RECOVERY AND VIABILITY OF PRICKLY ACACIA (*ACACIA NILOTICA* SSP. *INDICA*) SEED INGESTED BY SHEEP AND CATTLE

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Summary. Prickly acacia (*Acacia nilotica* subsp. *indica*) has reached pest proportions in some parts of central-western Queensland. The spread of the plant has been co-incident with a change from sheep to cattle grazing within the affected area, together with a number of years of above average rainfall.

Feeding studies with sheep and cattle indicate that differences in the rates of recovery of ingested seed, together with differences in the germination rates of the recovered seeds, are sufficient to largely account for the spread of prickly acacia.

INTRODUCTION

Prickly acacia, a native of the Indian subcontinent (Brenan 1957; Ali and Faruqi 1969), has been widely planted in the grasslands of western Queensland (Figure 1) as a fodder (Everist 1969), shade and ornamental tree.

In the late 1960s and early 1970s, depressed wool prices and optimism about beef prices caused many graziers to change from sheep to cattle grazing. Simultaneously, a number of good wet seasons occurred and the area of land occupied by prickly acacia increased considerably. As the young plant forms dense, thorny thickets which rapidly become impenetrable, prickly acacia has acquired considerable nuisance value in the worst affected areas.

Since the change from sheep to cattle grazing appears to have been co-incident with the expansion of prickly acacia, feeding trials were conducted to determine what influence ingestion of seeds by sheep and cattle may have had on the spread of the plant. At the same time seed from the same seed lots was subjected to a number of mechanical or chemical treatments to determine its viability. *Acacia* species are mostly hard-seeded, and a number of hot water, acid, and mechanical scarification techniques have been used to promote germination (Brown and Booysen 1969; Clemens *et al.* 1977).

