New Zealand Journal of Botany

ISSN: (Print) (Online) Journal homepage: www.tandfonline.com/journals/tnzb20

Additions to the naturalised vascular flora of the Kingdom of Tonga

Peter B. Heenan

To cite this article: Peter B. Heenan (18 Mar 2024): Additions to the naturalised vascular flora of the Kingdom of Tonga, New Zealand Journal of Botany, DOI: 10.1080/0028825X.2024.2327610

To link to this article: https://doi.org/10.1080/0028825X.2024.2327610

Published online: 18 Mar 2024.

NEW ZEALAND JOURNAL OF BOTANY
https://doi.org/10.1080/0028825X.2024.2327610

Taylor & Francis
Taylor & Francis Group

RESEARCH ARTICLE

Additions to the naturalised vascular flora of the Kingdom of Tonga

Peter B. Heenan

Allan Herbarium, Manaaki Whenua Landcare Research, Lincoln, New Zealand

ABSTRACT

Nineteen new records of flowering plants naturalised in the Kingdom of Tonga are recognised, with the majority of these present in the southern islands of ʻEua and Tongatapu. These records comprise earlier but unpublished collections made by G. P. Buelow and W. R. Sykes, and also collections made in 2023. These records are from seven families, with Asteraceae comprising seven species and Fabaceae and Lamiaceae three each. Basellaceae includes two new records, *Anredera cordifolia* (Ten.) Steenis and *Basella alba* L. The invasive *Anredera* was well-established at the location at which it was collected on ʻEua and may pose a threat to the indigenous tropical forest in ʻEua National Park. Many of the other new records are smaller-growing herbaceous species which are likely to have minimal environmental impact as they predominantly occur in disturbed waste places among other weed species. While some of the species listed here were previously recorded as observations in checklists, it has been difficult to locate herbarium vouchers supporting these records and so the vouchers reported here are a provisional first record for these.

ARTICLE HISTORY
Received 19 December 2023
Accepted 29 February 2024

HANDLING EDITOR
Lara Shepherd

KEYWORDS
Anredera cordifolia; *Basella alba*; *Dysphania ambrosioides*; invasive species; Tonga; naturalised flora; *Pseudognaphalium luteoalbum*; *Sonchus arvensis*; *Symphyotrichum ericoides* var. *ericoides*; weeds

Introduction

The Kingdom of Tonga comprises 170 limestone, coral and volcanic islands placed into three broad geographic groups of Tongatapu, Vavaʻu and Haʻapai distributed over latitudes 15°–23° and longitudes 173°–177°. The indigenous, naturalised and some of the cultivated vascular plant flora has been documented by Yuncker (1959; reprinted 1971) who recognised 71 species of fern and 630 flowering plants. The total number of naturalised plants recorded by Yuncker are not clear, with uncertainty around whether some species are Polynesian Introductions, more recently naturalised, or indigenous plants with weed-like tendencies. Subsequent descriptions of the flora have included checklists of a particular island (e.g. Late, Sykes 1981) or group of islands (e.g. Vavaʻu, Atherton et al. 2014), taxonomic groups such as ferns of ʻEua (Sykes 1978), orchids (Cribb and Whistler 2011) and grasses (Clayton and Snow 2010), along with ecological studies (e.g. Whistler 1992a; Wiser et al. 2002). Some of the recent literature has been focussed on the naturalised flora. Space and Flynn (2001) list and evaluate invasive species that are present or have the potential to be a risk to Tonga, Suzuki et al.

CONTACT Peter B. Heenan heenanp@landcareresearch.co.nz

(2007) document 11 new weed records for Tonga and additional range expansions within the archipelago, and Atherton et al. (2014) recognise 19 weed species as new records for Tonga from islands of the Vava‘u group.

The latest contribution is a checklist of the indigenous and naturalised flora that brings together a suite of disparate literature into an excel spreadsheet (Fall and Drezner 2019). This checklist is an important contribution, but the inclusion of both accepted and some synonymous names and omission of relevant literature (e.g. Suzuki et al. 2007; Atherton et al. 2014) is unfortunate. Fall and Drezner (2019) document 427 species naturalised in Tonga.

