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THREE NEW SPECIES OF *TETRAGONIA* AND *TRIANTHEMA* (AIZOACEAE)

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Abstract

Three new species of the family Aizoaceae are described and illustrated. *Tetragonia cristata* C.A. Gardner ex Prescott is from Western Australia, *Trianthema megasperma* Prescott, from the Northern Territory and *Trianthema patelliitecta* Prescott, from the north-western part of Australia. The affinities of these taxa are discussed, distribution maps and ecological data are provided.

Introduction

Little work has been done on the family Aizoaceae in Australia since Bentham's treatment in 1870, and only few native species are known from the comparatively poorly collected interior of the continent. Of about 40 species recorded for Australia, as compared with an estimated 1200 species in the world, about half are introduced and have become weeds. Almost all the Australian species of *Trianthema* and *Tetragonia* were described by F. Mueller (1859, 1876, 1884, 1895). An additional species, *Tetragonia eremaea* was described by Ostenfeld (1921) and *Trianthema compacta* by C.T. White (1919). The family has now been examined as part of a flora treatment for the "Flora of Australia" and three new species of *Trianthema* and *Tetragonia* are here described in preparation for this publication. New species of *Gunniopsis* are described elsewhere by R.J. Chinnock.

This paper brings the accepted number of species in Australia to 12 for *Trianthema* and eight in *Tetragonia*.

Tetragonia cristata C.A. Gardner ex Prescott, sp. nov.

Affinis *T. tetragonoidi* (Pallas) Kuntze et *T. eremaeae* Ostenf. sed fructu turbinato base cuneato et alis quatuor extensis supra fructu, cristarum convolutarum numero inter alas et pagina dense papillosa differt.

Type: Between Gidgee and Youno Downs, W.A., *C.A. Gardner 24467*, 22 Aug., 1963, (PERTH, holo).

The specific epithet was pencilled on one of Gardner's collections in his own hand (*C.A. Gardner 24467*) but the name was never published. It seems that the name refers to the convoluted ridges along the fruit.

Description

Prostrate annual herb with stems to 60 cm long, succulent, glabrous or with a few vesicular hairs on young growth, crystalline on all parts. *Leaves* alternate, scattered, constricted into petiole 5-20 mm long; lamina flat, ovate to rhomboid, 5-50 mm long, 3-25 mm broad, apex usually acute, mid-vein visible below, densely papillose. *Flowers* solitary at each node, sessile, axillary. *Perianth*: lobes 4, lanceolate to ovate, papillose outside, glabrous inside, c. 3 mm long, yellow. *Stamens* 12-30, c. 2 mm long. *Ovary* top-shaped, densely papillose, c. 2 mm long; styles 4-8, c. 3 mm long, terete; stigmatic surface on one edge, recurved; ovules 4-8. *Fruit* top-shaped, with four wings extending above fruit, cuneate at base, with a number of convoluted ridges between wings, densely

