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*Tecticornia indefessa* (Chenopodioideae: Salicornioideae), a new mat samphire (formerly *Tegicornia*) from north of Esperance, Western Australia


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Tecticornia indefessa (Chenopodiaceae: Salicornioideae), a new mat samphire (formerly Tegicornia) from north of Esperance, Western Australia

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Abstract

Shepherd, K.A., Tecticornia indefessa (Chenopodiaceae: Salicornioideae), a new mat samphire (formerly Tegicornia) from north of Esperance, Western Australia. Nuytsia 17: 367–374 (2007). A taxon previously thought to be an intergeneric hybrid between an unknown species of the former genus Halosarcia Paul G.Wilson (now Tecticornia Hook.f.) and Tegicornia uniflora Paul G.Wilson (now Tecticornia uniflora (Paul G.Wilson) K.A.Sheph. & Paul G.Wilson) is recognised as a distinct species: Tecticornia indefessa K.A.Sheph. While sharing a similar mat-like habit and perianth structure to the dioecious T. uniflora, this taxon has bisexual or female flowers with distinctive seeds. Previous analysis of nuclear DNA sequences supports this taxon as distinct. Illustrations and maps and a revised description of T. uniflora are included.

Introduction

Recent phylogenetic analysis of nuclear DNA sequences has shown that Tegicornia Paul G.Wilson along with all other Australian samphires except Sarcocornia A.J.Scott, form a monophyletic group (Shepherd et al. 2004; Shepherd et al. 2005b). Consequently, the genera Tegicornia, Halosarcia Paul G.Wilson, Pachycornia Hook.f. and Sclerostegia Paul G.Wilson have been subsumed into a much expanded Tecticornia Hook.f. (Shepherd & Wilson 2007).

In his initial revision of the Australian Salicornioideae (Chenopodiaceae), Wilson (1980) recognised Tegicornia as a monotypic genus. The only representative of the genus, Tegicornia uniflora Paul G.Wilson (now Tecticornia uniflora (Paul G.Wilson) K.A.Sheph. & Paul G.Wilson), was considered unique as it is the only samphire which is dioecious. This taxon was further characterised by a distinct prostrate habit, having pairs of single flowers dispersed amongst vegetative articles and an obovate, dorsiventrally flattened perianth. Recent glasshouse studies have shown however, that under cultivation T. uniflora may produce spicate inflorescences comprised of 1–3-flowered cymes typical of other samphires (Shepherd 2004).

A mat samphire from near Truslove, north of Esperance, was also described by Wilson (1980) as a putative intergeneric hybrid between an unknown species of the former genus Halosarcia and the then Tegicornia uniflora. Plants from the Truslove population have the mat-like habit and unusual perianth shape typical of Tecticornia uniflora. However, they also produced small spicate inflorescences with
opposite pairs of 1–3-flowered cymes which had not been observed in *T. uniflora*. These plants have mostly hermaphroditic flowers, although towards the apex of some inflorescences the lateral flowers are female or sterile. Wilson (1980) suggested that, due to the sterility of flowers and the presence of immature seeds in combination with the presence of characters reminiscent of both *T. uniflora* and ‘a generalised species of *Halosarcia*’, that this taxon was of hybrid origin.

While hybridisation apparently readily occurs within the Salicornioideae (Dalby 1975; Wilson 1980; Castroviejo & Lago 1992; O’Callaghan 1992; Shepherd & Yan 2003), the Truslove taxon has a uniform population which has been sampled over a 28 year period. This taxon occupies a stable, undisturbed habitat, is apparently fertile and produces seed. Furthermore, as the closest population of one proposed parent *T. uniflora* is over 350 kilometres away, it was determined that this taxon was unlikely to be of hybrid origin. It was subsequently given the phrase name *Tegicornia* sp. Truslove (P.G. Wilson 11824C) in April 2003 (Western Australian Herbarium 1998–). While allied to *T. uniflora* in having a mat-like habit and distinctive obovate perianth, molecular sequence evidence shows that it is genetically distinct (Shepherd et al. 2004). The presence of hermaphrodite flowers and characteristic sculpturing of the seed coat also supports this taxon as unique, and it is therefore described as a new species herein.

**Methods**

This study is based on the examination of herbarium specimens lodged at the Western Australian Herbarium (PERTH). Floral characters were scored from fresh material, or material preserved in 70% ethanol. Inflorescence photographs were taken using a Nikon Digital Camera Head (DS-5M) mounted on a dissecting microscope using a DS Camera Control Unit (DS-L1). Seed images were obtained using an Environmental Scanning Electron Microscope (ESEM) (Danilastos 1993). Species distribution bioregions are based on Version 5.1 of the Interim Biogeographic Regionalisation for Australia (IBRA) categories (Thackway & Cresswell 1995; Environment Australia 2000) as modified on FloraBase (Western Australian Herbarium 1998–). Distribution maps were created using DIVA-GIS freeware Version 5.2.0.2 and show IBRA Version 6.1 regions (Department of the Environment and Water Resources 2007) with coordinates from collections lodged at PERTH. Precise localities are withheld due to conservation concerns. Terminology used to describe the inflorescence structure is outlined in Shepherd (2007).

