local informants to be present. S — seen just in a *talo* plantation at Fonuakula Farm. Sykes (1970: 59) recommended the eradication of this South American weed, and it appears to have been done—no later collections are known.

***Pueraria lobata* (Willd.) Ohwi** *aka* **IND**
Y as *P. thunbergiana* (Sieb.&Zucc.) Benth. — common along roadsides, in waste, etc.

S — uncommon, mainly seen in waste nr Paliasi. There are no later collections.
• This Indo-Malesian famine-food plant is not listed by Nicolson and Fosberg (2004) but is almost certainly ancient in the CPO, perhaps as an introduced species—its name (*aka* and cognates) is found throughout Western Polynesia and Fiji (Whistler 2000: 154; Smith 1985: 226).

***Pueraria phaseoloides* (Roxb.) Benth.** **CAS**
S — introduced for pasture improvement, perhaps first in 1954; not definitely seen wild anywhere but persisting in at least one place. There are no later collections from the wild.
• This low-growing Indo-Malesian vine has "scarcely" naturalised in Fiji (Smith 1988:227), and is not mentioned by Whistler (1988) as a weed of Western Polynesia.

***Rhynchosia minima* (L.) DC.** **FNI**
Y, S — common in plantations and scrubby waste and on roadsides. A later collection, giving quite a different picture, is *Whistler* 4972 CHR 392243, coll. 1981, Hio (just north of Tuapa), in disturbed roadside vegetation, not seen elsewhere. There is just one later collection, *Sykes* 1398/N CHR 658691, coll. 2006, Amanau–Alofi South, quite common on derelict building site.
• This slender Old World herb is a widespread tropical weed but in Western Polynesia is found only on Niue (Whistler 1988: 27). Nor is it a weed in Fiji (Smith 1985: 255).

***Senna occidentalis* L.** **FNI**
Y as *Cassia occidentalis* L. — infrequent on rocky cliffs near the sea. S — rare, in waste at Alofi. A later specimen is *Flynn* 6693 US 3399461, coll. 2000, Fonuakula, at roadside.
• This shrub, native perhaps to the Old World tropics, might be an early post-European introduction to the CPO, e.g., it was collected from Fiji in 1860 (Smith 1985: 112). The very similar *S. sophera* (L.) Roxb., also a probable Old World species, was found on Tonga by Cook's Second Voyage (Nicolson and Fosberg 2004: 427) but has never been found on Niue.
Both species were present on Amboina in the mid-17th C. (Merrill 1917: 258).

***Senna tora* (L.) Roxb.** **FNI**
New record, based on two *Sykes* collections made in 2006: 1409/N CHR 658703, Amanau, between old concrete foundations of old building site; 1507/N CHR 659602, Vaipapahi Farm, in waste nr buildings.
• Widespread now as a pernicious weed, this Indo-Malesian subshrub was collected in Fiji by Seemann in 1860, but first records for Western Polynesia come from more than a half a century later (Smith 1985: 110; Whistler 1988: 27). The plant was present on Amboina in the mid-17th C. (Merrill 1917: 257).

***Tephrosia purpurea* (L.) Pers.** *kohuhu, kauhuhu* **IND**
Y — frequent in waste, along roadsides etc. S — quite common in plantations, particularly in the open parts of the inland basin. The only later collection is *Sykes* 1158/N CHR 282208, coll. 1975, Liku, in a passionfruit plantation.
• This subshrub is widespread on tropical shores of the Old World and is an ancient species of the CPO—Nicolson and Fosberg (2004: 446) cite Cook's Voyages material from Tahiti and Tonga. Smith (1985: 173) said that in Fiji it grows in rocky, open dry places, usually near the coast. He did not note it as a weed, but speculated that in view of its use as a fish-poison it might have been deliberately introduced to Fiji and further eastwards.

***Uraria lagopodoides* (L.) DC.** *uluhega* **IND**
Y — occ. in waste areas and clearings. S —locally common in old pasture and waste, mainly on the western side of the island and at Vaiea Farm. The only later collection is *Sykes* 1109/N CHR 282160, coll. 1975, airport, in mown lawn.
• Whistler (1988: 28) said that this low-growing herbaceous scrambler, widespread naturally from India eastwards at least as far as Australia, might be a pre-European introduction to Western Polynesia. The only relevant Cook's Voyages material however seems to be an observation by Georg Forster for New Caledonia (Nicolson and Fosberg 2004: 447). Smith (1985: 198) thought that despite its weediness in Fiji it was probably indigenous there, and cited collections by the U.S. Exploring Expedition and Seemann.

**MALVACEAE**

***Abutilon grandifolium* (Willd.) Sweet *Abutilon indicum* (L.) Sw.** **FNI**
Y — on sea-cliffs and in thickets. S — uncommon, just on the west coast, in waste or disturbed scrub nr houses. There are no later collections.
• This weedy shrub, probably an Old World species, may have died out on Niue. It is recorded elsewhere in the CPO only from Fiji, as a possible garden escape (Smith 1981: 439). For Hawaii, Hillebrand (1888: 46) noted that it was a cultivated plant "bidding fair to become naturalized", but it has not done so (Wagner *et al*. 1990: 873). The species was present in Amboina in the mid-17th C. (Merrill 1917: 355).

***Gossypium barbadense* L.** **CAS**
Y as *G. brasiliense* Macfad. — introduced, uncommon in villages. S — Persisting after cultivation at least.
• The record of Sykes (1970: 111) comes from "a small adventive colony from near an isolated house at Toa in the middle of the fernland". This New World shrub was widely grown in Fiji in the days of the cotton boom (1860s) but lacks a comparable abundance in the wild there—Smith (1981: 430) just notes that it "persists infrequently" [from self-sown seed?]. It is not listed by Whistler (1988) as a Western Polynesian weed.

***Hibiscus abelmoschus* L.** *fou igo* **IND**
Y — frequent in clearings and waste. S — uncommon, in open waste in the centre of the island, esp. in the young coconut plantations of Vaiea Farm. A later collection is *Flynn* 6700 US 3399444, coll. 2000, Vahavaha area NE of Hakupu, roadside, secondary vegetation. The earliest collection for Niue is *Jensen*, coll. 1876 (BM *n.v.*; cited by Whistler 1988: 29).

• This Indo-Malesian shrub, often seen as a garden weed, is an ancient species of the CPO—Nicolson and Fosberg (2004: 484) cite Cook's Voyages records for the Society Islands.

***Hibiscus diversifolius* Jacq.** *fou hele* **FNI**
Y, S, as *H. cannabinus* non L. — occ. in waste places, often near habitation, perhaps most common (*f.* Sykes) in Liku on the east side of the island. There are several later collections.
• This sprawling Indo-Australian subshrub was found in Fiji in 1860 (Smith 1981: 419) but further to the east, e.g., in the Cook Islands (Sykes 2016), the only records are recent ones.
• The first part of the Niuean name is the invariable Polynesian generic for hibiscus species, while *hele*, "entangling", would refer to the plant's spreading, prickly branches.

***Hibiscus rosa-sinensis* L.** *kaute* **NN**
Y — cultivated, common about houses, wild along roadsides and in thickets. S — much-planted by houses, graves, etc. The first collection is *Moore* 390 US 1217132, coll. 1899.
• Sykes (1970: 114) said that the most commonly seen form of this ornamental Indo-Malesian shrub had single scarlet flowers. He also ascertained, from Niuean informants, that fruit was unknown on this plant (or on any other form of it) and concluded that Yuncker's record referred just to relics of cultivation. The question of whether some of the island's plants belong to a pre-European cultivar is an open one (Nicolson and Fosberg 2004: 487).

***Malvastrum coromandelianum* (L.) Garcke** **FNI**
Y, S — abundant weed of waste and plantations. There is just one later collection (CHR 282349, coll. 1975) of this New World subshrub, which is now a pantropical weed.

***Sida acuta* Burm.f.** *mōtofu* **FNI**
Y, S — rather uncommon in pasture and plantations. The only later collection is *Sykes* 1285/N CHR 282321, coll. 1975, Halagigie Point, in [recently?] cleared area.
• This weedy shrub, perhaps originating from the New World tropics, might be an early post-European introduction to the CPO (Smith 1981:436). It is probably declining on Niue.

***Sida parvifolia* DC. incl. S. *samoensis* Rech.**
*mōtofu, mōtofu totolo* **IND**
Y, S — local in waste and plantations, mainly in the Alofi and Fonuakula areas.
• Sykes (1970: 117) thought that this low-growing weedy subshrub, native to tropical coasts from the Indian Ocean eastwards, might have been introduced to Niue. But it is ancient in the CPO—Nicolson and Fosberg (2004: 491) record it under the name *S. pusilla* Cav. (a taxon they say probably includes *Sida samoensis*) and cite Cook's Second Voyage material from Tonga and Vanuatu.

***Sida rhombifolia* L.** *mōtofu* **FNI**
Y, S — common on roadsides and in waste and plantations. There are no later collections.
• According to Nicolson and Fosberg (2004: 491) all Cook's Voyages records of this nearly-pantropical shrub actually refer to *S. parvifolia* (see above). The earliest Western Polynesian collection of *S. rhombifolia* appears to be an 1840 one for Tonga (Whistler 1988: 30).

***Triumfetta rhomboidea* Jacq.** *mōtipo* **FNI**
Y as *T. bartramia* L., S — common in plantations and waste. A later collection is *Flynn* 6710 US 1211260, coll. 2000, Toi–Mutulau, roadside.
• The original range of this weedy, burr-fruited tropical subshrub is unclear, but might not have included the western part of the CPO, since the plant was collected in Tonga only in 1891 and in Samoa in 1905. It grew on Amboina in the mid-17th C. (Merrill 1917: 354).

***Urena lobata* L.** *mōtipo* **IND**
Y, S — common in clearings and waste. There are no later collections.
• This weedy, burr-fruited subshrub, native perhaps to tropical Asia, is an ancient species of the CPO—there is Cook's Second Voyage material from the Society Islands (Nicolson and Fosberg 2004: 494) and a Third Voyage collection from Hawaii (Wagner *et al*. 1990: 903). It seems that it might be declining in abundance on Niue.

***Waltheria indica* L.** **IND**
S — uncommon, in a few old taro plantations. The only later collection appears to be *Flynn* 6701 US 3399445, coll. 2000, nr Hakupu, along side of road to Liku, a single plant.
• Sykes (1970: 204) thought that this small shrub, native perhaps to the New World but nearly pantropical as a weed in historic times, might be a recent introduction to Niue. However, it is of ancient occurrence in the CPO—Nicolson and Fosberg (2004: 654) cite Cook's Second Voyage material from the Society Islands and New Caledonia, and St John (1978) has noted Third Voyage material from Hawaii. The situation for Western Polynesia is less clear, with the first collections from Tonga and Samoa being made as late as 1891 and 1905 respectively (Whistler 1988: 37).
• Regardless of status, *W. indica* perhaps survives on Niue mainly in the seed-bank—cf. a collection from Samoa: *Whistler* 9462 PTBG 10612, coll. 1994, Savai'i, "by a bulldozed track across lava, the first Samoan collection for 90 years". Also, given its present-day abundance on the volcanic terrain of the Marquesas Islands, it is clearly not a calcicole.

## MELASTOMATACEAE

***Dissotis rotundifolia* (Sm.) Triana** **DD**
New record, based on *Flynn* 6709 (PTBG, US; *n.v.*), coll. 2000, Alofi-Lakepa roadside. It is unclear that this collection comes from a wild plant rather than a garden discard.
• This creeping African ornamental herb is not mentioned by Whistler (1988) but Smith (1985: 384) said that it is naturalised to some degree in Samoa, along [forest] trails in Upolu.

