Blue gums proving firestoppers this summer

BY DAVID GEDDES

Three recent bushfire events have triggered this article exploring the startling, 'damping down' affects that blue gum plantations can have on fire behaviour. In late January 2006, a period of very hot weather combined with lightning storms caused bushfires on Kangaroo Island in South Australia, in the Grampians in western Victoria and in Gippsland. While all three fires burnt into blue gum plantations, each fire caused very little damage to the plantation trees.

Since the rapid expansion of the hardwood plantation sector about a decade ago, it has been quite remarkable that there have been very few blue gum plantation losses to wildfire. This article briefly highlights personal observations or investigations of 28 fires in blue gum plantations on former cleared agricultural land that have occurred since 1994. These fires were in six plantation regions across three states (WA, SA and Victoria) and include most of the blue gum plantation fires in Australia and all of the serious fires affecting blue gums.

Starting with the facts from the 28 case study fires:

- In the 12 years since the first reported blue gum plantation fire in Australia (Parker 1994), the worst area loss was on 9 January 2005 in western Victoria. On a day of Extreme Forest Fire Danger, that fire burnt 350ha of 6 and 7 year old plantations (Crowe & Sheldon 2005). But a very hot fire in high fuel load native forest changed to a fire of significantly reduced intensity when it entered the blue gum plantation.
- The next largest area loss was in Gippsland in February 2003. About 250ha of a low quality 10 yo plantation was burnt. Despite high grass loads in the plantation, fire behaviour was mild until it exited

Timbercorp blue gum plantations survive as a green island in a sea of burnt bush in the 25,000ha Grampians fire (January 2006).

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Two photographs showing the difference in fire behaviour between blue gums and pines in a fire in Gippsland (February 2003). Low flame and low rate of spread in the blue gums. Very high flame height in the pines.

the blue gums and entered a pine plantation, at which stage fire behaviour became extreme with multiple crown fires, very high flame heights and severe destruction in the pines.

- Plantation area losses of greater than 100ha occurred in only three of the 28 fires. In those cases, losses in other vegetation types exceeded thousands of hectares.
- Area losses in more than 85% of the fires observed were less than 30ha. In 10% of cases, this was due to small scale plantations caught in the path of large wildfires. In 45% of cases, the mild fire behaviour in the blue gum plantations was a contributing factor to the fires being brought under control. In several of the case fires, the fire went out in the blue gum plantations, without any human intervention, due to lack of fuel.
- About 75% of the fires occurred on days when the Forest Fire Danger was Very High or Extreme. Under such conditions, plantation losses would normally be expected to be severe (Vercoe 2003).

OBSERVED BEHAVIOUR

Drawing on actual fire behaviour in the 28 blue gum fire case studies, and from discussions with fire fighters who observed actual fire behaviour in the plantations in several of the more serious fire losses, it can be concluded that where blue gums have been established on formerly cleared agricultural land, fire behaviour is different to that in grassland, pine plantation and native vegetation fuel types. Fire behaviour is likely to be more severe where there is a large amount of grassy fuel understory.

There is a difference in the fire spread into a young blue gum plantation, depending on row direction relative to the fire travel. It is likely rows perpendicular to the fire direction provide a better barrier to fire spread than rows parallel to fire direction. Where rows are in the same direction as the fire, grassy fuel between the rows may enable a fire to carry for short distances.

In older blue gum plantations, fuel loads increase due to leaf fall accumulation and branch shedding. Higher growth-rate plantations accumulate such fuel at an earlier age. Such fuel loads can allow the fire to easily spread through the plantation, and on upward sloping terrain, crown fires can occasionally occur (Boness 1996). Short distance spotting may occur.

The evidence from the case study fires suggests that large scale, young blue gum plantations have the ability to slow a wildfire on Extreme FFD days. There will, however, be some plantation losses, depending on the intensity of the fire entering the plantation. For large wildfires, it is reasonable to assume that the compartments on the leading edge as the fire strikes, could be burnt. For example, in the Valley View fire in December 2000 (Braun 2002), about 25% of the plantation area was burnt, but this 3 yo plantation saved the township of Mount Barker from serious destruction, despite no fire fighting activity taking place in the plantation.

While it could be expected that parts of blue gum plantations burnt on a severe FFD day will be killed, depending on the intensity of the fire, many trees may have scorched leaves without being killed. In milder fire conditions, there is a very good chance of tree survival from a wildfire.

Fire behaviour in open areas within plantations (such as creeklines, swamps or dead patches of trees) may be similar to grass fire rates of spread due to increased grassy fuel and increased wind.

WHY IS THIS SO?

Why has the fire behaviour been less intense than many firefighters had expected? In order to cause severe damage, fires require a combination of high fuel loads and wind to drive the fire. Wind within plantations is reduced by 33-50% of the wind external to the plantation. Fuel loads in well managed young blue gum plantations with good weed control and an absence of woody debris on the forest floor are lower than open pastures and significantly lower than native forests. Furthermore, ground fuel in plantations aged less than 7 years is often discontinuous, providing in effect a series of mini firebreaks within the plantation. In older plantations there is a gap between ground fuel and the crowns, reducing the chances of crown fires and leading to similar low intensity fire behaviour, such as in well thinned pine plantations.

It is known that a number of fires have been stopped by firebreaks and have not entered the blue gums. Plantation managers in several regions have also mentioned that lightning strike fires have started within blue gums, but have not developed due to lack of ground fuel. These fires are not included in the 28 case study fires.

Despite the low area losses to date, fire authorities should not become complacent when dealing with blue gum fires. When drawing conclusions from case studies there is a need to recognise fire experience in blue gum plantations is still at a relative early stage, and there is still not a good balance of data from spring, summer and autumn fires. There is still potential for much higher losses than have been experienced, particularly in older blue gum plantations with leaf litter and dry branches on the ground. Furthermore, the 28 case study fires were all established on formerly cleared agricultural land. Where plantations have been established on former native forest sites, understorey fuel levels can be more like those in a native forest (Gould, McCaw and Cheney 2001). Depending on harvesting techniques, woody ground fuel loads may be high in second rotation plantations, giving rise to more severe fire behaviour (Wettenhall 2003).

In summary, where blue gums have been established on formerly cleared agricultural land, fires in plantations will be less intense than in pine plantations and native vegetation types, as well as slower spreading than in fully cured grasslands. But caution must be taken in comparing past fires. Most large blue gum fires have been in plantations where the grassy or shrubby understorey has been almost non-existent. If dry grass or woody shrubs are present under plantations, it is quite likely fire behaviour will be more severe. Second rotation plantations also have a higher potential rate of fire spread because of the higher quantity of wood debris.

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