

White bryony (*Bryonia cretica* subsp. *dioica*) eradication response in New Zealand

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Summary White bryony (*Bryonia cretica* subsp. *dioica*), an introduced species to New Zealand, has the potential to cause substantial environmental damage. It is known at three sites in the North Island of New Zealand, Rangitikei, Aria and Mokauiti, and has been controlled since 1999. In 2006 white bryony was identified by MAF Biosecurity New Zealand (MAFBNZ) as a pest for eradication, under a National Interest Pest Response. The white bryony eradication programme is managed and funded by MAFBNZ with the response operations carried out in partnership with the Department of Conservation for the Rangitikei site, and the Waikato Regional Council for the Aria and Mokauiti sites. Control is carried out twice a year during the summer season. The tuber is cut and picloram (Tordon™ 2G or Vigilant™) is applied to the cut crown, or the tuber is completely removed. Any berries are removed and destroyed. The number of plants treated and their location is recorded. An increase in effort and refined searching techniques has increased the number of plants found at the Rangitikei site. The number of plants found and destroyed at the Mokauiti sites has been reduced to low levels, while a recent new discovery at Aria has increased plant numbers there. Delimiting surveys carried out beyond the control areas will determine if there are further infestations outside the current known extent.

INTRODUCTION

White bryony (*Bryonia cretica* subsp. *dioica*) originated from Central to South Europe, West Asia and North Africa. It was introduced to New Zealand as a garden plant, possibly for its herbal properties, and has become a pest in the wild. It is a soft green cucumber-like vine that climbs to 6 m. Plants produce clusters of small cream flowers in spring. Originally plants found in New Zealand were recorded to be monoecious but recent research has verified that they are in fact dioecious (James *et al.* 2006). Green berries ripen to red over summer and the seed is bird-dispersed. The perennial tuber persists over winter while the foliage dies down. Toxic alkaloids are present in the fruit and tuber, which may be poisonous to humans if consumed in quantity.

White bryony has the potential to cause substantial environmental damage in New Zealand. It can smother small trees and shrubs and exclude all other species. Seed is easily dispersed via birds. Its dense growth habit may also impede recreational access to areas and degrade landscape values.

First discovered in 1991, white bryony was found to be established in the Makino Reserve, Mokai Valley alongside the Rangitikei River near Taihape. It was found growing in canopy gaps in regenerating forest and amongst rank grass adjacent to the river. The Rangitikei infestation area is the largest. The terrain at this site is characterised by steep cliffs and river terraces, making surveillance and plant location difficult. The white bryony infestations at Aria and Mokauiti are much smaller. White bryony was discovered at a small QEII National Trust reserve at Mokauiti in 1999 and at Aria in 2000 and control began immediately. The terrain at these two sites is rolling to steep pastoral farm land with some bush remnants. Control has been carried out annually since 1999. The number of plants found and destroyed at each site has been recorded since 2001.

White bryony was identified as a pest for eradication through the National Interest Pest Response (NIPR) prioritisation exercise led by MAF Biosecurity New Zealand (MAFBNZ) and completed in December 2006 (Knegtmans 2007). Prior to 2006 white bryony was managed and controlled by the Department of Conservation (DOC), the Manawatu Regional Council and Waikato Regional Council (Environment Waikato). White bryony has a limited distribution in New Zealand, and is only known to be present in the Waikato and Wanganui regions.

Management of this pest plant is currently undertaken and funded by MAFBNZ, utilising the provisions of the *Biosecurity Act 1993* relating to unwanted organisms. The current white bryony response goal is to achieve eradication of white bryony from New Zealand by 2013. The operational management for the white bryony response is undertaken by Environment Waikato and DOC by way of a partnership agreement with MAFBNZ. Environment Waikato manages the two sites in the Waikato region at Aria and

Moukaiiti, while DOC manages the site at Mokai Valley, Rangitikei. The response goal and the operations are reviewed annually by a Technical Advisory Group.

METHOD

Treatment Annually, each site receives two rounds of treatment during the summer. The first round of control is carried out from November to December, and the second from January to February. The control areas are grid searched by a team (generally three or four people) with the space between searchers varying according to ground cover. Searchers are closer together in bush areas and on foot. In some open areas on farm land searching may be done on motorbike or quad. At the Rangitikei site much of the terrain is difficult to access. Abseiling allows for search and treatment access on cliff faces and a raft is used to ferry staff to sites along the river gorge. GPS units are carried by each team member to track the search and mark the position of any plant found. The GPS tracking is used to identify any possible gaps in the surveillance.

White bryony plants are controlled by cutting the crown from the tuber and treating the cut with picloram (Vigilant™ gel or Tordon™ granules). Tubers of smaller plants may be completely removed and bagged to take off site for appropriate disposal. Vines with viable berries are also bagged and removed off site for disposal.

Delimiting survey Prior to MAFBNZ's management of white bryony, ground based delimiting surveys between 0.5 to 1 km beyond the known plants were carried out each year. Searches were concentrated on bush, shrub, forest and hedge areas. These areas were grid searched maintaining spacing between searchers of 4 to 10 m or more – depending on vegetation cover and terrain.

In the belief that bird species such as kereru (NZ wood pigeon) may disperse white bryony, MAFBNZ increased the delimiting area and a 10 km delimiting boundary was identified around the three infestation sites. Within this boundary a delimiting survey using helicopter and combined ground searches was carried out in January 2007/2008. The aerial search was done at as low altitude as could safely be carried out. The flight path was tracked using GPS and carried out at approximately 100 m intervals.

