Killey, Paul (from CRC for forestry website)

PhD student

Topic: Physiological response and growth of subtropical eucalypts following repeated pruning.

School of Botany and Zoology, Fenner School of Environment and Society, Australian National University (ANU)

Pruning plantation trees is an important silvicultural tool for enhancing commercial log value. For the tree, however, pruning removes the photosynthetic machinery required to capture the energy needed for survival and growth. Previous research has demonstrated that a number of eucalypt species have an ability to compensate for lost foliage through a short-term increase in the photosynthetic capacity of the remaining crown. As a result, if less than 50% of the green crown is removed after canopy closure, then growth (DBH and height increments) remains equivalent to unpruned trees.

Research to date has investigated the response of two subtropical eucalypts (*Eucalyptus cloeziana* and *E. pilularis*) to a single pruning event. The effect of current silvicultural regimes involving multiple pruning events and different subtropical species is not known. Nor can we anticipate how pruned trees will respond to concurrent other stresses, such as drought or herbivory. Further investigation of this group of eucalypts is required to inform pruning regimes for a wider range of subtropical species.

My research will address these knowledge gaps by answering the following questions:

- Is the ability to increase photosynthetic capacity consistent across a range of commercially important species from different subgenera?
- Can the physiological response to defoliation be predicted by a species' phylogeny and/or the ecological envelope defined by its geographic distribution?
- Is the ability to increase photosynthetic capacity impaired by repeated pruning events?
- If so, what is the physiological basis for a decline in compensation, and how might this be managed for silviculturally favourable results?
- Is the ability to increase photosynthetic capacity impaired by concurrent events such as water stress or heat stress?
- Is the physiological response to pruning different to other defoliation events such as herbivory, fire or drought?

The results of this research will inform the pruning regimes applied to subtropical eucalypt plantations. Recommendations will include the optimum timing of repeated pruning events and modifications to pruning prescriptions for favourable and unfavourable conditions. This research will also assist in refining yield predictions for pruned trees.

I completed my undergraduate studies in 2008, graduating from the Australian National University (ANU) with a Bachelor of Science (Forestry) with Honours, for which I was awarded a University Medal. My honours research investigated the production of coarse woody debris in yellow box – red gum woodlands in the ACT. I have also worked as a research assistant investigating carbon stocks and sequestration in the vegetation biomass of the ACT.