This paper is a further contribution to the naturalised flora of Tonga in documenting 19 species newly recognised from the archipelago. These 19 species are treated as the single broad category of naturalised whereby they form a wild population(s) self-maintained by seed or vegetative reproduction (following Webb et al. 1988). The categories casual or adventive for collections which are known to be new naturalisations that haven't become widely established, or garden plants regenerating spontaneously in their immediate vicinity, are not applied as a more thorough and extensive weed survey is required to establish the distribution and abundance of the new records presented here.

Materials and methods

Seventeen days (21 October–6 November 2023) were spent in Tonga while the author attended a Pacific region 4-day Climate Smart Agriculture Workshop in Nuku‘alofa, Tongatapu (23–26 October). The days outside of this were personal holiday. Field work observing and making opportunistic collections of weeds was undertaken on a daily basis, albeit for varying amounts of time each day. For the majority of the stay I was based on Tongatapu but also visited Pangaimotu (28 October) and ‘Eua (31 October–2 November) Islands. Approximately 100 collections of plant specimens were made and have been lodged in Allan Herbarium (CHR). These specimens have been digitised and images are available at Allan Herbarium in the Specimens Collection Data website (https://scd.landcareresearch.co.nz/).

Also available for study are specimens deposited in Allan Herbarium (CHR) that were collected from Tonga by G. P. Buelow during 1977–1983, but he did not publish any research based on these collections. W. R. Sykes visited Tonga between 1977 and 1997 also deposited his specimens in CHR, with his early collections being the basis for his fern study of ‘Eua (Sykes 1978) and a vegetation study of Late (Sykes 1981).

All names listed here were further investigated in Plants of the World Online (POWO; https://powo.science.kew.org) and Global Core Biodata Resource (GBIF; https://GBIF.org) for nomenclatural and distributional information, respectively. Fall and Drezner (2019) provides a useful compendium of most of the botanical literature relating to Tonga plants and was checked for all names. While some of these names in GBIF, POWO and Fall and Drezner (2019) give Tonga for the distribution, the list presented here is the first published record for several names based on herbarium voucher(s). In this regard, it should be noted that some of the naturalised species reported for Tonga in GBIF and by Fall and Drezner (2019) are not supported by herbarium vouchers but are merely observational records. While less than satisfactory, this approach is

understandable as these observational records are important contributions to understanding the flora and reflect the typically limited resources available for field work, research, herbarium collections and publications. A major limitation of not having herbarium vouchers is that the plant material to which the name refers cannot be subsequently checked and have an assessment of its taxonomic status or a nomenclature update.

New naturalised flora records

Amaranthaceae

Dysphania ambrosioides (L.) Mosyakin & Clemants

Biostatus: Naturalised; new record for Tonga.

Tonga distribution: ʻEua.

Voucher: old soil heap, Nafanua Wharf, Ohonua, ʻEua, Tonga, 2 November 2023, *P. B. Heenan s.n.*, CHR 662870.

Natural distribution: North, Central and South America.

Notes: Plants scattered over old soil heaps at Nafanua Wharf. Known from other Pacific Island countries and territories (PIER 2024).

Asteraceae

Cosmos sulphureus Cav.

Biostatus: Naturalised; new record for Tonga.

Tonga distribution: Tongatapu.

Voucher: next to main road in Tokomololo, Tongatapu, Tonga, 17 April 1978, *G. P. Buelow 246*, CHR 377639.

Natural distribution: Mexico to Central America.

Notes: Plants growing along the roadside.

Gamochaeta pensylvanica (Willd.) Cabrera

Biostatus: Naturalised; new record for Tonga.

Tonga distribution: Tongatapu.

Vouchers: in cow pasture, 2–3 m, south of Tokomilolo village, Tongatapu, Tonga, 23 September 1978, *G. P. Buelow 1504*, CHR 361275/AK378118; next to Mateialona Road, 1–2 m, Kolofoʻou, Tongatapu, Tonga, 17 October 1978, *G. P. Buelow 1572*, CHR 361328/AK378117.