**MELIACEAE**

***Aglaia saltatorum* A.C.Sm.** *lagakali* **IND**

Y as *A. samoensis* A.Gray — in thickets and forested areas. S — only seen in the villages and abandoned sites. A later collection is *Sykes* 1629/N CHR 659727, coll. 2006, Hakupu village, cultivated.

• This small tree, native to Tonga and Fiji's Lau Group, is grown in villages there and in Niue for its scented flowers. One of Sykes' collections (CHR 169811) is said to be fruit-bearing, but it seems that (*pace* Yuncker) naturalisation does not occur. Why this should be so is unclear.

**MYRTACEAE**

***Psidium guajava* L. incl. *P. cujavillus* Burm.f.** *kautoga* **FNI**

Y, S — common in scrub and disturbed forest all over the island, except at the coast; often pioneering in abandoned cultivations. There are no later collections.

• S. P. Smith (1902: 96) said that on Niue this shrubby New World fruit-tree, the yellow guava, had already covered many hundreds of acres in the more open parts of the island. It was first recorded in the CPO from Fiji in 1860 (Smith 1985: 307).

***Syzygium samarangense* (Bl.) Merr. & Perry** *kolivao* **FNI**

Y as *Eugenia richii* non A.Gray — common in forest. S, as *Syzygium richii* non (A.Gray) Merr. & Perry — common in older secondary forest, occ. in primary forest. A later collection is *Gardner* 10748 AK 293529, coll. 2005, Hakupu sea-track, [flowering at bush edge].

• Whistler (1980) pointed out that in Western Polynesia this tree was an introduced, Malesian species [long known as *Eugenia javanica* Lam.]. No collections from the 19th C. are known from Niue, Tonga or Samoa, and Smith (1985: 351) states that it appeared to have been introduced to Fiji only "in the past half century" and had not naturalised.

• Clearly, *S. samarangense* is well-suited to Niuean conditions. Its fruit has a single, fairly small seed (c. 1.5 cm diameter), which could easily be taken by fruit-bats or the Pacific Pigeon, or even by the next-largest of the island's frugiverous birds, the Crimson-Crowned Fruit Dove (cf. McConkey 2005).

• The Niuean name of this tree, *kolivao*, was first recorded by Yuncker (1943: 91). However, Tregear and Smith (1907: 66) note *koli* as the "name of a shrub". This name relates not to any other of Niue's several species of *Syzygium* but to the Tongan *S. neurocalyx*, a well-known indigenous small tree cultivated there for its scented fruit. For this reason Whistler (2013: 11) has suggested that *S. neurocalyx* was once also present on Niue. The Niuean name *koli vao* simply means "the *koli* of the forest".

**NYCTAGINACEAE**

***Boerhavia diffusa* L.** *kātule* **IND**

Y, S — common in plantations and waste, esp. (*f.* Sykes) in the more open areas of the inland basin. A later collection is *Sykes* 1426/N CHR 659520, coll. 2006, Alofi North, around graves, rare?

• It seems likely that some members of the pantropical *B. diffusa* complex (Nicolson and Fosberg 2004: 538–9, as *B. acutifolia* and *B. tetrandra*) are native to the CPO. These succulent herbs grow naturally on coral rock and sand at the coast, so it might be significant that neither Yuncker nor Sykes mention finding members of the genus in such places.

• Whistler (2013: 47) recorded this plant as *B. acutifolia* (Choisy) J.W.Moore, and saw it only once, in 2013: *Whistler* 12994, uncommon along the trail to the Talava Arches.

***Mirabilis jalapa* L.** **FNI**

Y — cultivated for ornament and commonly wild in waste and along roadsides. S — rare, mostly in waste places near Alofi. A later collection is *Sykes* 1582/N CHR 659678, Alofi South, Peleni's Guest House, in shrubbery, regenerating by seed.

• This New World subshrub has not been recorded as a weed elsewhere in Western Polynesia (Whistler 1988) but is said to be so in Fiji (Smith 1979: 263).

**OXALIDACEAE**

***Oxalis corniculata* L., incl. var. *repens* (Thunb.) Zucc.** *kihikihi* **FNI**

Y, S —locally common in plantations and waste, also seen on roadsides and in lawns. There are no later collections.

• Whistler (1988: 31) gives 1876 as the date of the first Niuean collection, that is, a *Jensen* specimen (BM *n.v.).* Nicolson and Fosberg (2004: 549) imply that the Cook's Voyages records of the species might just refer to occurrences in New Zealand and Norfolk Island, places likely to be within the original distribution of this widespread Old World herb. On the other hand, Whistler (1988: 31) described it as being "an aboriginal introduction to Polynesia" and cited collections from Tonga and Samoa made by the U.S. Exploring Expedition in 1839–40.

**PAPAVERACEAE**

***Argemone subfusiformis* G.B. Ownbey subsp. *subfusiformis*** ***ER***

S as *A. mexicana* L. — in waste ground at Fonuakula Farm, apparently as a very recent introduction and increasing rapidly; requiring to be eradicated. There are no later collections. The voucher for this prickle-leaved South American herb is CHR 168709, det. G. B. Ownbey 1997.

• There are no other records from the CPO, but Green (1994: 56) in discussing the species' occurrence on Norfolk Island suggests that material presently identified as *A. mexicana* (as for example, in Fiji) needs re-evaluation.

**PASSIFLORACEAE**

***Passiflora foetida* L.** **FNI**

Recorded by Whistler (1988: 32), on the basis of *Sykes* 1225/N CHR *n.v.,* coll. 1975. A later collection is *Sykes* 1391/N CHR 658664, coll. 2006, nr Amanau, on

derelict building site created by January 2005 hurricane [correctly, Cyclone Heta of Jan 2004?].
• This New World vine, its fruit barely edible to humans, is now a pantropical weed. It was first seen in Western Polynesia (Samoa) in 1921 (Whistler 1988: 32).

***Passiflora laurifolia* L.** **NN**
S — infrequent in cultivation, growing well but perhaps not naturalised anywhere. There are no later collections.
• Whistler (1988: 32) records this edible-fruited New World vine as wild in Tonga and Samoa, in disturbed forest.

***Passiflora maliformis* L.** **CAS**
Y, S — cultivated, and wild near houses and in disturbed scrub and plantations. There are no later collections.
• Whistler (1988: 32) records this edible-fruited New World vine as occasionally found [wild] in Tonga, Samoa and Wallis and Futuna, in secondary vegetation.

**PHYLLANTHACEAE**
***Bischofia javanica* Blume** **IND**
S — Tree at forest edge on upper terrace, Alofi–Paliasi Road. There are no later collections, but Whistler (2013) was informed of another tree in a garden on the island.
• Given the extreme rarity of the species on Niue, Sykes's record might be that of a cultivation relic, or a casual naturalisation from other, unsighted, cultivated trees.
• Smith (1979: 494) included Niue in the natural, Indo-Pacific range of the species, and suggested it might have been introduced further eastwards in ancient times (but the only Cook's Voyages material cited by Nicolson and Fosberg (2004: 411) is a record from New Caledonia). In Tonga *B. javanica* is a common forest tree, and, being valued for its wood and the dyestuff from its bark, might have been taken from there to Niue long ago.

***Phyllanthus amarus* Sch. & Thon.** **FNI**
***Phyllanthus niruri* L.**
Y, S — quite common, particularly (*f.* Sykes) in plantations. The only later collection is *Sykes* 1249/N CHR 282298, coll. 1975, Amanau, waste place on cliff edge.
• This African subshrub is now a pantropical weed. Whistler (1988: 19) noted that it was first collected from Samoa in 1893 and is still relatively common there in disturbed places and cultivated ground, but that it is uncommon in Tonga.

***Phyllanthus virgatus* G.Forst.** **IND**
***Phyllanthus simplex* Retz.**
Y, S — common around houses and in plantations. Two of the several later collections are: *Whistler 10822* PTBG *n.v.*, coll. 1997, Mafeku, in a plantation; *Sykes* 1597/N CHR 659654, coll. 2006, nr start of Liku–Tautu track.
• This small weedy Indo-Malesian subshrub is believed to be a pre-European introduction to the CPO (Nicolson and Fosberg 2004: 424). Sykes (1970: 95) described it as being more frequent than the similar-looking *P. amarus* and found in a greater variety of habitats, including the dry plantations of the island's central basin. In contrast, it appears to have declined elsewhere in the region, e.g., in Samoa and Tonga (Whistler 1988: 19) and perhaps in the Cook Islands too (Sykes 2016: 767).

**PLANTAGINACEAE**
***Angelonia biflora* Benth. in DC., incl. *A. angustifolia* Benth. in DC.** **CAS**
New record, based on *Whistler* 10822 PTBG *n.v.*, coll. 1997, Maleoa (Makefu), uncommon weed in plantation. A later collection is *Sykes* 1569/N CHR 659665, coll. 2006, Alofi South, relic of cultivation, uncommon.
• This might be the taxon recorded by Yuncker (1943: 107) as *A. gardneri* Hook. and seen by him just as an ornamental herb. Sykes (1970: 192) did not record the plant. Smith (1991: 76) tentatively distinguished between *A. biflora* and *A. angustifolia* in Fiji and said that both were quite commonly cultivated, and casually naturalised.

***Plantago lanceolata* L.** *mōtie* **FNI**
Y, S — common on roadsides and in plantations. A later collection is *Sykes* 1649/N CHR 659747, coll. 2006, Alofi South, in lawn; very common in gardens, waste places, roadsides.
• Elsewhere in Western Polynesia this weedy Northern Hemisphere herb is much less abundant (Whistler 1988: 33), and it is unknown in Fiji (Smith 1991: 148). For the Cook Islands, Sykes (2016: 782) says that it is locally abundant near the airfield on Mangaia (on crushed coral?) but is just is an uncommon weed on the volcanic terrain of Rarotonga.
• The Niuean name is a generic for grasses and similar herbs.

***Plantago major* L.** **FNI**
Y — common on roadsides and in plantations. S — rare, seen just in two places. No later collections are known.
• There are mid- to late-19th C. collections of this Old World herb from Samoa, Tonga and Fiji (Whistler 1988: 33; Smith 1991: 149) but the plant is still uncommon in these places. For the Cook Islands, Sykes (2016: 782) notes that it is found, like *P. lanceolata*, just on the two largest islands (Rarotonga and Mangaia), in relatively moist habitats.

***Russelia equisetiformis* Schltdl. & Cham.** **CAS**
Y, S — cultivated for ornament, and wild along roadsides, mainly (*f.* Sykes) down the western side of the island. There are no later collections.
• Whistler (1988) does not include this New World shrub as a Western Polynesian weed, but it is now at least a casual there and in Fiji (Smith 1991: 78). In the Cook Islands, where it is commonly cultivated, Sykes (2016: 852) notes that fruit capsules are not formed.

**POLYGALACEAE**
***Polygala paniculata* L.** **FNI**
S — Vaipapahi Farm, apparently new to the island. There are no later collections.

• The first Western Polynesia record of this small weedy New World herb, now widespread in the CPO, comes from Samoa in 1905 (Whistler (1988: 33).

**POLYGONACEAE**

***Antigonon leptopus* Hook. & Arn.** **CAS**

Y — cultivated. S — cultivated, and wild in a small area of cleared forest opposite the Alofi Hospital. There are no later collections.

• This ornamental New World vine is not noted by Whistler (1988) as a weed in Western Polynesia but Smith (1981: 305) says that in Fiji it has naturalised along roadsides, etc.

**PORTULACACEAE**

***Portulaca oleracea* L.** *kamole* **FNI**

Y, S — common in plantations and waste, esp. (*f.* Sykes) where the ground has been compacted. There are no later collections.

