



Methods of Control

Full *Rhododendron ponticum* eradication from a site can rarely be achieved in a single visit, with work typically requiring a series of phases spread over a period of several years. Based on many years of experience in managing *R. ponticum* within Snowdonia National Park, the Snowdonia National Park Authority (SNPA) have developed a three-phase approach to treating *R. ponticum*, in order to achieve full eradication. As the name suggests, the three-phase management approach consists of three separate stages of treatment, as follows:

Phase 1 – Attack Phase (year 0): The attack phase consists of the initial treatment of an infested area. The method utilised will depend on various factors including site topography, access, and the density and size of *R. ponticum* plants. This phase is usually the most expensive and labour intensive.

Phase 2 – Follow-up Phase (year 2): The follow-up phase is usually undertaken 18-24 months after the initial attack phase. Again, the method of control used for follow-up treatment will vary, but usually consists of chemical treatment and pulling up young seedlings by hand.

Phase 3 – Maintenance Phase (year 5): The final phase of treatment, the maintenance phase, is usually undertaken around 5-years after the initial attack phase, or 3 years after the follow-up phase. By this time, re-growth should be minimal both in terms of size and amount, with any remaining plants requiring chemical treatment or hand-pulling. Subsequent maintenance phases may be required after year 5 should small amounts of *R. ponticum* seedlings re-appear on site, or if there are seed sources present on adjacent areas of land.

Several approved control methods can be used in the various phases of management, either in isolation or in combination, to treat *R. ponticum* on an infested site. These are outlined below:

(A) Stem treatment:

- Whilst stem treatment can be laborious, particularly for large areas of dense *R. ponticum* invasion, it is a highly effective method of control returning a high percentage kill rate when done well (>95%). As a result, less work is often required in the subsequent follow-up phases where stem treatment has been used during the attack phase. The highly targeted nature of stem-treatment makes it a favoured technique in sensitive conservation sites (as the risk of any chemical drift is minimal), as well as sites requiring rope access, due to the relatively small amount of equipment needed to carry out the work, and the minimal follow-up treatment requirement.
- The most effective form of stem treatment involves drilling into the stem close to its base, using a standard cordless drill and a 12mm bit to create a 20mm deep well. An 8mm bit may be more suitable for thinner stems, in which case, a deeper hole is required to allow administration of the correct volume of herbicide solution. In general, this form of stem treatment can only be used on more mature bushes where individual stems are over 3cm in diameter, as drilling an appropriately sized hole in thinner stems becomes difficult.



- After drilling each hole, 2mL of the herbicide solution should be applied directly into the hole using an appropriate applicator, for example, a spot gun or a veterinary injector. To maximise the amount of the active ingredient absorbed by the plant, and therefore the likelihood of killing the stem, the herbicide solution should be applied as soon as possible after drilling the hole. The recommended herbicide is a 25% aqueous solution of Roundup Biactive with a strong marker dye.
- Each stem must be treated separately, and care must be taken not to miss any layered stems extending laterally from the parent plant. One hole should be drilled for every 3cm in stem diameter in order to successfully kill a stem, for example, a 9cm diameter stem requires 3 holes, all evenly spaced out around the stem circumference.
- Alternative approaches to drilling involve using a hatchet or billhook to create a flap of bark in the stem deep enough to hold 2mL of the herbicide solution, or by “scraping” the bark off a stem with a chainsaw and directly applying the herbicide onto the exposed wood with a paintbrush. These approaches can be used on thinner diameter stems than the conventional drilling technique.
- This method can be used throughout the year, with March to October optimal as the chemical will be translocated throughout the plant more rapidly during the growing season. However, care should be taken not to disturb any nesting birds during this optimal period, with work on any individual bushes where there are active nests postponed until the fledglings have left. Stem-treatment should not take place when rain is forecast as it will reduce the effectiveness. The herbicide solution should be mixed for the day of use only, with any residual solution disposed of safely at the end of each working day, according to the Code of Practice for Using Plant Protection Products. As the results of this treatment will not be immediately visible, a methodical approach is essential to avoid missing any plants; it is recommended that treated plants are marked with spray paint or by snapping the highest branch, in order to allow identification of those that have been treated. In most situations, there is no need to cut or remove the dead standing bushes, which will naturally decompose without intervention. However, care must be taken not to leave any standing deadwood overhanging buildings, public footpaths, roads, or in any other location that might pose a risk to the public safety or property.

