NUYTSIA

WESTERN AUSTRALIA'S JOURNAL OF SYSTEMATIC BOTANY

ISSN 0085-4417

Macfarlane, T.D. and Hearn, R.W.
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Nuytsia 16(2): 469–471 (2007)

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SHORT COMMUNICATIONS

Occurrence and status of *Pentapogon quadrifidus* (Poaceae) in Western Australia

Pentapogon R.Br. (Poaceae) is a genus endemic to Australia, currently considered monospecific. The species *P. quadrifidus* (Labill.) Baill. (Fiveawn Speargrass) is native in South Australia (Jessop *et al.* 2006), New South Wales (Jacobs & McClay 1993), Victoria (Walsh 1994) and Tasmania (Morris 1991). A varietal taxon was described by Bentham (1878) from Tasmania although not again recognised until Morris (1990) confirmed its validity and corrected its nomenclature.

Pentapogon has not been considered to occur in Western Australia except in reference to the original generic position for the species now known as *Deyeuxia drummondii* (Steud.) J. Vickery (Vickery 1940; Gardner 1952).

In 1995 A.R. Annels and R.W. Hearn collected grasses among other flora from a location near Rocky Gully, Western Australia, during an investigation of the site for the occurrence of threatened flora. One of the grasses was identified as *Pentapogon quadrifidus*, the first definite record of the species from Western Australia. Subsequent visits to the location confirmed its continuing presence.

The Rocky Gully site is a low-lying and winter-wet flat with low shrubs and open herb fields on sandy clay soils over laterite, drying out in summer. The surrounding vegetation is Jarrah (*Eucalyptus marginata* Sm.) and Marri (*Corymbia calophylla* (Lindl.) K.D.Hill & L.A.S.Johnson) forest. This habitat is consistent with at least some habitats in which it grows in eastern Australia. However the site shows evidence of past disturbance including possible clearing and grazing seeing as there is an old fence, and there is also some usage of a vehicle track passing through the area. This disturbance and the single known Western Australian locality left open the possibility that *Pentapogon quadrifidus* is not native there, that it may for example have been introduced in animal fodder. Further survey was undertaken to see whether a better view of its status could be formed.

At the original site the topography was relatively flat with unclear drainage lines so that it was difficult to relate the hydrographic zonation and vegetation associations to the occurrence of *Pentapogon quadrifidus*. The wetland was examined more extensively and a drainage line was found where the hydrographic and vegetation zonation were clearer. The centre of the wetland was a woodland of *Eucalyptus rudis* Endl. and *Melaleuca preissiana* Schauer with tall shrubs of *Melaleuca densa* R.Br. and *Viminaria juncea* (Schrad. & J.C.Wendl.) Hoffmanns., and there was a transition to a low shrubland dominated by *Hypocalymma angustifolium* (Endl.) Schauer, *Astartea* sp. and *Pericalymma* sp. *Pentapogon quadrifidus* was found in a narrow zone at the edge of the winter wet area where this low shrubland gradually changed to eucalypt forest dominated by Jarrah and Marri. The *P. quadrifidus* plants, which are sparsely tufted perennials, grew in the open and in the shelter of shrubs through which the flowering culms project.

The concept of the habitat preferences of *Pentapogon quadrifidus* thus acquired was used in a wider survey of selected wetlands in the area that were considered to be possible sites for the species. Some of these sites proved to have different vegetation or physical characteristics from the original site or were degraded and did not have the target species, although at least one site looked suitable but also lacked *P. quadrifidus*. *Pentapogon quadrifidus* was found at one other site that looked suitable, the low-lying flats beside the Frankland River where it crosses Muir Highway. At this location it was scattered sparsely over a wide zone, the gradient being more gradual than the water course at Rocky

Gully but resembling the original collection point in associated species and soil. The associated vegetation consisted of an open woodland of *Eucalyptus rudis* and *Corymbia calophylla* with scattered tall shrubs of *Melaleuca preissiana, Allocasuarina humilis* (Otto & F.Dietr.) L.A.S.Johnson*, Hakea prostrata* R.Br.*, H. varia* R.Br. *and Xanthorrhoea preissii* Endl. and an open sedge ground layer. The vegetation at this second location appeared virtually undisturbed by human activity.

Subsequently a third population of *Pentapogon quadrifidus* was discovered by the authors while engaged in field work for other purposes. At Wamballup Nature Reserve NE of Mount Barker it grew in low-lying flats adjacent to a severely salt-affected water course. This habitat was more open and the vegetation sparser and with fewer shrubs than at the other two sites. It grew with several other native perennial grasses and exotic annual grasses, among other plants. It seems likely that further populations may be found, although in a search at a very promising site at Gordon Hall *P. quadrifidus* was not found even though the vegetation was in good condition including eight native grass species.

