

Will pollen-mediated gene flow from industrial *Eucalyptus* plantations impact on the genetic integrity of native eucalypt forests in Australia?

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With the large increase in industrial eucalypt plantations in Australia over the last decade, there is growing concern that native eucalypt gene pools may be contaminated by pollen flow from locally exotic eucalypt species or provenances. We are studying the risk of hybridisation from the two most commonly planted hardwood species in industrial plantations in Australia, *Eucalyptus nitens* and *E. globulus*. While both species are native to Australia, they are frequently planted outside their natural range and in close proximity to species with which they do not co-occur naturally. While hybridisation will not occur when adjacent species belong to different subgenera to the plantation species, barriers to hybridisation within subgenera of *Eucalyptus* are frequently weak and exotic gene flow is then possible. A number of steps in the process of pollen-mediated gene flow have therefore been assessed. Firstly, field surveys across the entire temperate hardwood estate have confirmed that many compatible native eucalypts are found adjacent to plantations and that most older plantations are reproductively active. Secondly, open-pollinated seed collections have demonstrated that plantations can hybridise with some native species (most notably *E. camaldulensis* and *E. ovata*) and exotic F₁ hybrid seedlings involving native *E. ovata* have been identified in the wild. Thirdly, artificial pollination studies have confirmed that numerous other hybrid combinations are possible involving species from the same subgenus as *E. globulus* and *E. nitens*. Fourthly, there is evidence to suggest that flowering time asynchrony and spatial isolation are important barriers which will reduce or prevent hybridisation in many cases. Fifthly, despite evidence that first generation hybrids are often less fit than parental species, some hybrids may survive to reproduction and backcross with native species. Full assessment of the impact of such hybridisation will depend on long-term studies of hybrid fitness. Strategies to identify species most at risk of exotic gene flow have been developed and practical measures to minimise this risk have been identified.

Key Words

Biological invasion, genetic pollution, pollen dispersal, introgression, off-site impacts, forest management