

A weed risk minimisation strategy for the European olive, *Olea europaea* ssp. *europaea*, in Tasmania

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Summary The European olive (*Olea europaea* ssp. *europaea*) is the focus of an emerging industry in Tasmania. It is also a serious environmental weed in several areas of mainland southern Australia.

This paper describes a weed awareness initiative, the aim of which is to assist the management of the potential weed risk posed by the European olive to Tasmania's natural environment. A range of factors indicates a precautionary approach is justified, even in the absence of feral olive plants in Tasmania at present.

The Feral Olive Working Group considered what Tasmanian growers could do to reduce potential olive weed risk. The output of the group's discussions over 18 months is a five-part strategy. This addresses the need for better tracking of the industry's size, distribution and growth, a code of practice which reduces the spread of seed from groves, a weed risk assessment for individual groves, an education and awareness program and strategy adoption incentives. Each component requires sustained activity into the long term, continued agency/industry cooperation and periodic review. Education and awareness initiatives underpin the strategy throughout and the need to inform these with research that assesses the weed risk of this plant in different Tasmanian environments is highlighted. The ongoing role of growers in data collection is critical. The initiative demonstrates an initial willingness by the local industry to acknowledge environmental responsibilities.

This is a novel approach to preventative weed management in Tasmania because its subject is a problem yet to develop, for a plant with apparent commercial promise. Typically, the weed risk of a new plant enterprise is given little attention relative to its commercial outlook. The strategy seeks to demonstrate one approach to reconciling these two attributes.

Keywords European olive, preventative weed management, grower awareness.

INTRODUCTION

The European olive in Australia *Olea europaea* includes more than 2500 cultivars evolved from a handful of wild forms that originated in the Mediterranean (Zohary 1994). The European olive, *O. europaea* ssp. *europaea*, was first introduced to Australia

in 1800 (Spennemann and Allen 2000). It is now found in cultivation in most states and territories. Despite repeated attempts, the fortunes of the Australian olive industry have been mostly unspectacular due to the high drupe picking costs and low domestic demand that existed for most of the 20th century. However, since the early 1990s, new olive plantings have proliferated in response to increased domestic and global demand. Industry estimates for the late 1990s gave the area planted to olives in Australia at around 5000 ha with another 7000 ha planned for the near future, compared with 200 ha in 1975 (Rural Industries, Research and Development Corporation [RIRDC] 1998). No hard data are available, but press estimates put the number of trees at this time between 3 million and 7 million (The Weekend Australian March 23–24 2002). This recent upturn in the olive industry, whilst promising economic benefit, is also cause for concern because the environmental weed legacy of previous plantings is significant but relatively poorly understood.

Unprofitable plantings of olives in the past saw many groves abandoned to appreciative frugivores, in particular, birds. The dispersal of olive seeds is accomplished by a variety of birds, but foxes and other mammals may also be instrumental. The European olive, spread thus, has proven a successful invader of roadsides and disturbed areas. However, it also establishes in a range of native vegetation types including open forest, woodland, rock outcrop vegetation and riparian strips (Muyt 2001). The dense crown that forms over mixed aged thickets virtually precludes native plant recruitment (Carr *et al.* 1992). The plant is therefore considered an environmental weed in Australia. It has naturalised around Perth in Western Australia, in several regions of New South Wales and in the Grampians National Park and the Warby Ranges in Victoria. The most well-known populations occur in the Adelaide foothills in South Australia. Here, one study indicated native species richness and abundance in *Eucalyptus microcarpa* woodland was reduced by more than 50% by European olive invasion (Crossman 1999).

Interestingly, a Rural Industries, Research and Development Corporation (RIRDC) analysis identified the feral populations of South Australia as a strength in view of the genetic resource they represent, whilst

the environmental restrictions proposed as a result of the plant's invasiveness were deemed a threat (RIRDC 1998). In addition, feral populations are harvested frequently for private and commercial use (Animal and Plant Control Commission 1999). Clearly, the feral olive issue is a dramatic example of colliding economic, social and environmental priorities.

The European olive in Tasmania The European olive has not yet naturalised in Tasmania. However, given the growing significance of the plant as an environmental weed in other regions of southern Australia and the current steady and enthusiastic level of anthropogenic introduction to Tasmania, it seems timely to consider the potential for this situation to arise.

Distribution European olives are grown in many localities in Tasmania, with clusters in the Southern Midlands, the South East, the East Coast, the Tamar Valley and the North West. Apart from the South West, Central Highlands and West Coast, most regions in Tasmania are proving suitable for olive cultivation.

Numbers and grove size Whilst European olives have been grown in Tasmania for at least one hundred and fifty years, plantings were confined to scattered backyard trees and small, domestic groves. This situation changed rapidly over the 1990s as a Tasmanian olive industry emerged. Estimates of the number of European olives in Tasmania at present vary tremendously. Industry records suggest 82,000 trees, most under five years old (RIRDC 1998). A recently established Tasmanian company aims to plant nearly a quarter of a million trees over the next five years (Tasmanian Country April 5 2002). Numbers aside, it is clear that the rate at which the European olive is being planted in Tasmania today is significant, exceeds any previous introductions and is likely to be sustained for a number of years.

