

## **Advisory Paper**

# Managing *Rhododendron ponticum* as an Invasive Species

## **Introduction**

*Rhododendron ponticum* has been highlighted as one of the most invasive plant species within the Scottish Highlands. The rate of expansion is increasing across the Highlands, partly due to change in land management, and also as a result of the natural exponential growth of an invading species.

The plant is native to Spain, Portugal, and around the region of the Black Sea, and was first introduced to Britain around 1763 as a cultivated flowering plant. It then became especially popular on country estates in Victorian times, providing ornamental value, as well as cover for game birds. It was also used as a rootstock for cultivated, hybrid rhododendrons. Wild 'naturalised' *R. ponticum* in Britain is thought to have derived mainly from Spanish and Portuguese introductions. The twentieth century demise of many country estates, and consequent lack of control has allowed *R. ponticum* to invade large areas of the Highlands.

## **Why the need for control**

*Rhododendron ponticum* is an aggressive invader responsible for the destruction of many native habitats and the associated flora and fauna. Where conditions are suitable the plant can grow to create a dense tangle of woody stems, and thick leaf canopy, eliminating native plants unable to grow due to insufficient light.

Many habitats are at risk including woodlands, heathland and watercourses, where the bush can shade out light and eliminate plants essential to the food chain.

*R. ponticum* thrives in a mild wet climate, where there are nutrient poor acidic soils, and as a consequence has spread widely within the west Highlands.

The longer it is allowed to establish in a habitat the more difficult and costly it is to remove. This escalates the overall expense of management options and as a consequence some land is abandoned.

Mature bushes also act as a prolific seed source for the invasion of adjacent areas. Delay in controlling the plant will increase costs and reduce management options.

## **Plant Biology**

The plant invades areas both vegetatively (stem layering) and via seed dispersal. Stem layering occurs when horizontal branches come into contact with suitable moist conditions on the ground. They can develop roots, which slowly extend the area of cover into areas that may not be suitable for seed germination.

Seed dispersal allows for rapid colonization of suitable ground, but seedling growth is initially very slow. Flowering commences after 10-12 years in good growing conditions and each flower head can produce around 5000 seeds, which are dispersed in February or March. Rhododendron seeds are designed for dispersal by wind, but this appears to be limited to 5m within woodland and up to 100m in open flat ground on a lightly breezy day. Seed may disperse more widely in strong wind and upper air currents, or if carried by animals or humans.

Seeds do not establish well in areas where there is already a continuous vegetative ground cover, and once wetted are only viable for one year. Once germinated however, seedling require constant moisture availability, as they are vulnerable to desiccation, but require little light for growth thriving in only 2-5% of full daylight. Suitable sites for seed germination include disturbed ground and areas with a low moss cover providing a water holding function.

The plant survives well in nutrient poor soils due to mycorrhizal (fungal) associations established with ericaceous plants including heathers. This gives Rhododendron a competitive advantage and helps explain why the plant is successful at colonising heathland.

Grazing animals generally avoid Rhododendrons due to the toughness and unpalatability of the leaf, but also because of toxins contained within the plant. These 'free' phenols are most concentrated in the emergent leaf and buds, and poisoning to animals has occurred in the case of extreme hunger or inexperience. These toxins are also present in sticky exudates that act as a defence mechanism against small invertebrates.

<b>The major habitat-types in which <i>R. ponticum</i> is naturalised</b>	
<b>Semi - natural habitat types (relatively undisturbed)</b>	<b>Artificial habitat sites (relatively disturbed)</b>
<ul style="list-style-type: none"> <li>• Semi- natural deciduous woodland</li> <li>• Heather moorland</li> <li>• Lowland heath</li> <li>• Acid bogs</li> <li>• Acid sand dunes</li> <li>• Riparian sites</li> </ul>	<ul style="list-style-type: none"> <li>• Deciduous plantations</li> <li>• Coniferous plantations</li> <li>• Managed heather moorland</li> <li>• Landscaped parks, woods, gardens</li> <li>• Riverine and reservoir sites</li> <li>• Railway, roadsides, cuttings, embankments</li> </ul>
<b>Key Factors in invasion</b>	
<ol style="list-style-type: none"> <li>1. Prolific production of viable easily dispersed seed.</li> <li>2. Capacity for winter photosynthesis in climatic conditions such as those in the mild west coast of Britain</li> <li>3. Ability to tolerate severe shading</li> <li>4. Enhanced growth on soil of low nutrient status due to mycorrhizal associations</li> </ol>	

5. Diminished herbivore pressure, due to high concentrations of simple 'free' phenols in plant tissues
6. Possible 'allelopathy' (inhibited growth of plant competitors) due to concentrations of 'free' phenols
7. The dense vigorous growth resulting from the above factors enables Rhododendron to overtop, crowd out, and shade its competitors.
8. Disturbance of sites is more likely to create favourable conditions to allow further invasion.