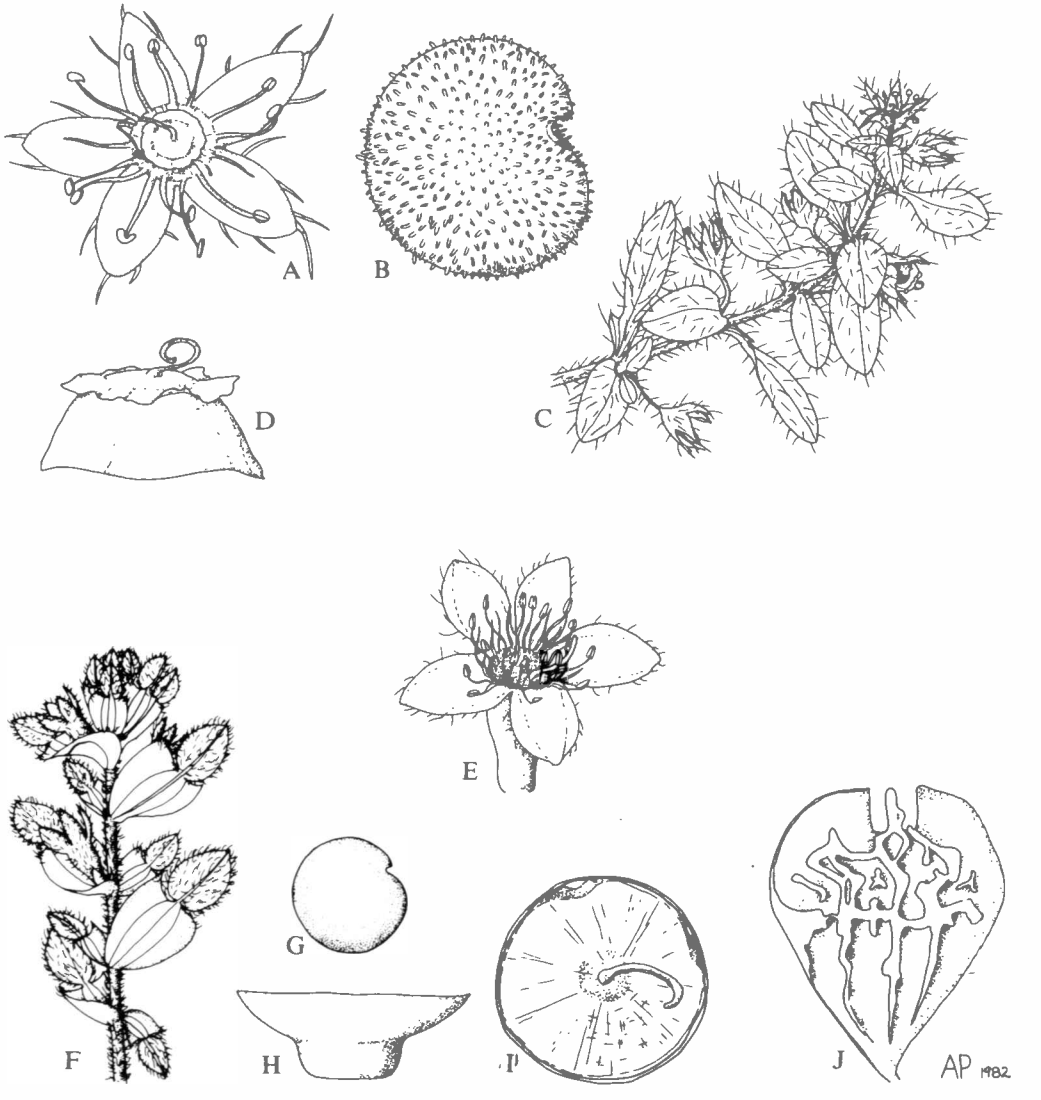


Fig. 1. A-D, *Trianthema megasperma*: A, flower from above, x4 (*Lazarides 7990*); B, seed covered with papillae, x10; C, habit showing solitary pedicellate flowers, x2; D, operculum with undulating rim near the top, x10; (B-D, *Gittins 2893*); E-I, *Trianthema patellitecta*: E, flower, x4 (*Bedbrook 4E*); F, habit, x2; G, seed x10; H, operculum in side view, x10; I, operculum from above showing hyaline cover, x10 (F-I, *Bennett 1734*); J, *Tetragonia cristata*: fruit showing surface structure but papillae not shown, x3 (*Demarz 6943*).

papillose, drying bony or woody, 8-15 mm long, 8-12 mm broad at widest point, purplish when fresh. *Seeds* several, each with separate woody casing, c. 3 mm long, pear-shaped, smooth, pale brown. (Fig. 1 & 2).

Distribution

Western Australia. Most of the specimens were collected in the vicinity of Meekatharra. (Map 1).

