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VIABILITY OF SEED OF BRACHIARIA DECUMBENS

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SUMMARY

Results are reported which show that *Brachiaria decumbens* is functionally a fertile grass. Thorough cleaning of raw seed lots results in a high (54%) caryopses yield. Delayed germination of otherwise sound caryopses is caused by an impermeable seed coat.

Acid-scarification with concentrated sulphuric acid for 10-15 min. significantly increased germination of the seed. The mean germination 3 weeks after sowing was 1% for untreated seed and 2·8, 30·0, 33·2% for 5, 10 and 15 minutes acid scarification respectively. Increased germination was also obtained following acid scarification of seed stored at room temperature for 10 months.

Introduction

Brachiaria decumbens Stapf (Commonwealth Plant Introduction 1964; Department of Primary Industries Q 1160) has shown good performance under grazing in trial and commercial plantings in North Queensland. It withstands hard conditions, including poor soils, and because of its mat-forming habit it is an ideal grass for smothering weeds.

Several authors have stated that *B. decumbens* produces little viable seed, and that this limits the use of the species for sown pastures.

J. H. Saint-Smith (unpublished records, Queensland Department of Primary Industries), using various harvesting techniques, obtained samples of *B. decumbens* seed containing 8–24% caryopses, but the highest recorded germination was only 4%. Germination was not improved after 12 months' storage.

The result of a previous study (McLean and Grof 1968) indicated that acid-scarification improved the germination of *B. ruziziensis* seeds, while mechanical scarification was ineffective. In view of the good agronomic value of *B. decumbens*, an economical and convenient method of treating the seed to increase germination was sought.

Method

Mature inflorescences of *B. decumbens* were cut with a 9-in. long stalk, thus simulating mechanical harvesting with a grain header-type of harvester. The seeds were just at the turning point of the soft dough to the hard dough stage of ripeness when harvesting was carried out on December 28, 1965. The cut seed-heads were spread out in thin layers and air-dried for 3 days. Drying was completed in a forced-draught oven in which the temperature was maintained at 120°F for 24 hr. The seed-heads were thrashed and the seed graded and winnowed. The cleaned sample contained 54% caryopses.

Lots of 100 seeds (florets containing caryopses) were stirred in a beaker containing concentrated sulphuric acid (sp. gr. 1·86) for 5, 10 and 15 min. respectively. The seeds were then washed in running water and finally spread out to dry. The seeds were sown in a plant-house on January 26, 1966, in small wooden boxes filled with vermiculite. The treatments with an untreated check were arranged in a 4 x 5 randomized block layout. Emerged seedlings were counted weekly until seedling emergence ceased.

Untreated seed was stored at room temperature for 10 months and the previously described seed treatments were repeated.

Results

Results of weekly seedling counts over a period of 3 weeks are presented in Table 1. It is clearly indicated that acid scarification materially increased and also hastened the germination of freshly harvested *B. decumbens* seeds (Figure 1).

TABLE 1

EFFECTS OF THREE PERIODS OF ACID-SCARIFICATION ON GERMINATION OF FRESHLY HARVESTED AND STORED SEED OF *B. decumbens*

	Mean percentage of emerged seedlings						
	Fresh Seed				Stored Seed (10 months)		
Weeks after Sowing	Untreated Control	Period Acid-scarification Minutes			Untreated Control	Period Acid-scarification Minutes		
		5	10	15		5	10	15
1	0	0	2·8	3·4	0·04	7·1	9·5	16·5
2	0	1	17·2	21·0	14·2	51·2	51·4	54·1
3	1	2·8	30·0	33·2	21·7	51·4	52·6	54·1
	acid-scarification ⩾ untreated acid-scarification 10 and 15 minutes ⩾ acid-scarification 5 minutes				acid-scarification 5 to 15 minutes ⩾ control			

In the case of fresh seed, the longer periods of acid treatment, i.e. 10 and 15 min, gave better results than acid-scarification for 5 min. All three periods of acid treatment employed in the experiment resulted in the complete dehulling of the seeds.