## **Control Methods**

Rhododendron clearance is generally accomplished through a combination of physical and chemical means. To determine the most effective approach for an area it is essential to complete a ground survey and prioritise which areas should be cleared first, bearing in mind the largest seed source, and what sites are at most risk of further invasion.

Rhododendron seedlings and young plants can be physically pulled up by hand or grubbed out by mattock, being careful not to leave fragments of root in the soil. Many plants are relatively easily removed this way on soft peaty soils. Pulled plants may be hung up in tree branches to dry the roots so they do not re-establish or can be removed from site.

### **Herbicide control**

Bushes that are below 1.3m in height may be treated with an approved herbicide, such as Glyphosate, which is applied to all leaves on the entire bush using a knapsack sprayer.

Mature bushes that are above 1.3 m in height will need to be cut first before herbicide is applied. Herbicide can then be applied to the new shoots from the severed stumps; this regrowth is treated with a foliar spray after a full season of growth and before the bush exceeds 1.3m in height. Ensure all foliage is treated in a rain free period > 6 hours. (Optimum time between March and October).

Mature bushes with thick stems can either be stem treated with chemical or cut first and stump treated later.

Stem treatment has the advantage of not having to cut or remove the bush, ensures the herbicide is targeted, and may be applied at any time of year. If there are multiple stems then each stem needs to be treated, and the bush can be left to die in situ or removed later. The dead wood of treated bushes is more easily burnt or chipped on site. The usual method is to drill a well in the stem to contain 2ml of chemical on a large mature bush (e.g. a 10mm drill bit requires a 2cm well). Alternatively the stem may be frayed with a hand axe before applying the herbicide.

If bushes are cut first using a chainsaw or bow saw and the branches burnt or chipped on site, the severed stumps may then be treated with herbicide as soon as possible or within hours of cutting. (Optimum time between October and March, avoiding rising sap).

## **Lever and Mulch**

'Lever and mulch' is a strenuous technique, but avoids the use of herbicide, and the need to dispose of brush. [www.morverncommunitywoodlands.org.uk](http://www.morverncommunitywoodlands.org.uk).

### Precautionary note:

Species such as otter, and pine marten are legally protected under the Wildlife and Countryside Act and it is offence knowingly disturb them. Checking sites for breeding holts and dens before removal of Rhododendron is strongly advised as a precautionary action.

## **Management strategy for a successful control programme**

1. Quantify the extent of the infestation with a survey of the site and condition of the bushes. Consider factors such as prevailing wind and seed source.
2. Decide on best methods of removal, and prioritise the operations within a time frame management plan.
3. Cost the expenditure required for removal before committing to funding.
4. Implement control techniques with follow up treatment.
5. Resurvey the site and remove seedlings.

Complete eradication of rhododendron from a site or catchment area will require careful planning and a time frame of at least seven years, including resurveying of the site.

Removal of the largest and oldest bushes first is generally the best approach to long term control, thereby eliminating the biggest seed source spreading into receptive sites.

If neighbouring landowners also have invasive Rhododendron then ideally a coordinated approach should be adopted, where there is cooperation, with the same long-term aims being agreed.

The general public may regard Rhododendron ponticum as an attractive flowering bush and be resistant or critical of its removal. It is advisable that where there will be a large-scale removal of rhododendron an element of public relations is carried out to explain about the overall operation. Furthermore alternative Rhododendron species are available that do not pose a threat to native habitat.

Some experiments have begun on establishing ground cover such as grass seed and wood rush into sites where R. ponticum had been removed. The idea is to reduce the establishment of seedlings, but to date there are no results available on the success of these trials.

## **Scotland Rural Development Programme (grant aid)**

The Scottish Rural Development Plan (SRDP) has grants available for the removal of Rhododendron ponticum under capital items. This currently stands at £3500 per

hectare of infected land, using manual eradication, and £850 per hectare of infested land for chemical eradication. In addition to these capital items, financial support of up to 100% of eligible actual costs is available for capital works for Sites of Special Scientific Interest (SSSI) and Natura sites.

### **Sources of information**

‘Managing and Controlling Invasive Rhododendron’ – produced by the Forestry Commission is a very informative practice guide. <http://www.forestresearch.gov.uk/>

‘Managing Rhododendron ponticum as an invasive species’ advisory sheet - [www.highlandbiodiversity.com](http://www.highlandbiodiversity.com)

‘Stem injection application’ - [www.highlandbiodiversity.com](http://www.highlandbiodiversity.com)

This factsheet has been produced by the Highland Invasive Species Forum to raise awareness of the problem of invasive species and to offer advice. It is one of a series of leaflets – including a general leaflet on ‘Highland Invasive Species’ and species leaflets on ‘Japanese Knotweed’, and ‘Mink’.