Simple rules to use when buying seed of tropical perennial grasses

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Abstract: *Successful establishment of sown pastures is dependent on the quality of seed sown. This is particularly important for tropical perennial grasses to reduce the risk of establishment failure and so the cost of resowing. Tropical perennial grass seed quality can vary markedly between seed production years, depending on seasonal, harvesting and storage conditions. Quality may also vary among species of tropical perennial grasses, so it is often a case of 'buyer beware'. In this paper, the results obtained from 168 certificates of seed analyses for the period 2003-2008 are used to develop some simple rules to follow when purchasing seed of tropical perennial grasses to ensure that you purchase the highest possible quality. We also show you how seed quality and seed coating can have a large effect on sowing rate and seed costs.*

Key words: *Seed purity, germination, pure live seed, seed test report, certificate of analysis, florets, seed coating*

Introduction

The 2008-2009 summer sowing season for tropical perennial grasses has again highlighted the need for producers to know the quality of seed that they are purchasing. Several incidences have been reported where sown pastures have failed to establish and this has been traced back to poor seed quality. Results from producer focus groups (McCormick *et al.* 2009) on the North-West Slopes of New South Wales (NSW) indicated that two of the main barriers to the wider adoption and use of tropical perennial grasses was their cost of establishment, in particular the high cost of seed, and the high risk of establishment failure.

In tropical perennial grasses, there is a wide variation in the inherent seed quality among species which is related to indeterminate seed ripening and differing levels of complexity in their plant genetics. The lightweight and fluffy nature of the florets (husk surrounding the seed) of many species, indeterminate ripening within the seed head and a small seed size often requires greater expertise in seed harvesting and handling, which can also add to the variability in tropical perennial grass seed quality. Most 'seed' of tropical grasses is sold in the floret, but with variations in seasonal conditions there can be large differences in the proportion of florets that contain seed, seed size and the ability of seeds to germinate.

While the minimum sowing rates required to achieve a good plant density for tropical grasses can be calculated, sowing rate depends on seed quality which in turn depends on the level of seed purity and its germination. Unfortunately, there are no guidelines as to what level of seed purity and germination a buyer should expect for seed of the more commonly recommended cultivars for northern NSW. These cultivars include; Katambora Rhodes grass (*Chloris gayana*), Premier digit (*Digitaria eriantha*), Bambatsi panic (*Panicum coloratum* var. *makarikariense*), Inverell purple pigeon grass (*Setaria incrassata*), Swann forest bluegrass (*Bothriochloa bladhii* ssp *glabra*), Bissett creeping bluegrass (*Bothriochloa insculpta*) and Floren bluegrass (*Dichanthium aristatum*).

There are two main aspects to seed quality that producers should be familiar with; varietal purity and physical seed quality. Sourcing seed that has varietal purity or is true to type ensures that a paddock will perform in accordance with the given traits of a particular variety. Generally,

varietal purity cannot be adequately tested in a laboratory and so it is mainly achieved by purchasing seed that has been produced under a suitable quality assurance process. Both 'certified seed' and company based 'quality assured seed' are examples of this. Testing for seed physical quality involves measuring the level of contamination of a seed lot with weed seeds or other material that is not the nominated species, as well as the capacity of seed to germinate and produce viable plants. In this paper, we focus on the physical seed test report – also known as a certificate of seed analysis. The International Seed Testing Association (ISTA) provides an international standard for seed quality testing that is used by certified laboratories.

There are no legislated minimum seed quality standards other than those contained in relevant noxious weed legislation. Most reputable seed companies adopt the voluntary Seed Industry Code of Practice which provides minimum labelling requirements. This code includes a full seed analysis certificate being available at the point of sale. It is strongly recommended that when purchasing tropical grass seed you obtain a current certificate of seed analysis (not more than six months old) from an ISTA or NATA (National Association of Testing Authorities) accredited laboratory that uses approved testing methods. This is the only reliable way to find out about the seed purity and germination of the seed lot you are intending to purchase.

Seed purity reports the proportion of pure seed, inert matter and other seeds or potentially undesirable weed seeds, as a percentage by weight. Pure seed is the percentage by weight of seed or seed units (florets) in the sample that conforms to the description of the nominated species for analysis. For seed sold 'in the floret', this includes whole florets, which may or may not contain a seed (caryopsis). This test does not differentiate between different cultivars of the same species. On a seed test certificate, germination is expressed as the percentage of seeds which produce a normal seedling. On some certificates it is also reported as the final count. These seedlings are likely to establish under field conditions. Also reported on some certificates are results for fresh seeds, which are seeds that are viable (alive), absorb water and swell up, but do not germinate. They should not be included in germination since the length of time and the conditions required to make them germinate are not fully understood. In addition, dead or abnormal seedlings should not to be included. Some certificates of analysis may also give results for a tetrazolium test. This test determines if a seed has a viable embryo, but includes seeds which are dormant, immature and damaged and should not be considered when assessing germination.

Another factor that affects sowing rate is seed weight. For tropical perennial grasses, the use of seed coating has been an industry response to overcome the difficulty of sowing light, fluffy seeds. However, while seed coating does improve the flow of seed through sowing machinery it also can markedly increase seed weight, with little effect on purity or germination. Additionally; seed coating may mask the presence of undesirable weeds and inert matter, reinforcing the need to obtain a seed analysis certificate before buying. This increase in seed weight needs to be taken into account when calculating both sowing rates and the costs.