Natural distribution: Tropical and subtropical North, Central and South America.

Pseudognaphalium luteoalbum (L.) Hilliard & B. L. Burtt

Biostatus: Naturalised; new record for Tonga.

Tonga distribution: ʻEua, Tongatapu.

Vouchers: near Kolivai Beach, Haʻatafu, Tongatapu, Tonga, 9 November 1997, *W. R. Sykes 920/T*, CHR 515589; bare ground in garden, Alaivahamamaʻo Bypass Road, Nukuʻalofa, Tongatapu, Tonga, 5 November 2023, *P. B. Heenan s.n.*, CHR 662846; stony ground on Vuna Road footpath, near Royal Palace of Tonga, Nukuʻalofa,

Tongatapu, 5 November 2023, *P. B. Heenan s.n.*, CHR 662832; disturbed gravels in car park of Malau Building, Pangai, ʻEua, Tonga, 31 October 2023, *P. B. Heenan s.n.*, CHR 662844; access track, Rock Garden Coral Formations, southern ʻEua, Tonga, 31 October 2023, *P. B. Heenan s.n.*, CHR 662833.

Natural distribution: Africa, Europe, Asia and Oceania.

Notes: The first collection of *P. luteoalbum* sens. lat. from Tonga is Sykes 920/T (CHR 515589) from Tongatapu, but this record has not previously been published. Additional collections from Tongatapu have been made in Nukuʻalofa and these are reported here, along with two collections from ʻEua (Figure 1).

Smissen et al. (2022) included Sykes 920/T from Tongatapu in their DNA phylogeny of the *Pseudognaphalium luteoalbum* complex. In this study, Sykes 920/T grouped with plants known to have red-florets and treated as *P. luteoalbum* sens. str. (Smissen et al. 2022, clade B). These authors referred yellow-floret plants from New Zealand to *P. lanatum* (G. Forst) (Smissen et al. 2022, clade A). In terms of biostatus, these authors treated *P. luteoalbum* sens. str. as introduced to New Zealand since it mostly occurs in urban and peri-urban areas, and *P. lanatum* was considered indigenous as it occurs in populations mostly associated with natural indigenous vegetation. There were some samples in clade A and clade B for which flower colour was not known. Since Sykes 920/T from Tongatapu is a member of the red-floret clade B and red-floret plants were observed on ʻEua (e.g. CHR 662833; pers. obs.), *P. luteoalbum* sens. str. is accepted for Tonga as naturalised. It is notable that POWO (https://powo.science.kew.org; accessed 5 November 2023) gives the native range of *P. luteoalbum* as Africa, Europe, Asia and Oceania, but they do not recognise *P. lanatum*.

Sonchus arvensis L.

Biostatus: Naturalised; new record for Tonga.

Tonga distribution: Tongatapu.

Vouchers: wharf, Nukuʻalofa, 27 November 1997, *W. R. Sykes 1200/T*, CHR 515864/AK 365334/BISH 730033/BISH 730036; bare ground, Tsunami Rock, Tongatapu, Tonga, 3 November 2023, *P. B. Heenan s.n.*, CHR 662820; makatea platform, beach west of Kolovai, Tongatapu, Tonga, 3 November 2023, *P. B. Heenan s.n.*, CHR 662821; rocky outcrop, Captain Cook Landing Site, Taufaʻahau Road, Alaki, Tongatapu, Tonga, 4 November 2023, *P. B. Heenan s.n.*, CHR 662822/CHR 662823.

Natural distribution: Europe to Siberia and Caucasus.

Notes: Although collected from several sites on Tongatapu, *S. arvensis* was only present in small numbers and never abundant. At all locations it occurred with *S. oleraceus* (Figure 1). Previously listed by Swarbrick (1997) as occurring in Tonga.

