PLANT RECOVERY AFTER FIRES OF DIFFERENT INTENSITIES: SOME SHORT-TERM OBSERVATIONS FROM CENTRAL AUSTRALIA

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ABSTRACT

The main objective of this project was to observe short-term changes in the regeneration of trees, shrubs and herbage species after fires of different intensities on pastoral land near Alice Springs. After the fires, ground cover increased on both burnt sites, however, cover increased faster on the cool burn site than the hot burn site. The growth rate of species was higher on the cool burn site, as were the number of plants that flowered and set seed. Interestingly, some plants that appeared to have been killed by the intense hot burn resprouted during the study.

INTRODUCTION

Exceptionally high rainfall in 2000 and 2001 followed by severe frosts in the winter of 2002 created high fuel loads in Central Australia. This resulted in the biggest fire seasons since the 1970's in the Alice Springs district. We studied plant regeneration on two burnt sites near Alice Springs. One site had experienced a "cool" burn that had moved slowly and occurred during the night. The "hot" burn site experienced an intense and fast moving fire that burnt into the canopies of the trees (Grant Heaslip, *pers. comm.*). Data were collected to see which species germinated or resprouted after the fires, how fast they grew and if any flowered or seeded. Data were also collected on a site that had not been burnt for comparison.

For this study, it was predicted that:

- Ground cover and pasture growth would increase faster on the cool burn site than the hot burn site due to less harsh surface conditions.
- Trees and shrubs on the hot burn site would not resprout due to the extensive damage they had suffered.

METHODS

The three research sites for this project were located on Bond Springs station, approximately 20 km north of Alice Springs. Site 1 was the 'unburnt' site and had not been burnt for 25 years. Site 2 was classified as a 'cool burn' site as the fire, which occurred in November 2002, was of low intensity (Grant Heaslip *pers. comm.*). Site 3 was classified as a 'hot burn' site as the fire was an intense fire-storm that obliterated most plants in its path, leaving the earth bare and plants charred (Grant Heaslip *pers. comm.*). Within each of these sites, three 1 sq m quadrats were randomly selected as the plant sampling locations. These permanent quadrats were used to measure the number, growth, mortality and reproduction of all species present. They were also used to gain an appreciation of cover change over time. The plant measurements were repeated three times over the summer of 2002/3. A full description of the methodology can be found in Walton and Walsh (2004).

RESULTS AND DISCUSSION

Copperburr and mulga grass significantly increased in height on the unburnt site but the oatgrass and umbrella grass significantly decreased. Observations indicate that the decline in oatgrass height was due to the death of many small seedlings that germinated after the November rains. The reduction in height of the umbrella grass was due to grazing. On the cool burn site, tar vine, caltrop and pea plant increased significantly in height whilst swainsona, paddy melon and umbrella grass decreased in height. Observations confirmed that the swainsona and paddy melon suffered mortality and that the umbrella grass was grazed. On the hot burn site, whitewood, silky heads, sida, grey indigo and an unknown grass showed increases in height over the study. Interestingly, mortality did not appear to be higher on the hot burn site, which might have been expected due to the harshness of the microenvironment around the plants.

Ground cover on all three sites increased during the project (Walton and Walsh, 2004). Even though many of the small plants that germinated actually died, the more-established plants, such as the grasses, larger shrubs and resprouting trees continued to grow and thrive. As predicted, the cover on the cool burn site increased faster than on the hot burn site.

High plant mortality was evident on all three sites. Caltrop seedlings had the highest mortality on the unburnt site (Walton and Walsh, 2004). Oatgrass seedlings had the highest mortality rate on the cool burn site. The high mortality measured on all sites (including the unburnt site) suggests that small seedlings are very prone to high summer temperatures.

With regards to reproduction, it was found that only herbage species were able to recover, flower and set seed during the study. No shrub species reproduced during the study. The species that reproduced on the unburnt and cool burn sites included 8-day grass, mulga grass, oatgrass, caltrop and swainsona. No flowering or seed set was observed on the hot burn site. A harsher environment, caused by higher evaporation on the bare soil may have stopped the plants from getting enough moisture to grow to sexual maturity on this site.

Species did resprout on both burnt sites, however, more resprouting occurred on the cool burn site. The species that showed basal resprouting included fork-leafed and long-leafed corkwood, acacia bush, broombush, witchetty bush and whitewood. The only woody species that did not resprout on the cool burn site was spiny saltbush.

CONCLUSION

Plant regeneration occurred on both the burnt sites studied, with the main difference being the time taken for plants to regenerate and reproduce. As predicted, recovery was faster on the cool burn site compared to the hot burn site. Our second prediction, that badly burnt shrubs and trees on the hot burn site would not resprout, was not supported.

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REFERENCES

Walton, L. and Walsh, D. (2004). Plant recovery after fires of different intensities: some observations from Central Australia. *Range Management Newsletter* 04/1: 6-10.