Maku Lotus soil seed banks in farmers' fields

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Lotus pedunculatus cv. Grasslands Maku has been sown widely on acid infertile soils in coastal regions of eastern Australia. Maku lotus is a rhizomatous perennial legume that persists vegetatively; however, seedling recruitment may occur following drought breaking rain or flood if seed is present in the soil. To determine the size of 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, Q. ($26^0$10'S) to Bairnsdale, Vic. (37?51 'S). All paddocks had been sown to Maku lotus prior to 1988 and had flowered at some stage since then. At each site twenty-five 7 cm diameter cores were taken to a depth of 5 cm. Samples were processed by the method described in (I) and lotus seeds/m^2 were related to site characters. Site characters used were rainfall, latitude, maximum daylength, July mean minimum and January mean maximum temperature, aspect, soil type, soil pH, fertiliser history, year sown, percentage cover of lotus, other species present. paddock size. type of livestock enterprise, stocking rate and stocking method.

Results and discussion

Lotus seed banks ranged in size from 0 to 6,621 seeds/m^2 with a mean of 662 (s.e. 184.5). The size of the lotus seed bank was positively correlated with latitude ($r=0.33$; $P<0.05$), daylength ($r=0.3$ I; $P<0.05$) and percentage cover of lotus ($r=0.37$; $P<0.01$) and negatively correlated with January mean maximum temperature ($r=-0.40$; $P<0.01$). There was no significant correlation with other site characters.

Daylength has already been shown to influence flowering in another variety of *L. pedunculatus* (2) and minimum daylength requirements may not be met at the low latitude sites with maximum daylengths as short as 13 hours 45 minutes. 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, seed yield and yield components and losses of seed from the seed bank. The influence of insect predators at each of these stages needs to be monitored. Whatever the mechanism, seed banks can contribute to the persistence of Maku lotus in farmers fields, particularly at high latitude sites with longer days and lower summer maximum temperatures.

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