Field germination of tropical grasses with new seed coating technology

L. Song, G. Veness and I. Kalms

Heritage Seeds, 22 Suscatand Street, Rocklea QLD 4106
<leonard@heritageseeds.com.au >

Abstract. *Seed dormancy is a common cause of low germination and field establishment of certain tropical pasture grasses. By coating these seeds with dormancy breaking substances, germination and field establishment were found to have improved substantially. In particular, the germination improvement over bare or uncoated seeds ranged from 41 per cent in* Chloris gayana *cv. Gayndah to 174 per cent in* Panicum maximum *cv. Gatton grasses. Such results have commercial implications for seed-coating. It will significantly reduce the risk of poor field establishment and thereby remove a significant impediment to the wider adoption of pasture improvement. The economic benefits for the beef industry from this innovation are potentially very significant.*

Introduction

Seeds of certain tropical grasses have a tendency to remain dormant, often resulting in poor germination and slow establishment. For instance, seeds of *Cenchrus ciliaris* cv. Gayndah, *Setaria sphacelata* cv. Splenda, *Panicum maximum* cv. Gatton, and *Urochloa decumbens* cv. Signal have been frequently reported with 5–20% germination in laboratory tests. In spite of this, their viabilities can remain high, as detected in the Tetrazolium Test (TZ). The TZ test is a laboratory staining method for detecting viable seeds and is reported as 'fresh seeds' in the standard laboratory test. Thus, seed line with a high percentage of 'fresh seeds' but low germination has potential to respond to the seed coating product.

Seed dormancy can be overcome by treating seed with selected chemicals. Seed coating with such chemicals can provide a mechanism to overcome seed dormancy and enhance germination. Other advantages of coated seed include improvements in seeding operation and protection against pathogens and pests.

We previously reported a glasshouse experiment in which seeds of the above species have produced significantly higher germination after inclusion of special substances in seed coating (Song and Kalms 2007). This study reported improved germination of coated seeds over bare seeds for USA buffel, Splenda, Gatton, Sabi and Signal grasses. This present report is a continuation of the above study under field conditions.

Methods

Seed lines of *C. ciliaris* cv. Gayndah, *S. sphacelata* cv. Splenda, *P. maximum* cv. Gatton, and *U. decumbens* cv. Signal were selected for this study. These seed lines were submitted for laboratory tests for their germination and TZ tests and were coated with substances for enhancing germination.

For each treatment, 200 seeds were manually counted and planted into rows 5 m long. Both coated seeds and bare seeds were planted adjacent in the same plot for comparison. The experiment was replicated eight times using a randomised block design. The seeds were sown to a depth of 20 mm and compacted with a press wheel. The soil moisture was kept to saturation using a trickle irrigation or drip-line system. Final germination count was made at 35 days from planting and expressed as a percentage.

Results and discussion

Significantly higher germination was obtained with coated seeds compared with bare seeds for all four species tested.

In spite of the variation in field results, higher germination of coated seeds over bare seeds for all four species has been consistently demonstrated in all eight replications. Variation in field germination was largely attributed to soil crusting and soil moisture.

Because the seed lines used have high percentages of empty florets and dead seeds (shown as 'Others' in Table 1) the potential germination has been reduced, even after treating with substances for breaking seed dormancy. Overall, the improvement in germination of coated seeds over bare seeds has been significant (shown as 'improvement in germination of coated over bare seeds' in Table 1). It is expected that further improvement in germination could be achieved with scarification or removal of seed coat prior to seed coating.

The improved germination demonstrated here is due to the breaking of seed dormancy present in these tropical pasture species. This new seed coating technology provides a solution to both the germination and establishment problems commonly encountered in tropical grasses. With significantly higher germination as well as vastly improved seed handling over bare seed,

Table 1. Laboratory test and field germination of coated seeds versus bare seeds for four species at Gatton in 2007

Grass species	Laboratory test					Field germination	
	Fresh Seeds (%)	Others (%)	Bare seeds (%)	Coated seeds (%)	LSD (*P*=0.05)	Coated vs Bare	Improvement of coated over bare seeds (%)
C. ciliaris cv. Gayndah	69.0	31.0	26.5	37.4	2.8	+ 10.9	41
S. sphacelata cv. Splenda	84.0	16.0	18.0	39.2	3.1	+ 21.2	117
P. maximum cv. Gatton	47.0	53.0	16.3	44.7	3.5	+ 28.4	174
U. decumbens cv. Signal	63.0	37.0	24.6	46.3	2.9	+ 21.7	88

this new coating technology will offer faster and more reliable pasture establishment in Australia's northern grazing industries.

The value of increased production from pasture improvement in Australia's northern beef industry has been estimated at more than AUD$30 million annually. We believe this technology will significantly reduce the risk of poor establishment and thereby remove a significant impediment to the wider adoption of pasture improvement. The economic benefits for the beef industry from this innovation are potentially very significant.

This new seed coating technology will be marketed by Heritage Seeds under the AgriCOTE DORM-BREAKER brand name.

References

Song L, Kalms I (2007) Improving germination of tropical grasses with new seed-coating technology. In '7th Australian Tropical Pasture Conference, Dalby 11–12 April 2007'. (Ed I Partridge) pp. 75. (The Tropical Grasslands Society of Australia Inc.: St Lucia)

Acknowledgements

Part of the funding for this project was obtained from the Queensland Industry Development Scheme.