

## SHORT COMMUNICATION

***Luvunga monophylla* (DC.) Mabb. (Rutaceae):  
a new species for Queensland**David G. Fell<sup>1,3</sup> & David J. Stanton<sup>2</sup><sup>1</sup>3D Environmental, P.O. Box 337, Alstonville NSW 2477, Australia. Email: davidfell@3denvironmental.com.au; <sup>3</sup>corresponding author<sup>2</sup>3D Environmental, PO Box 959, Kenmore, Queensland 4069, Australia.

The genus *Luvunga* Buch.-Ham. ex Wight & Arn. contains twelve species occurring in Asia, Malesia and Australia (Hyland *et al.* 2003). *Luvunga monophylla* is the sole Australian representative of Rutaceae subtribe *Triphasiineae* in the tribe *Aurantieae* Rchb. (Mabberley 1998); however, infrafamilial relationships in this part of the family remain to be fully resolved utilising molecular data and this group may not be recognized in the future (Kubitzki *et al.* 2010).

*Luvunga monophylla* (DC.) Mabb. is a facultatively deciduous, spiny shrub or climber, 0.5–3 m high with white, cream, yellow flowers, obovoid fleshy fruit to 10 mm diameter, and one or two seeds per fruit (Pedley 1987; Russell-Smith & Dunlop 1992; Hyland *et al.* 2003; Department of Environment and Conservation 2010). It was first collected from Australia in the Sir Edward Pellew Group of islands, Gulf of Carpentaria, in December 1802 by Robert Brown during Flinders' *Investigator* circumnavigation of Australia and was collected in Timor by J.B.L.C.T. Leschenault de la Tour during Baudin's 1800–1803 expedition in *Le Géographe* and *Le Naturaliste* (Mabberley 1998).

It has now been recorded on Iama (Yam Island), Torres Strait which is the first record of the species for Queensland. Prior to this collection it had been recorded from Australia in the North Kimberley and Dampierland bioregions of Western Australia (Department of Environment & Conservation 2010) and in the Arnhem Coast, Central Arnhem, Tiwi, Gulf Coastal, Gulf Fall and Uplands and

Darwin Coastal Bioregions of the Northern Territory. The habitat in these areas includes monsoon forest, deciduous vine thicket and semi-deciduous vine thicket on coastal dunes and basalt scree slopes (Pedley 1987; Russell-Smith & Dunlop 1992; Liddle *et al.* 1994; Department of Planning & Infrastructure 2010). It is also found in the Philippines, Indonesia (Java) and Timor-Leste (Hyland *et al.* 2003; Cowie 2006).

A survey of the vegetation of the Torres Strait Islands, north Queensland, Australia, was carried out in 2007 (Stanton *et al.* 2008). The survey's primary objective was to map vegetation communities at 1: 25,000 and Regional Ecosystems at 1: 50,000, supplemented by floristic inventory and collections of voucher specimens for Australian herbaria. Collections of *Luvunga monophylla* from Iama (also known as Yam Island) were made in October 2007 (Fell 8851 & Stanton [BRI]). This occurrence extends its geographical range eastwards from the eastern Arnhem Land coast of the Northern Territory.

**Iama (Yam Island)**

Iama is a continental island of 186 ha located at 9°54'S 142°46'E. It is situated 91 km north-north-east of Cape York Peninsula and belongs to the Central Group of Torres Strait Islands. The island is the homeland of the Iamalgal people. As at the 2006 Census, the population was 309, of whom over 90% were Indigenous (Australian Bureau of Statistics 2007). Land tenure is Deed of Grant in Trust (DOGIT) and Native Title.

The primary geology of the island is granite with a range of Holocene aged landforms fringing its margins. Coarse-grained granite, which forms the dominant landform feature, represents the most easterly extension of the Badu Granite batholith. Soil development is typically skeletal, with large granite boulders on lower slopes and littoral margins. Small areas of acid volcanic rock form a headland in the island's east. Holocene features include ridges of coralline sand and fine-grained estuarine deposits associated with a broad embayment on the island's northern coast (Willmott & Powell 1977; Stanton *et al.* 2008).