• This succulent herb now has a nearly pantropical distribution but there is no Cook's Voyages material of it from the CPO (Nicolson and Fosberg 2004: 563); rather, it seems to be an early European introduction here, having been found, for example, in Tonga in 1840 (Whistler 1988: 34).

• Niue's two indigenous members of the genus, *P. lutea* Sol. ex G.Forst. and *P. samoensis* Poelln., only grow close to the sea, in more or less natural habitats (Sykes 1970: 171).

RUBIACEAE

***Gardenia taitensis* DC.** *tiale* **IND**

Y — frequent in thickets, esp. nr the sea. S — locally common nr the sea; occ. cultivated in gardens, for its scented flowers.

• Sykes (1970: 176) said Niueans told him that this plant was not indigenous to the island. But it is certainly an ancient species of the CPO—Nicolson and Fosberg (2004: 594) cite Cook's Second Voyage material from the Society Islands and Tonga. Smith (1988: 181) suggests that its native range extends from Vanuatu to Niue and perhaps further to Samoa. East of here this ornamental shrub is often planted in gardens and around graves (cf. Whistler 2015: 96), but it hardly seems to have naturalised in these places– Sykes (2016: 808), for example, notes that in the Cook Islands fruit is rarely formed.

***Hedyotis biflora* (L.) Lam.** **IND**

S — nr Namoui, in an old plantation some way inland. There are no later collections.

• This small sprawling Indo-Malesian herb is likely to be native to the CPO—in Fiji, for example, Smith (1988: 358) notes it as a plant of coastal rocks rather than a weed. The only Cook's Voyages material known, perhaps from Tonga, is of uncertain identity (Nicolson and Fosberg 2004: 594).

***Spermacoce assurgens* Ruiz & Pav.** **FNI**
***Borreria laevis* (Lam.) Griseb.**

Y — in clearings and waste. S as *B. laevis* and *B. verticillata* (L.) G.Mey. —abundant throughout, probably the island's most numerous weed. There are no later collections.

• A straggling New World herb now nearly pantropical as a weed, this plant was first collected from Western Polynesia (Samoa) in 1931 (Whistler 1988: 35). Some recent works give its correct name as *S. remota* Lam.

• Several specimens of this genus (CHR 170396, 658688, 659569, 659605) have been tentatively identified by Sykes (in sched. 2002) as *S. pusilla* Wall., but I cannot see that they are other than *S. assurgens*. The former species, a small Old World herb of seasonally damp, sandy ground, seems to be unknown in the CPO.

**RUTACEAE**

***Citrus aurantifolia* (Christm.) Swingle** *tipolo* **CAS**

Y, S — cultivated, and (*f.* Sykes) wild to some degree.

• This species, the lime, was said by Sykes (1970: 182) to be the only member of its genus to thrive on Niue, and that "bushes often grow near the tracks to plantations, where the seed was dropped either accidentally or deliberately". Whistler (1988) does not record it as having naturalised elsewhere in Western Polynesia, but it seems to have done so (infrequently) in Fiji, having been introduced, according to Seemann, from Tahiti in 1823 (Smith 1985: 520).

• The American ecologist Daniel Janzen (quoted by Barlow 2000: 35) has commented on the lack of appreciation of the role horses and cattle have in dispersing large fruits and seeds. Both kinds of animal were common enough on Niue fifty years and more ago. On Norfolk Island, cattle are said to have been the principal dispersers for the rough lemon, *Citrus jambhiri* Lush. (O. Evans, pers. comm.), and in Fiji Twyford and Wright (1965: 215) note that "citrus trees and occasional groves are scattered ... often in the most unlikely [*sic*] places deep in the forest and frequently alongside interior tracks of the main islands".

**SAPINDACEAE**

***Cardiospermum halicacabum* L.** **IND**

S — on building-site spoil at the new Paliasi High School, seed being freely produced. There are no later collections.

• Presumably this forest-edge climber is a recent introduction to Niue. However, its natural range seems to be a nearly pantropical one and includes the CPO—Nicolson and Fosberg (2004: 622) cite Cook's Voyages material from the Society Islands. It was found early in the European era in Tonga and Samoa (Whistler 1988: 35) and Fiji (Smith 1985: 583).

***Pometia pinnata* J.R.Forst. & G.Forst.** *tava* **IND**

Y, S — common except nr the sea, able to regenerate in secondary stands.

• There is no evidence that this well-known forest tree, valued for its edible fruit and easily-worked wood, was ever cultivated on Niue or introduced there from further west in its extensive Indo-Pacific range. It is certainly an ancient species of the CPO—Nicolson and Fosberg (2004: 625) cite Second Voyage collections from Tonga and Vanuatu. But its pre-European absence from the Cook Islands and French Polynesia (Sykes 2016: 842) makes one wonder whether it was humans or fruit-bats that brought it to Niue.

**SOLANACEAE**

***Capsicum frutescens* L.** **FNI**

Y, S — cultivated and occ. wild around houses and disturbed scrub and forest. There are no later collections from the wild of this familiar New World subshrub.

***Cestrum nocturnum* L.** **NN**

Y, S — uncommon as a cultivated plant (*f.* Sykes), mainly in Alofi.

• Whistler (1988: 36) accepted this ornamental New World shrub as a naturalisation but this appears not to be the case, e.g., the collection *Sykes* 1486/N CHR 659581, coll. 2006, Hakupu village, was just from a cultivated plant.

***Datura metel* L.** **CAS**

Y as *D. fastuosa* L., S — cultivated, occ. in waste, persisting locally (*f.* Sykes) through producing prolific seed. There are no later collections.

• This Asian subshrub is not noted by Whistler (1988) as a weed in Niue or anywhere else in Western Polynesia, but it is said to be somewhat weedy in Fiji (Smith 1991: 32).

***Nicandra physalodes* (L.) Gaertn.** **CAS**

Recorded by Whistler (1988: 36), on the basis of *Sykes* 1235/N CHR 282284, coll. 1975, Vaiola, by old cow shed. There are no later collections.

• This weedy New World subshrub is apparently very rare on Niue. It appears to be a relatively recent and largely unsuccessful introduction to the CPO (cf. Whistler 1988: 36).

***Nicotiana tabacum* L.** **CAS**

Y, S — sparingly cultivated, and (*f.* Sykes) rarely wild, e.g., on coral walls at Fonuakula golf course. There are no later collections.

• This familiar New World herb would have been cultivated throughout the CPO early in the European era, but it appears to have been able to naturalise only locally, e.g., in the drier parts of Fiji (Smith 1991: 37), and on Mangaia in the Cook Islands, along roadsides through coral rock (Sykes 2016: 859).

***Physalis angulata* L., incl. P. *minima* L.**
*fua manini*, *manini* **FNI**

Y, S — common in plantations etc., esp. (*f.* Sykes) in the inland basin. A later collection is *Sykes* 1307/N CHR 282353, coll. 1975, Fangafetu, in *talo* plantation in fernland.

• Whistler (1988: 36) noted the early (c. 1840) first-collection dates for this subshrub in Tonga and Samoa. It seems likely to have been an early introduction to Niue as well, with Smith (1902: 92) even saying that it was regarded as a native species. It would have been known at that time as a food-plant, but with fruits smaller and not nearly as edible as those of *P. peruviana*.

• *Physalis angulata* is said to be a New World species, but remarkably, there is Cook's First and Second Voyage material of it from the Society Islands (Nicolson and Fosberg 2004: 645). The apparent absence of this weedy plant from elsewhere in the Pacific at that time (including Hawaii) seems to call for a special explanation: was it introduced to the Societies by Bougainville, from Brazil? It may also be relevant, with respect to the western CPO records, that this plant, including the form known as *P. minima*, was present on Amboina in the mid-17th C. (Merrill 1917: 461, 462).

***Physalis peruviana* L.** *manini pālagi* **FNI**

Y, S — occ. in plantations and waste. There are no later collections.

• Whistler (1988: 36) has noted the early (c. 1840) first-collection dates for Tonga and Samoa of this edible-fruited New World subshrub, the Cape gooseberry. Its copious production of long-lived seeds may have enabled it to spread quickly through the CPO, as a stowaway in soil and in association with farm animals and planting material, etc.

***Solanum americanum* Mill.** *polo*, *polo kai* **IND**

Y, S, as *S. nigrum* non L. — common in plantations and waste.

• This weedy subshrub is believed to be of pre-European occurrence in the Pacific—Nicolson and Fosberg (2004: 645) record Cook's Second and Third Voyage material from at least Tahiti and Easter Island.

• Sykes (1970: 197) described his Niuean plants as having umbellate inflorescences, small (less than 1 cm diam.) flowers on peduncles that become deflexed in fruit, and fruit that are "scarcely glossy". An earlier Niuean specimen, S. P. *Smith* 71 AK 93708, coll. 1901, "*polo kai*" was determined by S. D. Knapp in 2017 as the very similar species *S. opacum* A.Braun & Bouché. Both the specimens of Sykes that bore fruit, (CHR 169995, -7) are labelled as having black fruit, as in *S. americanum*, but Sykes (1970: 198) also mentions "scarcely glossy" fruits, as in *S. opacum*. Perhaps both species are present.

***Solanum repandum* G.Forst.** *lokumoka* **IND**

Y as *S. album* non Lour. — occ. in plantations. S — rare, seen in only three places, incl. an old banana plantation at Utuhina. The only later collection (*f.* Whistler 2013) is *Whistler* 10819, *n.v.*, coll. 1997, in a plantation at Makefu (Maleoa) The first collection from Niue is the one cited by Yuncker (1943: 106): *S. P. Smith* 47 AK 93695, coll. 1901, "*lukumoka*".

• The species was regarded by Smith (1991: 15) as an ancient one in the CPO—he cites Cook's Voyages material from the Society and Marquesas Islands—but he also thought that "in view of the fact that *Solanum repandum* is found only in association with human disturbances, it is probably not truly indigenous [here]". Whistler (2013: 77) concurred, calling this plant "the Polynesian tomato" and treating it as a cultivar of the Indo-Malesian *Solanum ferox* L. [but the closely related *S. lasiocarpum* Dunal is another possibility].

• Whistler (2000: 202) recorded the following cognates of the Niuean name in Western Polynesia: *taulo'u* (Samoa), *to'uloku* (Tonga), *tauloko* (Uvea) and *tauloku* (Futuna). Perhaps recording an actively varying vocabulary of his time McEwen (1970) gives *lokumoka*, *lukumoka*, and *lokufulu*. The first contrastive, *moka*, is hard to explain, but the second, *fulu*, would seem to refer to the obvious hairiness of the young fruit.

***Solanum torvum* Sw.** **CAS**
Recorded by Whistler (1988: 37), on the basis of *Sykes* 1126/N CHR 282176, coll. 1975, near airport, in a plantation of *Leucaena*. There are no later collections.
• Now a pernicious pantropical weed, this shrub from the West Indies was firmly established on Fiji (Viti Levu) by 1906 (Smith 1991: 10).