Symphyotrichum ericoides (L.) G. L. Nesom var. *ericoides*

Biostatus: Naturalised; new record for Tonga.

Tonga distribution: Tongatapu.

Vouchers: east of Nukuʻalofa, Tongatapu, 20 February 1987, *Art Whistler 6089*, CHR 433891; Vuna Road Cemetery, Nukuʻalofa, Tongatapu, 27 November 1997, *W. R. Sykes 1197/T*, CHR 515861; rough ground and a neglected part of a residential garden, Alaiva-hamamalʻo Bypass Road, Nukuʻalofa, Tongatapu, Tonga, 5 November 2023, *P. B. Heenan s.n.*, CHR 662828.

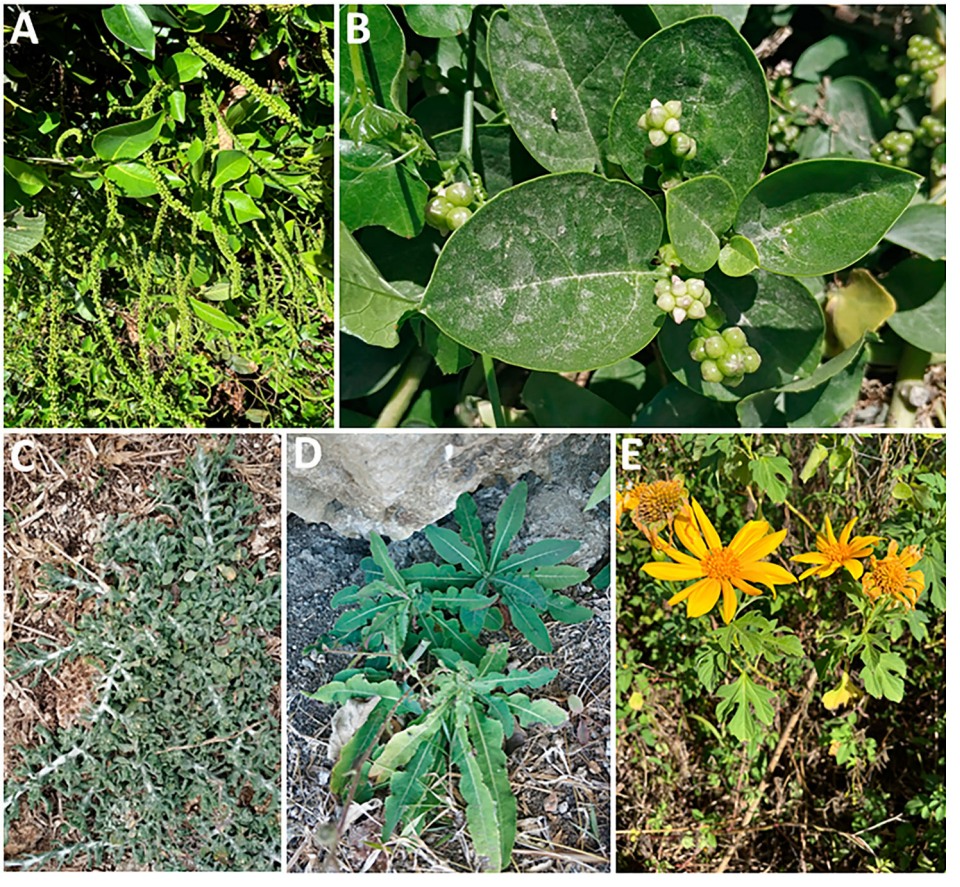

Figure 1. Newly recorded naturalised plants of Tonga. **A,** *Anredera cordifolia*, Fangatave Caves track, ʻEua. **B,** *Basella alba*, Nukuʻalofa, Tongatapu. **C,** *Pseudognaphalium luteoalbum*, Rock Garden Coral Formations, ʻEua. **D,** *Sonchus arvensis*, Tsunami Rock, Tongatapu. **E,** *Tithonia diversifolia*, near Nafanua Wharf, ʻEua.

Natural distribution: Central and eastern Canada, United States of America, and Mexico.

