Persistence of residual herbicides for preventing establishment of broom (*Cytisus scoparius*) seedlings

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A bioassay tested how long after application that residual herbicides used in forestry continue to suppress or kill broom (*Cytisus scoparius*) seedlings. Eleven herbicide treatments were applied to small plots of Tokomaru silt loam soil near Palmerston North on 4 December 2008. Soil samples were taken fortnightly until herbicide residues no longer affected broom seedlings. The samples were placed into pots and sown with scarified viable broom seeds within a heated glasshouse. Herbicide effects were determined by scoring the severity of damage to seedlings and measuring seedling dry weight; these were compared with broom seedlings established at the same time in untreated soil. The most persistent residues came from triclopyr/picloram applications, which killed broom seedlings for 5 months after application, and then suppressed growth of seedlings for a further 7 months. Broom seedling death also continued for 4-5 months for hexazinone application, for 2 months with clopyralid and terbutylazine residues, and for less than a month after triclopyr and metsulfuron treatments. With all herbicide treatments, there was a period of several weeks or months after the time that seedlings could germinate successfully when the residues were still sufficiently high to stunt development of new broom seedlings.

Current status of classical biological control of *Cirsium arvense* in New Zealand

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Cirsium arvense (L.) Scop. (Californian, Canada or creeping thistle) is an exotic perennial herb that successfully established in New Zealand (NZ) approximately 130 years ago, and is now considered one of the worst invasive weeds in NZ arable and pastoral systems. Two insects, *Cassida rubiginosa* and *Ceratapion onopordi*, were recently released for classical biological control. Studies carried out from 2006 to 2009 in both the native (Europe) and introduced (NZ) ranges of the plant aimed to quantify *C. arvense* growth characteristics and assess incidence of the specialised rust pathogen, *Puccinia punctiformis*, in regions with and without the supposed pathogen vector, *C. onopordi*. In permanent field plots natural enemies were excluded with insecticides and fungicides, and compared with controls. The impact of *C. rubiginosa* was also assessed under different pasture competition scenarios. The survey data indicate that *C. arvense* expresses similar growth characteristics in both ranges, and that incidence of the rust pathogen is similar in both ranges, regardless of the presence of *C. onopordi*. The data suggest that the overall suite of natural enemies is capable of exerting some regulating influence on the plant in its native range, but that the released biocontrol agents will not likely have a significant impact on this weed in NZ.