***Solanum viride* R.Br.** *polo*, *polo miti* **IND**
S as *S. uporo* Dunal and *S. tongaense* St John — in open ground in plantations and on a recently cleared track. The first collection of this rare plant from Niue is *S. P. Smith* 72, AK 93683, coll. 1901, common, "*polo miti*". (Another *Smith* collection from this time, AK 93696 *n.v.*, was also accepted by Sykes (1970: 200) as belonging to this species).
• Whistler (2013) thought that this shrub had not been seen on the island since 1965, but there is a single later collection: *Sykes* 1254/N CHR 282303, coll. 1975, Alofi, cultivated by house, det. D. E. Symon 1986.
• Smith (1991: 20) treated *S. viride* as indigenous to Fiji, Tonga and Samoa, "from which its range may have been extended eastwards to Niue [and further] by human assistance". He noted that the fruits of the "wild type", as seen in Niue, are c. 1 cm diameter, while those of cultivated plants are 3 cm diam., tomato-like and edible. Both forms are now uncommon everywhere in the CPO. The notes of Sykes' collections would suggest that this is another rare species that now occurs on Niue mainly in the seed-bank.
• The plant that Yuncker (1943: 199) determined as *S. uporo* was noted by Sykes (1970: 199) as having a greater amount of pubescence on its leaf undersides and a different habitat (the coast north of Alofi). Sykes' conclusion that this collection (*Yuncker* 10039, *n.v.)* belongs to *S. amicorum* Benth., an uncommon native species of Tonga, was accepted by Whistler (pers. comm. c. 2013). An earlier collection (*S .P. Smith* 63 AK 93685, coll. 1901, "*polo*") was determined by Sykes as possibly belonging to S. amicorum but in my opinion might just as well be *S. viride*.

**THYMELAEACEAE**
***Phaleria disperma* (G.Forst.) Baill.** **IND**
S — cultivated ornamental, occ. in villages from Alofi North to Avasele; a number of plants of various ages in a coconut plantation at the latter place. The only later collection is *Sykes* 1568/N CHR 659664, coll. 2006, Alofi South, relic of cultivation, with ripe fruit.
• This shrub is native to Fiji, Samoa and Tonga, where it is usually found in sandy or rocky coastal places. Sykes (1970: 206) thought it likely to be a recent [presumably, deliberate] introduction to Niue.

URTICACEAE
***Laportea interrupta* (L.) Chew** *hogohogo*, *ogoogo* **IND**
Y as *Fleurya interrupta* (L.) Gaudich. — occ. in waste and clearings. The only later collection is *Sykes* 1116/N CHR 282167, Alofi wharf, by building in light shade. The first collection is *Jensen* BM *n.v.*, coll. 1876 (Whistler 1988: 210).
• The several specimens that Sykes (1970: 210) referred to under this name actually belong to *Acalypha indica* (see above), so *L. interrupta* might now be extinct on Niue or exist there only in the seed-bank. This annual herb, which is said to have stinging hairs only sometimes, is widespread in the tropics from India to Australia and is also ancient in the CPO—Nicolson and Fosberg (2004: 678) cite Cook's Voyages material from the Society Islands.

***Pilea microphylla* (L.) Lieb.** **FNI**
Y, S — common on shaded damp rocks, walls, moist ground nr houses, and (*f.* Sykes) locally abundant in open coastal forest. There are no later collections of this New World herb.
• Three other species of *Pilea*, *P. cadierei* Gagn. & Guillaumin, *P. depressa* (Sw.) Blume, and *P. serpyllacea* Lieb., are cultivated on Niue and are spreading (partly by seed?) from their original sites, but they are said to be less common than *P. microphylla* (CHR !).

**VERBENACEAE**
***Lantana camara* L.** **FNI**
S as *L. camara* var. *aculeata* (L.) Mold. — mainly in waste ground near Fonuakula Farm, apparently a recent introduction for ornament but already spreading. The only later collection is *Sykes* 1480/N CHR 659575 coll. 2006, Lemanga inland of Vaiea, scattered in scrub along road and tracks.
• This scrambling New World shrub, a pernicious weed in many tropical and subtropical countries, was first found in the CPO in Samoa in c. 1895 (Whistler 1988: 39).

***Stachytarpheta jamaicensis* (L.) Vahl** **CAS**
Recorded by Whistler (1988: 39), on the basis of *Sykes* "1374" [correctly, 1324]/N CHR 282370, coll. 1975, Vaiea Farm, in rough grazed pasture, not seen elsewhere. There are no later collections.

***Stachytarpheta urticifolia* (Salisb.) Sims** **FNI**
Y as *S. indica* non Vahl — uncommon, in waste. S — widespread in waste and pasture, also locally common along roadsides through forest. A later collection of this well-known New World weed is *Herrick* AK 220562, coll. 1994, Palaha sea-track, common at edge of clearing.

***Verbena bonariensis* L.** **CAS**
S — in waste at Fokipa near Hakupu. The voucher is *Sykes* 1014/N CHR 169881, coll. 1965, det. H. N. Moldenke 1968. There are no later collections of this New World subshrub.

***Verbena officinalis* L.** **CAS**
Y — occ. weed of roadsides and waste. Sykes (1970: 216) confirmed the record, which is based on *Yuncker* 9645 (BISH?, *n.v.*) but did not see the plant growing on Niue, and neither has any later botanist. The first collection, its habitat not recorded, is *Moore* 393 US 653393, coll. 1899, det. N. O'Leary, 2006.
• It is unexpected that this European ornamental herb should have naturalised on Niue, since it is unknown

elsewhere in the CPO, even in gardens. However, it is recorded from New Caledonia (MacKee 1985: 136), and its native habitat in Britain is said to be fairly dry calcareous grassland (Stace 1991: 658).

## MONOCOTYLEDONS

### AMARYLLIDACEAE

***Crinum asiaticum* L.** **IND**

Y, S — cultivated for ornament; persisting at house sites, along roadsides and around graves etc. "as an escape" but (*f.* Sykes) apparently not naturalising.

• The absence of this widespread Indo-Pacific species from the natural coastal habitats of Niue suggests that it is probably a post-European introduction here. However, there is Cook's Second Voyage material from Tonga that might belong to this species, and a likely record for Vanuatu (Nicolson and Fosberg 2004: 166).

***Hymenocallis pedalis* Herb.** **NN**
***H. littoralis* non (Jacq.) Salisb.**

Y — cultivated for ornament around houses and commonly wild along roadsides and in waste. S — cultivated esp. in the villages along the western side, not seen wild.

• This robust New World herb is widely grown in the CPO but seems merely to persist rather than naturalise, e.g., in the Cook Islands (Sykes 2016: 169).

***Proiphys amboinensis* (L.) Herb.** **NN**
***Eurycles amboinensis* (L.) Lindl.**

Y, S — cultivated for ornament, persisting around graves etc. but probably not naturalising.

• This robust Malesian herb is widely cultivated in the CPO, but, like the hymenocallis and the crinum, persists rather than naturalises. In this region, however, all three species seem to be able to make fruit and seed (Sykes 2016).

***Zephyranthes rosea* Lindl.** **FNI**

Y — introduced ornamental, cultivated about houses, frequent along roadsides and in waste. S — occ. cultivated, wild in lawns and waste esp. in Alofi and Avasele. An earlier collection is *Woods* AK 118908, coll. 1959, "growing everywhere after the hurricane".

• This bulb-bearing New World herb is a fairly recent arrival to Western Polynesia but had naturalised in New Caledonia by 1966 (MacKee 1985: 62). In the Cook Islands it has become abundant as a weed of lawns, just as on Niue (Sykes 2016: 171).

### ARACEAE

***Amorphophallus paeoniifolius* (Dennst.) Nicolson**
***A. campanulatus* Decne** *teve* **IND**

Y — common in thickets and forest clearings. S — not common, seen just in and around a few old inland plantations. There are no later collections.

• This robust Old World herb grows wild in coastal forest and open waste throughout the CPO. It is a well-known famine-food plant of the Polynesians and there has never been any doubt about its antiquity here, e.g., it was seen in the Society Islands during Cook's Second Voyage, being cultivated under forest trees (Nicolson and Fosberg 2004: 167).

### ARECACEAE

***Cocos nucifera* L.** *niu* **IND**

Y, S — common around the island, but (*f.* Sykes) relatively scarce in the south, esp. inland.

• Georg Forster wrote that very few"coco-palms" were seen on island's west coast (Pointer 2015: 33). A 1903 map of the island (*loc. cit.* 233) shows "extensive coconut cultivations" at Mutalau in the north-west.

• The coconut palm, originating it seems in Southeast Asia, might be indigenous to various islands of the CPO, or at least an ancient introduction to them. On Niue, naturalisation perhaps occurs only where rats and coconut crabs cannot eat the seedlings.

***Pritchardia pacifica* Seem. & Wendl.** *piu* **IND**

Y as *Eupritchardia pacifica* (Seem. & Wendl.) Kuntze), S — cultivated for ornament around houses and (*f.* Sykes) occ. seen elsewhere, apparently having sprung up from discarded fruit [or bird-dispersed seed?]. There are no later collections.

• This palm is native somewhere in the western Pacific (Watling 2005) but perhaps not to Niue, to judge especially by its lack of integration into the island's primary forest.

### ASPARAGACEAE

***Cordyline fruticosa* (L.) A.Chev.** *tī* **IND**
***C. terminalis* (L.) Kunth**

Y, S — cultivated in hedges and for ornament, and commonly wild across the island in scrub and forest. There are no later collections.

• This Indo-Malesian shrub is an ancient plant of the CPO (Nicolson and Fosberg 2004: 162) and was formerly of great cultural significance, in ritual, boundary-marking, and as a famine food. The evidence from pollen studies is that it accompanied Polynesian migrations across the Pacific (M. Prebble, cited in Hinkle 2004).

***Furcraea foetida* (L.) Haw.** *toua* **FNI**

Y as "possibly *F. gigantea* Vent.", S — once cultivated for its fibres, now wild in many open areas in the east and south of the island. There are no later collections.

• It is just by coincidence that the Niuean name for this robust South American herb should recall the obsolete English word "tow", meaning the fibres of flax (*Linum*), etc.—it is in fact the Niuean form of the usual Polynesian word for rope.

### CANNACEAE

***Canna indica* L. (and hybrids)** **CAS**

S — cultivated, naturalised locally. There are no later collections.

• This genus of robust rhizomatous herbs is a strictly tropical American one. Sykes (1970: 224) noted that plants matching *C. indica* in the strict sense (small stature, slender yellow to crimson flowers) are present on the island, make good seed, and grow wild to a slight

degree around houses and in waste (CHR 169965). In contrast, the larger-flowered hybrids (*C.* × *generalis* L.H. Bailey) do not set seed and are seen in the wild just as cultivation relics, e.g., in the Cook Islands (Sykes 2016: 207).

**COMMELINACEAE**

***Commelina diffusa* Burm.f.** **IND**

Y — along roads and in waste, on moist soil. S — common in plantations, also nr houses.

There are no later collections.

• This succulent Indo-Malesian herb is an ancient species of the CPO—Nicolson and Fosberg (2004: 175) cite Cook's Second Voyage material from the Societies and Tonga and probably Vanuatu as well. Despite not having been collected recently on Niue *C. diffusa* seems unlikely to have declined there—it is currently recorded, for example, as abundant in the Cook Islands (Sykes 2016: 209), although it is said to grow well on coral rock and sand here only if conditions are moist enough.

***Rhoeo spathacea* (Sw.) Stearn** **FNI**

Y as *Rhoeo discolor* (L'Hér.) Hance, S — cultivated for ornament, also commonly wild in waste, occ. abundant in open rocky coastal ground esp. nr Alofi. There are no later collections of this New World succulent.

***Tradescantia zebrina* Bosse** **FNI**
***Zebrina pendula* Schnizl**

Y — cultivated, and common on exposed rocks around houses nr the coast. S — seldom cultivated, and a rare wild plant of rocky waste. There are no later collections of this New World succulent.

**CYPERACEAE**

***Cyperus alternifolius* L.** **DD**

Y, S — cultivated for ornament, uncommon. A specimen of unclear status (a garden discard?) is *Flynn* 6698 US 3442144, coll. 2000, Alofi-Lakepa Rd, in secondary forest.

