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PRESOAKING TREATMENT OF CENCHRUS CILIARIS SEED

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SUMMARY

Twenty-month-old seed of *Cenchrus ciliaris* cv. Biloela was subjected to presoaking for 6, 12, 24 and 36 hr followed by a short drying period prior to germination in the dark in petri dishes at 30°C. All presoaking treatments commenced germination 9 hr before non-treated seed. The greatest stimulation to germination occurred with the 12 hr treatment. All presoaking treatments, however, depressed the final germination.

I. INTRODUCTION

Many pasture grass seeding failures occur on heavy-textured soils in central Queensland when unfavourable conditions develop after planting. Hot drying winds, and rain that briefly wets the surface and causes the soil to crust, are two conditions that damage range seedlings. One approach to ameliorate these conditions and improve establishment is with mulches (Rickert 1973), as moisture stress is a major factor limiting field germination (Leslie 1965). Leslie found in the majority of cases in his study that more rapid germination would have been advantageous and suggested that attempts to stimulate germination would be well founded provided that the inherent limitations were not overlooked. This suggests that failures could be reduced if practices were employed that would hasten emergence.

The germination rate of a range of temperate pasture grasses has been stimulated by various presoaking treatments (Tincker 1925; Chippendale 1932, 1934; Keller and Bleak 1968; Bleak and Keller 1969, 1970; Cocks and Donald 1972). Buffel grass (*Cenchrus ciliaris*) is one of the major cultivated tropical grasses used in the 500–750 mm annual rainfall areas of central Queensland (Humphreys 1967) and in the light of the above it was decided to investigate the effect of presoaking on its germination.

II. MATERIALS AND METHODS

Characteristically the genus *Cenchrus* has a spike-like inflorescence composed of fascicles which are clusters of a few spikelets surrounded by an involucre of bristles and which fall entire. The fertile dispersal unit, commonly called the seed, thus is made up of 1 or 2, rarely more, caryopses, enclosed by paleas, lemmas and glumes all within the involucre. In this experiment the seed fascicle was regarded as the seed unit rather than the (naked) caryopsis, as it has been shown that field establishment failures are greatly increased if the latter are sown (Humphreys 1958).

The seed was obtained from a commercial source and is believed to have been approximately 20 months old. In a test by the Standards Branch of the Department of Primary Industries prior to the experiment, it had a germination of 46% in 14 days.

There were five presoaking treatments in which buffel grass seed (*Cenchrus ciliaris* cv. Biloela) was wet for 6, 12, 24, 36 and 48 hr. Fascicles were presoaked in small plastic bags containing 10 ml of water. The bags were sealed and initially agitated for 10 min. At the completion of soaking the seed was dried in a forced-draft oven at 40°C for 12 hr and then kept at room temperature for 12 hr. The presoaking was timed so that all treatments finished at the same time and then went through the 24 hr drying phase together. The control was similarly treated but without the addition of water.

Germination was carried out on moist blotting paper in petri dishes in the dark at a constant temperature of 30°C. Fifty seeds were used per treatment and each treatment was replicated five times. A seed was regarded as germinated at the emergence of the radicle. Although seed-testing laboratories usually require the emergence of the coleoptile as well, the criterion adopted here was similar to that adopted by the authors previously mentioned working with presoaking of temperate grasses and was maintained for uniformity. After germination the seed was removed.

Treatments were arranged in a randomized block design.

III. RESULTS

All presoaked seed commenced germination after 30 hr, while the control did not commence until 39 hr (Figure 1). At this stage the differences in percentage of seed germinated between the control and the presoaked treatments 6, 12, 24, 36, and 48 hr were respectively 5·6, 7·6, 7·2, 2·4 and 0·8%. The greatest difference between the control and presoaking treatments occurred after 72 hr, when they were respectively 11·2, 25·2, 6·8, 6·4 and —0·8%. After this the differences between the control and the presoaking treatments declined until at the final recording period after 384 hr the greatest germination occurred in the control. The depression in final germination percentage was greatest in the longest presoaking treatments and least in the shortest presoaking treatment.

The final germination percentage recorded in the control, 46·8%, was in close agreement with the figure of 46%, obtained on the seed sample by Standards Branch just prior to the commencement of the experiment.

IV. DISCUSSION

This experiment showed that the rate of germination of buffel grass could be stimulated by presoaking. The 12 hr presoaking, which gave the greatest stimulation, was much shorter than the optimum time of approximately 50 hr for *Agropyron desertorum* (Bleak and Keller 1969) but similar to the times of 10 hr for *Hordeum leporinum* and 18 hr for *Lolium rigidum* (Cocks and Donald 1972). As also found by Cocks and Donald, when the period of presoaking increased the final germination was depressed.

