



# Observations on fire behavior in a blue gum plantation

FIRE SPECIAL

BY FABIAN CROWE AND DARREN SHELLEN

*On the hottest April day on record in south west Victoria, a fire occurred in the Dunmore State Forest, in the Portland Fire District. The total area of the Dunmore fire was 1,349ha, including 350ha of blue gum plantations. When the fire reached the blue gums, vastly different fire behavior was observed.*

As the temperature soared towards 34.1C, spots from a previous fuel reduction burn jumped the containment line at 1 pm on Saturday 9 April 2005. Fanned by strong northerly winds, the fire spread rapidly at up to 3.6km/hr through predominately messmate stringybark forest. The overall fuel hazard rating was very high. The structural vegetation type is open forest and the terrain is relatively flat.

From eye witness and wildfire investigation reports, the fire behavior changed greatly when the fire entered the blue gum plantations from the native forest resulting in flame heights, fire intensity and the rate of spread being greatly reduced. There were, however, areas that sustained substantial damage.

Forest managers need to take into account row direction, compartment size and native remnant patches when establishing and managing plantations for protection and fire fighting. These issues are discussed in more detail below.

Examination of the unburnt areas adjacent to the fire suggests that the fuel structure within the plantations was relatively typical of 6 and 7yo plantations. The height of the plantation was approximately 14m, with the surface and elevated fuel hazard generally moderate including some accumulation of leaf litter and dead twigs in the ruts next to the mounds.

There were, however, isolated small patches within each plantation where both the surface and elevated fuel hazards were very high due to the presence of accumulated leaf litter, twigs, bark and bracken. Such accumulations of fuel would cause an increase in fire intensity.

There were also a number of openings (seasonal wetlands, remnant vegetation) within each plantation where the quantity of fully cured grasses increased the surface fuel hazard to extreme. These openings are exposed to the influence of the prevailing winds and more solar radiation. The combination of these factors caused an increase in fire intensity in the plantations around these openings.

## BLUE-GUM FIRE BEHAVIOR

The fire behavior varied greatly through the different plantations due to different fuel compositions, percentage of remnant vegetation area, row direction, and plantation layout. The native vegetation to the north of Tobin block had severe fire behavior with eye witness reports detailing flame heights of 20m above canopy height.

There were multiple points of ignition on the northern boundary of the Tobin Plantation Block. The burn and char patterns in this area suggest that the maximum flame height during the initial stages of each of these fires was less than 2m. As each of these fires developed, they merged with others, increasing the flame height to more than 10m. Once the flames reached a height of 10m or more, they were exposed to prevailing north to northwest winds up to 60 km/hr, creating short runs through the crowns of the plantation (photo 1). These short runs could not be sustained due to the moderate fuel loads and the fuel arrangement.



Plantation area burnt with fire runs.



Down Plantation – rows run east/west with greatly reduced fire intensity.

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# No time is ever the right time

BY MURRAY TURNER



FIRE SPECIAL

While it is accepted that the traditional bushfire season in the Green Triangle of Victoria begins in November and extends to mid-March, this year was an exception to the rule.

The region experienced unseasonal rains in January and February followed by a dry period extending into late May early June. The AFG forestry insurance facility incurred a large loss in the Green Triangle regions as late as 7 April 2005.

The plantation, which was subject to a claim, was an area located well within the Green Triangle – a designated forestry region comprising some 279,000ha of pines and eucalypt plantations. Statistics issued in 2003 indicated that the area featured some 113,000ha of eucalypt and 155,000ha of pine and this represented approximately 17 per cent of Australia's plantation resource as at 2001.

The fire was first reported to the Incident Control Centre on 8 April 2005 by a Green Triangle spotter plane, which had been activated by the Regional Controller to survey the region following storm/lightning activity.

In addition to the Insured having their own Fire Management Program, the Green Triangle is also subject to a Management Plan authored by the Southern Border Fire Co-Ordination Association. The Insured own fire fighting assets comprised of two large tankers, both of which responded to the fire. The Co-Ordination Association had access to five regional brigades in addition to the resources of other forestry companies who also operate in the region.

The Department of Sustainability and Environment (DSE) recorded fire crews from Casterton were immediately deployed, consisting of three slip-on units and one command vehicle comprising eight people in total. Simultaneous notice was given to the Country Fire Authority (CFA), who mobilised their own units from Digby, Merino, Dartmoor and Drik Drik Brigades.

The likely cause of the fire was lightning on the evening of 7 April 2005 or in the early hours of 8 April 2005. It is understood the fire originated further north of the Insured's holdings and then travelled in a southerly direction. It was eventually extinguished on the afternoon of Friday 8 April 2005, with mopping up and monitoring of the area continuing over the weekend.

At the fire's peak there were some 60 DSE and 55 CFA personnel actively involved in fighting the fire, supported by six bulldozers, 12 tankers and three slip ons.

The fire was eventually brought under control, but not before destroying over 300ha of plantation timber, native forest and grassland. DSE and CFA crews remained in the area until late on 9 April, with DSE crews actively patrolling the area up until the 18 April to ensure that a flair up did not occur.

The question of the salvage of the Insured's fire-affected trees was resolved by feedback by the respective timber mills, itemised as follows:

- The limited market currently available for small diameter material;
- The economic impact of processing charred logs on the mill's sawmilling operations; and
- The narrow timeframe available for salvage due to the terrain and soil type.

Accordingly, no salvage prospect existed.

Compliance issues were reported on by the assessor who confirmed that the tree health and plantation management was found to be of a high standard, with all fire breaks exceeding the insurance policy's prescribed widths. Boundary breaks were measured at between 10m and 15m on average with all internal tracks in excess of 5m and well maintained.

The client has received full and final settlement for the loss.

Murray Turner, Divisional Manager, Corporate Risks, Jardine Lloyd Thompson Pty Ltd



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Tobin Plantation – rows run north/south with increased fire intensity.

## • Effect of row direction

The fire intensity in the Tobin Plantation Block, where the rows of trees were planted in a north/south direction, was significantly greater than the fire in Down Plantation Block, where the rows were in an east/west direction – in spite of the Down Block being in the immediate path of a very intense running fire out of the native vegetation area to the north. This variation in fire intensity is attributable to both the concentration of litter fuels in the mound ruts and greater exposure to the prevailing winds.

## • Effect of compartment breaks

It was evident that the east/west compartment breaks within and between the plantations did not halt the progress of any running fire due to the heavy spotting from the native vegetation. But these breaks did serve to reduce the intensity of the running fire and to limit the spread of flanking fire. The burn and char patterns in the runs of fire in the Tobin Block, north of the east/west compartment break indicated that the flame height was between 10 and 15m. To the south of the 10m wide break, the flame height rarely exceeded 3m.

## • Effect of native vegetation

Areas of remnant vegetation are found among the plantations. The overall fuel hazard in each of the native areas was extreme. It was evident from the burn and char patterns that the intensity of fire in the native vegetation areas was significantly greater than in the plantations. It was also evident that plantation trees immediately adjacent to native vegetation suffered substantially more fire damage than others.

There is little doubt that the presence of long unburnt stringybark trees in the native vegetation contributed to a significant amount of short distance spotting into adjacent areas. When multiple spot fires occur in close proximity, fire develops faster and with more intensity.



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