REGENERATION OF TROPICAL ACACIA SPECIES IN RESPONSE TO FIRE

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Introduction

Most acacias are well known to regenerate prolifically from the soil seed bank following fire, however some species have been observed to resprout from the base.

This study examines the germination and resprouting behaviour of 8 species - *A. cincinnata, A. crassicarpa, A. flavescens,* and *A. mangium* from tropical coastal woodlands and forests, and *A. elachantha, A. hyaloneura, A. platycarpa,* and *A. ramiflora* from the inland woodlands of White Mountains National Park in north Queensland.

Methods

- Seeds of each species were subjected to dry heat at 40, 60, 80, 100 and 120°C and in water at 60 and 80°C for 5 minutes, and then incubated at 28°C, and germination monitored.

- Resprouting ability was determined in a pot study of resource allocation. Eight individuals of *A. cincinnata, A. crassicarpa, A. flavescens, A. mangium, A. platycarpa* and *A. ramiflora*, 6 individuals of *A. hyaloneura*, and 3 *A. elachantha* were grown in 20 cm pots for 18 months. After harvesting the above-ground biomass, the pots were left to dry, before the roots were harvested, and resprouting monitored.

- To further examine resprouting behaviour, nine 12 m x 12 m plots, separated by 4 m fire breaks, were established. Acacias were planted at an initial spacing of 1.5 m x 3 m, and where sufficient seedlings were available, intermediate rows were planted to give a 1.5 m x 1.5 m spacing. Three replicates were allocated randomly to the three treatments – control, burnt and clipped. Seedlings were planted between October and December 2003, most by the end of November. Ten individuals of *A. crassicarpa, A. flavescens, A. ramiflora* and 8 of *A. elachantha* were planted in each plot, alternating between species. Fewer individuals of *A. mangium* (10), *A. platycarpa* (9), *A. cincinnata* (10) and *A. hyaloneura* (2) were available, and these were planted in even numbers across plots. Three plots were burnt on August 2004. In 3 plots, the wattles were cut 3 cm from the base on September 2004. Surviving plants were measured in September 2004 and September 2005.

Results

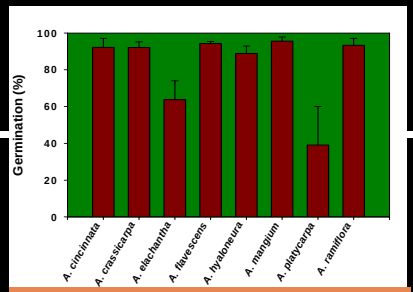

Fig. 1: Germination of seeds of 8 species of tropical acacias 140 days after treatment at 80°C moist heat. Values are means ± S.E. of 3 replicates of 30 seeds.

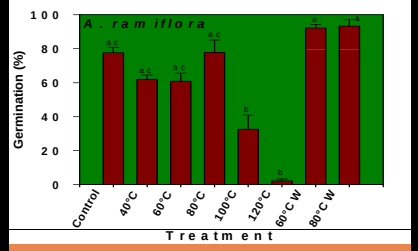

Fig. 2: Germination of seeds of *A. ramiflora* subjected to different heat-shock treatments.

- Highest germination percentages were found for most species after treatment with 80 or 100°C dry heat or 80°C wet heat (Figs 1,2). Some 49% of seeds across treatments germinated over the first 140 days, whilst 10% of the remaining seeds germinated over a further 614 days, with one third of seeds remaining potentially viable after this time.
- All of the wattles resprouted from the base after harvesting, except *A. hyaloneura* and *A. mangium*. All individuals of the other species resprouted.
- Only one individual each of *A. crassicarpa* and *A. mangium* survived the fire treatment, while 3 individuals of *A. crassicarpa*, and one individual of *A. ramiflora*, *A. elachantha* and *A. mangium* survived the clipping treatment (Fig. 3). Hence, survival was low, probably due to the competition from a high biomass of Guinea Grass (*Megathyrsus maximus*), and the intensity of the fire fuelled by the high fuel load.

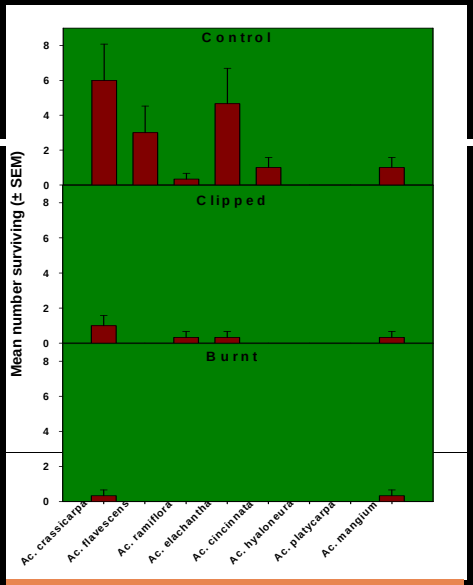

Fig. 3: Mean number of surviving wattles in plots subjected to no treatment, clipping and burning.

Conclusions

- The results indicate that germination of most species is favoured by a heat shock at 80°C for 5 minutes.
- All species but *A. hyaloneura* showed some ability to resprout, but few resprouted following an intense fire when only a year old.
- For management purposes, low intensity fire may promote resprouting of many of these species, but high fuel loads, such as result from invasive grasses, will not favour resprouting.