

Novel chemistries in Eucalyptus essential oils – a nature’s gift for herbicide discovery

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Summary The heavy reliance on herbicides for weed management in conservation farming systems has resulted in the rapid development of herbicide resistance, thereby restricting herbicide options and threatening the continued success of conservation farming systems. More than 45 weed species have been confirmed to have evolved resistance in Australia and some species such as annual ryegrass and wild radish have developed multiple resistance to herbicides with different modes of action. It is therefore imperative to discover new compounds with novel modes of action to combat this ever-evolving herbicide resistance in weeds. It has long been recognised that some eucalyptus species are capable of suppressing understorey vegetation growth via allelopathy. Eucalyptus contains a rich source of bioactive constituents, which have been reported to cause phytotoxicity to a number of weed species. The bioactive compounds in eucalyptus oils could possess potential commercial value for further

exploitation as natural herbicides. Eucalyptus is a member of Myraceae family and it is a native to Australia. There are about 800 eucalyptus species readily available in Australia. Leaf materials of more than 300 Eucalyptus species were kindly provided by Dr Dean Nicolle of Currency Creek Arboretum. The essential oils were extracted and evaluated for their herbicidal activities and their potential in weed management. Results showed that eucalyptus species differed significantly in oil contents from 0% to 4.49% (fw, leaf) and in herbicidal activities against the germination and growth of annual ryegrass. Some *Eucalyptus* essential oils at 2.5µl/petri dish promoted the germination up to 19%, while others inhibited the germination up to 96%. The bioactive compounds associated with Eucalyptus allelopathy will also be discussed.

Keywords Annual ryegrass, herbicide resistance, chemical control, allelopathy