Notes: It was also observed during November 2023 in a disused carpark near the Royal Palace of Tonga, Nukuʻalofa, but was not collected. Previously reported, apparently without a voucher, from Kao and Tofua (Park and Whistler 2001, as *Aster subulatus* Steud.).

Tithonia diversifolia (Hemsl.) A. Gray

Biostatus: Naturalised; new record for Tonga.

Tonga distribution: ʻEua.

Vouchers: near Taʻanga Bakery, just north of Nafanua Wharf, ʻEua, 1 November 2023, *P. B. Heenan s.n.*, CHR 662839; near Taʻanga Bakery, just north of Nafanua Wharf, ʻEua, 1 November 2023, *P. B. Heenan s.n.*, CHR 662840.

Natural distribution: Mexico to Central America.

Notes: On ‘Eua, near Ta‘anga Bakery, naturally established adult plants and seedlings were locally common in wasteland (Figure 1). Previously stated by Whistler (1991) as being naturalised in Tonga, but no particular island group is referenced, or voucher known. Listed by Space and Flynn (2001) as being from Vava‘u Group but it is uncertain whether it is cultivated or a casual naturalisation, and a voucher is not cited. Known from other Pacific Island countries and territories (PIER 2024).

Tithonia rotundifolia (Mill.) Blake

Biostatus: Naturalised; new record for Tonga.

Tonga distribution: Tongatapu.

Voucher: Ancient Cemetery, Taufa‘ahau Road, Lapaha, Tongatapu, Tonga, 4 November 2023, *P. B. Heenan s.n.*, CHR 662831.

Natural distribution: Mexico to Central America.

Notes: Listed by Whistler (1991) as being from Tonga, but no voucher or specific location was stated. A voucher from Hango, ‘Eua (*G. P. Buelow 1821*, 21 February 1979, CHR 398657) is uncertain as to its biostatus, as it is stated to be either an ‘escape or persistant ornamental at edge of waste area near house’.

Basellaceae

Anredera cordifolia (Ten.) Steenis

Biostatus: Naturalised; new record for Tonga.

Tonga distribution: ‘Eua, Tongatapu (?).

Vouchers: Growing on fence, U. S. P. Center, Nuku‘alofa, Tongatapu, Tonga, *G. P. Buelow 127*, 21 February 1978, CHR 361385/AK377900; Fangatave Caves track, ‘Eua, Tonga, 1 November 2023, *P. B. Heenan s.n.*, CHR 662826.

Natural distribution: Tropical South America to northern Argentina.

Notes: On ‘Eua, *A. cordifolia* was well-established locally and climbing rampantly over mature plants of the invasive *Psidium guajava* L. (Myrtaceae) (Figure 1). *Anredera cordifolia* is established in other Pacific Island countries (Starr et al. 2003; Sykes 2016), and has the potential to pose considerable risks to the tropical forest ecosystems of ‘Eua National Park. It is recommended that there should be further survey for *A. cordifolia* to determine the extent and impact of the species on ‘Eua and if necessary a management strategy written for its control/eradication. Known from other Pacific Island countries and territories (PIER 2024).

The Nuku‘alofa, Tongatapu, collection growing on a fence was stated by G. P. Buelow to be ‘probably an escape’, so there is some uncertainty this collection is actually naturalised.

Basella alba L.

Biostatus: Naturalised; new record for Tonga.

Tonga distribution: Tongatapu.

Voucher: along roadside, Alaivahamama‘o Bypass Road, Nuku‘alofa, Tongatapu, Tonga, 30 October 2023, *P. B. Heenan s.n.*, CHR 662874.

Natural distribution: Old World tropical regions, but long cultivated in the New World (Sykes 2016).

Notes: Growing on a weedy roadside verge where it had formed a dense patch (Figure 1). Distributed elsewhere in the Pacific (PIER 2024), such as Cook Islands where it is noted to regenerate freely from seed (Sykes 2016). It may therefore become more widely established in Tonga.