Specimens examined

WESTERN AUSTRALIA: Yagahong Hill, 50 km south-south-east of Meekatharra on the Sandstone Road, 27° 04′ S, 118° 40′ E, Ashburton District, *R.J. Chinnock 1031*, 14.ix.1973, fruit (AD); 30 miles N of Meekatharra, *C.A. Gardner 2330*, 17.vii.1931, flower and fruit (PERTH); Woodleigh Station, W.A.; *R. O'Farrell 42*, Sept. 1967, fruit (PERTH); 1 km S of Lake Austin, W.A.: *H. Demarz 6943*, 11.x.1978, fruit (PERTH); 200 km N of Northampton on Carnarvon Road, W.A., *W.E. Blackall 4552*, 31.viii.1940, flower and fruit (PERTH, 2 sheets); Belele Station WNW of Meekatharra, Chaddlebubba paddock, W.A., *D.W. Goodall 3068*, 8.xi.1965, flower and fruit (PERTH); Wadatharra Creek, 12 m W of Mt Magnet, W.A., *C.A. Gardner s.n.*, 11.x.1945, fruit (PERTH); Upper Murchison River, W.A., *Isaac Tyson s.n.*, 1892, flower and fruit (MEL 99868); 8 miles W of Mileura on Nookawarra Road, Eremean Province, W.A., *N.H. Speck 1010*, 19.vii.1958, fruit (AD); 143 miles N of Mullewa, S-W Division, W.A., *A.M. Ashby 4763*, 1.vii.1973, flower (AD 97421120); 19 miles W of Byro, W.A., *D. Demarz D3316*, 13.viii.1971, flower and fruit (PERTH).

Affinities

Vegetatively the species is indistinguishable from both *Tetragonia tetragonioides* (Pallas) Kuntze and *Tetragonia eremaea* Ostenf., and the three are extremely variable in the shape and size of the leaves. It is distinguished by the shape of the fruit as well as a number of convoluted ridges between the wings and its densely papillose surface. *T. tetragonioides* is largely restricted to the eastern half of Australia and *T. eremaea* to southern Australia, while *T. cristata* has mainly been recorded from central Western Australia.

Ecology

The habitat notes from the herbarium sheets vary greatly and include the following range:- 'Growing on rocky areas above cliffs', 'Granite outcrops', 'Red clay flat', 'Clay-calcareous' and 'Red sand'.

Trianthema megasperma Prescott, sp. nov.

Similis *T. pilosae* F. Muell. sed operculo campanulato pariete tenue et crista undulata prope apicum, semine uno duplo amplitudine (c. 3 mm lato) et floribus majoribus, solitariis et pedicelatis differt.

Type: c. 17 miles N of Mt Evelyn, 132° 45′ E, 13° 31′ S, 3.iii.1973, *M. Lazarides 7990* (holotype: CANB 265836; isotypes: BRI 224764; NT 52613).

The specific epithet refers to the single seed which is twice as large as the seeds of most other species in the genus.

Description

Prostrate perennial herb with stems to 1 m long, densely hirsute with long spreading hairs on all parts, hairs 2.0-3.0 mm long. *Branchlets* regularly alternate. *Leaves* opposite, one of each pair distinctly larger than the other; petiole c. 6 mm long, or on larger leaves dilated into membranous sheath immediately below lamina; lamina flat, ovate to obovate or spathulate, 3-30 mm long, 3-15 mm broad, acute or obtuse, with mid-vein depressed above, distinctly raised below, pale-green, strongly discolourous. *Flowers* solitary at each node, pedicellate; pedicel 2-10 mm long. *Perianth*: lobes 5,

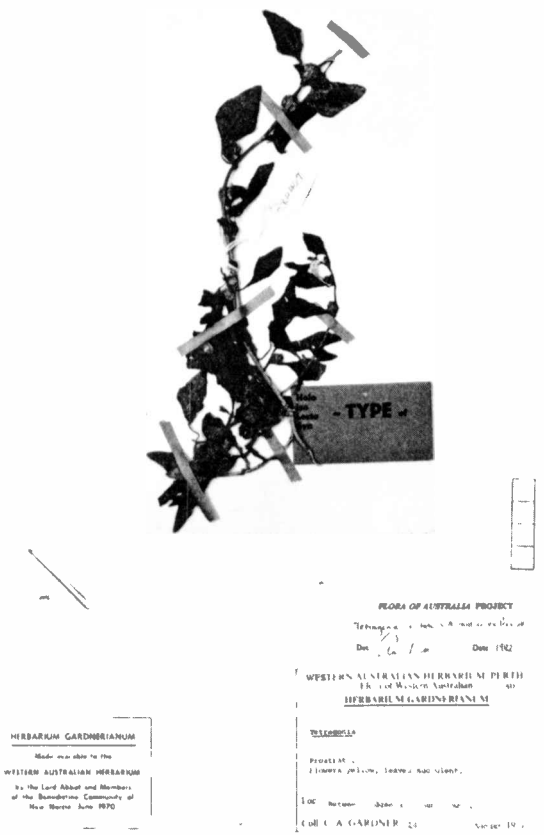


Fig. 2. Holotype of the name *Tetragonia cristata, Gardner 24467* (PERTH).

