

# EFFECT OF BUSHFIRE SMOKE ON PLANT PHYSIOLOGY

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## Aim of my PhD project

To analyse the effect of smoke from bushfires and prescribed burning on agricultural and native plant physiology

## Introduction

In the last decade Australia has endured a long drought period, resulting in an increase in fire and a subsequent increase in bushfire smoke. This increase in smoke has emerged as a major risk for agricultural industries. For example, wineries have experienced considerable financial losses due to smoke taint in wine. The effect of smoke on grapevines and on other agricultural and native species is unknown. With the predicted changes in climate, the trend for an increase in annual bushfire events and its impacts is inevitable.

## Research questions

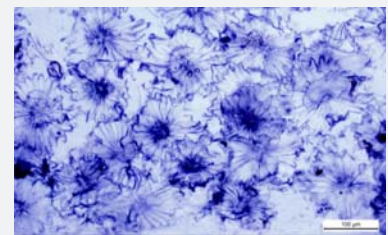
1. What are the immediate and short-term effects (days) of exposure to smoke on leaf-level physiology?
2. What are the long-term effects (weeks to months) of exposure to smoke on plant-level physiology?
3. How does smoke from bushfires and prescribed burning impact at a landscape level?



Gourd leaf after 15 minutes of smoke exposure



15 minutes of smoke exposure

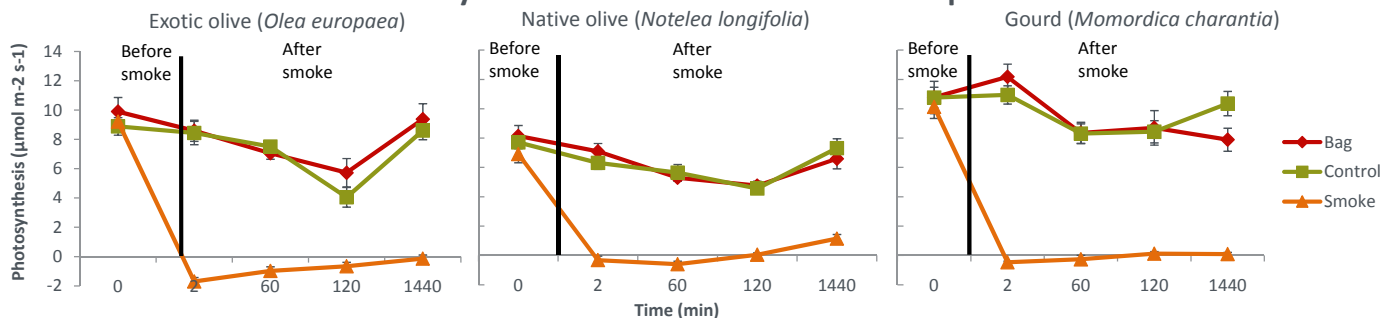


Do peltate hairs on the *Olea europaea* protect the stomata from smoke?

## Methodology

- Measurement of photosynthesis before and after smoke exposure
  - 15 different species (native and agricultural), four individuals per species
  - three treatments: control (no bag), exposed leaf (15 minutes exposure to smoke in bag), bagged leaf (15 minutes in bag)
  - *Eucalyptus saligna* used as fuel to create smoke
  - five time measurements: one before treatment and four after smoke exposure
- Leaf anatomy
  - transverse: leaf thickness, wax layer epidermal layer, hairiness
  - stomata count
  - leaf area and moisture content
- Chlorophyll content
- C:N ratio

## Photosynthesis before and after smoke exposure



## Results

- The bag has no significant influence on photosynthesis which shows that the technique we have designed is valid.
- Smoke has a significant influence on reducing photosynthesis for at least 24 hours.
- The thin, soft gourd leaves died within a hour after exposure to smoke. The sclerophyllous (tough) olive leaves – both native and exotic species – did not.
- Native species starts recovering within 24 hrs whereas the agricultural species do not.

## Outcome of my PhD project

This research will provide a better understanding of the consequences of exposure to smoke on agricultural and native plant physiology. This knowledge will contribute to infrastructure management plans and preventative measures for smoke exposure on agricultural crops and thus will be relevant for a range of stakeholders.