Breeding *Lotus Australis* Andrews for Low Cyanide Content

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The XX International Grassland Congress took place in Ireland and the UK in June-July 2005. The main congress took place in Dublin from 26 June to 1 July and was followed by post congress satellite workshops in Aberystwyth, Belfast, Cork, Glasgow and Oxford. The meeting was hosted by the Irish Grassland Association and the British Grassland Society.

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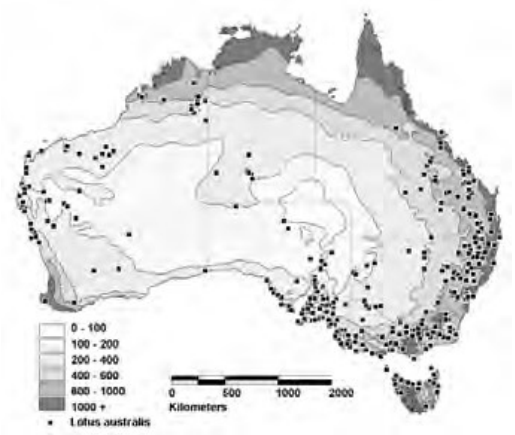

Figure 1 Annual rainfall and *L. australis* distribution in Australia

Introduction *Lotus australis* Andrews is a native perennial tetraploid legume (2n=4x=28) widely distributed throughout Australia (Figure 1). It is highly variable with 14 botanical varieties reported in the Australian Plant Name Index (http://www.anbg.gov.au). Despite broad adaptation within *L. australis* no cultivars have been developed for cultivation. One of the main barriers to cultivation is the reported cyanogenic nature of the species (Foulds, 1982), which makes it potentially toxic when plant cyanogenic glycosides are fully hydrolysed to form hydrogen cyanide (HCN). Foulds (1982) also reported that the cyanophoric trait was polymorphic at seedling and adult stages with 12% of plants acyanogenic in some populations. . The Cooperative Research Center for Plant-Based Management of Dryland Salinity, financially supported by Australian Wool Innovation has commenced a breeding program to develop a non-toxic cultivar of *L. australis*. The selection criterion of the first phase of the breeding programme was for low HCN production. Once this trait is stabilised, forage production and seed yield as well as general plant health will be the main breeding objectives.

Materials and methods A preliminary test was conducted to compare the semi-quantitative Feigl-Anger paper (FA) test (Feigl and Anger, 1966) with a wet-chemistry method (APHA, 1988) to estimate HCN content in 4 *Lotus* species including *L. australis*. Subsequently a test was performed on 66 plants corresponding to 10 accessions of *L. australis*, using the FA test. Time was recorded for three distinct stages observed in the FA test. The first stage is observed when the white filter paper starts to change colour, the second when the filter paper is light blue and finally when the filter paper is dark blue. The more rapid the colour change, the more HCN present. Each test was completed within 1 h and 3 h were required to complete the test on all 66 samples.

Results The ranking obtained from the FA test and the wet-chemistry test were the same. Subsequently the former test was chosen for its speed, low cost and sample size efficiencies (eg. 5 to 10 leaves). From the 66 samples tested with the FA test, 6 samples turned dark blue within 6 min of exposure, whilst 10 were light blue or had not changed colour after 1 h. There was only 1 sample that did not record a colour change. Thirty-nine of the lowest HCN content plants have been selected from the paper test and 60 seeds per plant were scarified, pre-germinated in Petri-plates and subsequently planted to re-select the low HCN lines.

Conclusions The FA test is an accurate, rapid and low cost method for screening cyanogenesis in *L. australis*. The low-HCN material identified in this research will form the basis of a new breeding programme for *L. australis*.

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