**Taxonomy**


Dioecious, perennial prostrate herb, 5–10 cm high to 0.5–1 m across. **Vegetative articles** obovoid or barrel-shaped to spherical, circular in cross section, glossy deep green and red, 1.5–5 mm long, 2–6 mm wide, apex rounded or truncate, margin entire. **Inflorescence** 3–7.5 mm long, 2–3.6 mm wide, of 1–3-flowered cymes forming a spike 2–3 nodes long, with a slightly undulating ellipsoidal outline, terminal to main or lateral branches, or flowers solitary and interspersed among vegetative articles. **Bracts** fused, barrel-shaped, convex in face view with the upper edge shallowly curved, concave in side view with the upper edge shallowly curved, outer face of bract not protruding, apex truncate to
acute, margins entire; not overlapping subtending bracts. Flowers dioecious, with the central floret larger than or more or less equal to lateral florets, exposed above subtending bracts, free from bracts, adjacent florets and opposite florets. Perianth fused, broadly obovate in the female, narrowly obovate in the male and dorsiventrally compressed, with both the adaxial and abaxial surfaces slightly ascending, apex truncate with the aperture at or just below the apex; lobes 3 with one small abaxial lobe inside two lateral lobes, margins entire. Stamen 1; the anther elliptic, 1–2 mm long, abaxial to the ovary. Ovary free from the stem cortex, style bifid, membranous. Fruiting spikes scarcely expanded, soft, membranous-papery, apical vegetative growth absent. Fruitlets partially exposed above subtending bracts, sunken in the stem, free from bracts, adjacent fruits and opposite fruits; fruiting perianth membranous-papery, not enclosing the seed, dehiscence not in the medial plane. Pericarp fused with the perianth, not enclosing the seed; style at fruiting stage absent, or present with the base thickened. Seed vertical and rotated to the left or right relative to the stem axis, ovate with a beak, 1.6–2 mm long, opaque, dark red-brown or black, with concentric fan-like porcate rows. Embryo curved, perisperm present. (Figure 1)

Figure 1. Tecticornia uniflora. A – distinct mat-like habit (K.A. Shepherd KAS 745 & J. English); B – solitary male florets in each bract; C – solitary female florets in each bract, showing the typical broad obovate perianth exposed above the subtending truncate bract; D – upright inflorescences may form when grown in cultivation, with arrows indicating a cluster of 3 female flowers (showing the exerted stigmas) (grown from seed collected from K.A. Shepherd KAS 748 & J. English); E – ESEM micrograph of a seed (K.A. Shepherd KAS 748 & J. English). Scale bars = 3 mm (B & C); 200 µm (E). B & C adapted from Wilson (1980).

Distribution. Found south of Newdegate to north of Mount Barker in the Esperance Plains, Jarrah Forest and Mallee regions of the South-West Botanical Province (Figure 2).

Habitat. This mat-like species grows in the low-lying flood zone around the margins of salt lakes in yellow or grey sandy clay (Figure 1A).

Phenology. Flowering from October to November.

Conservation status. Tecticornia uniflora is categorised as Priority Four under the Department of Environment and Conservation (DEC) Conservation Codes for Western Australian Flora (Atkins 2006), as it is restricted to a few isolated populations around the margins of salt lakes in the south-west of Western Australia.

Chromosome number. Diploid counts of 2n=18 were previously published for this species under Tegicornia uniflora (Shepherd & Yan 2003).

Affinity. While T. uniflora remains the only dioecious Australian samphire, it is not as distinct as Wilson (1980) first thought. Nuclear DNA sequence analysis has shown that T. uniflora is related to Tecticornia lylei (Ewart & Jean White) K.A.Sheph. & Paul G.Wilson (as Halosarcia lylei (Ewart

Figure 2. Distribution of Tecticornia uniflora (■) and T. indefessa (▲) in south-west Western Australia.
& Jean White) Paul G.Wilson, in Shepherd et al. 2004; Shepherd et al. 2005b). While this species is genetically similar to *T. lylei*, it is morphologically distinct from it. In appearance it is similar to *T. indefessa* but may be distinguished by a number of characters outlined under that species.

**Notes.** When grown in cultivation *T. uniflora* forms spicate inflorescences 2–3 nodes long, comprised of small 1–3-flowered cymes of male or female flowers (Figure 1D). The orientation of the seeds in this species is unusual and was described as ‘Type 5’ (Shepherd et al. 2005a) in which the seeds are orientated vertically but are rotated 90 degrees to the left or right.