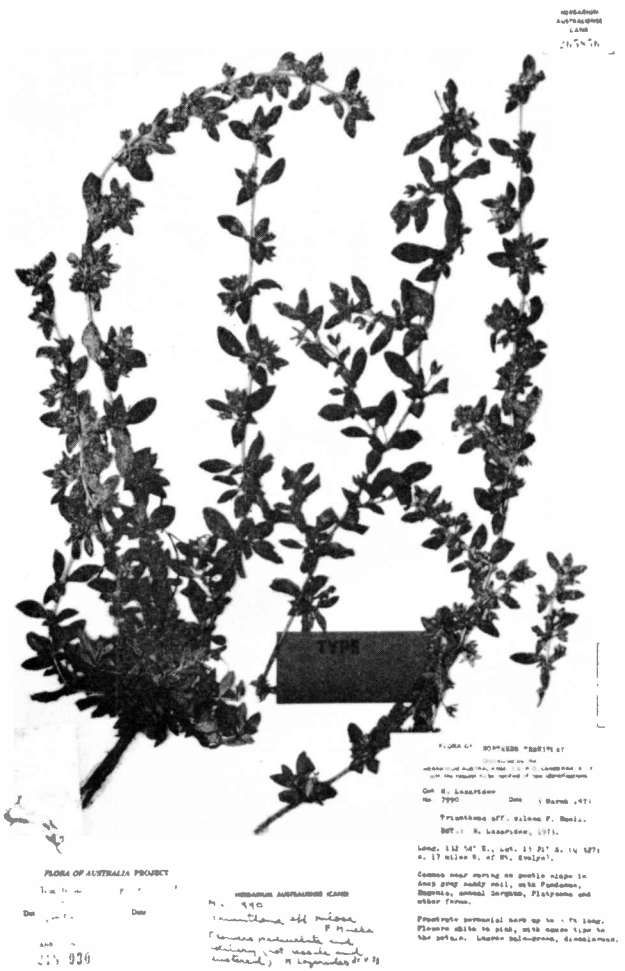


Fig. 3. Holotype of the name *Trianthema megasperma, Lazarides 7990* (CANB).

narrow-triangular to ovate, with scarious margins and distinct dorsal appendage just below the apex, spreading, hirsute outside, glabrous inside, white to pink with mauve tips, c. 6 mm long; perianth tube very short. *Stamens* 5-15, 2.5-4 mm long; filaments terete. *Ovary* ovoid, with distinct terminal rim, 3 mm diameter; style 2.5 mm long, recurved at the blunt tip; ovules 2. *Fruit* a dry ovoid capsule, dehiscing by circumscissal split near base; operculum campanulate, thin-walled, with undulating ridge near top, 3 mm broad, tightly enclosing the large seed. *Seed*, one maturing per capsule, c. 3 mm broad, dorsiventrally compressed pea-shaped, black, reticulate or rugose, studded with small clear papillae, lifting the operculum when mature. (Figs 1 & 3).

Distribution

Northern Territory. Restricted to an area close to the north-western edge of Arnhem Land. (Map 2).

Specimens examined

NORTHERN TERRITORY: 8 miles N Mudginberry Homestead, *N. Byrnes NB 807*, 18.v.1968, flower and fruit (BRI, DNA, NSW, NT); Koongarra area, 132° 52′, 120° 50′, *M.O. Rankin 1947*, 18.iv.1979, flower and fruit (CANB, DNA); near East Alligator River 132° 5′, 12° 20′, *C.H. Gittins 2893*, 21.v.1975, flower and fruit (BRI); Myra Falls vicinity, Tin Camp Creek 12° 28′ S, 133° 20′ E, *T.G. Hartley 13796*, 29.v.1973, flower and fruit (CANB); near Buffalo Springs, Mt Brockman, 4 km NNE of Koongarra, *M. Lazarides 8917*, 22.v.1980 (CANB); Gulungul Creek on Arnhem Highway, 12° 39′ S, 132° 53′ E, *L.A. Craven 5553*, 18.v.1980 (CANB, 2 sheets); c. 16 km S of Oenpelli Mission, 12° 29′ S, 133° 03′ E, *L.G. Adams & C.R. Dunlop 2983*, 15.ii.1973 (CANB).

