

## Boneseed rust: a highly promising candidate for biological control

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**Summary** Boneseed (*Chrysanthemoides monilifera* ssp. *monilifera* (L.) T.Norl.) is a woody evergreen erect shrub, 1–3 metres high, that originates from South Africa. In Australia, it invades native vegetation and threatens the ecological stability and biodiversity of areas dedicated to nature conservation. Major infestations are found on the Mornington Peninsula and You Yangs Ranges in Victoria and in the Mount Lofty Range in South Australia. Small or scattered infestations occur elsewhere throughout Victoria, Tasmania and South Australia.

Improving the effectiveness of the biological control program against boneseed has been identified as a high research priority in the National Strategy for this Weed of National Significance, as none of the six insect agents released so far have established in the field

The systemic South African boneseed rust fungus, *Endophyllum osteospermi* (Doidge) A.R.Wood, is a highly promising biocontrol agent because it reduces growth and reproduction of plants by causing extensive deformation of infected branches (witches' brooms). In South Africa the rust appears to be a primary cause for the decline and death observed in some local boneseed populations (Wood and Crous 2005). The systemic nature of the rust is a desirable characteristic for biological control purposes as once the fungus is established within the host the infection is retained until the death of the witches' brooms.

The boneseed rust is only recorded in South Africa on a small group of related plants of the genera *Chrysanthemoides* and *Osteospermum* (Calenduleae: Asteraceae). As there are no indigenous representatives of the Calenduleae in Australia, the non-target plants most at risk from this rust fungus are the introduced, ornamental species belonging to this tribe.

Novel approaches to test the host-specificity of this candidate agent were developed due to the nature of the rust fungus, which develops visible symptoms only 1–3 years after infection of its host. An initial series of host-specificity tests were performed on detached leaves of plant species of the approved test list

to determine, using microscopy techniques, whether the rust was capable of penetrating epidermal cells of non-target plant species (Wood 2006). Successful penetration was observed on boneseed and its close relative species tested within the Calenduleae tribe. Penetration though also occurred on four other species outside the Calenduleae. Additional tests carried out on leaves still attached to plants of some of the non-target plant species as well as the target weed species confirmed accuracy of results obtained with detached leaves.

Since penetration of epidermal cells does not however, necessarily imply that the infection process will continue and be successful; more tests on whole plants of the species where penetration occurred in initial tests are currently underway to determine if the fungus is capable of colonising tissue of these species. Results from host-specificity tests will be used to fully assess the risk of significant impact on non-target plant species, before deciding if an application for the release of this rust fungus in Australia should be submitted to the authorities.

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