**Tecticornia indefessa** K.A.Sheph., *sp. nov.*


**Typus:** south-east of Truslove, Western Australia [precise locality withheld for conservation purposes], 15 January 1981, P.G. Wilson 11824 A (holo: PERTH 02493500; iso: CANB).

**Halosarca** sp. *x Tegicornia uniflora* Paul G.Wilson, Nuytsia 3: 25 (1980).


Bisexual or gynomonoecious, *perennial* prostrate herb, 5–15 cm high to 0.5–2 m across. *Vegetative articles* obovoid or barrel-shaped to spherical, circular in cross section, glossy deep green and red, 3–6(–8) mm long and 2–6 mm wide, apex acute to shortly acuminate, margins entire. *Inflorescence* up to 9 mm long, 2–4.5 mm wide, of 1–3-flowered cymes forming a spike of 2–4 nodes, with a slightly undulating outline, terminal to main or lateral branches. *Bracts* fused, sometimes becoming free towards the apex of the inflorescence, barrel-shaped, convex in face view with the upper edge shallowly curved, concave in side view with the upper edge shallowly curved, outer face of bract not protruding, apex acute to shortly acuminate, margins entire; partially overlapping subtending bracts. *Flowers* bisexual or the lateral florets in the 3-flowered cyme female or sterile, with the central floret larger than or more or less equal to lateral florets, covered by the subtending bracts with only the apex exposed, free from bracts, adjacent florets and opposite florets. *Perianth* fused, broadly obovate and dorsiventrally compressed, with both the adaxial and abaxial surfaces slightly ascending, apex truncate with the aperture at or just below the apex; lobes 3 with one small abaxial lobe inside two lateral lobes, margins entire. *Stamen* 1; the anther elliptic, 1–2 mm long, abaxial to the ovary. *Ovary* free from the stem cortex, style bifid, membranous. *Fruiting spikes* scarcely expanded, soft, membranous-papery, apical vegetative growth absent. *Fruitlets* obscured or partially exposed above subtending bracts, sunken in the stem, free from bracts, adjacent fruits and opposite fruits; fruiting perianth membranous-papery, not enclosing the seed, dehiscence not in the medial plane. *Pericarp* fused with the perianth, not enclosing the seed; style at fruiting stage present with the base thickened. *Seed* vertical relative to the stem axis, ovate with a beak, 1.2–2 mm long, opaque, dark red-brown, with faint ribs on the outer margin, the sides smooth. *Embryo* curved, perisperm present. (Figure 3)

Distribution. Common around the margin of a salt lake in a conservation reserve north of Esperance, in the Mallee region of the South-West Botanical Province (Figure 2).

Habitat. In white to brown-grey sand near the edge of a salt lake.

Phenology. Flowering from September to October with fruits forming in December to January.

Conservation status. Recently listed as Priority Two under DEC Conservation Codes for Western Australian Flora, as although it is poorly known, a population occurs within a nature reserve.

Chromosome number. Unknown.

Etymology. The specific epithet is derived from the Latin indefessus (unworn, indefatigable), in recognition of the tireless work of Paul G. Wilson (1928–) who has contributed so much to the taxonomy of the Australia flora and who has freely shared his knowledge (and love) of the Australian samphires.

Affinity. This species is allied to Tecticornia uniflora in having a similar mat-like habit and flattened obovate perianth (in the female flowers of T. uniflora). It occurs approximately 350 km from the nearest known population of T. uniflora and is distinguished by having hermaphrodite (and sometimes female) flowers that are covered by subtending bracts which tend to have more acute rather than truncate apices (Figure 3A). The seeds of T. indefessa have sculpturing only on the outer margin of the seed coat rather than over the whole surface of the seed as in T. uniflora (Figure 3B).
Notes. Three collections (G.J. Keighery & J.J. Alford 1471 (PERTH 02493551), K. Newbey 7906 (PERTH 02493543) and R. Hnatiuk 761144 (PERTH 01153129)) from near the coast at Israelite Bay, have a distinctive prostrate habit similar to *T. indefessa* but with generally smaller vegetative articles which appear to have a dull rather than glossy surface. As two specimens are infertile and the third has immature flowers, this taxon cannot be identified with certainty and further collections are required to confirm its status.

The orientation of the seeds in *T. indefessa* is currently recorded as being vertical relative to the stem axis. This is based on a limited number of observations as there is a lack of material with mature seed available at PERTH. Further collections are required to confirm if the seeds are always vertical rather than having a ‘Type 5’ orientation (Shepherd *et al.* 2005a) as observed in *T. uniflora*.

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