Affinities

The species is similar to *Trianthema pilosa* in leaf shape and indumentum, but the branches are longer and the nodes more distant. The flowers are large, solitary and pedicellate. The fruit is very distinctive with its thin-walled campanulate operculum with undulating rim and one seed twice as large as in *T. pilosa*.

Ecology

On all herbarium sheets available it is stated that the plant was collected in sandy soil.

It is curious to find that some of the seeds are hollow, but the phenomenon is not well understood especially as it cannot be attributed to insect attacks in the cases investigated.

Trianthema patellitecta Prescott, sp. nov.

Similis *T. pilosae* F. Muell. sed operculo patelliformi tecto membrana hyalina et seminis laevibus differt.

Type: Kimberley Research Station, W.A., *R.A. Perry 3067*, 26.vii.1952 (holotype: CANB 92755; isotypes: AD 96103192; BRI 177606; CANB 47388, NSW).

The specific epithet refers to the operculum which from the top resembles a dish covered with a hyaline membrane.

Description

Spreading prostrate herb with stems to 1 m long, with long internodes, hirsute with stiff spreading hairs on all parts. *Branchlets* distant, regularly alternate, or one long and one short per node. *Leaves* clustered, opposite, petiole c. 6 mm long, usually dilated into membranous sheath immediately below lamina, sheath on young leaves larger than lamina, ovate, winged at anterior edge, 3-veined; lamina flat, ovate, larger ones tending