• Recorded by Whistler (1988: 41) as a weed in Western Polynesia. Niue has few of the damp habitats required by this familiar garden plant, a native of the Indian Ocean region.

***Cyperus brevifolius* (Rottb.) Hassk.** **CAS**

S — only in damp ground near Alofi wharf. There are no later collections.

• This pantropical species is widespread in Western Polynesia, as a relatively recent introduction (Whistler 1988: 43).

***Cyperus cyperoides* (L.) Kuntze** **FNI**

Y — common along roadsides and in waste. S — occ. in waste, common only in the Fonuakula and Vaiola areas. A later collection is *Sykes* 1280 CHR 282326, coll. 1975, Vaipapahi, in mown area of plantation.

• This weedy Old World sedge is regarded as a post-European introduction to the CPO. The first collection for Niue, and apparently the first for Western Polynesia, is *Jensen*, coll. 1876, BM *n.v.*, which was recorded by Whistler (1988: 44) as *Mariscus sumatrensis* (Retz.) Raynal.

***Cyperus gracilis* R.Br.** **FNI**

S as *C. compressus* non L. — rare, in shaded ground at Alofi. Two later *Sykes* collections were made in 1975 (CHR !), both coming from low-growing grass under trees.

• This slender sedge, native to Australia and New Caledonia, is known elsewhere in the CPO only from Tonga (Whistler 1988: 41).

***Cyperus javanicus* Houtt.** **IND**

S — rare, near a shelterbelt at Vaiea Farm, and perhaps at one plantation elsewhere. There are no later collections.

• Elsewhere in the CPO this robust Old World sedge grows mainly in unmodified coastal habitats, and Nicolson and Fosberg (2004: 180) cite likely Cook's First Voyage records from the Society Islands. Its absence from Niue's coast, then, supports the contention of Sykes (1970: 227) that it might be a recent introduction to the island.

***Cyperus mindorensis* (Steud.) Huygh** **IND**

Y, S as *Cyperus kyllingia* Endl. — common in waste nr houses, less so (*f.* Sykes) along roadsides. There are no later collections.

• Koyama (1979: 262) knew of the Cook's Voyages material from the Society Islands (Nicolson and Fosberg 2004: 184), but, with respect to Fiji, appears to have regarded this widespread weedy sedge as an early post-European introduction. It was found at a relatively early date (1839) in Samoa too (Whistler 1988: 43, as *Kyllinga nemoralis* (J.R. & G.Forst) Dandy ex Hutch. & Dalz.).

***Cyperus polystachyos* Rottb.** **FNI**

Recorded by Whistler (1988: 44, as *Pycreus polystachyos* (Rottb.) P.Beauv.), on the basis of *Sykes* 1118/N CHR 282168, coll. 1975, Alofi wharf, in sandy rainwater channel. A later specimen of this widespread weedy sedge is *Sykes* 1443/N CHR 659537, coll. 2006, Tapeu, moist ground at base of municipal water tank.

• The native range of the species is unknown but apparently did not include the CPO—for example, it was a fairly recent arrival to Western Polynesia (Whistler 1988: 44).

***Cyperus rotundus* L.** **FNI**

Y — common around houses and in waste. S —common in plantations and waste but not a very troublesome [crop] weed. There are no later collections of this weedy Old World sedge.

***Cyperus seemannianus* Boeckeler** **IND**

S — scattered in secondary forest inland, probably more frequent in older forest, able to persist after forest clearance if left shaded. There are no later collections

• This sedge is believed to be endemic to the CPO, including the Society Islands (Koyama (1979: 255).

Sykes (1970: 228) thought it was "probably indigenous" to Niue. It favours relatively damp sites.
• Nicolson and Fosberg (2004: 179) record possible Cook's Voyages material from the Society Islands as the similar-looking *C. cyperoides*, but this plant (see above) is a post-European introduction to the CPO. Yuncker (1943: 25) might not have recorded *C. seemannianus* for a similar reason, so his "*C. cyperoides*" specimens (9670 & 9739, *n.v.*) should be checked.

***Fimbristylis ovata* (Burm.f.) J.Kern** **FNI**
Y as *Fimbrisylis* cf. *acuminata* Vahl — seen once in waste. S — rare, local nr two villages.
Also known from collections made by Sykes in 1975 from nr Vaiola (1348/N CHR 282394) and nr the Alofi wharf (1377/N CHR 282427). A collection (CHR 90054) was made by A. C. S. Wright in 1949 from Fonuakula Farm, the place where Yuncker (1943: 26) had found his single collection.
• The original distribution of this weedy perennial sedge is unclear (Whistler (2013) thought it indigenous to the CPO). Now a pantropical weed, it favours relatively dry sites.

**DIOSCOREACEAE**
***Dioscorea alata* L.** *ufi* **IND**
Y, S — widely cultivated, and (*f.* Sykes) occ. persisting in old plantations. There are no later collections.
• This species, the winged yam, is well-known as a pre-European species in the CPO (Nicolson and Fosberg 2004: 188). It is not recorded by Whistler (1988) as a Western Polynesian weed, but for Fiji Smith (1979: 171) described it as "fully naturalised".

***Dioscorea bulbifera* L.** *hoi* **IND**
Y, S — common as a wild climber, along tracksides and in old plantations, waste and secondary forest. There are no later collections.
• This yam is also an ancient species of the CPO (Nicolson and Fosberg 2004: 189). Being a famine-food plant it might have been taken from island to island deliberately, or, thanks to its stem bulbils, might have spread as a contaminant of soil around the planting stock of some other species. It is the only yam recorded by Whistler (1988: 45) as a weed in Western Polynesia.

***Dioscorea esculenta* (Lour.) Burkill** *ufilei* **IND**
Y — frequent in thickets. S — mostly in the more central areas, in open fernland but also in taller vegetation there. The only later collection (CHR 659623, coll. 2006) is of a crop plant.
• This yam is often regarded as a pre-European introduction to the islands of the CPO (to Fiji at least, according to archaeological research; Horrocks and Nunn 2007) but there seem to be no supporting Cook's Voyages specimens.

***Dioscorea pentaphylla* L.** *pilita* **IND**
Y, S — quite common in dry waste and scrub, like *D. bulbifera* in this regard but (*f.* Sykes) less frequent. The only later collection is *Sykes* 1628/N CHR 659699 coll. 2006, Vaikona Chasm track, quite common in understorey of open forest.
• This yam is an ancient famine-food plant of the CPO— Nicolson and Fosberg (2004: 190) cite Cook's Second Voyage material from the Society Islands.

**ORCHIDACEAE**
***Vanilla planifolia* Andrews** **NN**
Y as *V. fragrans* (Salisb.) Ames, S as *V. mexicana* Mill. — originally cultivated for house decoration and garlands, but sometimes (*f.* Sykes) long-persistent in the wild, e.g., in the former village of Fasiau, where it was "climbing to the tops of small trees" (Sykes 1970: 265).
• The vanilla orchid seems not to have naturalised by seed in Tonga, Samoa or the Cooks (Cribb and Whistler 2011: 121) but might have done so in dry forest in Fiji (Kores 1991).
• The recent revival of the vanilla industry on Niue has meant that seed-pods, formed through hand-pollination, are now commercially available. The plant involved could be the 'Tahitian vanilla', said to be a hybrid between *V. planifolia* and *V. odorata* C.Presl.

**POACEAE**
***Axonopus compressus* (Sw.) P.Beauv.** **FNI**
S — common around houses and in plantations. The first collection is *Wright* CHR 67612, coll. 1949, Fonuakula Farm. A later collection is *Sykes* 1314/N CHR 282360, coll. 1975, old pasture area, abundant here and in many other places.
• A New World grass that has become a pantropical weed, *A. compressus* has been known in the CPO for a hundred years or so, e.g., in Fiji (Parham 1979: 333).

***Axonopus fissifolius* (Raddi) Kuhlm.** **FNI**
Recorded by Whistler (1988: 46, as *A. affinis* Chase), on the basis of *Sykes* 1378/N CHR 282428, coll. 1975, Amanau Hotel, in rough lawn. A possible later collection is *Sykes* 1599/N CHR *659696 n.v.*, coll. 2006, Liku–Tautu trackside, in scrub.
• Clayton and Snow (2010: 65) do not list this New World grass as occurring on Niue.

***Bothriochloa bladhii* (Retz.) S.T.Blake** **FNI**
Recorded by Whistler (1988: 46), citing *Krause* 1588 BISH 421407, coll. 1978. An earlier collection is *Sykes* 1309/N CHR 282355, coll. 1975, Fangafetu, small area in grassy fernland, det. T.A. Cope 1985. A later collection is *Sykes* 1451/N CHR 659545 *n.v.*, coll. 2006, airport, common at boundary fence.
• Clayton and Snow (2010: 86) do not list this Old World grass as occurring on Niue.

***Cenchrus ciliaris* L.** **CAS**
S — cultivated at Vaipapahi and Vaiea Farms. A specimen from the wild, recorded by Whistler (1988: 47), is *Sykes* 1332/N CHR 282378, coll. 1975, Amanau Hotel, waste place on cliff edge. There are no later collections of this Old World fodder grass and weed.

***Cenchrus echinatus* L.** *mōtie vihilago* **FNI**
Y, S — common along roadsides and in waste and plantations, esp. on the poor soils of the inland basin.
• Nicolson and Fosberg (2004: 223) referred Cook's Second Voyage material to this New World species, in error for the widespread Pacific endemic *C. caliculatus* Cav. The confusion dates back to Banks and Solander, who found *C. caliculatus* in the Society Islands but recorded it in their *mss.* as *C. echinatus* (Merrill 1954; Gardner 2007).

***Cenchrus purpureus* (Schumach.) Morrone CAS**
S as *Pennisetum purpureum* Schumach. — uncommon, cultivated as a fodder plant (introduced in 1954) and apparently persisting for a number of years. A later collection is *Sykes* 1334/N CHR 282380, coll. 1975, Amanau, in waste. Whistler (1988: 55) cites this large African grass as having naturalised on Niue.
• The records (under *Pennisetum*) in Clayton and Snow (2010: 74) of *Cenchrus macrostachyus* Hochst. ex Steud. and *Cenchrus polystachios* (L.) Morrone. (syn. *P. setosum* (Sw.) L.Rich.), appear to be based just on the cultivated plants noted by Yuncker (1940: 23) and Sykes (1970: 250).

***Chloris barbata* Sw. FNI**
Recorded by Whistler (1988: 48), citing *Krause* 1592 BISH 421404, coll. 1978. An earlier collection is *Sykes* 1123/N CHR 282193, coll. 1975, Alofi wharf, on sand heap. A later collection of this nearly pantropical weedy grass is *Sykes* 1466/N CHR 659561, Alofi South, very common in waste ground.

***Chloris gayana* Kunth CAS**
S — seen in two places away from where it was trialed in 1961 as a pasture grass.
A later collection of this African grass is *Sykes* 1532/N CHR 659627, coll. 2006, Hakupu, Tuhia'atua track, edge of sea cliff.

***Chrysopogon aciculatus* (Retz.) Trin.** *mōtie fisi* **IND**
Y, S — common in lawns, waste and in some [grazed?] plantations.
• Sykes (1970: 238) implied that this Indo-Malesian grass had been introduced to Niue. Nicolson and Fosberg (2004) do not mention the species, but it is well known to have been found by Cook's First Voyage botanists Banks and Solander in the Society Islands (Seemann 1868: 320), and the dates of its first collections in Western Polynesia (Whistler 1988: 378) and Fiji (Parham 1979: 378) are also early ones. Its bristly seed-heads would seem to give it an effective means of long-distance dispersal, so it is treated here as a native Niuean plant.

