ENGLISH HERITAGE

Landscape Advice Note: Problem Weeds

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Japanese knotweed and bracken both spread through underground rhizomes, making them much harder to eradicate. This Landscape Advice Note explains the options available for dealing with these problem weeds on historic sites.

JAPANESE KNOTWEED

Japanese knotweed (*Fallopia japonica*) is a non-native herbaceous plant. Introduced from Japan as an ornamental for large gardens it is now an invasive weed, common throughout most of the British Isles. It spreads mainly by the vegetative means of underground rhizomes. The rhizomes can spread for long distances and often penetrate quite deep below the surface.

A tall herbaceous plant of the *Polygonaceae* family, Japanese knotweed can grow to a height of 2-3m in a single season. The reddish-brown bamboo like stems appear each spring and grow rapidly, becoming greener through the summer, the leaves in the early stage also appear reddish but quickly become a dull green. Creamy white, upright inflorescences appear from between the leaf axils between August and October. After the first frosts the stems quickly die but remain standing, slowly collapsing over the winter. The fallen stems break down slowly, helping to inhibit the growth of other plants and assisting the buildup of a monoculture of Japanese knotweed.

The underground rhizomes can be extremely prolific in suitable soils, rapidly building up a multi-layered network. Each rhizome contains numerous buds, some of which remain dormant unless damage occurs to growing shoots, thus allowing rapid replacement.

This plant is able to rapidly establish itself and out compete most native plants and the monoculture it produces is a stark contrast to the more diverse and ecologically interesting native habitats it invades. Early identification and treatment of this plant is easier and more cost effective than controlling established stands. Both the Environment Agency and Royal Institute of Chartered Surveyors (RICS) publications referenced at the end of this note contain excellent identification sections.

Under the Wildlife and Countryside Act (1981) it is an offence to plant this species in the wild and care must be taken to ensure that it is not introduced accidentally. This also applies to one other introduced plant - Giant Hogweed (*Heracleum mantegazzianum).*

The correct botanical name for Japanese knotweed is *Fallopia japonica*, but it has previously been known by two other botanical names - *Reynoutria japonica* and *Polygonum cuspidatum* and these may been seen in some literature.

CHEMICAL CONTROL

There are three chemicals known to give some control of Japanese knotweed:

- 24D + Dicamba + Triclopyr (sold under the trade name Broadsword)
- Glyphosate (sold under a wide range of trade names, but widely known as Roundup)
- Picloram (sold under the trade name Tordon 22K)

Note: Always check that approvals are still current before use.

However, it must be stated that complete control is very rarely achieved in the first year and allowance must be made for follow up treatments in the second, third and even subsequent years as necessary.

The three chemicals are approved for use in non-crop areas and on grassland. However it should be noted that all are non-specific and will affect ALL broadleaved (non grass) plants in the area treated and glyphosate will also affect grasses. Whilst this is not such a concern when treating large infestations it needs to be taken into account when treating the 'invading front' where there may still be a more diverse flora. In such a case spot treatment or individually injecting stems should be considered.

The timing of application varies but initial application should be made when the majority of stems have four to five leaves fully expanded. This should be followed by a second application at the same stage on any regrowth. If sufficient funds are available, better results can be obtained if stems are allowed to grow until about mid to late June and then cut to ground level and all the arisings removed, then regrowth is treated at the four to five leaf stage.

Tordon 22K and Atladox HI should not be applied on more than one occasion per year and when further treatments are needed one of the other chemicals should be used.

Care should be taken if using any chemical containing picloram near trees as root uptake can result in damage or even death.

Only certain products containing glyphosate are approved for use near water, and Environmental Agency approval is required.

FRONT COVER
Japanese knotweed *Fallopia japonica,* escaping from a private garden, Suffolk © Natural England/Paul Lacey

IMAGE 01
Bracken *Pteridium aquilinum*, Wytham Woods Site of Special Scientific Interest, Oxfordshire © Natural England/Peter Wakely

MECHANICAL CONTROL

Mechanical control will not be successful in the short term because of this plants regrowth ability. Even in areas of short mown grass it appears capable of surviving being cut close to the ground for more than two years and then regrowing to full height if cutting stops.

Ultimately mechanical control could prove successful but only if carried out consistently over a number of years and covering the whole affected area. Cutting or pulling would need to be carried out at a stage when the plant had invested maximum energy from reserves in growth but received little back from the leaves - probably at about the stage when eight to ten leaves are fully expanded - and cutting would have to be repeated each time this stage was reached, which may be as many as four or five times each year.

Cut material should be allowed to dry out and die completely. Pulled stems may have crown material attached which will take much longer to die and should be treated like rhizomes. Cut, pulled or dug material (rhizomes) may be kept on site and treated if they regrow. If removal from site is necessary the material can only be disposed of at a suitably licensed facility. This also applies to soil from sites contaminated with knotweed.

Successful control or containment has been achieved using root barriers membranes and these are detailed in the Environment Agency publication *The Knotweed Code of Practice* (see references). However, these methods usually require considerable ground disturbance and changes to ground levels so are unlikely to be acceptable on historic sites.

BRACKEN

Bracken (*Pteridium aquilinum*) is a native fern, common throughout the British Isles. It can spread by spores or by the vegetative means of underground rhizomes. The spores are windblown and can travel for considerable distances. The rhizomes can spread for long distances and often penetrate deep below the surface. Bracken is common on light acid soils, particularly woods and heaths but unusual on limestone.

