Does post-fire understorey vegetation offer a 'nutrient kick' via decomposition?

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Determining changes in *Eucalyptus* litter during decomposition

Infrequent but intense bushfires can have pivotal effects on vegetation structure across landscapes. A projected increase in the frequency of bushfires means long unburnt forest areas could become scarce and regenerating forests become more dominant across Australia. Investigation of the effects of post-fire understorey species in nutrient cycling help us to understand the role of litter decomposition in fuel accumulation after bushfire.

Research objective

1. To understand how litter from post-fire understorey vegetation may affect the rate of *Eucalyptus* decomposition
2. To examine the potential of spectroscopic methods for analysing the chemical quality of decomposing litter

Why does litter decomposition matter?

- Litter breakdown controls the depth of the forest litter layer
- This layer is associated with fire ignition and fire intensity
- High quality litter (i.e., low ratio of carbon (C):nitrogen (N) and lignin content) from acacias, ferns, and grasses can decompose relatively fast
- Mixing high quality litter with low quality litter from eucalypts may increase its rate of decomposition

How does bushfire affect forest structure?

- **Litter quantity**: fire can reduce the amount of accumulated litter
- **Understorey composition**: fire reduces the density of woody shrubs and often promotes a grassy understorey
- **Overstorey structure**: loss of overstorey cover allows light penetration to the forest floor – promote the growth of ferns and N-fixing *Acacia*

How will the effects of understorey vegetation on litter dynamics be measured?

- **Visual assessment** – abundance and type of understorey species
- **Litter collection** – from recently burnt and long unburnt forests
- **Litter quality analysis** – analysis of litter C, N, cellulose, and lignin using wet chemistry and spectroscopy
- **Decomposition study** – mix *Eucalyptus* litter with understorey litter and monitor rates of decomposition in purpose built litter beds

Why use spectroscopic methods to measure litter quality?

- Spectroscopy – novel, fast, accurate, and low-cost technique
- Requires the use of statistical and multivariate analyses to correlate C, N, cellulose, and lignin content with spectra signals
- Research-grade portable spectrometers are available to measure litter quality (e.g., C, N) in the field for real-time data

Why is this project important?

- Manage forest fuels more efficiently and accurately
- Promote ecological health outcomes
- Allow fast and accurate measurement of large sample set

Take home messages

Fuel accumulation in burnt forests:

- Post-fire understorey species that produce high quality litter may increase the rate of litter decomposition

Spectroscopy:

- Potential to be used in field conditions for real-time measurements

Further information

For additional information scan the QR code or contact:

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