Euphorbiaceae

Euphorbia peplus L.

Biostatus: Naturalised; new record for Tonga.

Tonga distribution: Tongatapu.

Vouchers: semi shade, coral sand by grave stones, Nukuʻalofa, Tongatapu, Tonga, 19 July 1977, *W. R. Sykes 846/T*, CHR 318280; south of Talamahu Market, Unga Road, Nukuʻalofa, Tongatapu, Tonga, 15 September 1978, *G. P. Buelow 1498*, CHR 359779; Haʻatoka Cemetery, backside Pea and Tokomololo, Tongatapu, Tonga, 15 September 1978, *G. P. Buelow 1496*, CHR 359777; cemetery W of the Palace, Tongatapu, Tonga, 9 November 1987, *A. Whistler 6111*, US 3126766; Vuna Road cemetery, Nukuʻalofa, Tongatapu, Tonga, 27 November 1997, *W. R. Sykes 1198/T*, CHR 515862/BISH 753019; Liku Road, near entrance to Vaini Research Station, Tongatapu, Tonga, 8 July 2001, *T. W. Flynn & J. Space 6837*, US 3429622.

Natural distribution: Mediterranean to Somalia, Europe and western Himalaya.

Notes: Described as 'locally abundant' by Buelow 1496 and Sykes 846/T. Known from other Pacific Island countries and territories (PIER 2024). Listed in PIER (2024) as being present in Tonga based on an unpublished checklist (Whistler 1992b) and voucher specimens.

Fabaceae

Medicago lupulina L.

Biostatus: Naturalised; new record for Tonga.

Tonga distribution: Tongatapu.

Vouchers: Tonga Club, Nukuʻalofa, Tongatapu, Tonga, 7 August 1958, *V. Ilolahia 70*, BISH 41222; weed in lawn, Alaivahamamaʻo Bypass Road near intersection with Tupoulali Road, Nukuʻalofa, Tongatapu, Tonga, 16 September 1978, *G. P. Buelow 1502*, CHR 361273; Nukuʻalofa, Tongatapu Island, Tonga, 24 July 1988, *A. E. Wright 8350*, AK 184803.

Natural distribution: Macaronesia, Europe to Caucasus, Tropical Africa to Arabian Peninsula, Indian Subcontinent to China.

Notes: Listed in PIER (2024) as being present in Tonga based on an unpublished checklist (Whistler 1992b) and voucher specimens.

Medicago polymorpha L.

Biostatus: Naturalised; new record for Tonga.

Tonga distribution: Tongatapu.

Vouchers: Pangai field by Palace, Nukuʻalofa, Tongatapu, Tonga, 4 August 1958, *V. Ilolahia 82*, BISH 41261; Nukuʻalofa, Tongatapu, Tonga, 27 January 1959, *E. Soakai 323*, BISH 749725; weed in lawn, at house near Vaiola Motuʻa and

U. S. P. Center, Nukuʻalofa, Tongatapu, Tonga, 15 September 1978, *G. P. Buelow 1497*, CHR 359778; Tongatapu Island, Tonga, 31 July 1981, *Setchell, W. A. et al. 15324*, BISH 155038.

Natural distribution: Macaronesia, Europe to Central Asia and western Nepal, Tropical Africa to Arabian Peninsula.

Notes: Listed as being present in Tonga by Whistler (1988).

Trifolium repens L.

Biostatus: Naturalised; new record for Tonga.

Tonga distribution: Tongatapu.

Vouchers: Grass runway, Fuaʻamotu Airfield, Tongatapu, 4 August 1958, *L. E. Lawrence s.n.*, CHR 525731; cut field, Fuaʻamotu Airport, 29 January 1980, *G. P. Buelow 2349*, CHR 392072/BISH 490424.

Natural distribution: Macaronesia, Africa, Egypt to Zimbabwe, Europe to Mongolia and Himalaya.

Lamiaceae

Mentha requienii Benth.

Biostatus: Naturalised; new record for Tonga.

Tonga Distribution: Tongatapu.