This paper reports (a) the average purity and germination percentages from certificates of seed analysis from 2003-2008 which can be used as a guide when purchasing seed and (b) some simple rules that have been developed for producers to follow when buying perennial tropical grass seed. Following these guidelines will ensure that producers will be better informed about seed purity and germination and will purchase quality seed.

Methods

A total of 168 certificates of seed analysis from ISTA accredited laboratories (submitted by both private and public sector agronomists between 2003 and 2008) were reviewed. The number of certificates for individual tropical grass cultivars ranged from 12 (Inverell purple pigeon grass) to 52 (Premier digit grass). The certificates were used to determine:

1. The average seed purity and seed germination of six cultivars of tropical perennial grasses

commonly sown on the North-West Slopes (Table 1).

2. Pure Live Seed (PLS, Table 1). This is the proportion of seeds in the sample that are capable of producing a seedling and is calculated from the seed purity and seed germination percentages. For example, if a seed sample had 90% physical purity and 50% germination, then its potential PLS is (0.9 x 0.5 = 0.45). Therefore, when sown at a rate of 2 kg/ha, this seed lot would have the equivalent of 0.45 x 2 = 0.9 kg/ha of PLS.

Results and discussion

The average seed purity and germination for six of the tropical perennial grass cultivars commonly recommend for sowing on the North West Slopes NSW are shown in Table 1, together with the calculated PLS. Only three certificates of seed analysis were available for Swann forest bluegrass and its average seed purity was 59% and germination was 52%, giving a PLS of 0.307. The closer the PLS is to 1.0 the better quality the seed. Of the cultivars listed in Table 1 Bambatsi panic and Katambora Rhodes grass had the highest average seed quality, while Bissett creeping bluegrass had the poorest.

If you purchase and sow seed that has higher than average purity and germination it may be possible to reduce the sowing rate and save seed costs. Alternatively, you can maintain the sowing rate and be confident of having a high potential stand density. However, if you intend to purchase seed that has below average purity and germination then you will need to increase the sowing rate to ensure that the density of the established is sufficient to produce a productive and persistent pasture.

This will naturally increase the cost of seed. For example, if you want to sow a Premier digit pasture at 2 kg/ha and are considering buying seed which has 50% purity and 20% germination (a PLS of 0.100) then you would be sowing only 0.2 kg/ha of PLS. Since the average PLS for Premier digit is 0.396 (Table 1) the sowing rate would need to be increased by a factor of 3.96 (i.e. 0.396/0.100=3.96) to 7.9 kg/ha. If the seed costs $20/kg, then the total seed cost would increase from $40/ha if the average PLS was 0.396 to $158/ha if the PLS was 0.100.

The information in Table 1 was used to develop three simple rules to assist producers when buying seed of the recommended cultivars of tropical perennial grasses in northern NSW and so avoid seed quality problems. These rules are:

1. Always view a copy of a current (no older than six months) certificate of seed analysis for the seed lot that you are intending to purchase. Check that the certificate is from an ISTA or NATA accredited laboratory using approved methods of analysis. If one is not available, ask the seller to provide you with one or have the seed lot analysed yourself. You will need a certificate of analysis that shows both purity and germination which will cost $145-200 per sample and take 4-6 weeks to obtain, but compared with the cost of buying the seed it is cheap insurance.

2. Use the PLS information in Table 1 to adjust likely sowing rates and costs. If seed quality and purity is below the average expected for a cultivar,

Table 1. Average purity (%) and germination (%) of normal seeds of six of the seven tropical perennial grass cultivars commonly recommended for sowing on the North-West Slopes of NSW. Pure live seeds (PLS) was calculated as purity%/100 x germination%/100. The number of tests indicates the number of seed analysis certificates used to calculate the average.

Cultivar	Common name	Purity (%)	Germination (%)	Pure live seeds (PLS)	No. of tests
Bambatsi	panic	95	60	0.570	39
Premier	digit grass	72	55	0.396	52
Katambora	Rhodes grass	94	55	0.517	18
Floren	bluegrass	73	30	0.219	27
Bissett	creeping bluegrass	68	29	0.197	17
Inverell	purple pigeon grass	94	26	0.244	12

then it is going to cost extra money to increase the sowing rate. Is it worth buying a poor quality seed lot?

3. Only buy seed with the highest purity and germination and lowest cost per unit of seed weight. For example, two seed samples with the same purity and germination costing $20 per kg, sown at a rate of 2 kg per ha would cost $40 per ha for uncoated or bare seed. With a seed coating of 2:1 it would cost $80 per ha. Higher ratios of seed coatings would further increase the seed cost per hectare.

There are other agronomic factors such as sowing time, sowing depth, weed control and nutrition, which need to be considered in the successful establishment and management of tropical perennial grass pastures. However, by using the information in Table 1 and following these simple rules seed quality should not be a limiting factor for the cultivars recommended for sowing in northern NSW.

References

McCormick, LH, Boschma, SP, Lodge GM & Scott, JF 2009, Producer constraints to wide spread adoption of sown tropical grass pastures on the North-West Slopes of New South Wales, *Tropical Grasslands* 43 (in press)