Atriplex alces Edginton & E.J.Thomps. (Chenopodiaceae), a new species from central Queensland, Australia

Summary

Edginton, M. & Thompson, E.J. (2017). *Atriplex alces* (Chenopodiaceae), a new species from central Queensland, Australia. ***Austrobaileya* 10(1): 184–195.** A new species of *Atriplex* L. (*Atriplex alces* Edginton & E.J.Thomps.) endemic to central Queensland is described and illustrated. Its affinity to *Atriplex eardleyae* Aellen is discussed and a table of differences is presented.

Key Words: Chenopodiaceae, *Atriplex*, *Atriplex alces*, *Atriplex eardleyae*, Australia flora, Queensland flora, Edgbaston

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Introduction

Atriplex L. is a cosmopolitan genus of over 250 species occurring predominantly in subtropical and temperate regions on saline soils (Wilson 1984). Approximately 66 described species occur in Australia (Australian Plant Census 2017). Wilson (1984) described 60 species for Australia of which two are introduced, and with 15 native species occurring in Queensland. Bostock & Holland (2016) recorded 32 native species for Queensland. All of the Australian native species are endemic except for one which also occurs in New Zealand (Wilson 1984). Australian Plant Census 2017 listed a further four species of *Atriplex* as naturalised in Australia.

The new species described in this paper was brought to the attention of botanists at the Queensland Herbarium (BRI) from material collected at Edgbaston Reserve by Bush Heritage ecologist Paul Foreman. Edgbaston Reserve is a Bush Heritage property in central Queensland overlapping the Pelican Creek artesian spring complex that is well known for its extraordinary fauna and flora. The property is known to contain 11 threatened plant species, including *Atriplex morrisii* R.H.Anderson., a **Vulnerable** species (under *Nature Conservation Act 1992*).

The new species has similarities to *Atriplex eardleyae* Aellen, from which it is distinguished in this paper.

Material and methods

This study was based upon the examination of dried herbarium material and label data held at BRI, and field observations. Digital images of the type specimen of *Atriplex eardleyae* (JSTOR 2016) were examined.

Drawings were undertaken using rehydrated Herbarium specimens.

Leaf transverse sections were prepared free-hand by a modified version of the method described by Frohlich (1984), using fresh material for the new species and dried herbarium material for *A. eardleyae*. Herbarium material was rehydrated by initial immersion in hot water and left to soak for several hours. Instead of sandwiching the leaf material between pieces of paraffin as used by Frohlich (1984), each sample was placed on a glass slide covered with a glass slide cover which was used as a cutting guide. Thin sections were created while viewing at ×4 magnification under a binocular microscope.

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Photographs, other than for the type, were taken using a Nikon DS – Fil microscope camera coupled with a Leica MZ6 stereomicroscope. Composite images were produced by combining single images using Helicon focus version 5.2 (Helicon Soft 2016). This improved depth of field.

In common with many other species of *Atriplex*, the bracteoles of *A. alces* are enlarged and cover the fruit. This means that the structure on most *Atriplex* which presents ostensibly as the 'fruit', and is commonly referred to as such, is actually the fruit with bracteoles. For the purposes of this study, the term 'fruit' is used for the structure which presents ostensibly as the fruit.

Taxonomy

Atriplex alces Edginton & E.J.Thomps. **sp. nov.** Similar to *A. eardleyae* Aellen differing by the narrower leaves, seed and the intricately divided fruiting bracteoles with larger appendages. **Typus:** Queensland. Mitchell District: On Edgbaston Station, 33 km NNE of Aramac, 8 April 2010, *E.J. Thompson MUT401 & M. Edginton* (holo: BRI).