Stock sources Tasmania has several independent olive propagation nurseries that supply many of the nearly 40 named varieties thought to be grown in the state. At least one nursery is developing cool climate varieties. Most trees are sourced from the Australian mainland. The majority of olive juveniles have been raised from cuttings. However, some mainland sourced stock are grafted, with certain rootstock reportedly from feral South Australian plants. Other trees have been raised from seed, but the sources are largely unknown.

Environmental limits Whilst most olives in Tasmania are cultivated under regimes involving some or all

of irrigation, fertilisers and protection from browsing, older plantings have survived and produced fruit without any special assistance.

The major environmental limits in terms of rainfall, temperature, light and soil conditions for European olive survival and fruiting in Australia, outside cultivation have been identified loosely (Animal and Plant Control Commission [APPC] 1999, Spennemann and Allen 2000). Hot, dry summers, cold, wet winters, an annual rainfall of at least 500 mm, night chilling in winter, the absence of frost during bloom formation and seed set and well drained soils are each considered important. It is suggested that conditions within or nearly within the ranges of these parameters may be satisfied in certain natural environments in Tasmania.

Vector pools Olives are an excellent source of high-energy oil and birds in particular appreciate this. In South Australia, at least sixteen bird species feed on olive fruits (Paton *et al.* 1988). Of these, the introduced European Starling (*Sturnus vulgaris*) is one species known to disperse the seed appreciable distances.

Tasmania has a widely distributed population of starlings. In addition, growers have reported losses to currawongs, magpies, ravens, blackbirds and a variety of parrots. The distances over which these birds may disperse the fruit, if at all, is not known.

Invasive history elsewhere One of the most consistent indicators of whether or not a plant will become a weed is its invasive history in similar environments elsewhere. Tasmania has vegetation formations similar to those being invaded in mainland southern Australia. These include lowland grasslands and woodland, dry eucalypt forest, riparian vegetation and rock outcrop vegetation. Some of these, and in particular grassy woodlands, already require urgent protection. Carr *et al.* (1992) give the European olive a risk rating of 'serious' with respect to similar Victorian vegetation formations. Mulvaney (1997) assessed the European olive as having a low risk rating for Tasmanian World Heritage Area (WHA). However, much of this area is quite removed from current olive plantings, and represents mostly upland, montane or alpine environs and vegetation. Thus, the low risk identified for Tasmanian WHA cannot be readily translated to warmer, lowland vegetation nearer to olive plantings in the state.

Environmental weed potential of the European olive in Tasmania Will *O. europaea* become an environmental weed in Tasmania? A number of factors indicate the necessity of taking a precautionary approach. In summary, these include:

- An increase in introduction pressure, resulting from more European olives being planted, and plantings increasing in size and distribution in Tasmania.
- The likely presence of stock raised on mainland feral rootstock or from mainland feral seed.
- The development of cool climate varieties.
- Tasmania falls within the bioclimatic range of the European olive so far as that has been defined.
- The widespread distribution of at least one known major vector, the European starling.

STRATEGY PLANNING AND DEVELOPMENT

An industry-based group was convened in mid-2000 by the Department of Primary Industries, Water and Environment (DPIWE). The eight-member Feral Olive Working Group (FOWG) met first to identify and discuss the main issues. Subsequent sessions involved information input from other DPIWE personnel (e.g. wildlife managers), the design of practicable actions to address aspects of olive weed risk, consideration of roles of government, industry and individual growers in the initiative and the development of the strategy.

STRATEGY COMPONENTS

The strategy has five principal components:

An olive register The olive register is a database of numbers, varieties, ages and the locations of olives in Tasmania. Its function is to facilitate better tracking of the size, growth and distribution of the industry. Since weed risk often relates both to introduction pressure and the proximity of introductions to susceptible vegetation, this information is critical.

Code of practice A code of practice gives guidance to industry proponents seeking to conduct their activities in a way that is professional and recognisable as such. The code lists simple, readily adopted actions. These include wildlife monitoring and management, grove, bush and roadside surveillance for wildings, planning for thorough harvest, participation in the olive register and planning for abandoned groves. The code emphasises the importance of grower involvement and cooperation in the collection of data that relates to the feral olive issue.

Weed risk assessment for groves The function of a weed risk assessment protocol for groves is to provide growers with a tool to help gauge the environmental weed threat posed by their olive plantings, thus informing and improving grove management as it relates to olive escapes. The criteria for the assessment have been agreed upon but the weighting of scores is unresolved.

Education and awareness Many olive growers in Tasmania are relatively uninformed about the plant's weed status. Until this is addressed, the overall success of the strategy will be limited. The FOWG identified target audiences, key messages and appropriate means of delivery. Audiences include both commercial olive growers and home gardeners. Key messages address the environmental weed problem generally and as it relates specifically to olives, the concept of weed risk and the actions that may reasonably be taken by growers in order to reduce the likelihood of escapes.