(B) Manual cutting and burning/chipping/stacking:

- This method is suitable for large areas of dense *R. ponticum* where stem treatment (method A) is not feasible, for example, where growth is too dense to allow access to all bushes, or where the stems are too thin to drill.
- Using a chainsaw, all growth should be cut as close to ground level as possible to minimise any trip hazard. It is important to note that cutting alone will not kill the *R. ponticum* plant, with regeneration from the cut stump occurring within months. It is therefore essential that this method is followed by further phases of work, which usually involves chemical treatment to kill the regenerating stems (see method D).



- This method should be avoided during the bird nesting season (March to August in UK), however where this is not possible, a full survey of the area to be worked should be carried out each day. Any nests discovered must not be disturbed until nestlings have fledged, even this means postponing work over a significant area.
- In the past, some contractors have also treated cut stumps with herbicide. This is not encouraged, as application of herbicide to freshly cut stumps has produced poor results. Evidence shows that where this is done, a high proportion of treated stumps appear dead for a year or more, before producing weak re-growth which develops very slowly and can take 3 or more years to produce enough foliage to absorb a lethal dose of herbicide. Therefore, on a time-limited programme of work, this is unacceptable.
- Once cut, the *R. ponticum* material will need to be disposed of in order to facilitate access for subsequent follow-up phases. One approach is to stack the cut stems in windrows. Passages should be left between windrows to allow access on foot for regrowth spraying. No stacks should be built within 5m of public footpaths, tracks, roads, or watercourses, or where material could subsequently fall down onto these features. It is likely that large branches will have to be reduced in size (to less than 2m length) before stacking. Stacked material must not cover or impede future access to cut stumps which will need to be sprayed.
- Burning of cut material is also an option for areas of very high *R. ponticum* where there is too much material to be stacked. This approach should only take place under safe weather conditions and the local fire brigade should be informed of the planned work to avoid unnecessary callouts. No more than 10 cubic metres of cut material should be burnt within any 24-hour period. Artificial means of starting fires such as using old tyres and engine oil should not be used under any circumstances. Before leaving the site, fires should be banked or dowsed.
- Alternatively, the cut material can be chipped. This approach is highly dependent on access, with steep ground often making it unpractical. However, this approach is favoured in gardens or residential areas, where the work needs to be done tidily. Care should be taken not to cover any features of ecological value with the woodchip, and as a result this method is generally not encouraged by regulatory bodies within designated sites. Care should also be taken if disposing of the chip off site, given that *R. ponticum* is a carrier of the tree pathogen *P. ramorum*.
- The advantages and disadvantages of using the manual cutting method are outlined in Table 6.1.



Table 6.1. The advantages and disadvantages of using the manual cutting method of *R. ponticum* control.

Advantages	Disadvantages
Cost effective	Cutting alone does not kill the plant, therefore subsequent phases are likely to involve more work
Suitable method for all plant sizes	Can have adverse impacts on any ecological interest present on site, for example due to the need for follow up spraying of regenerating stumps
Can be undertaken on almost all terrains, including areas requiring rope access (see section 5.1)	Potential fire hazard if burning is used to dispose of cut material. Can also produce large volumes of smoke (potential for negative human and environmental impacts), whilst also leaving a visual, albeit short-term, scar on the landscape
Not weather dependent – can be carried out in wet conditions	If using a chipper to treat cut material, access is often difficult. Chipped material can reside on site for many years and hinder natural vegetation from re-establishing
	Cannot be carried out year-round – it must not be used during the bird nesting season

(C) Mechanical mulching/flailing:

- Where large, dense areas of *R. ponticum* grow on accessible sites where the terrain is not too steep, mechanical mulching may be an effective method of control, particularly during the attack phase. The use of this method will depend on (i.) the availability of appropriate machinery along with qualified operators, and (ii.) the accessibility of a site (due to the size of the machinery used and the subsequent limitations on where they can go). The potential for this technique is limited in areas with dense tree cover or steep and craggy terrain, both of which are environments where *R. ponticum* infestation often occurs. As a result, this approach is best used in combination with methods A and B, in order to treat any bushes which could not be accessed by the machinery. As with the above manual cutting method, flailing *R. ponticum* down to stump level alone will not kill the plants, therefore follow-up chemical treatment will be required in subsequent phases to treat the regenerating stems (method D). This method should not be used during the bird nesting season (March to August in the UK).