Decumbent to ascending perennial forb to subshrub up to 0.5 metres with a tap root, monoecious; foliage scurfy, with bladder scales (i.e. minutely vesicular). Leaves narrowly oblanceolate to linear, 5–15 mm long, 0.8–3 mm wide, grey; bladder scales in multiple layers, hence venation not visible through the scurf; base attenuate to narrowly cuneate into a short petiole, or sessile to subsessile, apex obtuse to sub-acute. Male flowers in small glomerules or short spikes of 7–30 flowers, or sometimes short racemes of 2–5 small glomerules each with 4–8 flowers, in upper leaf axils, usually with a few female flowers. Female flowers otherwise single or in small glomerules of 2–7 flowers, in medial to sub-distal leaf axils. Fruits 5–7 mm long. Fruiting bracteoles laterally fused from base to beyond the midpoint of their length; ovary tube often thinly scurfy, reticulate (not always obvious due to scurf), compressed, ± rectangular, rarely obtriangular, narrowing slightly to broad-cuneate into stipe, ovary tube 1.5–2.3 mm long, *c.*1 mm wide, expanding into valves at tip. Valves 1–1.6 mm long, 4–8 mm wide at top; fan-shaped to reinform at top, reticulate (not always obvious due to scurf), with broadly deltoid primary lobes, which are again divided into fine subulate to very narrowly deltoid secondary lobes, which are aligned with primary lobes or spreading, lending the bracteole a moose antler-like appearance. Tube with a pair of sessile (i.e. with linear-oblong attachments in line with the axis of the fruit) dorsal appendages usually similar in shape and texture, and sometimes size, to the concomitant side (i.e. left hand side or right hand side) of the valve, or appendages lacking. Stipe slender or stout, much shorter than tube to more than 3 times the length of tube. Seed oblong-elliptic, laterally compressed, *c.* 2 mm long × 1.2 mm wide × 0.5 mm thick; margins thickened, projecting into an ascending radicle on one side; pale brown in dried specimens. **Figs. 1–4, 6, 7, 10, 12, 14.**

***Additional specimens examined*: Queensland.** Mitchell District: 93 km E of Muttaburra on stock route through Sumana Station, Apr 2011, *Thompson MUT481 & Edginton* (BRI); 94 km East of Muttaburra on stock route through Sumana Station, Apr 2011, *Thompson MUT483 & Edginton* (BRI); 93.5 km E of Muttaburra on stock route through Sumana Station, Apr 2011, *Thompson MUT487 & Edginton* (BRI). Edgbaston, SE edge of Lake Mueller, *c.* 30 km NE of Aramac, May 2015, *Thompson MUT563* (BRI).

***Distribution and habitat*:** *Atriplex alces* has been collected from two general locations about 44 km apart **(Map 1).** The new species is only known from swales associated with weathered dunes within Regional Ecosystem (RE) 10.3.29b with vegetation described as hummock grasslands dominated by *Triodia longiceps* J.M.Black in the Desert Uplands Biogeographical Region of Queensland (Queensland Herbarium 2016) (**Fig. 16).**

***Phenology*:** *Atriplex alces* is only known to flower and fruit from March to April, as all specimens have been collected during this time period.

Fig. 1. Holotype of ***Atriplex alces*** (*Thompson MUT401 & Edginton*, BRI). Photo: M.A. Edginton.