This experiment tested presoaked seeds 24 hr after drying. If advantage was to be taken of the stimulated germination in the field the effect would need to last longer than this. However, Keller, Bleak and Hanson (1970) found with *Agropyron desertorum* that the effect does carry over for a reasonable period. In their case it took 1 year before all the initial advantage of the treatment was lost.

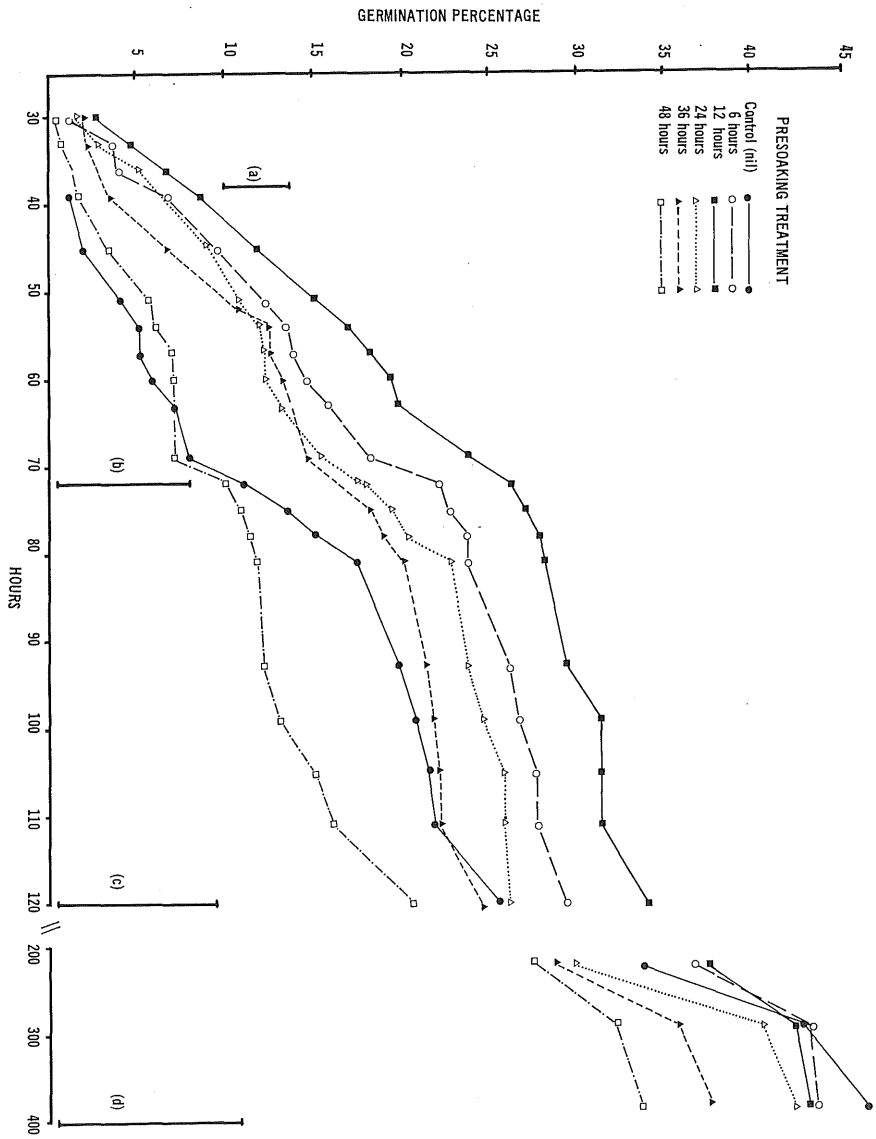

Fig. 1.—Germination of *Cenchrus ciliaris* cv. Biloela following presoaking for 6–48 hr and drying for 24 hr.

In range seeding the early germination and emergence of seedlings is important. However, the earliest root penetration into the soil under conditions favourable to seedling emergence may be of greater importance, as moisture near the soil surface may be rapidly depleted by high soil temperatures and dry air. The data of Keller and Bleak (1969) indicated conclusively that shoots emerge and roots penetrate the soil in less time following preplanting treatment. Roots from treated seeds remained nearly 2·5 cm longer for 3 days after seedling emergence.

The inherent danger with acceleration of germination under field conditions is that it may render the seed susceptible to "false" germination from small showers of rain with subsequent seedling mortality if moisture runs out. This could in part be overcome by planting when subsurface soil moisture is available and rainfall is most reliably anticipated. However, it is noteworthy that Bleak and Keller (1970) obtained proportionally better stands from treated seeds as soil moisture decreased. This also supports Chippendale's (1934) statement that under favourable conditions there was relatively little advantage to pretreatment, but the advantage was enhanced as conditions for establishment became less favourable.

Although the results indicate that presoaking will stimulate the germination of Biloela buffel grass in the laboratory, field testing is required to assess whether this has any practical significance. It is not known if the germination of different buffel grass cultivars, or other tropical grasses, will also be favourably stimulated.

V. ACKNOWLEDGMENT

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