Vouchers: Alaivahamamaʻo Bypass Road, Nukuʻalofa, Tongatapu, Tonga, 30 October 2023, *P. B. Heenan s.n.*, CHR 662837; Alaivahamamaʻo Bypass Road, Nukuʻalofa, Tongatapu, Tonga, 5 November 2023, *P. B. Heenan s.n.*, CHR 662838.

Natural distribution: Corsica, Sardegna and Italy.

Notes: Spreading through a damp lawn and damp ground on the shaded side of a house.

Mentha spicata L. subsp. *spicata*

Biostatus: Naturalised; new record for Tonga.

Tonga Distribution: Tongatapu.

Voucher: Alaivahamamaʻo Bypass Road, Nukuʻalofa, Tongatapu, Tonga, 5 November 2023, *P. B. Heenan s.n.*, CHR 662835.

Natural distribution: Europe to China.

Notes: Spreading around a garden with several clumps presumably established from broken pieces of plant. This form of *M. spicata* subsp. *spicata* is referred to as Winter mint, and is distinguished by being evergreen all year and its leaves with a rugose surface (Webb et al. 1988).

Ocimum tenuiflorum L.

Biostatus: Naturalised; new record for Tonga.

Tonga distribution: Tongatapu.

Vouchers: Alaivahamamaʻo Bypass Road, Nukuʻalofa, Tongatapu, Tonga, 4 November 2023, *P. B. Heenan s.n.*, CHR 662836; Alaivahamamaʻo Bypass Road, Nukuʻalofa, Tongatapu, Tonga, 6 November 2023, *P. B. Heenan s.n.*, CHR 662830.

Natural distribution: Tropical and subtropical Asia to western Pacific.

Notes: Spreading around a garden with several young plants established from seed from a nearby cultivated plant.

Oxalidaceae

Oxalis debilis Kunth

Biostatus: Naturalised; new record for Tonga.

Tonga distribution: Tongatapu.

Vouchers: weedy area at Tupou H[igh] S[chool], Nuku'alofa, Tonga, 5 June 1978, *G. P. Buelow 782*, CHR 360858; grass lawn between Palace wall and footpath, Vuna Road, near Royal Palace of Tonga, Nuku'alofa, Tongatapu, Tonga, 5 November 2023, *P. B. Heenan s.n.*, CHR 662834.

Natural distribution: Central America and northern South America.

Notes: The collection (CHR 662834) from near the Royal Palace of Tonga was from scattered plants growing along about 50 m of lawn.

Oxalis thompsoniae Conn & Richards

Biostatus: Naturalised; new record for Tonga.

Tonga distribution: Niuatoputapu Island.

Voucher: north east of Fo'imoa Ridge, Niuatoputapu Island, Tonga, 21 August 1978, *G. P. Buelow s.n.*, CHR 377617A.

Natural distribution: Papua New Guinea, Australia, Lord Howe Island and New Zealand.

Notes: Recorded as occurring in a sparsely wooded area and frequent throughout the island.

Segregated from *O. corniculata* L. by Conn and Richards (1994), a species that also occurs on Tongatapu Island (e.g. *A. E. Wright 8107*, CHR 450096) and 'Eua (e.g. *W. R. Sykes 92/T*, CHR 317078B). Given the natural distribution of *O. thompsoniae* in Papua New Guinea and Lord Howe Island, it is possible it is also indigenous to Tonga.

Acknowledgements

I thank Siua Halavatau and Sione Foliaki for the invitation to attend the Climate Smart Agriculture Workshop in Nuku'alofa which enabled the extended visit to Tonga. The collecting efforts in Tonga of Gary Buelow and Bill Sykes are also acknowledged as their unpublished herbarium vouchers deposited in CHR have been an invaluable source of information for the flora of Tonga. Ines Schoenberger is thanked for discussion and providing information on G. P. Buelow. Two anonymous referees are thanked for their comments on the draft manuscript.

Disclosure statement

No potential conflict of interest was reported by the author(s).