Remnant vegetation occurs over 75% of the island with the balance supporting regrowth, exotics, bamboo groves and cleared land. **Broad vegetation types are deciduous and semi-deciduous vine forest and thicket, *Acacia* dominated open forests and woodlands, shrublands and shrubland complexes, coastal dune complexes, grasslands and mangrove forest (Stanton *et al.* 2008).**

### ***Luvunga monophylla* on Iama**

Our vegetation survey recorded *Luvunga monophylla* at eight sites on the island, within open forest dominated by *Acacia auriculiformis* A.Cunn. ex Benth. and in deciduous vine forest and semi-deciduous vine thicket. **These vegetation types occur on rocky granitic hillslopes and the *Acacia* dominant vegetation is considered to have developed in response to past disturbance.**

The *Acacia* open forest habitat is endemic to Iama and the Torres Strait Islands and is mapped as Regional Ecosystem 3.12.35f (Stanton *et al.* 2008). Vine forest species such as *Canarium australianum* F.Muell., *Terminalia subacroptera* Domin, *Bombax ceiba* var. *leiocarpum* A.Robyns and *Diospyros hebecarpa* A.Cunn. ex Benth. are typical canopy associates. Groves of the naturalised Bamboo (*Bambusa vulgaris* Schrad.) and scattered Mango trees (*Mangifera indica* L.) occur throughout this habitat and are indicative of a long history of traditional use by local people.

**Deciduous vine forests and semi-deciduous vine thickets (RE3.12.35a and RE3.12.21a)** are extensive on the lower exposed rocky slopes and feature canopy species such as *Erythrina insularis* F.M.Bailey, *Antiaris toxicaria* var. *macrophylla* (R.Br.) Corner, *Terminalia subacroptera*, *Canarium australianum*, *Bombax ceiba* var. *leiocarpum*, *Acacia auriculiformis*, *Manilkara kauki* (L.) Dubard, *Gyrocarpus americanus* Jacq. subsp. *americanus*, *Diospyros* sp. (Mt White P.I. Forster PIF14415), *Sterculia quadrifida* R.Br. and *Premna dallachyana* Benth.

The habitats in which *Luvunga monophylla* occurs are in good condition and at the time of survey were relatively undisturbed and free of weeds. A conservative estimate of population size for *Luvunga monophylla* is between 50 and 100 individuals. The area of extent is 50 ha.

### **Discussion**

The nature of the disturbance history in the *Acacia* open forest is unknown, although the community would be expected to burn in hot conditions. Old charred stumps indicate that it is occasionally burnt, largely in a wildfire regime. Resilience to fire is documented from Northern Territory populations of *Luvunga* which have an ability to resprout from epicormic and basal lignotubers and display less than 30% mortality rate when subject to 100% leaf scorch. Life span is over 20 years with first seeding occurring between 6–20 years (Tropical Savannas Cooperative Research Centre 2010).

The fact that the *Acacia* dominant community is found only on Iama presents another puzzle. The nearby continental islands of Mabuyag (Mabuiag Island) and Gebar are dominated by open and closed forests of *Welchiodendron longivalve* (F.Muell.) Peter G. Wilson & J.T.Waterh., although not a single individual of this species was found on Iama. This may suggest that forests on Iama have developed independently from forest types on these neighbouring islands (Stanton *et al.* 2008). Extensive field surveys by Stanton *et al.* (2008) in similar habitats across the majority of the Torres Strait islands did not locate *Luvunga* elsewhere.

Prior to European contact the people of Iama practised traditional horticulture growing crops such as banana, yam and sweet potato (Haddon 1935; Neal 1989; Fuary 1991) with archaeological evidence suggesting that some gardening took place on rocky hillslopes (Neal 1989). It is likely that a combination of human disturbance, wind and fire have played a role in the development of *Luvunga* habitat.

