African Olive invasion – a landscape scale conservation threat

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Background and Biogeography

European Olives (Olea europaea subsp. europaea) are a deservedly popular crop in many areas of southern Australia, and very much a part of our modern food culture. With extensive olive groves now established by both hobby farmers and commercial growers, olives are also attracting attention as the ‘next generation’ of woody weeds. Bird dispersal of olive fruits, combined with the Mediterranean climate of the Adelaide Hills in South Australia, has seen European Olives become weedy and invade bushland (Crossman 2002).

In the western Sydney and Hunter Valley regions of NSW, the closely related African Olive (Olea europaea subsp. cuspidata) is now asserting itself as an invasive species. It is a dense-crowned small to medium tree (up to 15 metres) that is part of the tropical wild olive group, and well adapted to temperate and sub-tropical regions. Its major area of natural distribution is eastern Africa, with smaller occurrences in the Middle East, northern India, Afghanistan, Pakistan, Kashmir and China. It occurs naturally in a wide range of habitats from rocky hillsides to river banks, and grows in rainfall zones from about 100 mm near the Red Sea to about 1200 mm in the Ugandan highlands.

Introduction into Australia

African Olive was introduced into cultivation in NSW as a hedging plant and rootstock during the mid-1800’s, and is closely linked to agricultural pioneers John and William Macarthur and the development of the famous Camden Park Estate, near Camden. It was subsequently planted at properties throughout the Camden district, which is now a major centre of African Olive spread. It is still used occasionally as a rootstock for European Olive, however the small fruits have no commercial value and do not produce extractable oil.

Key Aspects of Biology and Environmental Impacts

African Olive plants are capable of producing fruits at age five years, with mature trees capable of bearing more than 25,000 fruits per annum. At an average size of 7 mm, the sweet black fruits are smaller than European Olive and readily consumed by a wide range of native and introduced bird species. Dense seedling ‘mats’ (Fig. 1), at densities of up to 950 seedlings/m²(Cuneo & Leishman 2006), form in the seed fall zone of mature plants. Seedlings are able to remain at this ‘seedling bank’ stage for many years.

Through bird dispersal, African Olive seed is highly mobile in the landscape, and is able to invade eucalypt woodlands as seedlings establish in ‘halos’ around large perch trees (Fig. 2). It is not known whether ingestion by birds increases seed germination, however germination from whole olive fruits does not usually occur until about 15 months after dispersal. Once established in bushland areas, African Olive is able to spread progressively and out-compete native understorey species for light and moisture.

African Olive is a long-lived tree (100+ years) (Fig. 3) and thrives on the hilly terrain and clay soils of the Cumberland Plain region west of Sydney, eventually forming dense monoculture stands and a continuous mid-canopy which excludes the regeneration of native species. In the southern Cumberland Plain (Camden-Picton region) the landscape scale of African Olive infestation is now a significant threatening process, with over 1900 hectares of dense olive mapped there. The remaining vegetation of the Cumberland Plain is now restricted to 13% of the landscape, and exists in a highly fragmented state. Fragments are highly vulnerable to weed invasion, a process that threatens many of the twelve endangered ecological communities present on the Plain. Threatened plants from the Cumberland Plain region also at risk from African Olive invasion include Pimelea spicata and Acacia pubescens (Coutts-Smith & Downey 2006).

Figure 1. Dense seedling ‘mats’ form around mature African Olive plants. Photo: Peter Cuneo
Control Techniques

Bushland management practitioners consider African Olive to be a persistent and difficult weed to control. ‘Cut and paint’ treatment of established plants with undiluted Glyphosate (e.g. Roundup®) is a proven effective method, with herbicide applied immediately to the entire stump surface. Drilling and injection of mature plants with undiluted Glyphosate is also widely used to control established stands of African Olive. Young plants (less than 1 m high) are killed by low intensity fire (von-Richter et al. 2005), but mature plants resprout readily after burns. Seedlings can also be controlled by dilute Glyphosate or Metsulfuron-methyl (e.g. Brush Off®) spot spray. Metsulfuron-methyl is a selective herbicide and preferred for situations where native grasses are to be retained. Successful control of large mature (>15 years) stands of African Olive at Mount Annan Botanic Garden has been achieved with a program of drilling/herbicide injection, followed by mechanical mulching of dead plants. The native Olive Lace Bug (Frogattia olivinia) is a known pest of European Olive in Australia, and has potential as a biological control for African Olive, although this requires further research.

The Future of Invasive Olives in NSW

African Olive is highly invasive and can no longer be regarded as a ‘sleeper’ weed in NSW. Its establishment as an invasive species in regions outside Australia, such as the Hawaiian Islands of Maui and Kauai’, is a clear indication of its adaptability and spread potential. It is highly adaptable and readily dispersed through the landscape, and already has impacted on native plant diversity in coastal areas of NSW. A regional African Olive control strategy is now urgently required for the Cumberland Plain and Hunter Valley regions.

Dispersal of seed by birds remains the key issue with invasive olives. With the increasing cultivation of European Olive into coastal NSW it must be assumed that there is potential for hybridisation with existing populations of African Olive. Hybridisation between European and African Olives will most likely result in trees that produce smaller fruits capable of being spread by birds into bushland areas.

There is increasing awareness in the NSW olive industry regarding the weed potential of European Olives, and weed risk assessment modelling and mapping for both European Olive (similar to that done for South Australia) and African Olive in eastern Australia is recommended in view of the expansion of the olive industry.

Future spread and potential biodiversity loss from this ‘next generation’ of woody weeds will need to be considered with respect to the overarching threat of climate change. Potential for expansion is significant with both European and African Olives established in eastern Australia, and well adapted to both sub-tropical and Mediterranean climates. Modelling of native and invasive species response to climate change is complex and at an early stage of development, however it is clear that climate change will favour opportunistic invasive species, like these olives, that are readily dispersed in the landscape.

References


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