Strategy adoption incentives for growers Participation in the initiative is completely voluntary. In order to encourage participation, a number of incentives were devised by the FOWG. These include a positive media campaign which highlights industry efforts to manage the issue, nomination for environmental awards, a research program targeting wildlife management in groves and eco-labelling of products from groves undertaking weed risk minimisation measures.

RESULTS AND DISCUSSION

Thus far, the accomplishments of the initiative relate mostly to awareness raising. The feral olive issue has been highlighted by FOWG members through a number of avenues including radio interviews, presentations at field days, newspaper and newsletter articles and the production of an information pamphlet. The strategy document is also available at all state libraries, from grower associations and from DPIWE. Positive feedback from a variety of sources including individual commercial olive growers, the Australian Olive Association, environmental consultants, gardeners, weed strategy groups and nature conservation supporters, indicates the issue is now receiving better consideration amongst olive growers and in the wider Tasmanian community.

The olive register form is distributed in an ongoing fashion by both Tasmanian olive associations, a number of olive nurseries and DPIWE. Approximately 30 growers have registered their details with the FOWG over the past 18 months. This is crudely estimated to represent a response in the order of 10% from commercial growers. The number of olive trees planted by each respondent ranges from 50 to 2500 whilst the average number of trees planted is around 550. The varieties most frequently planted by respondents are Manzanillo, Barnea, Parragon and Corregiola. Grafted varieties have been planted by 30% of respondents. Respondents are relatively evenly distributed between the north and south of the state and there is clustering of responses from the east coast, the south-east, the Southern Midlands, the Tamar Valley and the

north-west. Recent developments suggest the maintenance of the olive register may shift. The Department of State Development is pursuing similar information for its industry support efforts and the potential for centralising the collection of such data is being considered.

Implementation of the code of practice has yet to be assessed due to its recent introduction. However the submission of avian scat samples containing olive seeds and inquiries regarding grove wildlife log sheets, indicate some growers are seeking to incorporate at least some aspects of the code into their management practices.

The weed risk assessment for groves has not progressed beyond the identification of appropriate criteria at this point. The general weed risk assessment procedure includes complexities that will be better understood and accepted by growers once they are better informed about the issue. The FOWG decided that completion and delivery of the weed risk assessment for groves would be more strategically undertaken once grower awareness and acceptance had been given some time to mature. Research investigating the environmental weed potential of the European olive has commenced in the form of a PhD undertaken through the University of Tasmania. The results of this are expected to inform the initiative into the future and in particular, the weed risk assessment component.

Encouraging growers to support the strategy by providing participation incentives is limited by the funding and time available to generate tangible benefits for individuals and the industry overall. So far, several positive media efforts, praising the industry for its involvement in the initiative have been undertaken. In addition, three research proposals aimed at finding better ways of managing wildlife in groves have been drafted. Whilst there was student interest in at least two of these proposals and although each grower association agreed to donate a small amount of funding, the proposals were not promoted sufficiently and consequently research has yet to commence.

Future outcomes depend absolutely upon the continued support and maintenance of the strategy by both grower associations and the DPIWE. Grower association support is required mostly in the form of keeping the issue alive through networking fora such as newsletters, information packs for new growers, field days and industry seminars. DPIWE responsibilities lie in promoting and supporting formal research and grower data collection efforts, coordinating activities in relation to each of the five components and supporting growers and grower associations in

any attempts they make towards reducing the chance of olive escapes.

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REFERENCES

- Animal and Plant Control Commission, South Australia, (1999). 'Weed risk assessment and management of olives.' (APCC, Adelaide).
- Carr, G.W., Yugovic, J.V. and Robinson, K.E. (1992). 'Environmental weed invasions in Victoria. Conservation and management implications.' (Department of Conservation and Environment and Ecological Horticulture, Melbourne).
- Crossman, N.D. (1999). The impact of the European olive (*Olea europaea*) on Grey box (*Eucalyptus microcarpa*) woodlands in South Australia. Bachelor of Environmental Management honours thesis, Flinders University, South Australia.
- Mulvaney, M.J. (1997). 'Invasive potential of species used in garden and amenity plantings in the Tasmanian Wilderness World Heritage Area.' (Parks and Wildlife Occasional Paper No. 39).
- Muyt, A. (2001). 'Bush invaders of south-east Australia.' (R.G. and F.J. Richardson, Melbourne).
- Paton, D.C., Tucker, J.R., Paton, J.B. and Paton, B.A. (1988). Avian vectors of the seeds of the European olive (*Olea europaea*). *South Australian ornithologist* 30, 158-9.
- Rural Industries Research and Development Corporation, (1998). 'Research and development plan for the Australian olive industry 1998–2000.' (RIRDC).
- Spennemann, D.H.R. and Allen, L.R. (2000). Feral olives (*Olea europaea*) as future woody weeds in Australia: a review. *Journal of Experimental Agriculture* 40, 889-901.
- Tasmanian Country, April 5, (2002). Olive vision, pp. 1-2.
- The Weekend Australian, March 23–24, (2002). Oil's glut feeling, p. 25.
- Zohary, D. (1994). The wild genetic resources of the cultivated olive. *Acta horticulturae* 356, 62-64.