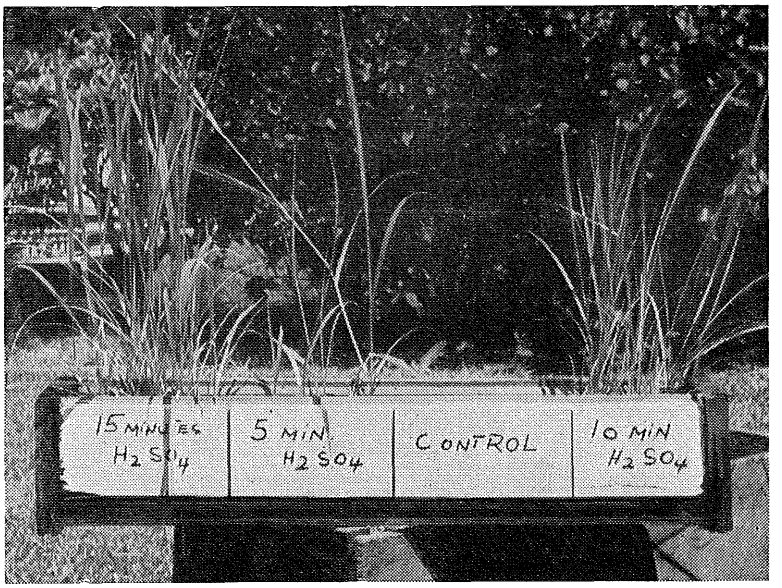

Fig. 1.—Effect of acid-scarification on germination of freshly harvested *Brachiaria decumbens* seed.

There is also an indication that the delayed germination of *B. decumbens* seeds is not caused by factors which inhibit germination, such as hormones, contained in the glumes but is due merely to an impermeable seed coat.

Germination of untreated seed stored at room temperature for 10 months also showed highly significant ($P < 0.01$) response to all three periods of acid-scarification. The differences between periods of acid treatment were non-significant.

Generally higher germination rates obtained with 10-month-old seed than with fresh seed suggests that an improvement occurs in storage. However, acid-scarification appears to be necessary for good germination of fresh as well as stored seed of *B. decumbens.*

Discussion

Since all three periods of acid treatment employed in this experiment resulted in the complete dehulling of the seeds, it is reasonable to suggest that the removal of the glumes *per se* is only partly responsible for the improved germination. Apparently the longer periods of treatment with acid, which severely mutilated the seed coat, were necessary to increase the permeability of the seed coat, and thereby improve the germination of this seed.

In a tropical environment the rate of weed growth is extremely rapid. For this reason, the prime requirements of a suitable pasture species are quick and even germination in the field, with rapid growth to enable early ascendancy over weed competitors. Readily available seed of *B. decumbens* with high germinating capacity would have considerable practical value.

For the acid treatment of small quantities of seed, an apparatus originally described by Burton (1939) was constructed (Figure 2). This consists of a 12-gal capacity perforated oil drum containing the seed which is rotated in the acid tank for the required period of time. The water tank surrounding the acid tank absorbs the heat generated by the action of the acid. In the treatment of quantities of seed with concentrated sulphuric acid, without agitation and without a water-bath surrounding the acid tank, the heat liberated was sufficient to kill the seed. After the treatment, the excess acid is allowed to drain back into the acid tank and the seeds are then washed by rotating the drum in the water tank. When thoroughly washed, the seeds are removed from the drum and spread out to dry.

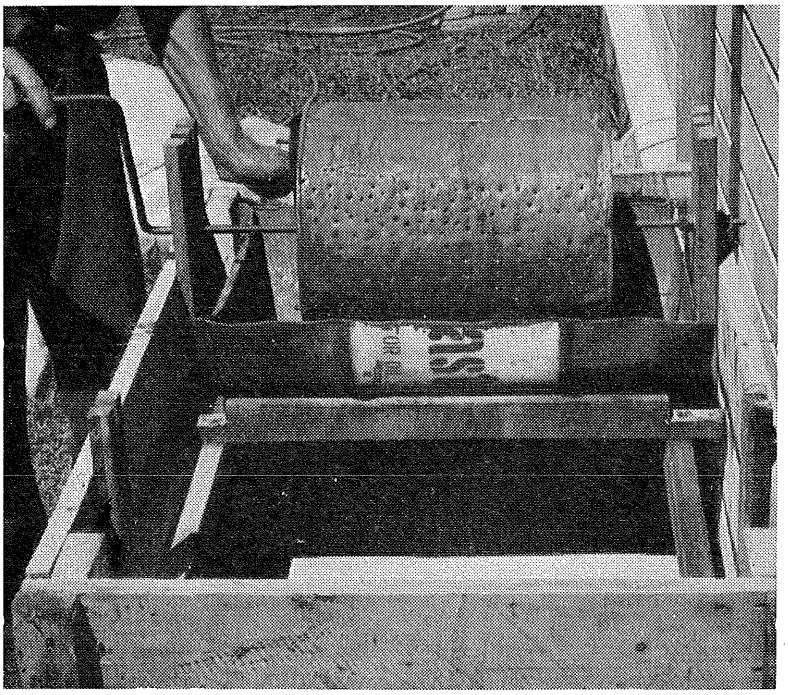

Fig. 2.—Machine for acid treatment of seed.

Acknowledgement

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