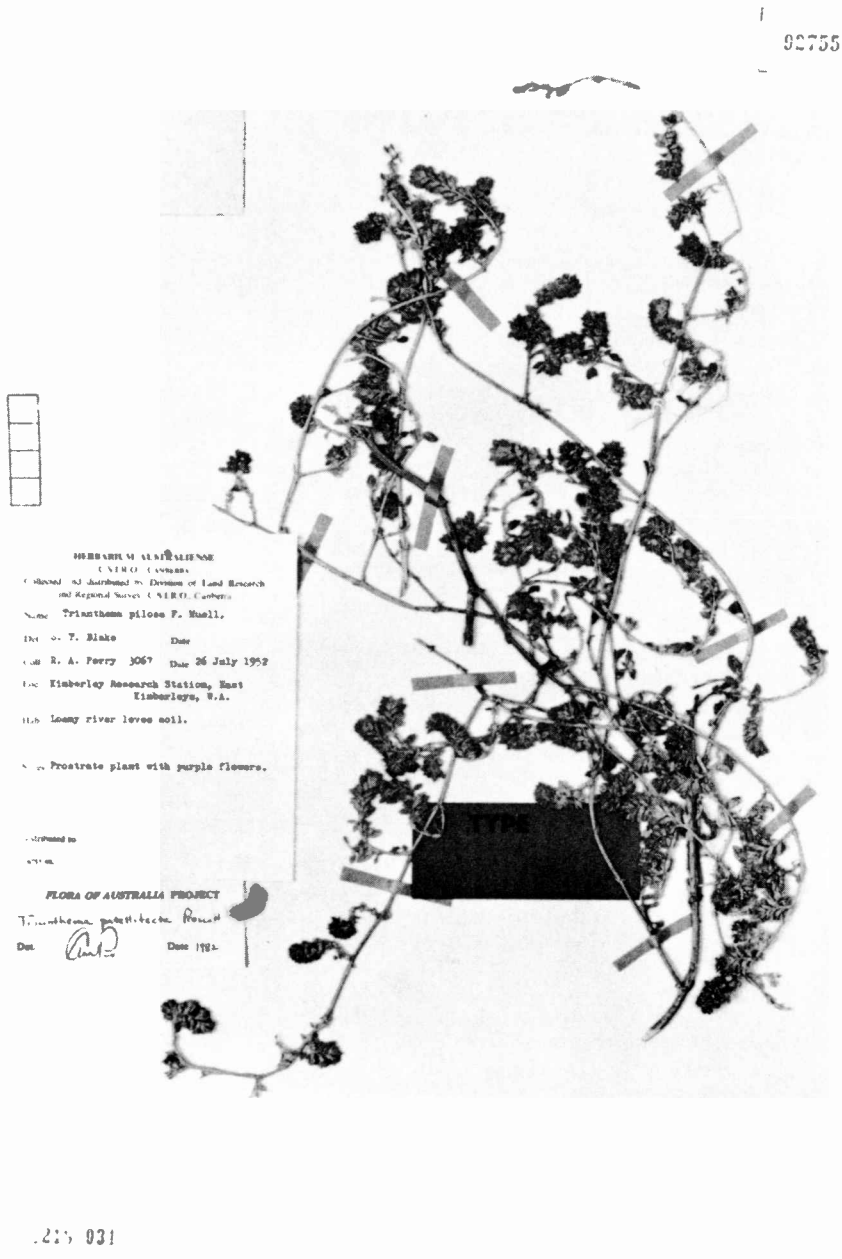


Fig. 4. Holotype of the name *Trianthema patellitecta, Perry 3067* (CANB).

to oval or spathulate, 4-30 mm long x 3-15 mm wide, apex usually acute, mid-vein visible below. *Flowers* solitary or paired, sessile, axillary. *Perianth*: lobes 5, triangular-lanceolate, unequal, 2 with narrow scarious margins, 3 wider, dorsal horn if present small, not exceeding perianth, red or purple inside, c. 2.5 mm long; perianth tube obconical, c. 2 mm long. *Stamens* 15-25, c. 2 mm long; filaments filiform. *Ovary* cylindrical, c. 1.5 mm long, style 2 mm long, terete, sunk into central depression, ovules 2. *Fruit* dry, globe-shaped, dehiscing by circumscissal split about the middle; operculum dish-shaped with fine hyaline cover across top, c. 4 mm across; style persistent. *Seeds* 2, one remains at base of operculum and one at base of fruit, c. 1.5 mm broad, pea-shaped, faintly reticulate, finally shiny black but initially with hyaline cover. (Figs 1 & 4).

Distribution

North-western Australia. Known from only a few localities but could be more widespread in remote areas. (Map 3).

Specimens examined

WESTERN AUSTRALIA: Karunji Station, *D. Rust 21*, January, 1951, flower and fruit (PERTH); Kununurra, *D. Bedbrook 4E*, 29.ii.1972, flower (PERTH); 5 km SSE of Kununurra, 128° 45′ E, 15° 49′ S, *K. Paijmans 2325*, 10.iii.1978 (CANB, PERTH); N.W. Kimberley Research Station, Kununurra, 128° 40′ E, 150° 32′ S, *M.H. Andrew 169*, 7.xii.1978, flower and fruit (DNA); King River, W.A., *N. Byrnes NB 303*, 18.v.1967, fruit (DNA); Prince-Regent's River, W.A., *Bradshaw & Allen s.n.*, 1891, fruit (MEL, NSW); Kimberley Research Station, W.A., *R.A. Perry 3067*, 26.vii.1952 (AD, BRI, CANB, NSW); Hidden Valley, c. 3 km NE of Kununurra, East Kimberley, *R. Pullen 10.587*, 25.iv.1977 (NSW, CANB); Kimberley Research Station, *B.G.W. Drysdale 204*, 14.ii.1950, flower and fruit (PERTH, CANB); 30 km NNW Kununurra 128° 40′ E, 15° 32′ S, *M.H. Andrew 299*, 18.i.1979, flower and fruit (BRI); King River Pumping Station, W.A., *E.M. Bennett 1734*, 18.v.1967, fruit (PERTH); Kununurra, near Kimberley Research Station); *K.T. Richards 26*, 18.iii.1964, flower and fruit (PERTH); Kimberley Research Station, Ord River, *P.J. van Rijn s.n.*, 26.viii.1960, flower (PERTH); Karungie, *D.W. Rust 180*, 21.ii.1951, fruit (CANB); vicinity of Kimberley Research Station, near Kununurra, East Kimberleys, *D.H. Mackenzie 690312-27*, 1969, flower and fruit (CANB); 4 miles NE of Wyndham Pumping Station, W.A., 15° 30′ S, 128° 05′ E, *J.R. Maconochie 121*, 18.v.1967 (CANB); Townside, c. 12 miles from the Station, *P.J. van Rijn 14*, 12.v.1960, flower and fruit (CANB).