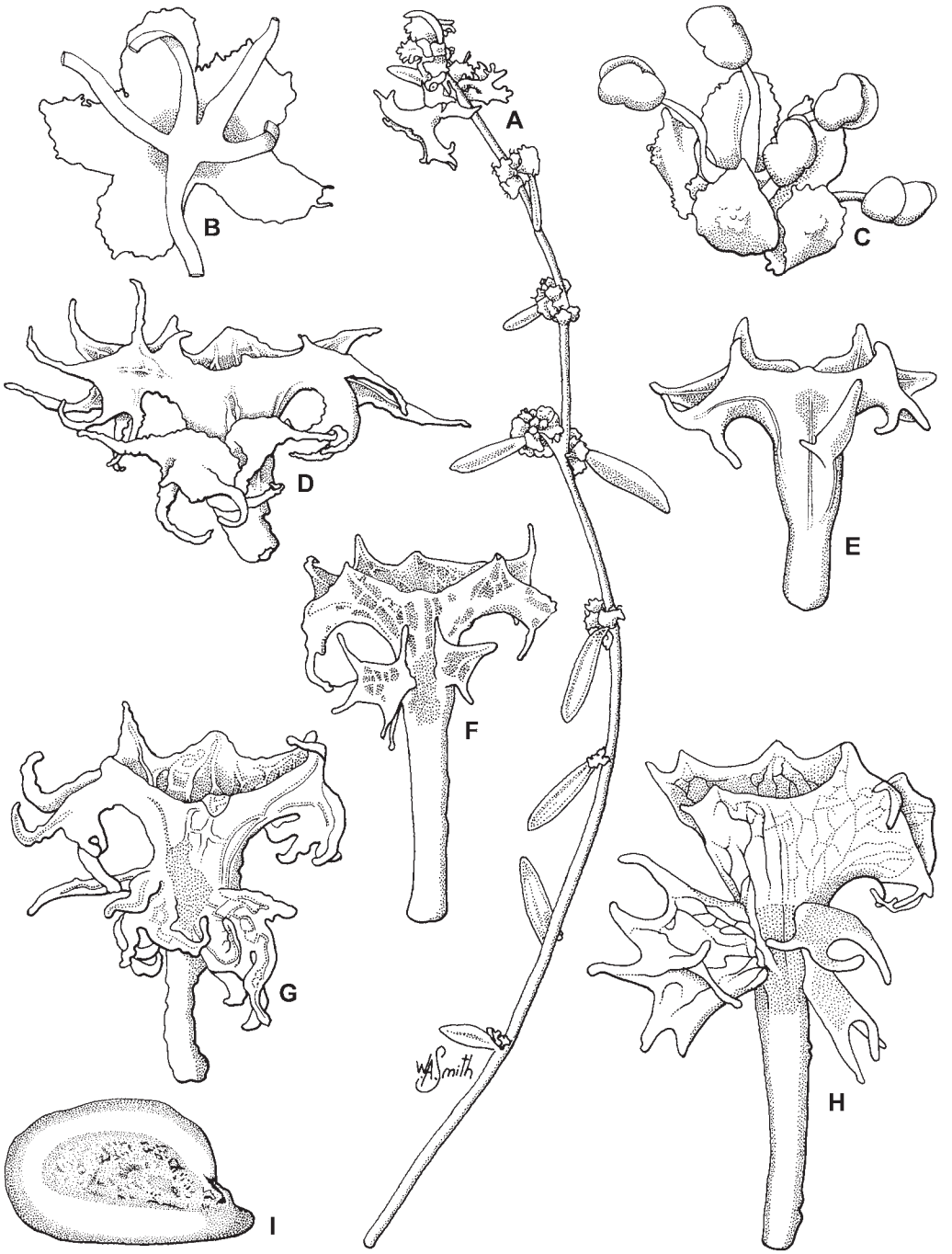

Fig. 2. ***Atriplex alces***. A. portion of branch including leaves, male inflorescences and mature and immature fruits. B. male flower opened and with anthers removed from filaments. C. male flower. D–H. fruits, showing variation in shape, not only between specimens but within a specimen. I. seed. A–C, E–F from *Thompson MUT481 & Edginton* (BRI); D, G, I from *Thompson MUT401 & Edginton* (BRI); H from *Thompson MUT483 & Edginton* (BRI). Del. W. Smith.

Fig. 3. ***Atriplex alces***. fruits with short pedicels (*Thompson MUT401* & *Edginton*, BRI). Scale as indicated. Photo: E.J. Thompson.