No uses are documented for Australian populations of *Luvunga monophylla*. Specimens were shown to numerous members of the community during our visit to Iama in November 2010. Although they recognized the plant, they stated that they had no name or use for it. In Java, it is occasionally cultivated as a hedge plant (Kruse 2001: 1013). In India, the dried fruits of *Luvunga scandens* Roxb. are used in the production of a medicinal oil said to be effective in treating dermal infections and baldness (Garg & Jain 1999) and the roots and fruits are used for treatment of scorpion stings (Lien *et al.* 2002).

It is interesting to note that the occurrence of *Luvunga monophylla* across northern Australia appears to be coterminous with those areas visited in the past by Macassan bêche-de-mer fishermen from southern Sulawesi in what is now Indonesia, Timor-Leste and between Cape Leveque in Western Australia and the Sir Edward Pellew Group in the Northern Territory (Macknight 1969: 2, 27; Stacey 2007: 58). There is no firm evidence that this trade included Torres Strait, although there is an 1881 record of an Ambonese prau (boat) being driven into the region during the northwest monsoon season (Anonymous 1881). This raises the possibility that *Luvunga monophylla* was introduced to Australia by human vectors.

### **Conservation status of *Luvunga monophylla***

In the Northern Territory this species is assigned 'least concern' status under the *Territory Parks and Wildlife Conservation Act 2000*, and in Western Australia it is 'Not Threatened' according to the *Wildlife Conservation Act 1950*.

Cowie (2006) records the taxon from dry deciduous forest in Timor-Leste, noting that the forest type is under ongoing pressure from conversion to agriculture. The heavy exploitation of dry deciduous forests elsewhere in the Timor region for swidden agriculture has resulted in large-scale conversion to anthropogenic grassland–*Chromolaena* shrubland (Cowie 2006). The extent of its occurrence and condition in habitats in the Philippines and Java is not known.

Potential threats to the Iama population include habitat disturbance from infrastructure and residential development, weed incursion and perhaps wildfire. Pressures on the limited availability of land suitable for housing and infrastructure development is intensified by population growth and coastal erosion associated with regular tidal surges. This presents a considerable challenge for the island community and planning agencies.

In combination, these threats represent a risk of stochastic extinction of the species in Queensland due to its small population size and highly localised occurrence. Accordingly, the species should be assigned regional significance in the Cape York Peninsula Bioregion. Integration of ecological and genetic studies will be required to determine the management requirements of *Luvunga monophylla* on Iama. Further assessments of population size, phenology and recruitment is achievable at the local level with the assistance of the local ranger program.