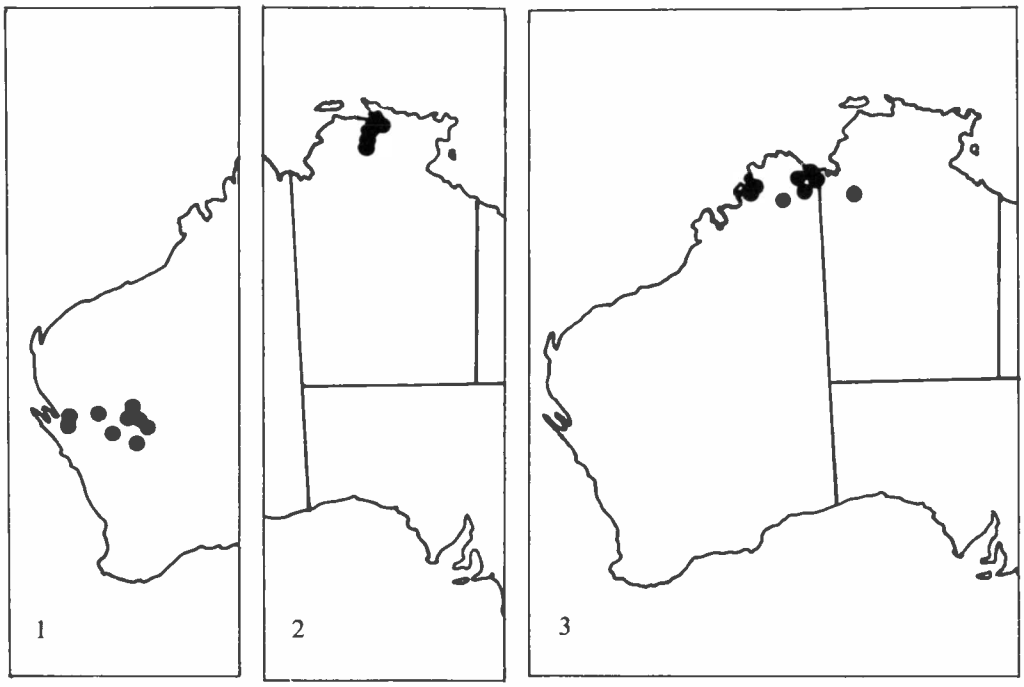
NORTHERN TERRITORY: Jasper Gorge, Victoria River Downs area, N.T. 130° 45′ E, 16° 02′ S, *B.J. Ganley s.n.*, 19.vii.1964, fruit (NT).

Affinities

This species is similar to *Trianthema pilosa* in leaf shape and indumentum but the fruit is very distinctive, because the operculum from the top resembles a dish covered with a hyaline cover. The seeds are smooth and without papillae. The habit appears to be slightly different with long internodes and leaves clustered on branchlets. These leaves are quite uniform in size and shape with lamina c. 5 mm long.

Ecology

The species is usually associated with sand near rivers. The notes available on herbarium sheets are: 'sandy embankment in sandstone cliff complex', 'sandstone hills', 'cockatoo sand', 'red levee sand', 'growing in gorge close to water', 'moist edge of herbaceous swamp within sandy savannah country', 'sandy river alluvium', 'loamy river levee soil', 'disturbed cultivated strip of cockatoo sand'.



Map 1. Distribution of *Tetragonia cristata*.
Map 2. Distribution of *Trianthema megasperma*.
Map 3. Distribution of *Trianthema patelliitecta*.

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