SPOTFIRE INITIATION BY FIREBRANDS

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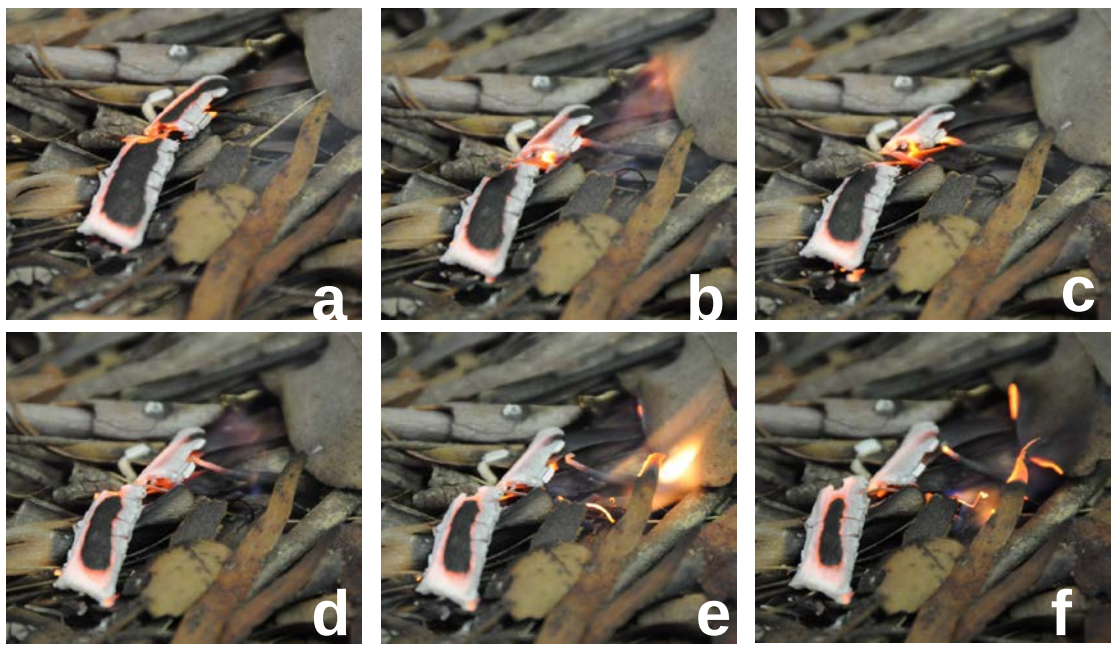
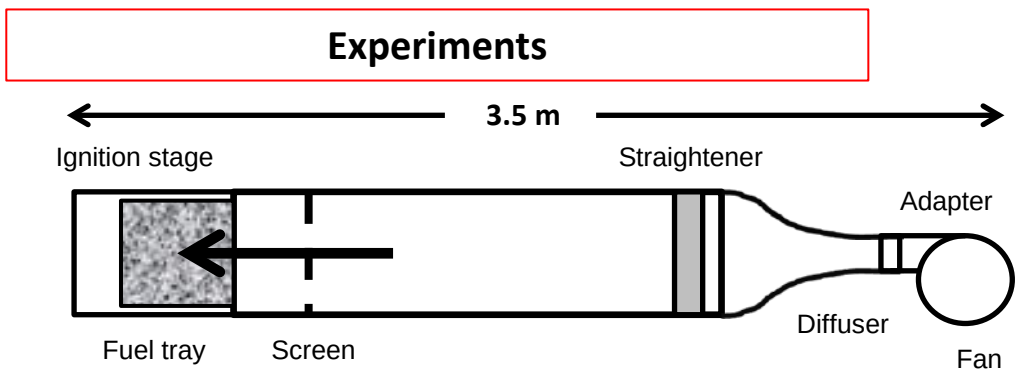
60 Years COMMONWEALTH BUSHFIRE RESEARCH

Research questions

1. How do wind and fuel moisture content influence the likelihood of **spotfire** ignitions by **firebrands**?
2. Can firebrands less than 0.1 g ignite spotfires?



Experiments



A. Test ignition success for 340 flaming or glowing **firebrand** samples dropped on to trays of the litter profile (**fuel**) of dry sclerophyll forest, in a purpose-built wind tunnel.

- wind speeds 0, 1 m s^{-1} or 2 m s^{-1}
- fuel moisture contents from 4% to 22%
- sustained flaming ignition of the fuel? (yes/no)

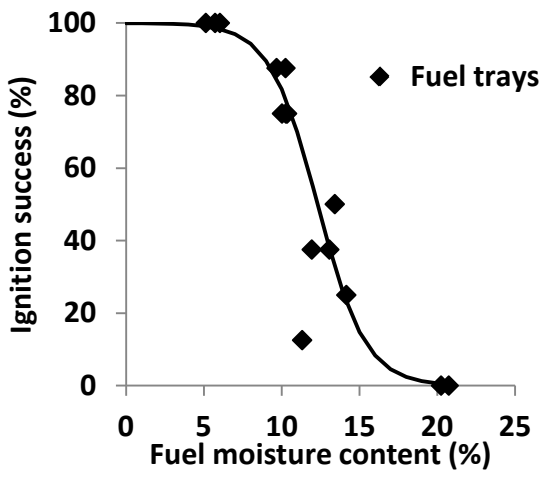
B. Measure 3D wind speed and turbulence in forest, and compare it to laboratory 'wind' across the fuel tray.

C. Characterise the **fuel** in terms of surface components (leaves, twigs bark), and surface roughness.

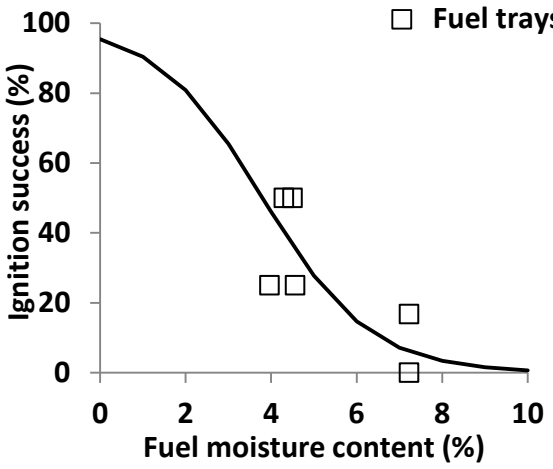
Answers

1. Models which quantify the ignition probability, by **firebrands**, of litter **fuel** of dry sclerophyll forest litter as functions of wind speed across the fuel, and fuel moisture content of the forest litter.

a. flaming firebrands and wind of 1 m s^{-1} or 2 m s^{-1}



b. Glowing firebrands and wind of 2 m s^{-1}



2. Yes they can……

The applications

The models of ignition probability can be combined with models of fuel moisture content (Matthews 2006) to inform managers of the risk of escape or escalation of existing fires, planned fires, or potential bushfires.

The future research

The influence of wind turbulence on ignition.

Matthews S (2006) A process-based model of fine fuel moisture. *International Journal of Wildland Fire* 15 (2), 155-168
Plucinski MP, Anderson WR (2008) Laboratory determination of factors influencing successful point ignition in the litter layer of shrubland vegetation. *International Journal of Wildland Fire* **17**, 628-637.
Ellis PFM (2011) Fuelbed ignition potential and bark morphology explain the notoriety of the eucalypt messmate 'stringybark' for intense spotting. *International Journal of Wildland Fire* 20(7) 897-907
Ellis PFM (2013) Firebrand characteristics of the stringy bark of messmate (*Eucalyptus obliqua*) investigated using non-tethered samples. *International Journal of Wildland Fire:Online early.*