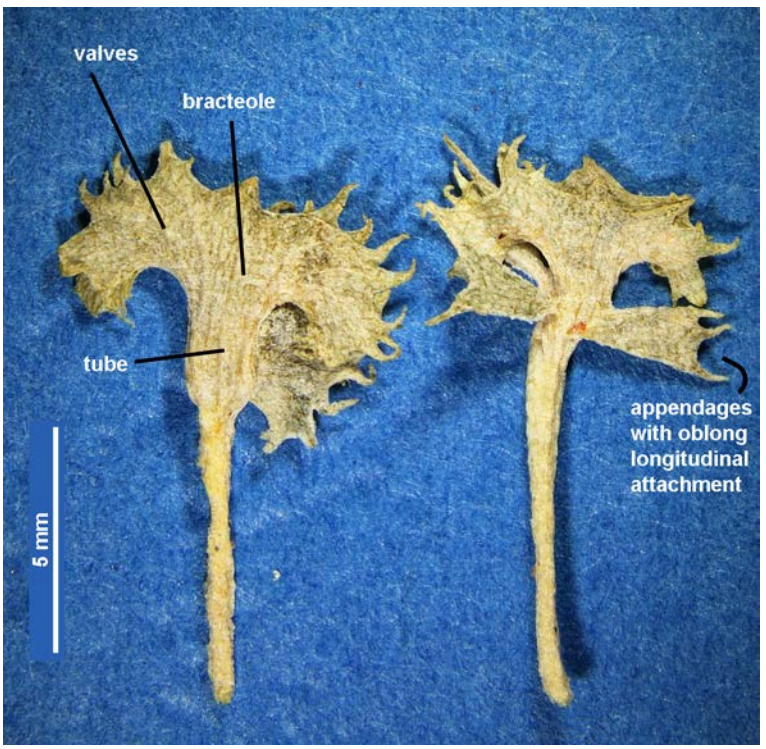

Fig. 4. ***Atriplex alces***. fruits with long pedicels (*Thompson MUT401* & *Edginton*, BRI). Scale as indicated. Photo: E.J. Thompson.

Fig. 5. *Atriplex eardleyae*. fruit (*Forster PIF35287 & Thomas*, BRI). Scale as indicated. Photo: E.J. Thompson.

Fig. 6. *Atriplex alces*. seed (*Thompson MUT481 & Edginton*, BRI). Photo: E.J. Thompson.

Fig. 7. *Atriplex alces*. seed (*Thompson MUT481 & Edginton*, BRI). Photo: E.J. Thompson.

***Affinities*:** The fruits of *Atriplex alces* resemble *A. eardleyae* (Section IV. Semibaccatae, Wilson 1984). Both species have unequal bracteoles *c.* half united, tube flattened and two foliaceous dorsal appendages. The two species are distinguishable by the leaves and other characters presented in **Table 1**.

Table 1. Morphological comparison of *Atriplex alces* and *A. eardleyae*

Character	*Atriplex alces*	*Atriplex eardleyae*
Valve lobe division	Moderately to highly divided, with fine subulate to very narrowly deltoid divisions at the extremities (antler-like) (**Figs. 2D–H, 3–4**)	Undivided to slightly divided, without fine subulate to very narrowly deltoid divisions at the extremities (not antler-like) (**Fig. 5**)
Bracteole dorsal appendages size (when present) and placement	Sometimes absent but usually present, small to large; often extends to distal ends of valve and often mimics in appearance the concomitant side (LHS or RHS) of valve (**Figs. 3–4**)	Absent or small; only at base of valve (**Fig. 5**)
Seed shape	± oblong-elliptic (**Figs. 2I, 6–7**)	Cordate-orbicular (**Figs. 8–9**)
Seed length	*c.* 2 mm	Usually much less than 2 mm
Leaf shape of most leaves on any one specimen	Narrowly oblanceolate to linear (**Fig. 10**)	Elliptic to sub-orbicular (**Fig. 11**)
Leaf margin	Always entire (**Fig. 10**)	Entire, coarsely dentate or lobed (**Fig. 11**)
Leaf scurf thickness	Usually multi-layered, obscuring venation **(Figs. 12&14)**	Usually one or two layers – venation clearly visible (**Figs. 13&15**)
Leaf colour	± grey (**Fig. 10**)	Greyish green (**Fig. 11**)
Leaf reticulation	Not visible under high magnification – if any exists it is obscured by scurf (**Fig. 12**)	Clearly visible through the scurf under high magnification (**Fig. 13**)

Fig. 8. *Atriplex eardleyae*. seed (*Forster PIF35287 & Thomas*, BRI). Photo: E.J. Thompson.