Bracken fronds, the above ground green parts of the plant with a typical fern-like appearance, emerge singly in spring and can grow to over 2m in some conditions, though half this size is more common. Fronds begin to senesce in late July/August, depending

on weather conditions, and die back completely by late autumn, although they will usually persist (dead) throughout the winter, slowly collapsing. The dead fronds are slow to break down and established areas of bracken quickly build up a deep litter which very effectively prevents most other plants establishing and leads to a monoculture of bracken.

The underground rhizomes can be extremely prolific in suitable soils, rapidly building up a multi-layered network with both separate and interconnected sections. Each rhizome contains numerous buds both active and dormant, with the dormant buds becoming active if early fronds are damaged. These combine to make control difficult.

This ability to rapidly establish itself and out compete other plants, along with changes to management practices throughout the country have led to a rapid increase in bracken dominated areas particularly at the expense of more ecologically valuable habitats such as heathland.

Bracken contains a number of toxins and carcinogens within the plants tissue and can cause serious health problems for all forms of grazing animals and it is inadvisable to graze animals in areas containing large amounts of bracken - although the extent to which bracken is eaten when there is sufficient grass is not known.

Concerns for human health in the UK are primarily directed towards the possibility of the spores being carcinogenic and it is advisable to avoid cutting, disturbing or even working in stands of bracken when the spores are ripe (July/August). If this is unavoidable, equipment with sealed cabs or masks with fine particulate filters should be worn. Although unusual in the UK it is worth noting that it is inadvisable to eat bracken, especially the young (still curled) fronds, in some areas where this is common (Japan, Canada and North East United States) increased incidences of oesophageal and stomach tumours have been recorded.

CHEMICAL CONTROL

There are three chemicals known to give reasonable control of bracken and these, along with the details of their use follows. However, it must be stated that complete control is very rarely achieved in the first year and allowance must be made for follow up treatments in the second and third years as necessary. There is also currently some disagreement about the level of permanent control which can be achieved using chemicals because of the complexity of the rhizome system and the dormancy of buds on rhizomes. The three chemicals are:

- Asulam (sold under the trade name Asulox)
- Picloram (sold under the trade name Tordon 22K)
- Glyphosate (sold under the trade name Roundup).

Asulam is the most well known bracken control chemical, it is also the most specific in its effect, generally killing only bracken, other ferns and docks - most other broad-leaved plants and grasses are unaffected or only slightly checked. However, asulam has been banned in the EU since 2011, but has received annual emergency authorisation for use in the UK each year since. Asulam may be used on grasslands (both pasture and amenity turf), in non-crop areas and near water (with appropriate Environment Agency approval). Because of its specificity it may, depending on the botanical interest, be permitted for use in SSSI sites. The timing of treatment with asulam is critical to the level of success - the chemical must be applied when the fronds are fully expanded but before senescence, this is usually late July/early August, but varies with weather conditions and location.

Picloram is absorbed by roots and can be applied two to four weeks before fronds emerge. It is, however much less specific and will affect all dicotyledonous (non grass) plants especially clover. It can be used on amenity grass and in non-crop areas but not on pasture or near water.

Glyphosate is well known for its wide use in many solutions, glyphosate is also effective for bracken control. Like asulam (above) timing is critical and should be carried out at the same period - late July/early August depending on weather and location. However, unlike asulam, glyphosate is non-specific and will kill most growing plants whether broadleaf or grass. This is not usually an issue in areas where bracken has already established a monoculture, but requires careful consideration where use to control an advancing bracken 'front' is necessary. This chemical may be used near water, with appropriate Environment Agency approval, but use is unlikely to be allowed in SSSI sites.

MECHANICAL CONTROL

Mechanical control of bracken is based on the principle of exhausting the plants energy reserves by allowing it to expend energy on growing but then cutting, pulling or damaging the frond before it can open and start replacing the energy expended. This is usually achieved by carrying out the operation two or three times in the first year, usually mid to late May, late June/early July and possible again in late August (as for chemical control these timings will vary with weather and location) and then twice and the second (and possible third) years. It has been shown that

this form of control can be as effective as chemical control and is arguably longer lasting.

In most cases it is preferable to remove all the arisings from mechanical operations, to prevent adding to any existing bracken litter and delaying re-colonisation by other plants. In areas where the bracken cover is light it might be possible to leave arisings in situ. The three mechanical controls are:

- Cutting
- Rolling
- Pulling

Cutting is simply cutting the fronds at or near ground level. It can be done by hand or machine depending on the terrain. Although cutting leaves a part of the base on the frond, this has no buds and will not re-shoot in the way cut tree saplings do, all regrowth will come from buds on the rhizome.

Rolling is generally carried out using tractor drawn rollers and is therefore confined to open areas accessible to the machinery. The roller needs to be heavy enough to break or crush the frond close to ground level.

Pulling involves gripping the frond near the base and pulling directly upwards. Pulling has the advantage over cutting in that under certain ground conditions it will tear away part of the rhizome, increasing the harm done.

The use of machines for cutting, pulling and in particular rolling may be unacceptable on sensitive archaeological sites. Carrying the work out by hand can be expensive unless volunteer labour is available.

NATURE CONSERVATION VALUE

In some situations bracken is of nature conservation value and selected areas should be retained. Small patches of bracken, particularly in glades or woodland edges, provide habitat diversity and support invertebrate species.

Bracken may also act as a substitute woodland canopy, allowing plants such as bluebells, violets and other species of ferns to persist in clearings and other open areas. In moorland areas stands of bracken can also be important as nesting habitat for birds.

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