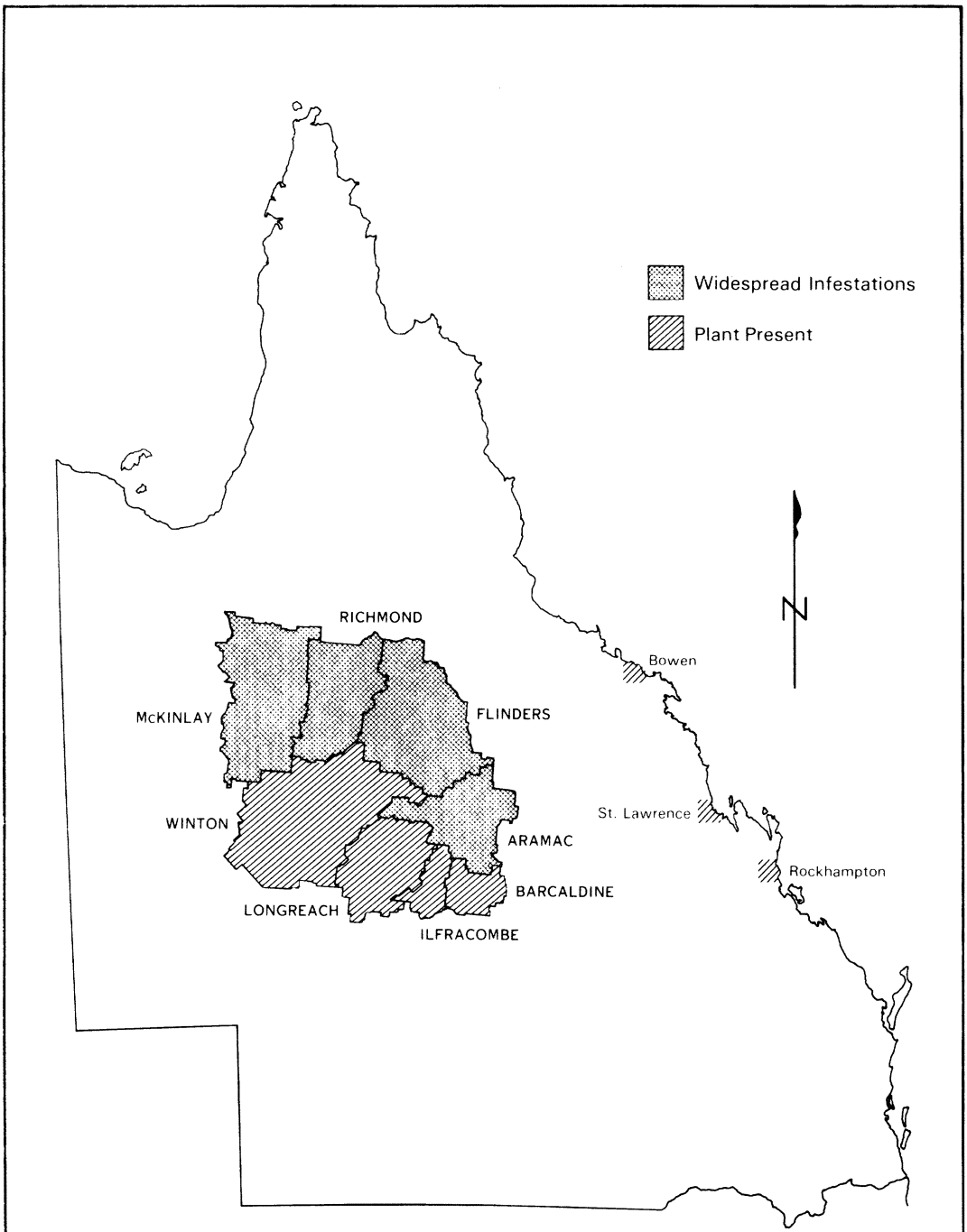

Figure 1. Locality Map. Queensland shires with prickly acacia *(Acacia nilotica)* infestations.

MATERIALS and METHODS

Feeding trials. Prickly acacia seed was collected from trees in the field and fed to sheep or cattle in three trials:-

Trial 1: 150 g seed pods plus a ration of chaff were fed to a single sheep on four successive days.

Trial 2: two steers were fed 500 g seed pods each, mixed with chaff so that all pods were eaten.

Trial 3: two sheep were fed a ration of 600 g pods plus 100 g chaff for eight days.

Dung was collected from all animals throughout the trials and for several days afterward, and any seeds passed were recovered. Seeds were also collected from cattle dung in the field.

Other treatments. Replicates of 100 seeds from the same collections were subjected to the following dormancy-breaking treatments:-

(a) immersed in 98% sulphuric acid for 1 hour then washed thoroughly with running tap water (Brown and Booysen 1969)

(b) a small portion of the seed coat at the distal end was filed away (Brown and Booysen 1969)

(c) immersed in distilled water at 80°C for five minutes (Clemens *et al*. 1977)

(d) soaked in distilled water at 20 to 25°C for 72 hours to simulate field conditions in which seed may be immersed in muddy water for several days after heavy rain.

Germination procedures. All treated seed and those recovered from sheep and cattle were allowed to imbibe distilled water for one hour before being placed in petri dishes on filter paper soaked in a benomyl plus captan mixture (Clemens *et al*. 1977) and germinated in the dark at 21 to 23°C. Germinated seeds (those with radicle emergence >2 mm beyond the testa) were counted and removed daily until germination was complete, usually at about 35 days.

Data analysis. Trial 1 was unreplicated, there being only sufficient seed available for 100 seeds in each treatment. In trials 2 and 3 a minimum of three replicates of 100 seed was used for each treatment. Data were then analysed by analysis of variance.

RESULTS and DISCUSSION

Prickly acacia has a potential germination of 85 to 97 percent (see Table 1). Mechanical scarification was the most successful treatment in inducing germination, followed by the hot water treatment. Acid scarification tended to leave the seed soft and liable to fungal attack, despite the use of antifungal agents. In this respect, *A. nilotica indica* may differ from *A. nilotica kraussiana* as Brown and Booysen (1969) apparently did not encounter this problem. Soaking prickly acacia seed in water for 72 hours did not reliably promote germination.

Table 1. Germination of prickly acacia seed after various treatments

Treatments	Germination (%)		
	Trial 1	Trial 2[1]	Trial 3[1]
Control (untreated)	-	12[a]	12[a]
72 hr soak	28	4[a]	13[a]
hot water (80°C/5 mins)	73	85[c]	87[b]
acid scarification	88	66[bc]	63[c]
mechanical scarification	75	85[c]	97[d]
recovered from cattle in the field	33	-	-
recovered from hand fed cattle	-	51[b]	-
recovered from hand fed sheep	15	-	15[a]

[1] Treatments followed by the same letter do not differ significantly at the 1% level of probability

Sheep and cattle readily ate the pods presented to them in the feeding trials. Approximately 81% of the seed ingested by cattle was recovered, and this seed had a germination rate of 51%; seed recovered from cattle dung in the field had a germination rate of 33%. Less than 1% of the seed fed to sheep was recovered intact, and this seed had a germination rate of only 15%. No direct comparison between sheep and cattle was made in the one trial, but there is no doubt these differences are reliable.

Although the above figures may vary somewhat with the diet available to the sheep or cattle, cattle will obviously be more efficient at spreading the plant than sheep. When account is taken of the feeding habits of sheep and cattle (Thetford *et al.* 1971), it can be appreciated that sheep will effect better control of germinating seedlings than cattle.

The upsurge in prickly acacia in Queensland can be at least partly explained by the change from sheep to cattle grazing within the affected area, probably compounded by the number of good wet seasons which occurred during the 1970s. Graziers may be able to avoid further spread of prickly acacia by having mixed herds of sheep and cattle, rather than cattle alone.

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