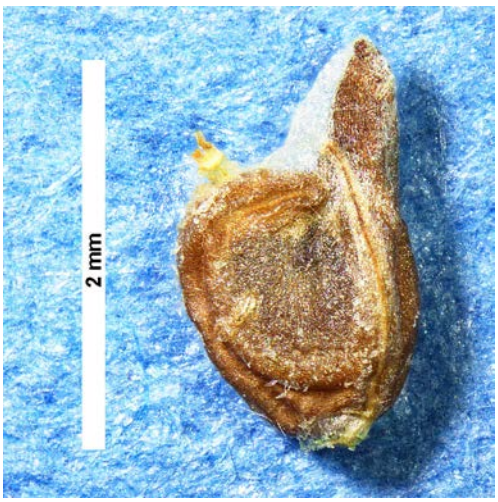

Fig. 9. *Atriplex eardleyae*. seed (*Forster PIF35287 & Thomas*, BRI). Photo: E.J. Thompson.

Fig. 10. *Atriplex alces*. abaxial view of leaf (*Thompson MUT401 & Edginton*, BRI). Scale as indicated. Photo: E.J. Thompson.

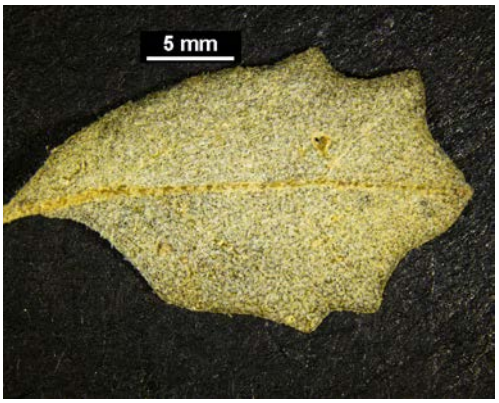

Fig. 11. *Atriplex eardleyae*. abaxial view of leaf (*Forster PIF35287 & Thomas*, BRI). Scale as indicated. Photo: E.J. Thompson.

Fig. 12. *Atriplex alces*. abaxial view (close-up) of leaf (*Thompson MUT401 & Edginton*, BRI). Scale as indicated. Photo: E.J. Thompson.

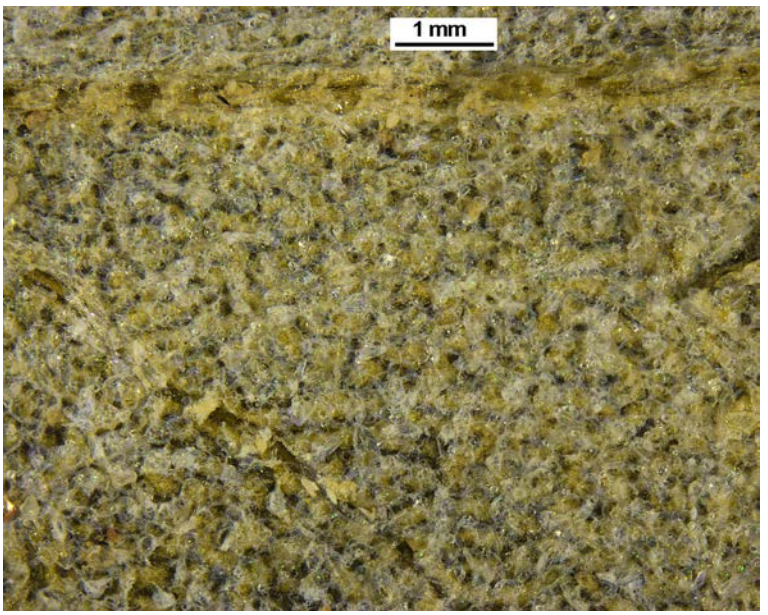

Fig. 13. ***Atriplex eardleyae***. abaxial view (close-up) of leaf (*Forster PIF35287 & Thomas,* BRI). Scale as indicated. Photo: E.J. Thompson.