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## References

- ANONYMOUS (1881). *The Brisbane Courier* 21 February: 3.
- AUSTRALIAN BUREAU OF STATISTICS (2007). **Population Distribution, Aboriginal and Torres Strait Islander Australians, Australia – 2006**. Cat. No. 4705.0. Australian Bureau of Statistics: Canberra.
- COWIE, I. (2006). *A Survey of Flora and Vegetation of the Proposed Jaco-Tutuala-Lore National Park, Timor-Leste (East Timor)*. Report to Birdlife International from NT Herbarium (DNA) Department of Natural Resources, Environment and the Arts: Palmerston, N.T. Version 1.0. Available from: <http://www.dpif.nt.gov.au/nreta/publications/wildlife/science/pdf/2006CowieI.pdf>
- DEPARTMENT OF ENVIRONMENT AND CONSERVATION, WESTERN AUSTRALIAN HERBARIUM (2010). *Florabase*. Online at <http://florabase.calm.wa.gov.au/> Accessed 30 October 2010.
- DEPARTMENT OF PLANNING AND INFRASTRUCTURE (2010). *Australian Virtual Herbarium*. NT Herbarium map tool. Northern Territory DPI, Darwin. Available from: <http://ipe.nt.gov.au/cgi-bin/avh.cgi>.
- GARG, S.C. & JAIN, R. (1999). Antifungal activity of *Luvunga scandens* against some keratinophilic fungi. *Indian Journal of Pharmaceutical Sciences* 61: 248–249.
- FUARY, M.M. (1991). *In so many words: an ethnography of life and identity on Yam Island, Torres Strait*. PhD thesis, James Cook University of North Queensland: Townsville.
- HADDON, A.C. (1935). *Reports of the Cambridge anthropological expedition to Torres Straits*. Vol. 1. general ethnography. Cambridge University Press: Cambridge.
- HYLAND, B.P.M., WHIFFIN, T., CHRISTOPHEL, D.C., GRAY, B. & ELICK, R.W. (2003). *Australian tropical rain forest plants: trees and shrubs and vines*. CSIRO Publishing: Melbourne.
- KRUSE, J. (2001). Rutaceae. In P. Hanelt (ed.), *Mansfeld's encyclopedia of agricultural and horticultural crops*, pp. 996–1038. Springer Verlag: Berlin.
- KUBITZKI, K., KALLUNKI, J.A., DURETTO, M. & WILSON, P.G. (2010). Rutaceae. In K. Kubitzki (ed.), *The Families and Genera of Vascular Plants. X. Flowering Plants Eudicots Sapindales, Cucurbitales, Myrtaceae*, pp. 276–356. Springer Verlag: Berlin/Heidelberg.
- LIDDLE, D.T., RUSSELL-SMITH, J., BROCK, J., LEACH, G.J. & CONNORS, G.T. (1994). *Atlas of the vascular rainforest plants of the Northern Territory. Flora of Australia Supplementary Series No. 3*. Australian Biological Resources Study: Canberra.
- LIEN, T.P., KAMPERDICK, C., SCHMIDT, J., ADAM, G. & VAN SUNG, T. (2002). Apotirucallane triterpenoids from *Luvunga sarmentosa* (Rutaceae). *Phytochemistry* 60: 747–754.
- MABBERLEY, D.J. (1998). Australian *Citreae* with notes on other *Aurantioideae* (Rutaceae). *Telopea* 7: 333–344.
- MACKNIGHT, C.C. (1976). *The voyage to Marege': Macassan Trepangers in Northern Australia*. Melbourne University Press: Carlton.
- NEAL, R.A. (1989). *An Archeological Inspection of Alternative Telecom Locations on Mabuig and Yam Islands, Torres Strait*. Unpublished report to Department of Community Services and Ethnic Affairs. Pirriport Pty Ltd: Helidon, Queensland.
- PEDLEY, L. (1987). *Paramignya* Wight (Rutaceae: *Citreae*) in Australia. *Austrobaileya* 2: 416.
- RUSSELL-SMITH, J. & DUNLOP, C.R. (1992). The status of monsoon vine forests in the Northern Territory: a perspective. In G.L. Werren & A.P. Kershaw (eds.) *The rainforest legacy*. Australian National Rainforests Study. Vol. 1, The Nature, Distribution and Status of Rainforest types, pp. 227–288. Australian Government Publishing Service: Canberra.
- STACEY, N. (2007). *Boats to burn: Bajo fishing activity in the Australian fishing zone*. Asia-Pacific Environment Monograph 2. ANU E Press: Canberra.
- STANTON D.J., FELL, D.G. & GOODING, D.O. (2008). *Vegetation Communities and Regional Ecosystems of the Torres Strait Islands, Queensland, Australia*. Unpublished report to the Torres Strait regional Authority, Land and Sea Management Unit. 3D Environmental Trust: Brisbane.
- TROPICAL SAVANNAS COOPERATIVE RESEARCH CENTRE (2010). *North Australian Land Manager Website*. Available from: <http://landmanager.org.au/view/311424/fire-responses-of-luvunga-monophylla.html>
- WILLMOTT, W.F. & POWELL, B.S. (1977). *Torres Strait-Boigu-Daru, Queensland 1:250 000 Geological Series - Explanatory Notes, Sheets SC/ 54-12, SC/ 54-7 and SC/ 54-8*. Bureau of Mineral Resources, Geology and Geophysics. Australian Government Publishing Service: Canberra.