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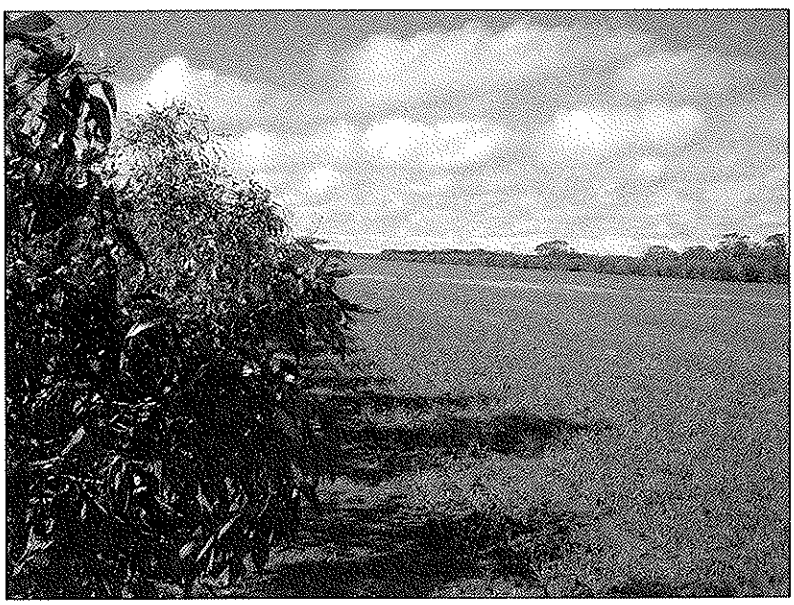
BUGS IN THE BUSHES -

how oil mallees are contributing to biodiversity in the Wheatbelt

Anita Lyons

Mallees are small eucalyptus trees, usually less than 10m tall, with multiple stems arising from the base. They are common to low rainfall, arid and semi-arid regions of Australia. Oil mallees are known for their high levels of essential oils, which can be extracted for use in perfumes, solvents and a variety of other products. They have also been promoted as a good source of raw material for renewable energy production through biomass combustion. Today however, the major reason that oil mallees are grown in the wheatbelt of Western Australia is as a potentially valuable asset in the prevention and reduction of dryland salinity.



Oil mallees growing in alleys

It has recently been suggested that the use of commercial perennial crops will soon be the only effective way to reduce groundwater recharge sufficiently to prevent the spread of dryland salinity. The lack of suitable options for use in low rainfall regions, combined with the salinity control potential of mallees, has made them the obvious choice for farm forestry development in the wheatbelt of Western Australia.

The major benefit of oil mallees over some other perennials is that, when established in alleys, they can reduce recharge while still allowing a profit to be made from conventional farming between the rows of trees. While some work has been done on aspects of mallee ecology in order to maximise productivity, little is known about their value as a source of biodiversity in natural and agricultural systems. As a result, it is not known if oil mallees are beneficial or could somehow pose a threat to farming systems. Some claim that growing trees in paddocks simply gives pests a place to shelter and causes them to multiply. Others suggest that overall biodiversity of paddocks could be vastly improved by planting oil mallees and that they could encourage beneficial species such as predatory insects and insectivorous birds.

As part of PhD research at Curtin University of Technology, I have been conducting a study in the wheatbelt of WA to determine the level of invertebrate diversity associated with oil mallee plantings. The timing and location of this study are opportune, as the oil mallee industry, while still in its infancy, is growing rapidly. This