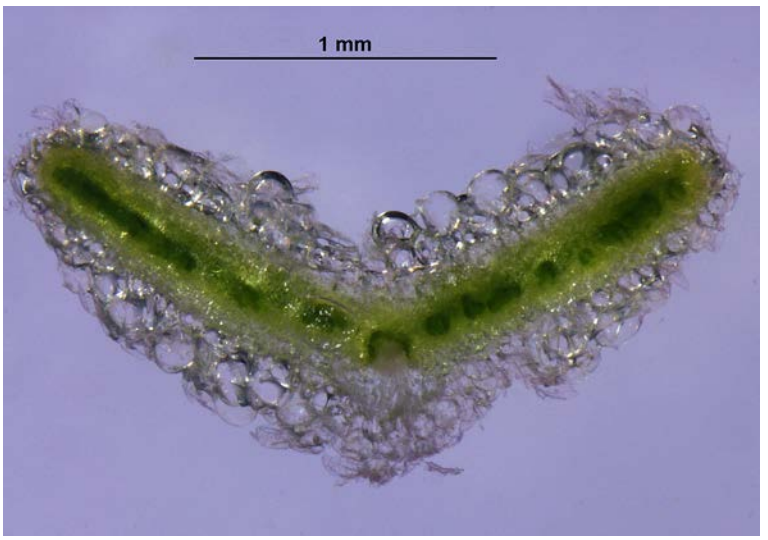

Fig. 14. ***Atriplex alces***. transverse section of leaf (*Thompson MUT563 & Edginton*, BRI). Scale as indicated. Photo: E.J. Thompson.

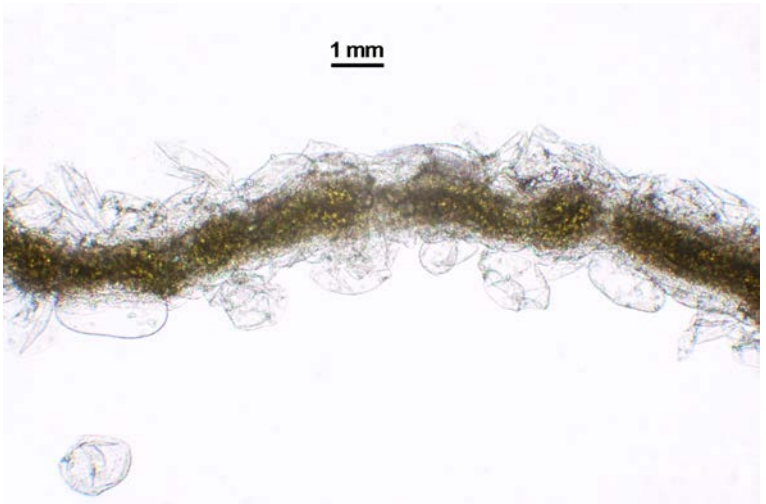

Fig. 15. ***Atriplex eardleyae***. transverse section of leaf (*Forster PIF35287 & Thomas*, BRI). Scale as indicated. Photo: E.J. Thompson.

Fig. 16. ***Atriplex alces***. habitat (locality for *Thompson MUT563 & Edginton*, BRI). Photo: E.J. Thompson.

Fig. 17. *Atriplex alces*. habit (*Thompson MUT563 & Edginton*, BRI). Photo: E.J. Thompson.

***Conservation status*:** *Atriplex alces* is only known to occur in RE 10.3.29, which has a *Vegetation Management Act 1999* class of **Of Concern** due to its very limited area of approximately 1000 ha. 10.3.29 also has a Regional Ecosystem Description Database (REDD) Biodiversity Status of **Endangered**. The REDD Biodiversity Status Notes for 10.3.29 state "Greater than >70% severely degraded by trampling and wind erosion". *Atriplex alces* was observed in two small populations. Field inspection of the population at Edgbaston in May 2015 revealed no plants at the site of collection of the type specimen although another small population was found nearby. No disturbance was evident.