***Coix lacryma-jobi* L.** *tagataga* **IND**
Y, S — occ. cultivated around houses. There are no later collections.
• In those Pacific islands where damp habitats are plentiful this Old World grass is a common weed. It is an ancient species of the CPO—Nicolson and Fosberg (2004: 225) cite Cook's Second Voyage material from Tonga. But there is no Cook's Voyages material from the Society Islands, nor was it found on Hawaii until the later part of the 19th C. (Wagner *et al.* 1990: 1517).
• This weedy grass can be assumed to have been widespread in Malesia in the mid-17th C. (it was certainly present on Amboina at that time; Merrill 1917: 84) so one can conjecture that it might have been introduced from there to Tonga by Tasman in 1643.

***Cymbopogon nardus* (L.) Rendle NN**
Y, S — Occ. cultivated around houses, persisting. There are no later collections.
• This tropical Asian grass is widely grown for ornament and for its citronella oil.

***Cynodon dactylon* (L.) Pers.** *mōtie molūlū* **FNI**
Y, S — common in lawns and waste, and (*f.* Sykes) also on rocky ground at the coast, where it may reach down to a few metres above high-tide level. The only later collection of this Old World grass is *Sykes* 1135/N CHR 282185, coll. 1975, Fonuakula Farm, tall plants weedy in a vegetable garden.

***Cynodon nlemfuensis* Vanderyst CAS**
Recorded for Niue by Clayton and Snow (2010: 50), presumably on the basis of *Waterhouse* 7040 (BISH, CHR 551721; *n.v.*), coll 2004, Vaipapahi Farm, on mound of sand and gravel.
• This African grass is now being used to improve dry pastures, e.g. in Australia. There seem to be no other records of it from Western Polynesia but it is present in Hawaii (Clayton and Snow 2010: 50).

***Cyrtococcum oxyphyllum* (Hochst. ex Steud.) Stapf FNI**
S — in an abandoned *talo* plantation at Niufela, within a forested area. Collections made in 1975 (*Sykes,* CHR 282305, –34) come from Lefuka and Halagigie Point. There are no later collections.
• This inconspicuous, shade-loving Indo-Malesian grass appears not to have been seen by the Cook's Voyages botanists, but Whistler (1988: 49) cites early post-European material for Tonga and possibly Samoa, as does Parham (1979: 351) for Fiji.

***Dactyloctenium aegyptium* (L.) Willd. FNI**
Recorded by Whistler (1988: 50), on the basis of *Sykes* 1246/N CHR 282295, coll. 1975, Anaana, roadside weed. A later collection of this weedy Old World grass is *Sykes* 1519/N CHR 659614, coll. 2006, Vaipapahi Farm, scattered in waste nr buildings.

***Dichanthium caricosum* (L.) A.Camus CAS**
S as *D. annulatum* (Forssk.) Stapf. This record is based on *Sykes* 241/N CHR 168786, coll. 1965, Amanau, in waste, det. ROG 2020. A second collection (CHR 168770, *n.v.*) which was identified by Sykes (1970: 239) as *D. caricosum*, was of a plant in a trial plot rather than from the wild.

• This Old World grass is widely used to improve dry pasture. It was introduced to Fiji in 1907 and has become a common weed there (Parham 1979: 384). The reason why it has not naturalised more widely on Niue is unclear—perhaps it is not a calcicole.
• Clayton and Snow (2010: 85) accept both this species and *D. annulatum* as present on Niue but there seem to be no verified collections of the latter.

***Digitaria ciliaris* (Retz.) Koeler** **FNI**
S as *D. adscendens* (Kunth) Henrard — in waste at Alofi and Amanau, apparently as a recent introduction. The only later collection is *Sykes* 1113/N CHR282164, coll. 1975, airport, on newly cultivated ground.
• Nicolson and Fosberg (2004: 227) record a Cook's Second Voyage specimen from the Society Islands as belonging this weedy (Indo-Malesian ?) grass. If this is correct that record would be by far the earliest occurrence of the species in the CPO (Gardner 2007: 52). Perhaps the specimen actually belongs with the other Second Voyage "*D. ciliaris*" material from Madeira and Ascension Island (Nicolson and Fosberg 2004).

***Digitaria setigera* Roth** **IND**
S as *D. pruriens* (Fisch. ex Trin.) Büse — perhaps quite widespread in waste ground, clearings in scrub near the coast, and in sweet-potato cultivations. Despite these notes there seem to be only two later collections, both made by Sykes in 1975: CHR 282175, Alofi, on cliff edge just above sea amid rank herbaceous plants; CHR 282248, Anaana, roadside clearing in coastal forest.
• Sykes (1970: 241) thought this Indo-Australian grass might be a fairly recent arrival to Niue. However, it is an ancient species of the CPO—Nicolson and Fosberg (2004: 227) cite Cook's Voyages material from the Society Islands. The first of the above-cited 1975 Niuean collections above suggest that it can grow in more or less natural coastal communities.

***Digitaria violascens* Link** **CAS**
S — in a small open area in fernland at Havaka. This small Asian grass appears not to have been seen subsequently.

***Echinochloa colona* (L.) Link** **CAS**
Recorded by Whistler (1988: 51), on the basis of Sykes 1250/N CHR 282299, coll. 1975, Amanau, waste place on cliff edge. Another collection of this Old World grass is Sykes 1115/N CHR 282166, coll. 1975, Alofi wharf, in sandy rain-wash channel.
• Sykes (1970: 242) recorded the rather similar species E. crus-galli (L.) P.Beauv., on the basis of a 1966 collection from a pasture-trial area. Whistler (1988: 52) suggested that the specimen, Lund CHR 156828, might represent E. stagnina (Retz.) P.Beauv., but in 1973 P. W. Michael determined it as E. colona.

***Eleusine indica* (L.) Gaertn.** **IND**
Y, S — common in waste, along roadsides, and in plantations. There are several later collections.
• This weedy Old World grass is an ancient species of the CPO—it was found on the Society Islands on both Cook's First and Second Voyages (Seemann 1868: 322; Nicolson and Fosberg 2004: 230). In this regard though the lack of Second Voyage material from Tonga and Vanuatu is disconcerting.
• The Niuean name *fahitalo* recorded by Yuncker and Sykes (as *mosie* [grass] *fahitalo*), a name not listed by McEwen (1970), was perhaps one made up for Yuncker on the spot. It means "grass at the edge of the *talo* garden".

***Eragrostis amabilis* (L.) Wight & Arn.** **FNI**
Y, S, as *E. tenella* (L.) P.Beauv. ex Roem. & Schult. — locally common esp. around houses. There are several later collections of this Old World grass, which is now a pantropical weed.

***Eragrostis minor* Host.** **CAS**
Recorded by Sykes (1970: 242, as *Eragrostis poaeoides* P.Beauv.) just on the basis of *Lund* CHR 156827, this specimen originating from seed impurity in a pasture trial at Vaiea Farm in 1966. There are no later collections of this small Northern Hemisphere grass.

***Ischaemum aristatum* L.** **CAS**
S as *I. indicum* (Houtt.) Merr. — being grown in trial pasture at Vaiea and Vaipapahi Farms. It was collected again from the latter place in 1975: *Sykes* 1201/N CHR 282250, persisting and spreading beyond bounds of original plot. This weedy Indo-Malesian grass seems not to have been seen elsewhere on Niue, but Whistler (1988: 53) accepted that it had naturalised.

***Melinis minutiflora* P.Beauv.** **CAS**
S — a rare plant in [sown?] old pasture at one place. A later collection is *Flynn* 6711 PTBG 30202, coll. 2000, Alofi, along roadside.
• This sprawling African grass, widely grown in the tropics as a pioneer, e.g,. after forest clearance, was first recorded in Samoa in 1905 but has not become weedy there (Whistler 1988: 53).

***Miscanthus floridulus* (Labill.) Warb. ex K.Schum. & Lauterb.** *kaho* **IND**
Y as *Miscanthus japonicus* non (Thunb.) Andersss. — in cut-over area nr Fonuakula plantation. S — common in open fernland and scrub, esp. in the south. A later collection is *Waterhouse* 7045 CHR 551753, coll. 2004, Vaiea–Hakupu, infrequent on roadside.
• Sykes (1970: 232, 246) pointed out that *M. floridulus*, a well known ancient species of the CPO (Nicolson and Fosberg 2004: 235), was the basis for the recording by Yuncker (1943: 21) of "*Arundo donax* L. ... common in clearings and second growth". This Mediterranean grass occurs elsewhere in the CPO but has never been found on Niue, wild or cultivated. Yuncker's error has crept into the *Arundo donax* entry of Clayton and Snow (2010: 36).

***Oplismenus compositus* (L.) P.Beauv. IND**
S — in plantations in or near forest. There are several later collections.
• Yuncker (1943) did not record this species, nor the following one. The pre-European distribution of these two forest grasses across the CPO is unclear but *O. compositus* at least is generally thought to be a widespread native species here.

***Oplismenus hirtellus* (L.) P.Beauv. IND**
S — in an old clearing in forest nr Halagigie Point. There are several later collections.
• As for *O. compositus*, it is a vexed question as to whether this forest grass, widespread now across the CPO, might be native to just some part of this region.

***Paspalum conjugatum* P.J.Bergius. FNI**
Y, S — common in plantations, along roadsides and in waste. There are no later collections.
• This weedy perennial grass of the New World tropics generally favours sites that at least sometimes are quite wet.

***Paspalum dilatatum* Poir. FNI**
Y — occ. in waste. S — in a few plantations, esp. nr Fonuakula. There are no later collections. This weedy perennial grass of the New World tropics also generally favours sites that at least sometimes are quite wet.

***Paspalum orbiculare* G.Forst. incl. *P. thunbergii* Kunth ex Steud. IND**
Y — in taro plantations and waste. S — in pasture at Vaiea Farm, and (as *P. thunbergii*) fairly common in a few inland areas, esp. nr the northwestern villages of Makefu and Tuapa.
• Sykes (1970: 249) thought that this Old World grass might be a recent introduction to Niue. But it is certainly ancient in the CPO—Cook's First Voyage botanists found it in the Society Islands (BM !) and it was found on Tonga during the Second Voyage (Nicolson and Fosberg (2004: 239). It too prefers sites that are periodically very wet, like clay hillsides or poorly drained depressions (hence its English common name, "ditch millet").
• Clayton and Snow (2010: 64) place *P. orbiculare,* but not *P. thunbergii*, into *P. scrobiculatum* L., whose type comes from India.

***Paspalum vaginatum* Sw.** *mōtie kalalahi* **IND**
Y — occ. in waste. S — mostly near the sea on rocky ground, esp. in sheltered places.
• This vigorous mat-forming grass is ancient in the CPO—there are Cook's First Voyage collections from the Society Islands (BM *s.n.*, !). It seems likely to be native to Niue as well. It is now subcosmopolitan in warmer regions, often as an invasive weed of coastal wetlands.
• The first part of the Niuean name is a generic for grasses and similar small plants, and the second part might refer to the usual habitat (*kala* border, *hi* to catch fish from the reef).

***Sorghum halepense* (L.) Pers. FNI**
Y — occ. in waste areas and on rocky cliffs near the sea. S — common along roadsides, in waste, and in a few old pasture areas.
• Whistler (1988: 57) said that F. R. Fosberg had suggested to him that in Western Polynesia this common weedy Old World grass ought to be re-identified as *S. sudanense* (Piper) Stapf, [i.e., *S.* × *drummondii* (Steud.) Millsp. & Chase], since it lacked the notorious, far-spreading rhizomes of *S. halepense*. Such an absence is recorded on one collection from Niue: *Leonard* CHR 309327, coll. 1976, Fonuakula, waste, "no rhizomes on [similar] plants in the area". Clayton and Snow (2010: 84) however accept *S. halepense* as growing on Niue.

