The Economist

Forest fires

Burning benefits

Controlled fires can both help prevent combustion and reduce insect attacks

From the print edition | Science and technology May 19th 2016

THE giant wildfire that raged recently through the Canadian province of Alberta, forcing more than 80,000 people to flee their homes, was caused in part by global warming producing drier conditions. Yet conservation efforts to prevent burning have not helped either, say some experts. Forests can regenerate after being

burnt, with much of the tinder-like underbrush being cleared away and dense tree canopies broken up so that young trees can get the sunlight they need to grow. Now a new study finds that fires, whether started naturally or under controlled conditions, can also thwart nasty insect infestations.

Like many useful discoveries, this one came about somewhat by accident. Sharon Hood of the US Forest Service was working with the University of Montana and colleagues on the ecology of a forest in western Montana that had been managed in a number of ways to make it more resistant to fire. They were monitoring areas that had been thinned to open up the canopy, exposed to controlled burns to remove ground growth, or both. To provide a control area for comparison, the team also kept an eye on part of the forest that had not seen a blaze since the 1800s. They were planning to monitor the forest for many years to come, but then the beetles arrived.

Latest updates

Jewellery's comeback among men
PROSPERO

Smoking rooms in airports are being stubbed out
GULLIVER

A new way of giving is changing philanthropy
GRAPHIC DETAIL

See all updates

These were mountain pine beetles, a pest in North America. The beetles lay their eggs in the phloem layer inside the trees' bark, which conducts nutrients from the leaves down to the roots. When the eggs hatch, the larvae feed off the phloem, draining the tree of its vital resources. If the number of beetles is low, trees are able to defend themselves effectively by flooding the areas under attack with an insecticidal resin. However, in great numbers the beetles tend to use chemical signalling compounds called pheromones to concentrate their invasion on one tree at a time, which exhausts resin levels and ultimately kills the tree. Beetle outbreaks have taken place for millennia, but recently have been getting much larger and lasting a lot longer.

Dr Hood knew the beetles were particularly problematic in forests where fires had been suppressed for a long time, although no one was sure why. The arrival of the beetles in 2005, just five years after the team began their monitoring, provided a golden opportunity to find out. So the researchers compared a 2012 survey of the forest with the findings from 2005. They found 720 of 2,189 trees had died during that time. Obvious evidence in the form of larval tunnels and bore holes showed that the beetles were responsible for their demise. However, the distribution of the dead trees was not evenly spread among the various zones.

As Dr Hood reports in *Ecological Applications*, the death toll was 50% in the control zone, 39% in the area intentionally burned, 14% in the one both thinned and burned, and nearly zero where it was merely thinned. There are two main reasons for this, she argues. First, the trees in the burn-only zone had particularly low levels of chemical compounds known as monoterpenes that the beetles use to make their pheromones. Without these chemicals, Dr Hood speculates that the beetles found it more difficult to co-ordinate their attacks. Second, trees living in the thinned-only forests were healthier overall due to reduced competition for resources and had larger supplies of resin available to them. Thus they were in a much better position to fend off the beetles. Thinning and controlled burning may well be a good way to reduce wildfires and insect infestations, but organising this over the vast swathes of land that have been subject to fire suppression for over a century will not be easy.