Predicting the emergence of annual pasture legumes: commercialisation of a soil-coring technique

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Soil-core sampling of stubble paddocks to assess total seed reserves of medics and clovers can be a valuable guide to farmers who must decide whether they need to sow additional pasture legume seed (1). However, an estimate of potential legume emergence is more useful than data on total legume seed reserve. This paper describes our recent research on predicting the emergence of the readily-germinable (soft) seed component of the total seed reserve of pasture legumes in the soil.

Methods

Two methods of assessing potential emergence of subterranean clover and annual medics following a wheat crop were studied in the period March 24 to May 24, 1988 on red-brown earth soil at the Waite Institute as follows:

Germination/emergence of medic and subterranean clover *in situ* in stubble paddocks following application of water to soil in steel rings; and

Germination/emergence of medic and subterranean clover in containers following watering of the 0-50 mm soil core samples collected in late March from stubble paddocks, and transported to growth rooms operating at 19?C. In the first method, steel cylinders (283 mm int.diam.) were driven into the soil and 5 litres rain water added to cylinders on March 30 to give rapid emergence of legumes. Further water was added to ensure complete emergence. In the second method, 4 soil cores (143 mm diam.) and 50 mm deep in the N, S, E, and W position and 50 mm from the steel cylinders were removed to the laboratory. Some whole cores were transferred to 150 mm square pots and watered with rain water to field capacity to allow germination and emergence at 19?C in a growth roan. Other cores were transferred to AGCHEM Pty Ltd for parallel germination/emergence studies. Paired samples were also prepared by a sample splitter, one sample being watered and emergence recorded while the other half was used for seed extraction by sieving (0.7 mm sieve for medics and 1.0 mm sieve for sub clovers) and flotation using perchlorethylene.

Results and discussion

Table 1. Regression equations showing interrelations of seed reserves, growth room emergence (GR), field emergence following watering (AR) and natural regeneration (NR) of medic.

GR Plants/m^2,	$Y = 0.160x + 52.7$	($r^2 = 0.926$***),	x = Total seeds/m^2
AR Plants/m^2,	$Y = 0.204x - 159$	($r^2 = 0.755$***),	x = Total seeds/m^2
NR Plants/m^2,	$Y = 0.125x + 137$	($r^2 = 0.731$***),	x = Total seeds/m^2
NR Plants/m^2,	$Y = 0.489x + 417$	($r^2 = 0.688$***),	x = Growth room emergence/m^2
NR Plants/m^2,	$Y = 0.528x + 405$	($r^2 = 0.729$***),	x = Steel ring emergence/m^2

***, $P < 0.001$

The data show clearly that both the growth roan emergence and steel cylinder emergence are highly correlated with total seed reserves in March and the subsequent natural regeneration of medic following opening rains on May 15. The results for sub-clover were very similar. Furthermore, emergence data from matching half and whole samples germinated at AGCHEM Pty Ltd or Waite Institute were entirely consistent. Thus it is clear that farmers and graziers who wish to check potential emergence of pasture legumes can do so by watering known areas in March-April. Alternatively they can secure the commercialised Pasture Legume Seed Soil Test Kit from AGCHEM Pty Ltd. This test kit procedure

involves taking 40 soil cores (56 mm diam and 50 mm deep) which fill 5 one-litre cartons. These are dispatched to AGCHEM Pty Ltd for germination/emergence and report.

Carter, E.D (1982). Australian Agronomy Conf., Wagga Wagga, N.S.W. p.180.