(D) Foliar spraying:

- For bushes typically less than 1.3-1.5m in height and where the stems are too thin for stem treatment (method A), foliar spraying can be very successful, providing the work is done with care. Knapsack sprayers with a hollow cone nozzle are usually used to apply the appropriate herbicide, and it is an imperative to have a skilled contractor operating the knapsack (see Section 5.1. for further information about the qualifications required).
- In order to ensure a *R. ponticum* plant is successfully killed, herbicide must be applied onto every single leaf to the point of foliar wetness (that is, the point just before run-off), and care must be taken not to miss any layered stems extending laterally from the parent plant.
- The recommended herbicide should include glyphosate as the active ingredient. Most formulations contain either 360g/L or 450g/L of glyphosate; 360g/L formulations should be made up to a 2% solution (1 part concentrate to 49 parts water: equivalent to 300mL per 15L tank), whilst 450g/L formulations should be made up to 1.6% (1 part concentrate to 62 parts water, equivalent to 240ml per 15L tank). In addition, 2% of an adjuvant such as Mixture B NF can be added to improve herbicide covering on the waxy surfaces of *R. ponticum* leaves. However, using an adjuvant should be avoided when working near water, with the herbicide concentration instead increased to 2.5% (if using a 360g/L glyphosate formulation). It is also highly recommended that a strong marker dye is added to the herbicide solution to allow identification of treated plants. Thorough mixing of the herbicide solution is essential; it takes at least two minutes of thorough agitation to mix the “oily” concentrate with water. The herbicide solution should be mixed for the day of use only, with any residual herbicide disposed of safely at the end of each working day, according to the Code of Practice for Using Plant Protection Products.
- It is worth noting that even with good technique and a careful approach, there can be some damage to adjacent vegetation due to drift. Native species such as heather and bilberry can take years to recover from spray damage, and young trees are easily killed. To minimise drift, it is advised that foliar spraying is only carried out in appropriate weather conditions, that is, not when rain or high winds are forecast (minimum of 6hrs with no rain forecast for knapsack application with mixture B NF, 12hrs without), and spraying of bushes taller than 1.5m should be avoided. Additionally, spraying should be avoided during hot, sunny conditions as the droplets may evaporate before penetrating the leaf, as well as in cold conditions (<7°C), as uptake and translocation within the plant is reduced.
- Whilst this method can be used throughout the year (in appropriate weather conditions), March to October is optimal as the chemical will be translocated throughout the plants more rapidly during the growing season, and appropriate weather conditions for spraying are less likely to occur in the winter.



(E) Hand-weeding:

- This method is best suited for Phase 3 work (sometimes Phase 2), or any future 'mop up' work on sites which have previously been managed for *R. ponticum*, but which still have some small seedlings present.
- Typically, this method is suitable for small plants and seedlings (<60cm in height) which have shallow root systems and are therefore easily uprooted. Uprooted plants should be disposed of safely (for example, through controlled burning), or have all the soil shaken off the roots before they are hung securely off the ground on nearby trees or crags, which will dry the roots and kill the plants. Uprooted plants will re-root if these precautions are not taken. A methodical approach is essential to avoid missing smaller plants, for example, by working as a team in rows sweeping across a site. It is essential that the basal node is removed, which can be difficult where *R. ponticum* is growing amongst dense vegetation such as *Molinia*. In this case, it is recommended that a spade or mattock is used to aid in digging out the whole root system.
- This method can be used throughout the year, however late winter to early spring is the optimal time, given that dense undergrowth or bracken may conceal small plants during the summer.

A methodical approach is essential to all the above methods in order to avoid missing any *R. ponticum* plants. This is particularly the case for methods involving chemical treatment where the results are not immediately visible, as well as hand-weeding, where the small seedlings are easily missed when growing amongst dense vegetation. Team working is encouraged, with several members systematically sweeping a site along transects to ensure no sections are missed. Team working is also encouraged from a safety perspective, given that invaded sites are typically remote and difficult terrain to walk on.