PROJECT 6

MANAGEMENT OF *BANKSIA COCCINEA* STANDS AFFECTED BY CANKER FUNGI

L. McCaw

SUMMARY

Field work between April and September 1996 has concentrated on the identification and assessment of plant health and condition in stands of *B. coccinea* unburnt for more than 15 years. Results to date have shown that canker-induced decline is not inevitable in older stands, with a small number of inividuals more than 45 years old being still in healthy condition. Unfortunately this stand was burnt by a wildfire in April. Seedling regeneration as a result of the fire will be assessed in spring 1996. The node count method does not appear to be a reliable method for determining the age of plants more than 15 years old, probably because thickening of the stem conceals the pattern of nodes.

INTRODUCTION

Banksia coccinea R. Br. is a distinctive species characteristic of shrubland plant communities on the southern sandplain of Western Australia, occuring within the region bounded approximately by Albany, the Stirling Range and the Young River in the east. Serious decline of *B. coccinea* stands was first reported in 1989 (Shearer and Fairman 1991), and subsequent work has implicated the ascomycete *Cryptodiaporthe melanocraspeda* as the causal agent for a destructive canker disease affecting the species (Bathgate and Shearer 1995). Previous work has investigated various aspects of the disease and its impact on *B. coccinea* populations including seed bank dynamics of *B. coccinea,* sources of inoculum and conditions favouring spore release, the infection process, factors influencing disease intensity, and possible management strategies to minimise disease impact (Bathgate and Shearer 1995). The shrubland plant communities in which *B. coccinea* occurs are prone to periodic fire and the potential role of fire in the management of canker-affected stands has been recognised. Bathgate and Shearer (1995) demonstrated a pattern of increasing disease severity with increasing stand age, and recorded canker present in all surveyed stands over 14 years of age. The importance of unburnt remnants of old stands as foci for infection of adjacent, younger regeneration was also confirmed, suggesting that fire regimes which create mosaics of small patches of unburnt vegetation could exacerbate disease development.

The project described in this report is intended to build on this prior work by investigating the feasibility and wider implications of using fire to manage canker-affected stands of *B. coccinea.* Goals of the project are (1) to determine the role of fire in the management and rehabilitation of *B. coccinea* stands affected by canker,

and (2) to recommend measures that may assist in maintaining viable stands of *B. coccinea* throughout its current geographic range.

WORK UNDERTAKEN MARCH-SEPTEMBER 1996

1. Assessment of health and condition of *B. coccinea* in long unburnt stands

Previous work by Bathgate and Shearer (1995) indicated a pattern of increasing disease severity with increasing stand age, and recorded canker present in all surveyed stands of *B. coccinea* over 14 years of age. This is a key issue for fire management, as the extent of decline in older stands could be used as one criteria, amongst others, for the most appropriate timing of intervention with prescribed fire to stimulate regeneration of the stand. It was therefore considered important to expand the data base for stands unburnt for longer than about 15 years across the geographic range of the species. Potential stands were identified using a variety of information including fire history maps maintained by the Department of CALM, examination of aerial photographs, local knowledge and field survey.

To date, suitable stands of *B. coccinea* unburnt for longer than 15 years have been identified and assessed at the following locations:

Location	**Year last burnt**
Stirling Range National Park - Two Mile Lake (A)	1969
Stirling Range National Park - Two Mile Lake (B)	1969
Stirling Range National Park - Two Mile Lake (C)	1969
Stirling Range National Park - Talyuberlup Track	pre-1950
Hopetoun - Table Hill	pre-1970
Hopetoun - Springdale Rd	pre-1970
South Stirlings	pre-1970
Chillinup Road	pre-1970

Unfortunately, the stand at Talyuberlup Track in the Stirling Range National Park was burnt by an arson-caused fire in April 1996 before the condition of the *B. coccinea* had been assessed. This stand contained a few large, widely-spaced individuals which were observed to be in good condition prior to the fire, with little or no evidence of limb dieback despite their considerable age.

At each site, the height and stem diameter of all *B. coccinea* has been recorded within transects. All *B. coccinea* plants have been permanently marked to permit re-location so that changes in health and condition can be monitored over time. Site locations have been fixed with a Global Positioning System to permit re-location, even if other forms of marking are damaged or destroyed. The extent of limb dieback was assessed using the same classification scheme employed by Bathgate and Shearer (1995). The plant species composition of the stand has been described at each site. Plant age has also been estimated using the node counting technique.

Stands display a typical even-aged structure, with evidence of suppression of some smaller and less vigorous individuals. Mortality levels are higher amongst the smaller plants, suggesting the competition may be responsible for at least a proportion of plant deaths. The highest level of mortality recorded was 18 per cent at the Stirling Range National Park Two Mile Lake (B) site. More than half the *B. coccinea* at each of the sites examined were considered to have no or only minor limb dieback.

It is intended to re-assess these sites in summer 1996/97 to determine whether there has been any significant change in condition over the winter months. These sites will also provide a valuable network for monitoring the health of the species over the longer term. At the burnt site in the Stirling Range National Park seedling regeneration will be examined to determine whether old plants are still capable of successful regeneration.

The node count method consistently under-estimated the age of *B. coccinea* and does not appear to be a reliable method for determining the age of plants more than 15 years old, probably because thickening of the stem conceals the pattern of nodes.

2. Regeneration of *B. coccinea* in stands degraded by canker

Transects to monitor the health and condition of established plants and to examine the success, or otherwise, of seedling regeneration have been established in a severely canker degraded stand at Waychinicup and in an immature stand at Wellstead where there is currently an active canker infection. Some seedling regeneration has occurred at both sites. Continued monitioring will be necessary to determine whether seedlings can persist and grow in the presence of high inoculum levels.

3. Flowering and seed production of *B. coccinea*

Populations of *B. coccinea* seedlings at the Stirling Range National Park which regenerated following fires in autumn 1989 and spring 1990 were re-assessed in September 1996 to determine flowering and seed production status in relation to plant age. Of the seedlings established in 1989, 40 per cent had flowered during the current spring. This was a smaller proportion than had flowered two years previously (60 per cent), and none had flowered in spring 1995. Only one of the 20 plants which regenerated in 1990 flowered in spring 1996, this being the first flowering recorded amongst this cohort since the fire despite the fact that the seedlings are now six years old. This result indicates that juvenile periods for plants may vary considerably even at the same site, and should not be regarded as a constant.

REFERENCES

Bathgate, J. and Shearer, B. (1995). Control and management of *Cryptodiaporthe melanocraspeda* canker threatening *Banksia coccinea*. Report to Endangered Species Unit, Australian Nature Conservation Agency, March 1995.

Shearer, B. and Fairman, R. (1991). Aerial canker fungi threaten *Banksia coccinea*. Abstract 85/C16. Proceedings of the Conservation Biology in Australia and Oceania Conference, University of Queensland.

CONTROL OF *PHYTOPHTHORA* AND *DIPLODINA* CANKER IN WESTERN AUSTRALIA

PROGRESS REPORT TO THE ENDANGERED SPECIES UNIT, AUSTRALIAN NATURE CONSERVATION AGENCY

OCTOBER 1996

Department of Conservation and Land Management
Locked Bag 104, Bentley Delivery Centre, WA 6983