

# Resilience of a forest understorey seedbank community to frequent burning

T.D. Penman<sup>1</sup>, D.L. Binns<sup>2</sup>, R. Shiels<sup>1</sup>, R.M. Allen<sup>1</sup> and S.H. Penman<sup>3</sup>

<sup>1</sup> Forest Science Centre, NSW DPI, Beecroft, NSW

<sup>2</sup> Native Forests Division, Forests NSW, Coffs Harbour, NSW

<sup>3</sup> Current address: CERBM, University of Wollongong, NSW

## Introduction

Sustainable use of natural resources is one of the key goals for land managers throughout the world. In forests used for timber production, prescribed burning and timber harvesting have the potential to impact on the composition of native vegetation and affect sustainability.

To date most research has focused on the effect these disturbances have on the above ground vegetation. However, the sustainability of a system will be strongly tied to the ability of the vegetation to regenerate following future natural and anthropogenic disturbances. In native forests, this occurs through both germination of seed stock or vegetative regeneration, with some species relying on the former (Gill 1981). Here we assess the soil stored seed bank of a long term experimental site with a documented disturbance history in south-eastern Australia.

The aim of this study is to determine whether timber harvesting and repeated prescribed burning have affected the richness and abundance of species within the soil stored seed bank, and if so which species were sensitive to these disturbances.

## Methods

Three and a half kg of soil was collected from each of 213 long term vegetation monitoring plots in the EBSA in April 2006. Each sample was sub-divided and treated with heat, smoke, heat and smoke, as well as a control, then placed in a glasshouse for a period of two years. Seedlings were identified to species level then removed from the experiment.



Figure 1: Collection of soil samples from the EBSA

Comparisons were made between the fire and logging treatments based on the following measures:

- species richness
- abundance of seedlings
- community composition; and
- distribution of individual species



Figure 2: The experimental setup in the glasshouse (left) and the smoke treatment being applied to samples (right)

## Results

- A total of 9526 seedlings germinated from 126 species
- Timber harvesting resulted in higher species richness & seedling abundance and varying community structure
- Frequent burning resulted in lower species richness & seedling abundance and varying community structure
- Six species affected by logging treatment - 2 increased occurrence, 4 decreased occurrence.
- Eight species affected by frequent burning – all decreased occurrence



Figure 3: Seedlings emerging during the study

## Discussion

Experimental frequent burning reduced the abundance and diversity of seeds in the seed bank. This is likely to affect the ability of the vegetation to respond to future disturbances such as wildfire. Development of appropriate fire intervals for sustainable management needs to consider effects on seed banks as well as on standing vegetation.