Pentapogon quadrifidus is thus known from three separate locations where it grows in consistent habitats among native vegetation in good condition. At each site it is scattered through the vegetation at varying densities but never dominating. From this pattern we concluded that the species is most likely to be native to Western Australia. We assume that it has been overlooked because it occurs in only a few sites, is inconspicuous, and superficially resembles *Austrodanthonia* species, especially *A. setacea*. Because of its apparently localised distribution it had a Priority 1 conservation rating for Western Australia in Atkins (2006). It is now considered to carry a Conservation Code for Western Australian Flora: Priority 2 following the discovery of the population in a nature reserve. This survey has achieved some of the management requirements listed for this species by Hearn *et al.* (2006).

Pentapogon has the following key features: perennial, ligule an unfringed membrane, inflorescence paniculate, spikelets 1-flowered, without incomplete florets, at least sometimes with a rachilla extension, the lemma firmer than the glumes and becoming moderately hardened at maturity, 5-awned, the central awn longest and with twisted column, geniculate, attached dorsally, the lateral awns not twisted or geniculate, comprising a scabrid bristle terminating the lateral lobes and the inner two longer than the outer two. Two of these features are not generally recognised for *Pentapogon.* Firstly, the central awn is variously described as dorsal (e.g. Watson & Dallwitz 1992; 1992 onwards), from the apical sinus, i.e. terminal (Jacobs & McClay 1993) or as either (Bentham 1878). We observed it to be dorsal and subterminal, being inserted on the back of the lemma a short distance (*c.* 0.3 mm) below the apex of the lemma body which in this case is represented by the base of the sinus between the two innermost lateral lobes. This can only be seen with careful study and avoidance of splitting the lemma. Secondly, we also observed in WA material that there can be a prolongation of the rachilla above the floret, although it is very short, *c.* 0.15 mm, and obscure because of being tucked under the edge of the lemma so that it only became visible upon probing. This feature has been reported as absent in *Pentapogon* (Watson & Dallwitz 1992, 1992 onwards; Sharp & Simon 2002) and further checking will be required to determine whether it is always present. Rachilla prolongation is of importance because of its bearing on considerations of the relationships of *Pentapogon* and as evidence that *P. quadrifidus* evolved from a multi-floreted ancestor.

The South Western Australian native genera most similar to *Pentapogon* in technical details include *Deyeuxia*, *Dichelachne* and *Echinopogon* but none of these have more than two lateral lobes or bristles on the lemma. The general appearance is most like *Austrodanthonia* in the field and *P. quadrifidus* may in the past have been overlooked because of this resemblance. Although differing from *Austrodanthonia* in important respects including the membranous ligule and the 1-flowered spikelets, the spikelets of *P. quadrifidus* nevertheless may superficially give the impression of being multiflowered because of the 5 awns which protrude from the spikelet in a bunched manner.

The Western Australian plants are considered to belong to *Pentapogon quadrifidus* var. *quadrifidus*. The type variety has spikelets with glumes measuring 5–14 mm long (Walsh 1994, Jessop *et al.* 2006), the Western Australian material measuring *c.* 8 mm. *P. quadrifidus* var. *parviflorus* (Benth.) D.I. Morris (Bentham 1878, Morris 1990), limited to Tasmania, has smaller spikelets with glumes less than 4 mm long. All other observed features of the W.A. plants are consistent with var. *quadrifidus* so there is no indication that it is an undescribed Western Australian endemic taxon.

Specimens examined. Western Australia: Muir Highway, 3.5 km E of junction of Frankland Rd in Rocky Gully townsite, 34° 31' 15.000" S**,** 117° 02' 40.000" E (GDA94), 23 Nov. 1995, *A.R. Annels & R. Hearn* ARA 5585 (PERTH); same location, *T.D. Macfarlane* 3767 (PERTH); same location, *T.D. Macfarlane & R.W. Hearn* TDM 3771 (PERTH); Frankland River near Muir Highway crossing, 14 Dec. 2004, *T.D. Macfarlane & R.W. Hearn* TDM 3777 (PERTH); Wamballup Nature Reserve, *c.* 23 km NW of Mt Barker, 1.5 km along Wamballup Road from Boyup–Cranbrook Rd, 30 Oct. 2006, *T.D. Macfarlane & R.W. Hearn* TDM 3909 (PERTH).

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