Funding

This work was supported by Ministry of Business, Innovation and Employment.

References

Atherton J, McKenna SA, Wheatley A. 2014. Rapid biodiversity assessment of the Vava'u archipelago, Kingdom of Tonga. Apia, Samoa: SPREP.

Clayton WD, Snow N. 2010. A key to Pacific grasses. Royal Botanic Gardens, Kew: Kew Publishing.

Conn BJ, Richards PG. 1994. A new species of *Oxalis* section *Corniculatae* (Oxalidaceae) from Australasia. Australian Systematic Botany. 7:171–181. doi: 10.1071/SB9940171.

Cribb PJ, Whistler WA. 2011. The orchids of Tonga, Niue, and the Cook Islands. Lankesteriana International Journal on Orchidology. 11:99–177.

Fall PL, Drezner TD. 2019. Vascular plant species of the Kingdom of Tonga by vegetation type, species origin, growth form, and dispersal mechanism. Ecology. 101:e02902.

Park G, Whistler A. 2001. The terrestrial ecology and botany of Tofua and Koa Islands in Ha'apai, Kingdom of Tonga. Report of the Botanical Survey of the Ha'apai Conservation Area Project of the South Pacific Biodiversity Conservation Programme, Apia, Samoa.

PIER. 2024. Pacific Island ecosystems at risk. US Forest Service; [accessed 2024 Feb 15]. http://www.hear.org/pier/.

Smissen RD, Breitwieser I, de Lange PJ. 2022. Pseudognaphalium (Asteraceae, Gnaphalieae) diversity in New Zealand revealed by DNA sequences with notes on the phylogenetic relationships of Hawaiian Islands plants referred to Pseudognaphalium sandwicensium. New Zealand Journal of Botany. 61:304–331. doi: 10.1080/0028825X.2022.2132871.

Space JC, Flynn T. 2001. Report to the Kingdom of Tonga on invasive plant species of environmental concern. Honolulu, Hawaii: USDA Forest Service.

Starr F, Starr K, Loope L. 2003. *Anredera cordifolia*. Haleakala Field Station, Maui, Hawai'i: United States Geological Survey Biological Resources Division. http://www.starrenvironmental.com/publications/species_reports/pdf/anredera_cordifolia.pdf.

Suzuki M, Taufatofua P, Koyama T. 2007. New records of plants from Tonga. Makinoa, n.s. 6:25–62.

Swarbrick JT. 1997. Weeds of the Pacific Islands. Technical Paper No. 209. Noumea, New Caledonia: South Pacific Commission. p. 124.

Sykes WR. 1978. The pteridophytes of 'Eua, southern Tonga. Bulletin of the Royal Society of New Zealand. 17:119–152.

Sykes WR. 1981. The vegetation of Late, Tonga. Allertonia. 2:323–353.

Sykes WR. 2016. Flora of Cook Islands. Kalaheo: Hawai'i: National Tropical Botanic Garden.

Webb CJ, Garnock-Jones PJ, Sykes WR. 1988. Flora of New Zealand IV. Christchurch: Botany Division, D.S.I.R.

Whistler WA. 1988. Checklist of the weed flora of western Polynesia. Technical Paper No. 194. Noumea, New Caledonia: South Pacific Commission. p. 69.

Whistler WA. 1991. The ethnobotany of Tonga: the plants, their Tongan names, and their uses. Bernice P. Bishop Museum Series in Botany. 2:1–155.

Whistler WA. 1992a. Vegetation of Samoa and Tonga. Pacific Science. 46:159–178.

Whistler WA. 1992b. Flora of Tonga [unpublished checklist]. p. 107.

Wiser SK, Drake DR, Burrows LE, Sykes WR. 2002. The potential for long-term persistence of forest fragments on Tongatapu, a large island in western Polynesia. Journal of Biogeography. 29:767–787. doi: 10.1046/j.1365-2699.2002.00723.x.

Yuncker TG. 1959. Plants of Tonga. Bernice P. Bishop Museum Bulletin. 220:1–283.