However, in terms of IUCN categories, there is insufficient data to support a classification of **Critically Endangered** or **Endangered.** The existing data does support a classification of **Vulnerable** (criterion D2) (IUCN 2001). We therefore recommend this species to be classified as **Vulnerable** under the IUCN and *Nature Conservation Act 1992*. We also recommend that this species is the subject of surveys to determine if it meets the criteria for higher categories under the IUCN and *Nature Conservation Act 1992*.

***Etymology*:** The specific epithet *alces* is Latin for "moose", and refers to the highly divided distal extremities of the valves and appendages of the fruit, which cause the fruits to resemble antlers.

Acknowledgements

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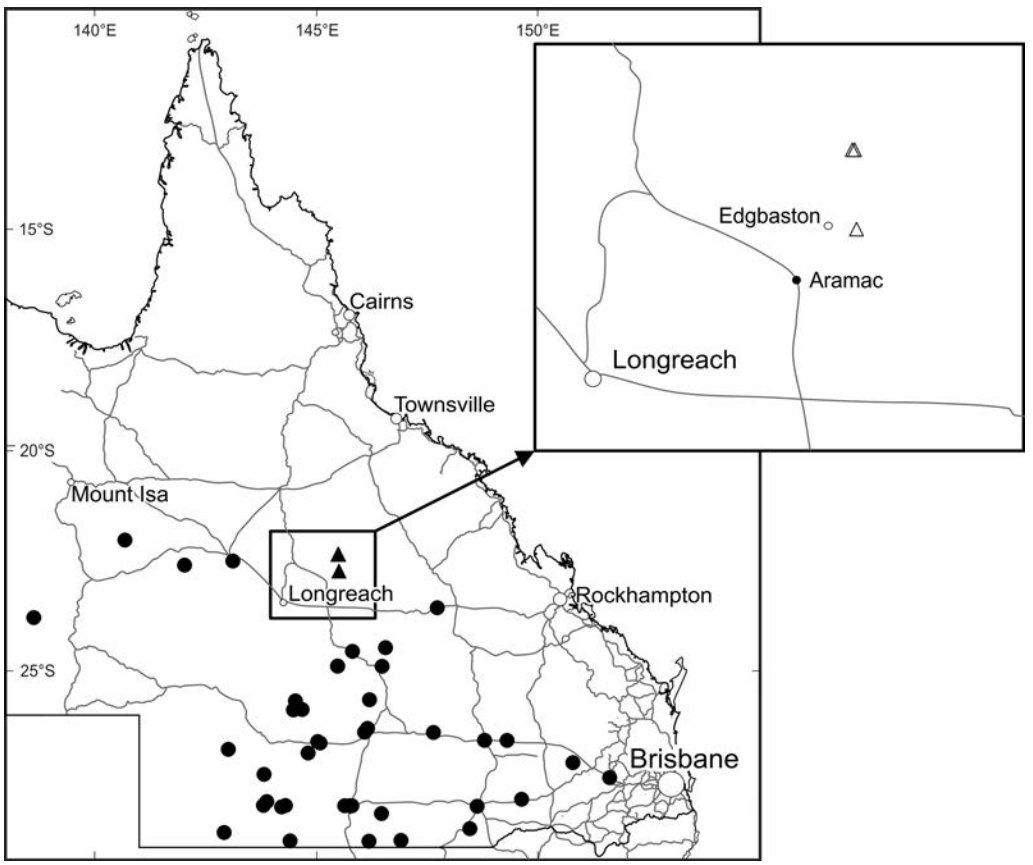

Map 1. Distribution of ***Atriplex alces*** (▲) and ***A. eardleyae*** (●). The two top markedly over-lapping triangles in the inset actually indicate three proximal records that cannot be effectively spatially separated at this scale. Del: W. Smith & A. R. Bean.