

Maku lotus soil seed banks in farmers fields in eastern Australia

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Introduction

Lotus pedunculatus cv. Grasslands Maku has been sown widely on acid infertile soils in coastal regions of eastern Australia (Harris *et. al* 1992). Maku lotus is a rhizomatous perennial legume that persists vegetatively; however, seedling recruitment may occur following drought or flood if seed is present in the soil. To determine the size of soil seed banks in farmers fields in eastern Australia a survey was conducted in 1991.

Methods

Soil samples were taken from 57 paddocks from locations ranging from Gympie, Queensland (26°10'S) to Bairnsdale, Victoria (37°51'S). All paddocks had been sown to Maku lotus prior to 1988 and had been allowed to flower at some stage since that time. At each site twenty-five 7 cm diameter cores were taken to a depth of 5 cm. Samples were processed by the method of Jones and Bunch (1988) and Maku lotus and white clover seeds/m² were related to site characters. Site characters used were rainfall, latitude, aspect, soil type, soil pH, fertilizer history, year sown, percentage cover of lotus, other species present, paddock size, type of livestock enterprise, stocking rate and stocking method.

Results

Lotus seed banks ranged in size from 0 to 6,621 seeds/m² with a mean of 662 (s.e. 184.5). White clover seed banks ranged in size from 0 to 6,789 seeds/m² with a mean of 956 (s.e. 171.4). The size of the lotus seed bank was positively correlated with latitude ($r=0.33$; $P<0.05$) and percentage cover of lotus ($r=0.37$; $P<0.01$) and was independent of other site characters. Samples collected from low latitude but high altitude at Glen Innes (29°42'S; 1000 m) had relatively high soil seed reserves (1890-2626 seeds/m²) compared with lower altitude sites at the same latitude.

Discussion

Daylength has already been shown to influence flowering in *L. pedunculatus* (Forde and Thomas 1966) and minimum daylength requirements may not be met at low latitude sites. The large seed banks at Glen Innes suggest that a vernalisation requirement may also need to be met. The size of the seed bank reflects a number of events, to fully understand the mechanisms involved, observations need to be made of flower number, yield and yield components and losses of seed from the seed bank. The effect of insect predators needs to be monitored throughout these stages. Whatever the mechanism, seed banks can contribute to the persistence of Maku lotus in farmers fields, particularly at high altitude and at sites further south than Taree (34°S). The size of lotus seed banks were comparable to that for white clover. A Maku lotus seed bank of 600 seeds/m² is equivalent to 2.7 kg/ha; this should be sufficient seed for a sward to re-establish following a drought or flood provided the seed was of reasonable quality (e.g. 30% germinable).

Acknowledgments

The authors wish to thank Dr J. Ayres, Messrs G. Bunch, R. Campbell, P. Dann, H. Kemp, D. McCoy, P. Midson, A. Rumbel and Ms R. Beardsell for supplying the samples. The research was funded by the Australian Dairy Research and Development Corporation.

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