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Bugs in the bushes

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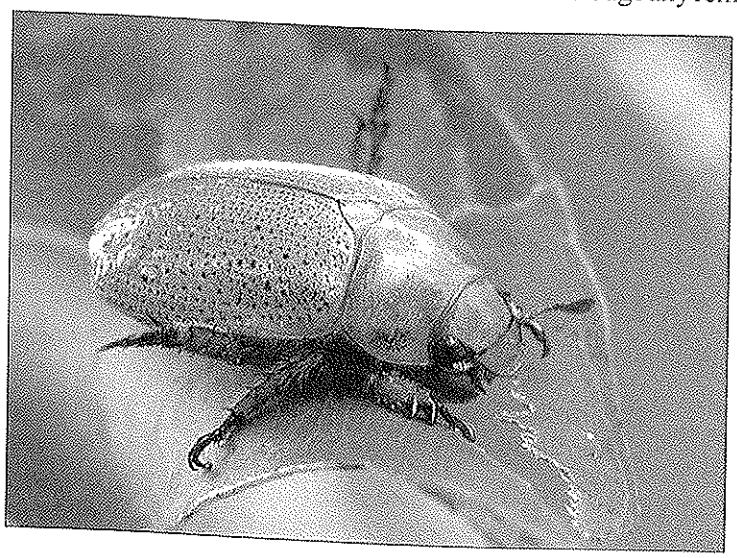
means that results from this work will be available to assist in the early decision-making processes of a large proportion of growers and investors, and will provide baseline data to support future work on oil mallees by other researchers. With Western Power testing a processing facility at Narrogin to produce oil, activated carbon and electricity concurrently from oil mallees this is an ideal time to further explore the potential benefits of these plants.



Christmas beetle eating eucalyptus leaves

As part of this study, I have conducted comparisons of the diversity observed in mallee plantings with that of local remnant vegetation. I have also compared some of the commonly grown mallee species with each other to determine if some species of oil mallee are better suited to promoting biodiversity than others. Invertebrate biodiversity might not be the first thing that comes to mind when we think about conservation issues. Invertebrates however, do have important roles to play in natural systems through the large number of vital ecosystem functions they perform and their place in many major food chains.

This study will concentrate on the canopy invertebrate fauna of the mallees. While canopy research involving invertebrates is common in tropical systems, there is limited information on temperate systems and still less relating to agro-forestry or conservation plantings in the agricultural areas of Australia. Hence this work will fill a void in the scientific literature by using commonly used techniques in a different environment.

Seven experimental sampling sites were set up in the wheatbelt of Western Australia in 2005. Four of these sites were used to examine differences between the oil mallee species *Eucalyptus polybractea*, *E. horistes*, and *E. loxophleba* subsp. *lissophloia*. The other three sites compared oil mallees to *E. wandoo* subsp. *wandoo* (wandoo) and *E. astringens* (brown mallet) in remnant vegetation. Sampling took place during spring 2005 and autumn 2006.

Trees at both alley and remnant sites were sampled primarily by canopy fogging, which involves spraying insecticides with a fogging machine into the canopy of individual trees. Sheets were placed beneath the trees before fogging, and 60 minutes after spraying the trees were shaken to dislodge any remaining insects. Insects were removed from the sheets by shaking into trays by hand. Once collected, samples were stored in alcohol until sorting.

For each tree, samples of each type of scale, gall, sedentary insect and other formation of interest were also taken by branch clipping. This was intended to demonstrate the diversity of invertebrate fauna not collected by canopy fogging. After field collection, all samples were taken to Curtin University of Technology for sorting and identification.

Preliminary results indicate that mallees could have a positive impact on biodiversity in the wheatbelt. The invertebrate diversity found in planted oil mallee is much greater than that which we would expect to encounter in a paddock containing crop or pasture alone. However, oil mallees do not support all of the invertebrate species that are found in the nearby remnant vegetation. This may be due to the distances required to be travelled by invertebrates moving from native vegetation to reach and colonize the oil mallee alleys. Another possibility is that the planted mallee vegetation does not contain all of the requirements needed to support the entire complement of species found in remnants.

As this project progresses it is hoped that this work will show how oil mallees can provide multiple benefits to both farmers and the environment.

Anita Lyons worked for seven years as a broad acre agronomist in Esperance. She has now returned to Curtin University of Technology to conduct this PhD project.