Emergence and survival of sown perennial grasses in a semi-arid environment

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The inclusion of pasture rotations into the farming systems of properties on the cracking clay soils of north-west NSW, is severely hampered by problems associated with the establishment phase (1,2,3).

A trial to investigate the effect time of sowing has on establishment, began at Walgett in 1987.(Annual median rainfall: 454mm).

Methods

Seed of the Australian native Mitchell grass (Astrebla lappacea) was sown as spikelets and caryopses, along with seed of Bambatsi Panic (Panicum coloratum var. makarikariense) at monthly intervals for one year beginning November 1987. Both grasses were sown using a bandseeder at a depth of 1-2cm into a cultivated seedbed. Results from the November sowing are presented.

Results and discussion

The complex relationship between rainfall and seedling emergence is shown in Table 1. Emergence is not synchronous but staggered over a range of rainfall events.

Table 1. Emergence of November sown seed

Emergence producing rainfall event (mm)	Date of emergence count	% Emergence of remaining unaccounted seed			% Survival of emerged seedling		
		Astrebla caryopses	Astrebla spikelets	Panicum	Astrebla caryopses	Astrebla spikelets	Panicum
51.0	15.12.87	0.20	0.17	0.041	18	50	*
26.5	3.01.88	0.10	0.88	0.014	16	15	*
10.5	2.02.88	0.017	0.14	0.014	*	40	*
34.0	24.02.88	0.050	0.92	0.23	*	30	8
121.0	20.04.88	0.37	7.64	2.14	*	45	44

* Insufficient plants for survival analysis.

Mitchell grass, when sown in its natural spikelet form, and Bambatsi Panic, remain viable in the soil for long periods (up to five months in this example). This ability to avoid 'false' germinations is a highly desirable attribute in a semi-arid environment.

These grasses can emerge throughout the year except during mid-winter, when low temperatures restrict germination and emergence. Seed sown during the winter did not emerge until the onset of warmer temperatures in the following spring.

Seedling survival from mid-summer emergence is very risky due to the low probability of follow-up rain, and the rapid drying of the soil surface associated with extreme (> 60?C) soil surface temperatures.

Spring or autumn emergence is favoured due to the milder seedbed conditions prevailing at these times. Seedlings emerging in autumn run the additional risk of death from exposure to frost, but strategies for avoiding this risk may be possible. Further research is needed to resolve these time of sowing options.

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