RESULTS AND DISCUSSION

Treatment The number of white bryony plants controlled at Mokauiti has decreased consistently since control started. Figure 1 shows the total number of plants found and destroyed. Only 15 plants were

found in the 2008/2009 year compared with over 2000 in 2001/2002.

Figure 2 shows white bryony plants found and destroyed at Aria since 2001. Between 2001 and 2004 there was a reduction in plants found. A large increase in plants in 2004/2005 (116 up from 112 the previous year) was due to aerial spraying of one property in 2003 to remove blackberry and gorse, which improved access and increased light levels, and made plants easier to find. A large reduction in plants occurred over the next few years but the discovery of a new site in February 2008 resulted in an increase in plants from 161 in 2007/2008 to 360 in 2008/09.

The number of white bryony plants found and destroyed at the Rangitikei site is shown in Figure 3. Since 2007/2008 the search effort has increased considerably and new techniques, such as abseiling,

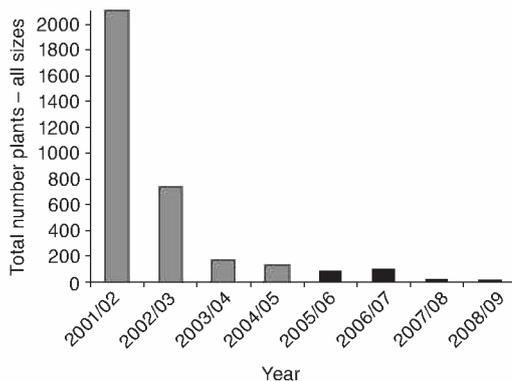


Figure 1. Total white bryony plants found at Mokauiti of all sizes.

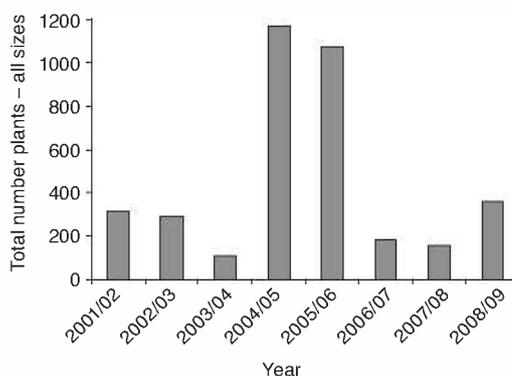


Figure 2. Total white bryony plants found at Aria.

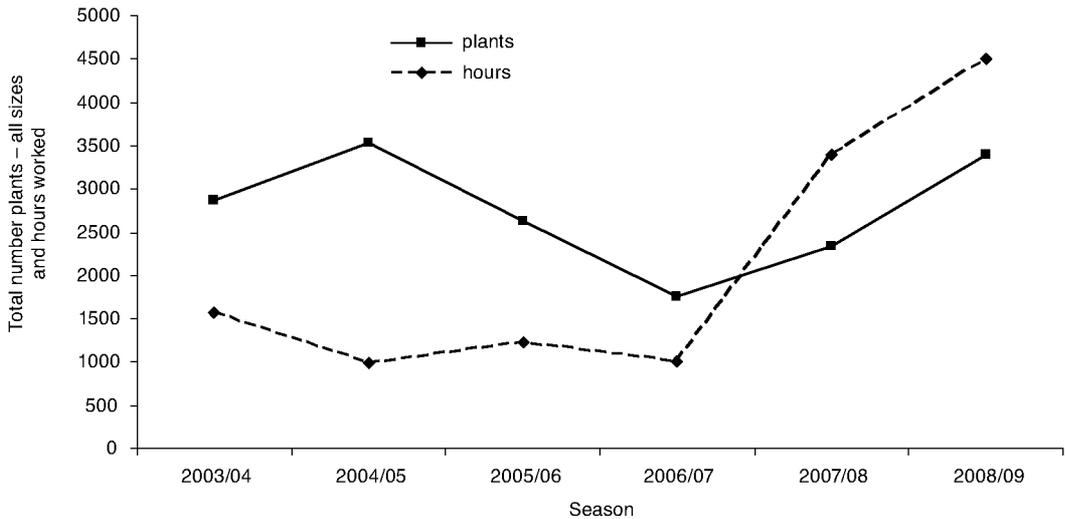


Figure 3. Total white bryony plants found and the search effort at Rangitikei (Beveridge 2009).

jet boat and GPS units, have been incorporated into the response. This has led to an increase in the number of plants found. DOC has recorded the annual search effort in man hours (Figure 3). Although the number of plants found has increased, the number of plants being found per hour search effort has decreased (Beveridge 2009). The decrease in number of plants found per hour is expected to continue over time and may result in difficulties in maintaining staff focus or morale (Beveridge 2009).

White bryony responds well to the current control techniques. Although control is effective, the eradication of the known populations relies on the location of all plants. Therefore, the current emphasis of the response is on surveillance to locate all the plants. Dispersal by birds is a significant risk in achieving the response goal.

Delimiting survey No white bryony was found beyond 500 m from the known infestation sites. This exercise also revealed that although helicopters may be used as a mode of transport to access difficult terrain, they were not a suitable tool for spotting white bryony from the air.

Since the 2008/2009 season, delimiting surveillance has focussed on ground searching high risk areas such as forest, within a 1.5 km boundary from each infestation area. The search areas concentrate on

high risk sites, for example, forest or shrub remnants. Infestation boundaries appear to have been largely determined at the Rangitikei and Mokauiti sites. A new infestation found on the boundary of the Aria site in 2008/2009 has revealed the priority for delimiting surveillance. Completion of the delimiting surveys will determine the boundaries of the infestation sites, and this is crucial to achieving the response goal of eradication.

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