

## Successful biocontrol of *Echium* spp.

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**Summary** The exotic species *Echium plantagineum* L. (Paterson's curse) and *Echium vulgare* L. (viper's bugloss) were significant noxious weeds of pastures and natural habitats in southern Australia. The more prolific *E. plantagineum* infests 33 million hectares of pastures and, in 2002, was estimated to cost the wool and meat industries A\$125 million pa. The *Echium* biocontrol program started in 1972. Between 1988 and 1996, seven biocontrol agents were released across southern Australia. This study examined the impact of three biocontrol agents on *E. plantagineum* and *E. vulgare*: *Mogulones larvatus*, *M. geographicus* and *Dialectica scariella*. A study site was established near Lithgow (NSW) with the three agents being released in 1995/6. All three agents established. Over a nine year period (1995–2003), impact on flowering by all agents and plant damage by *D. scariella* and *M. larvatus* were measured monthly on both *Echium* spp. Seed bank data was monitored annually (1997–2003).

Increasing populations corresponded to increased plant attack. The two *Mogulones* spp. killed up to 84% of *E. plantagineum* plants in one year and feeding by *D. scariella* caused 4% to 60% leaf damage. Moreover, by 2003, all three agents contributed to a decrease in plants that flowered by 31% and a decrease in the *Echium* seed bank by 85%. This study shows that all three agents contribute to biocontrol of *Echium* weeds. By 2010, *Echium* weeds across Australia had been successfully controlled by a combination of these three agents, two new agents *Longitarsus echii* and *Meligethes planiusculus* and a more drought tolerant biotype of *M. larvatus*.

**Keywords** *Echium plantagineum*, *Echium vulgare*, Paterson's curse, viper's bugloss, *Mogulones larvatus*, crown weevil, *Mogulones geographicus*, root weevil, *Dialectica scariella*, biological control, biocontrol.