***Sorghum arundinaceum* (Desv.) Stapf CAS**
Y as *S. vulgare* non (L.) Pers., S as *S. verticillatum* (Steud.) Stapf — cultivated widely but seemingly wild in only a few places. Sykes (1970: 251) noted that the plant he considered to be *S. verticillatum* was much less common in the wild than his "*S. halepense*" and could be distinguished by its pubescent rather than tomentose spikelets and its lack of rhizomes.
• A tall perennial African grass, *S. verticillatum* is cultivated in the world's tropics especially for its edible seeds and value as a fodder grass.

***Sporobolus indicus* (L.) R.Br. s.l.** *mōtie hikutaha* **FNI**
Y as *Sporobolus elongatus* non R.Br, S as *S. africanus* (Poir.) A.Robyns & Tournay — common in waste and along roadsides, particularly (*f.* Sykes) in the inland basin.
• Clayton and Snow (2010: 47) accept both *S. africanus* and *S. fertilis* (Steud.) Clayton as occurring on Niue. The latter taxon, like the former, is part of the *S. indicus* complex. Native perhaps just to Africa, these grasses are now cosmopolitan weeds.

***Urochloa glumaris* (Trin.) Veldkamp IND**
S as *Brachiaria paspaloides* (Presl) C.E.Hubb. — occ. in disturbed places near the coast.
• Sykes (1970: 235) suggested that this rather inconspicuous grass might also be present "in many plantations" on Niue and in 1975 was able to collect it twice more (CHR *n.v.*). There are however no later collections.
• This Indo-Malesian grass is an ancient species in the CPO and might have been widespread in the region—there is Banks and Solander material (BM 508016 !) from the Society Islands, and early post-European collections from Western Polynesia (Whistler 1988: 47) and Fiji (Seemann (1868: 325, as *Panicum ambiguum* Trin.).

***Urochloa humidicola* (Rendle) Morrone & Zuloaga FNI**
New record, based on *Sykes* 1316/N CHR 282362, coll. 1975, Vaiea Farm, near buildings.
A later collection is: *Waterhouse* 7083 CHR 551715, coll. 2004, Kaimiti [Alofi radio station], widely dominant in unmown grass.

• This grass, native to Central and South America, is widely cultivated in the tropics as a pasture species and probably was introduced to Niue for this reason. It was listed by Gardner (2007: 68) as *U. dictyoneura* (Fig. & De Not.) Veldkamp, which may be a different species and one not present in the Pacific Ocean region (Clayton and Snow 2010: 59).

***Urochloa maxima* (Jacq.) R.D.Webster FNI**
S as *Panicum maximum* Jacq. — persisting in an old pasture trial area, and apparently wild at Vaiea, in a damp waste place. A later collection, from an undoubtedly wild population of this robust weedy African grass, is *Sykes* 1336/N CHR 282382, coll. 1975, Amanau, abundant in waste place at cliff edge.

***Urochloa mutica* (Forsk.) T.Q.Nguyen CAS**
Y as *Panicum purpurascens* Raddi — cultivated as a forage grass. S as *Brachiaria mutica* (Forssk.) Stapf — introduced at least twice, the second time in 1965 to Vaiea Farm, but also growing in waste near Alofi radio station, apparently as a naturalisation from an earlier introduction. There are no later collections of this widespread tropical pasture and fodder grass, which is said to favour dampish sites.

***Urochloa subquadripara* (Trin.) R.D.Webster FNI**
S as *Brachiaria subquadripara* (Trin.) Hitchc. — in a few waste places, mainly in the Alofi area, apparently a relatively recent introduction. A later collection is *Sykes* 1562/N CHR 659657, coll. 2006, Mutulau–Uluvehi, on trackside close to the sea.
• Elsewhere in the Pacific this weedy Indo-Malesian grass is quite frequent in lightly shaded sandy places, e.g., in coconut plantations; perhaps by now it has spread widely on Niue.

**TACCACEAE**
***Tacca leontopetaloides* (L.) Kuntze** *pia* **IND**
***T. pinnatifida* G.Forst.**
Y, S — common all over the island in waste, scrub and forest, but not found close to the sea.
• This robust herb, a famine-food plant that is not cultivated today, seems likely to be ancient across the CPO, even though Nicolson and Fosberg (2004: 250) cite Cook's Voyages material from the Society Islands only.

**ZINGIBERACEAE**
***Curcuma longa* L.** *ago* **IND**
***C. domestica* Valeton**
Y, S — occ. cultivated near houses.
• This robust herb, the turmeric plant, is certainly ancient in the CPO—Nicolson and Fosberg (2004: 252) just cite Cook's Second Voyage material from Easter Island, but Seemann (1868: 291) noted that Solander had recorded it for Tahiti. It appears not to make seed, but in other parts of its range, e.g., Fiji (Smith 1979: 196), it naturalises to a slight degree through the break-up and dispersal of its drought-resistant rhizomes.

***Zingiber zerumbet* (L.) Sm.** *poloi* **IND**
Y, S — common in and near plantations, esp. those in forested areas.
• Like the very similar-looking turmeric, this plant (widely known as the shampoo ginger) makes no seed but can spread a little by break-up of its rhizomes, e.g., in Fiji (Smith 1979: 195). It is an ancient species of the CPO—Drake (1893: 223) and Nicolson and Fosberg (2004: 252) cite Cook's First and Second Voyages material from the Society Islands.

## DISCUSSION

The paragraphs under the five headings below address some significant aspects of Niue's naturalised flora.

### Change in the naturalised flora over time

The naturalisation of 158 flowering-plant species is accepted here, 99 as 'fully naturalised' and 59 as 'casually naturalised'. These are all species whose introduction to Niue occurred in the post-European era. The island also has a number of other wild-growing species that are likely to have been introduced before that time. Some are ancient Polynesian food-plants while others behave as weeds or as plants that might be thought to be rare natives or even members of the primary forest. There are 61 species in this group (not including the 'cultivated-only' species *Aglaia saltatorum*, *Bischofia javanica*, *Crinum asiaticum*, and *Pritchardia pacifica*).

Yuncker (1943) recorded about half the naturalised species accepted here, largely the fully naturalised ones. He collected *Laportea interrupta* (Urticaceae) and *Verbena officinalis* (Verbenaceae), two weedy herbs that have not been seen again. Neither he nor any later person saw *Adenostemma viscosum* (Asteraceae), an 'ancient weed' of the CPO collected just by S. P. Smith in 1901.

Sykes (1970) enlarged Yuncker's list by more than 50 records, about half of them fully naturalised species. Seven of his records (*Antigonon leptopus*, *Asystasia gangetica*, *Citrus aurantifolia*, *Merremia tuberosa*, *Nicotiana tabacum*, *Thunbergia fragrans*, *Zinnia elegans*) were of plants that Yuncker had seen only in cultivation. Sykes also reduced the number of naturalisations Yuncker had recorded, saying that apparently wild individuals of these species were much more likely to be relics of cultivation. In view of the failure of later botanists to bring evidence to the contrary these judgments have been accepted. There are nine species in this group: *Bauhinia monandra*, *Cymbo-pogon nardus*, *Hibiscus rosa-sinensis*, *Hymenocallis littoralis*, *Luffa cylindrica*, *Momordica charantia*, *Nerium oleander*, *Passiflora laurifolia*, and *Proiphys amboinensis*. All are exotics, that is, species native to regions far from the CPO, but (as noted above) there are also four non-naturalised species that have probably been introduced to Niue from closer sources: *Aglaia saltatorum*, *Bischofia javanica*, *Casuarina equisetifolia* and *Crinum asiaticum*.

Whistler (1988) added 16 new naturalisations, most of them based on collections Sykes had made in 1975. They are: *Alysicarpus vaginalis*, *Amaranthus lividus*, *Axonopus fissifolius*, *Bothriochloa bladhii*,

*Chloris barbata*, *Cyperus polystachyos*, *Dactyloctenium aegypticum*, *Echinochloa colona*, *Eleutheranthera ruderalis*, *Euphorbia heterophylla*, *Indigofera suffruticosa*, *Nicandra physalodes*, *Passiflora foetida*, *Ruellia prostrata*, *Stachytarpheta jamaicensis*, and *Youngia japonica*. It seems reasonable to suppose, from their behavior elsewhere in the Pacific, that by now most of them are fully naturalised.

The present article contains nine new records, based largely on collections Sykes made in 1975 and 2006: *Achillea millefolium, Angelonia biflora*, *Aster subulatus*, *Dissotis rotundifolia, Ipomoea fimbrisepala*, *I. hederifolia*, *Operculina ventricosa*, *Senna tora* and *Urochloa humidicola*. Only the aster, senna, and urochloa are judged to have fully naturalised.

### The naturalised ancient crop plants

With the exception of the famine-food plants (*Amorphophallus*, etc.) the members of this group—*Cucumis melo* var. *agrestis*, *Dioscorea alata* and *D. esculenta*, *Lablab purpureus*, *Solanum repandum* and *S. viride*—have all declined in abundance in the wild on Niue, just as they have elsewhere in the Pacific. These plants are candidates for *in situ* conservation.

### The ancient weeds

About half of Niue's putative pre-European weeds are now uncommon, rare or extinct: *Achyranthes aspera*, *Adenostemma viscosum*, *Boerhavia diffusa, Desmodium heterocarpon*, *Hedyotis biflora*, *Hibiscus abelmoschus*, *Laportea interrupta*, *Leucas decemdentata*, *Rorippa sarmentosa, Teucrium vesicarium*, *Urochloa glumaris*, and possibly *Digitaria setigera*, *Glycine tabacina* and *Waltheria indica.*

As exceptions though there seems to be a continuing abundance of other weedy pre-European species: *Abrus precatorius*, *Centella asiatica*, *Chrysopogon acicularis*, *Miscanthus floridulus*, *Phyllanthus virgatus*, *Sida parvifolia*, *Tephrosia purpurea*, and perhaps *Commelina diffusa* and *Urena lobata* too. All are fairly drought-tolerant plants, but not to any obvious degree more so than several listed in the previous paragraph.

### Unexplained absences

A number of Indo-Malesian weeds have long been established in the CPO but have never been found on Niue, e.g., *Cyathula prostrata* (Amaranthaceae), *Ipomoea alba* (Convolvulaceae), *Cyperus cyperinus* (Cyperaceae), and in the Asteraceae *Centipeda minima*, *Dichrocephala integrifolia*, *Glossocardia bidens* (syn. *Glossogyne tannensis*), and *Sigesbeckia orientalis.* With the exception of the first-mentioned these are generally found in quite shady or damp sites. But perhaps sheer lack of competitiveness is also to blame—even in Fiji, with its range of habitats, the last four taxa are uncommon ones (Smith 1991).

Secondly, there are some New World weeds that have spread widely through the CPO in the last hundred or so years but have not yet reached Niue. The milkweed *Asclepias curassavica* (Apocynaceae) is an outstanding example, but most belong to the Asteraceae: *Acmella uliginosa*, *Ageratum houstonianum*, *Erechtites valerianaefolia*, *Elephantopus mollis*, *Struchium sparganophorum*, *Tridax procumbens*, and *Xanthium pungens*. Several require damp habitats but perhaps it is largely Niue's isolation from the main trade and tourist routes that is keeping them out. (Four other weedy daisies have appeared recently in the CPO: *Calyptocarpus vialis* Less., *Emilia fosbergii* Nicolson, *Erigeron bellioides* DC. and *Sphagneticola trilobata* (L.) Pruski. One of the last places they get to here may well be Niue).

