



### Dieback on the Monaro

"Dieback refers to the deterioration and death of stands of trees or large areas of trees rather than individual trees"  
"A 1993 study listed 13 types of insects, five types of fungi, five kinds of vertebrate animals, four climatic perturbations and a parasitic plant that are implicated as major agents of dieback in south-eastern Australia."



Dieback in Eucalyptus viminalis woodland on Rockwell Road between Berridale and Dalgety. Virtually all the mature trees have died and there is no regeneration of saplings.

This is the typical presentation of dieback—it mainly appears on the granite country, typically is affecting one species of eucalypt and has led to widespread death of the trees in an areas from Rocky Plain to south of Dalgety and from east of Varney's Range to Cooma.

### What We do know about Dieback

The first sign of trees suffering stress is the loss of the upper most leaves on the trees. This can be followed by an almost complete defoliation of the leaves. The increase in light and/or hormonal changes in the trees allow for prolific growth of "epicormic shoots" - small shoots filled with leaves that sprout from the trunk and branches of the trees.

These tender young shoots are really attractive to insects to the extent that the leaf growth is typically consumed by insects. The tree has to try again—more epicormic shoots are produced by the tree, using food reserves that are stored in the lignotuber of the tree.

Eucalypts don't enjoy the Biggest Loser experience—the use of all its food reserves and the loss of the ability to photosynthesise means the trees are on a downward spiral till they finally die.



Stages of decline—the tree on right has a more complete leaf canopy compared to its neighbour, which has a few straggly shoots in the lower branches and the left hand tree has died. We circled the lonely Eucalypt at our Field Day on 18 March 2011 and observed that the patient had lost a lot of limbs and was surviving with a reduced diet from the small amount of leaf area on the lower limbs.

### Can we control the Insects?

Neil Murdoch and Lachy Ingram from Sydney University with Bayer are currently conducting trials on the property "Sunnyside" using the systemic insecticide "Silvashield". The trials are assessing whether the insecticide (active constituent Imadacloprid) can control the insect attack and allow the epicormic shoots to survive beyond the first year and start replenishing food stores within the tree.

The main insect culprits are the Eucalytus gum Weevil (*Gonipterus scutellatus*—which particularly loves *E. viminalis*) and the Christmas beetle (*Anoplognathus* sp) although the grasshoppers could also be munching as well.

Photo shows shoots from treated and untreated trees—the leaves at left are larger with minimal insect damage and the leaves of the untreated tree on the right have lost a lot of leaf surface area from insect attack and have less ability to photosynthesise.

The trial work was carried out on 2 sites with 10 treated trees and 10 untreated at each site. USLC will be looking at the methods and cost viability of insect control over a larger area.



### What we Don't Know about dieback on the Monaro

We know defoliation by insects is the process that is leading to the dieback. What we don't know is what takes the trees to the point where they become susceptible to loss of the leaf canopy leading to epicormic shoot growth and further defoliation.

The following factors could all be important in taking the trees to a point where they are subject to insect defoliation.

Drought—can reduce root vigour and tree accumulates nutrients in leaves, making leaves more attractive to insects

Lack of insect predators—reduced bird numbers and other predators have allowed insect populations to increase

Soil Health—compaction by stock, increased nutrient levels (stock camps) have impacted on trees that evolved in a low nutrient environment

Lack of fire—*E. viminalis* are fire sensitive (thin bark, white trunks) and are killed by high intensity fire but can also benefit from cool, low intensity fires

Nutrient Status of Leaves—leaves of drought stressed trees and the leaves of fresh epicormic growth have a higher concentration of nutrients, especially arginine, an amino acid essential to insect growth

Tree ages—Senescence (aging trees) is different from dieback (where trees of different age classes are affected. Many of the eucalypts are mature and therefore have less vigour and more susceptible to insect attack.



Participants at the Dieback field day travelled from Dalgety Hall to the property "Sunnyside" to hear speakers from Greening Australia and Sydney University. The field day was funded by Snowy River Landcare from a Community Action Grant submitted by Neil Murdoch.

### What to do and Where to Next

Already there are large areas of woodland where the defoliation has led to death of almost all the *E. viminalis*. Where are our options for future management of the remaining trees:

- ◆ If drought has led to the problem, will the present wetter season help solve the problem? Time will tell
- ◆ Is it cost effective to treat the remaining trees with insecticide? Given the slow regeneration times and seedling growth time on the Monaro it is best to look after what we have got. Trees would have to have a good sprouting of epicormic growth to benefit from insecticide treatment.
- ◆ Will fencing out stock help? Stock exclusion might help new seedlings establish but the new growth would have to be protected from insect attack
- ◆ Is replanting effective? Trees grow slow on the Monaro so a long term project can be to plant but it may be good to use seedlings of other Eucalypt species. Snow gums (*E. pauciflora*) and Candlebark (*E. rubidia*) should be suitable for places where there is mainly *E. viminalis* (ribbon gum).
- ◆ What will fire do? Try some small, scattered patches of burns in cooler seasons and keep a photo record of how the area responds. Less grass or ground cover may allow seedlings to emerge.



Larvae of the gum weevil and the devil itself. The larval and the adult forms leave different grazing patterns on the leaf—adults eat the outside of the leaf while the larvae tend to "skeletonise" the leaf. (Photos courtesy of Lachy Ingram)