### The climatically anomalous species

Lastly, a striking feature of Niue's weed flora is the abundance of the temperate-zone *Plantago lanceolata*, along with the recent successful establishment of two flatweed daisies that *P. lanceolata* often grows with in cooler parts of the world, *Leontodon taraxacoides* and *Taraxacum officinale*. Also in this category, that is, of plants rarely found weedy in the humid tropics, are *Achillea millefolium*, *Foeniculum vulgare*, *Lepidium virginicum* and *Verbena officinalis*.

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## APPENDIX 1. Botanical History

European discovery of Niue was made by James Cook in HMS *Resolution* on 20 June 1774, during his Second Voyage of exploration into the southern regions of the world (Robson 2000). On board were the two official naturalists, Johann Reinhold Forster and his son George, and an assistant, Anders Sparrman, a former pupil of Linnaeus, who had come on board at the Cape of Good Hope. In addition, surgeon's mate William Anderson had begun to make collections of his own (Beaglehole 1961; Nicolson and Fosberg 2004).

On the day after the island was sighted three brief landings were made on its western side, first at a coastal chasm north of Makapu Point and then in the vicinity of Opaahi, just south of where the wharf of the island's capital, Alofi, is now situated (Pointer 2015). The disputed nature of these landings (which led Cook to name Niue "Savage Island") meant that just a few, coastal plants were got that day: *Bikkia tetrandra*, *Hedyotis foetida*, *Heliotropium anomalum*, *H. foertherianum* (syn. *Argusia argentea*), *Ochrosia oppositifolia*, *Scaevola sericea*, *Timonius polygamus* and *Xylosma orbiculata* (Nicolson and Fosberg 2004). Niue is the type locality for the *Bikkia*, *Ochrosia*, and *Xylosma* species. At BM there is also a *"*Savage Island *Captain Cook"* collection of *Dendrobium biflorum* (Nicolson and Fosberg 2004: 206). This orchid is more usually found today in the forests of Niue's interior, so perhaps the collection actually belongs with the dozen or so *Forster* sheets of the plant from the Society Islands.

Few Niuean collections were made in the next 150 years. According to St John (1976) a certain Frits Jensen, who was associated with missionary and amateur naturalist Samuel Whitmee of Samoa, collected from Niue in 1876. His collections are at BM. It appears though that some of them, in particular those without a collector's number, were actually obtained elsewhere, perhaps mainly from the island of Lifu (Lifou) in the Loyalty Islands far to the west (Whistler 1984; Mabberley 1990). But the latter authors also conclude that numbered *Jensen* specimens might well come from Niue. In the BM database at present (May 2020) the highest *Jensen* collecting number is 56, for a specimen of *Eulophia pulchra*, an orchid which does grow on the island. At the time of writing (May 2020) not all of Jensen's collections appear on that database.

In June 1877 the New Zealand sea-trader Henry Abott Mair (1836–1881), collected ferns (but no higher plants) from Niue. This was during the "Victorian fern craze" era, and Mair might have been intending to sell his collections to a curio dealer, like Eric Craig of

Auckland (Goulding 1977). But he was soon to lose his life while labour-recruiting on Vanuatu, and in some way his specimens eventually came to AK.

In 1899 American icthyologist Dr H. F. Moore visited Niue for a day or so during the Pacific cruise of the U.S. Commission of Fish and Fisheries Steamer *Albatross* (notable for providing geologist Alexander Agassiz the chance to study at first hand the 'coral-reef problem'; Agassiz 1900). Moore made 28 collections on Niue (his 382 to 409, at the U.S. National Herbarium). A failure to write label notes deprives us of knowing, for example, whether his find of *Verbena officinalis* was made from a garden plant or a naturalisation.

In the acknowledgments accompanying his *Flora of Niue* Yuncker (1943: 13) thanked F. R. Fosberg for providing him with a list of Niue species "collected by H. F. Moore and P. H. Metcalf [*sic*] which he discovered in the US National Herbarium". This list has not been relocated, and no Metcalf(e) specimens appear in the current US database. This collector seems likely to be Peter Herbert Metcalfe 1854–1913, medical doctor and naturalist on Norfolk Island (who, for example, donated insects from that island to the Smithsonian Institution in 1884). What is not clear is whether Metcalfe himself was on Niue in 1899 and assisted with Moore's collecting, or whether he had collected separately at some other time, or whether the specimens referred to were actually from Norfolk Island.

A substantial contribution was made in 1901 by New Zealand's Stephenson Percy Smith. A senior civil servant who had newly retired as Surveyor General and Secretary for Lands and Mines, Smith was persuaded by his government to go as Resident Agent to Niue and help prepare a Constitution for the island. In his stay of nearly four months he collected c. 100 specimens, which are deposited at AK. A capable amateur ethnologist and historian, he published his observations on Niue the following year (Smith 1902) and subsequently co-authored a dictionary that contains numerous Niuean plant-names (Tregear and Smith 1907).

In January and February of 1940 T. G. Yuncker of DePauw University, U.S.A., made an extensive collection from Niue. This is now housed at BISH (only a portion currently data-based) and US. From his specimens and a loan of pieces extracted from Smith's AK material he was then able to write the island's first Flora (Yuncker 1943).

In September to November of 1965 W. R. Sykes of the Botany Division, DSIR, New Zealand, visited Niue and subsequently published an updated Flora (Sykes 1970). A second visit was made in September 1975, and a third in September and October 2005. Currently, the CHR database contains 1118 Niuean *Sykes* collections but since the highest such number to be found here is 1562 there must still be material yet to be data-based. Note that Sykes used a new set of numbers, each starting from 1, for the collections he made in various parts of the world, so a search for a collection of his from Niue needs to include either this place-name or "/N" after the number.

American botanist W. A. Whistler visited the island in 1981, 1984 (a single specimen at US), 1997, 2003 and 2013, and had c. 200 specimens from there in his private herbarium and at BISH, HAW, PTBG and US (Whistler pers. comm., c. 2013).

In 2005 the present author visited for three weeks in May-June and collected c. 100 numbers (AK, CHR and elsewhere). Other collectors, and the locations of their relatively few collections are: English traveller in the Pacific Mrs. D. V. G. Woods (coll. 1959; AK), New Zealand soil scientist A. C. S. Wright (coll. 1949, 1965; CHR), New Zealand entomologist P. A. Madison (coll. 1975; CHR), New Zealand plant pathologist R. A. Fullerton (coll. 1975; AK), Hawaiian mycologist N. L. H. Krauss (coll. 1978; BISH), American marine biologist G. Paulay (coll. 1986; US), herbarium technician J. Herrick (coll. 1994; AK), Hawaiian botanist T. Flynn (with others, coll. 2000; BISH), Australian botanist B.M. Waterhouse (coll. 2004; BISH, BRI, CHR), New Zealand ecologist L. Burrows (coll. 2015; CHR); also several (sometimes anonymous) New Zealand or Niuean civil servants, such as agricultural or medical officers (various dates; CHR).

Although he did not collect plants, New Zealand civil servant J. M. McEwen's contribution must also be mentioned. McEwen, a fluent speaker of Maori, was Resident Commissioner on Niue from 1953 until 1956, and with assistance from knowledgeable Niueans, in particular Mr Leslie Richmond Rex, he subsequently published a dictionary of the Niuean language (J. McEwen 1970; M. McEwen 2016). Although he deprecated this as being "a sad disappointment to professional linguists" it is still very useful to naturalists and others who might mainly need to know Niuean vocabulary.

A larger, bilingual Niuean dictionary has been produced under the editorship of New Zealand linguist W. B. Sperlich (1997). Its plant-name entries, including some not found in Sykes (1970), are grouped together in its English to Niuean index under "plant", but the Niuean entries sometimes give more descriptive or ethnobotanical information, as for example: "**titania** n. [biblical] A plant, tare [*sic*](an injurious corn weed as used in the Bible, but also said to occur on Niue, described as a thorny creeping weed".

## APPENDIX 2. Possible Limitations of the Cook's Voyages Data

Merrill (1941, 1954) emphasized some uncertainties with respect to the Cook's Voyages specimens, manuscripts and publications. He pointed out that "more than a dozen [in fact, many more; Quanchi and Robson 2005] Spanish, Dutch, English and French explorers" had passed through the Pacific before Cook. Critically, Tahiti was discovered by Europeans (Samuel Wallis) in 1764 and then by Bougainville in 1768, the year before Cook's

First Voyage arrived there. Conceivably those two visits could have introduced weeds into the Societies, as fruit, or seed on persons or animals, or in discarded bedding, etc. And the related question is: could weeds have been introduced there by Cook's First Voyage, to muddle the Second Voyage records?

The most likely candidates here would be plants of warmer regions, and for this reason Wallis's voyage, which stopped only briefly on the coast of southern Argentina, can probably be ruled out. Bougainville's expedition though stayed nearly half a year in Rio de Janeiro (c. 23°S), and Cook's First Voyage stayed a week in Madeira (33° N), restocking provisions and collecting plants.

With respect to the flora of Madeira in the late 18th C., none of the plants known to have occurred on this island at that time (Nicolson and Fosberg 2004; Francisco-Ortega *et al.* 2015) seem to have turned up in the Societies for the Second Voyage to find. However, there are two weedy species that Bougainville might possibly have brought into the Pacific. The first is *Physalis angulata* (Solanaceae). This is a New World plant but was found by Cook's First and Second Voyages in the Societies (Nicolson and Fosberg 2004: 645). The second is the Old World species *Amaranthus tricolor* (Amaranthaceae), found in the Societies by the Second Voyage but not by the First (Nicolson and Fosberg 2004: 263), and apparently not found anywhere further westwards at that time (although it was present on Amboina in the mid-17th C.; Merrill 1917: 213). Perhaps this plant had already spread to the Brazil by the time Bougainville got there and was taken on by him from there. Under this scenario the First Voyage would have missed it because not enough time had elapsed for it to appear as a conspicuous Tahitian weed.

With respect to the western part of the CPO, we could imagine that the value of the Cook's Second Voyage collections from Tonga might have been compromised by Abel Tasman's discovery and stay on Tongatapu in 1643. His voyage set out from Batavia and spent a month on the tropical island of Mauritius before reaching the CPO. Two Old World weeds, *Bidens biternata* (Asteraceae) and *Coix lacryma-jobi* (Poaceae), and one New World species, *Teucrium vesicarium* (Lamiaceae), might be implicated here—see the main text for details.

The other aspect of Merrill's thought was that weeds from the New World could have entered the Pacific from the west, via the "Spanish Galleon" route out of Acapulco to Guam and Manila, a path travelled from the mid-1550s onwards for two centuries or so. He contended that these would be able to spread rapidly in the Pacific, to give the impression to 18th C. visitors that they were native there.

But in fact, Cook's Second Voyage found no conspicuous presence of New World weeds in Tonga and Vanuatu, with the exceptions of *Teucrium vesicarium* (noted above) and *Ageratum conyzoides* (Asteraceae)—see the main text for detail. Also, numerous counterexamples exist, of weedy species (from both hemispheres) that were present in Amboina in the mid-17th C. and Southeast Asia or the Philippines a century later but were not found in Tonga, Samoa or Fiji by the first collectors there, e.g., *Abutilon indicum*, *Acmella uliginosa*, *Amaranthus spinosus*, *Crotalaria retusa*, *Senna alata*, *Senna tora*, *Talinum paniculatum*, and *Triumfetta rhomboidea* (Merrill 1917, 1918; Smith 1981, 1985, 1991; Whistler 1988).

In summary then, the usefulness of the Cook's Voyages records is largely confirmed.

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