Bracken

Bracken *Pteridium aquilinum* is one of the world's most successful plants, and also one of the oldest, with fossil records of at least 55 million years old. In England bracken *Pteridium aquilinum ssp. aquilinum* stands can be a distinctive and attractive feature in the landscape, particularly in the autumn when the fronds turn brown. It is a natural component of many habitats and supports a number of scarce and declining animal species. It appears to have become more widespread in recent years and this may be regarded as a threat to wildlife habitats, agricultural production and sites of archaeological interest. Therefore, bracken is frequently viewed as a problem that needs to be managed. Further information is available in TIN047, *Bracken management: ecological, archaeological and landscape issues and priorities* and TIN048, *Bracken management and control.*

Description and biology

Bracken is a large fern. Its stems or fronds usually reach between 100-200 cms, but a frond 400 cm long was recorded in Savernake Forest, Wiltshire.

Bracken fronds are green, changing to brown in the autumn as they die back. Below ground bracken has a vigorous and wide-spreading rhizome system. This extends to about 50 cm in depth, although on suitable soils rhizomes can extend down to a metre or more. In old colonies the rhizome system can be extensive and complex, to the extreme that in the oldest parts of a colony there is more rhizome than soil. This may cause die-back in the centre of the colony.

The mature fronds are upright and sturdy and can be seen from early July. They are usually leathery and shiny on the upper surface. Young fronds emerge as a trio of small leaves or pinnules. The stem or stipe then pushes upwards with a spirally coiled frond at its apex covered in mainly white and some red hairs. This gradually unfurls, first as one layer with two opposite blades and eventually several layers. Each of the blades is laterally branched. The final division bears the pinnules. Each pinnule has a down-curled edge under which are found the reproductive organs of the bracken arranged in lines. These organs are called sori and they produce the bracken spores.

Patches of bracken may appear where none have been recorded before as a result of spore development or of the introduction of rhizomes, eg by animal movement. An increase in the area of an already established patch is caused by the spread of rhizomes along a 'bracken front'.

Distribution

Bracken is the only fern in Britain able to cover extensive tracts of land and the only one in many parts of the world that is thought of as a weed. The species has one of the largest ranges of any plant, being found on every continent except Antarctica.

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The chief limiting factors seem to be extremes of cold (including high altitude regions) and poorly-drained marshes and fens. Essentially a temperate climate plant, bracken can be found between sea-level and 3000 metres although, in the UK, its range is limited to altitudes of below 600 metres.

Bracken is believed to have originated as a woodland species, but is now found in a wide range of habitats where it can be an aggressive competitor, invading lowland grass and heathland, and upland heather moorland. Growth rates, plant density and spore production all increase where bracken is in full sun.

Where it is eliminated by cultivation, bracken tends to re-invade quickly when cultivation ceases. It will grow under permanent woodland cover, but its vigour is usually limited to a few individual fronds.

It tolerates a wide range of soil types and can grow in dune slacks with greater than 90% sand content and in shady woods on heavy clay. It does not appear to like saline or permanently waterlogged soils. Traditionally, it is seen to be an indicator of deep, loamy well-drained or sandy soil as it seems to thrive best in these conditions. However, it has been found where wet flushes occur and even alongside streams. A principal factor determining presence in wet areas seems to be the oxygen level of the soil.

Bracken has been observed growing in soils with a pH ranging from 2.8 to 8.6, although it tends to be less competitive on soils of high pH.

Rainfall levels and humidity appear to affect the density and height of frond growth. The western side of the UK shows larger areas of bracken coverage. The patchier eastern UK range is probably due more to higher incidence of frosts than to less rainfall, but may also indicate larger areas of land under permanent cultivation. Exposure to wind and cold can also affect the plant, chiefly by reducing its vigour and the height to which the fronds can grow.

The degree and the aspect of the slopes on which it grows seems to vary with altitude, bracken generally preferring south-facing slopes as altitude increases.

Legislation

Bracken is not listed as a noxious weed. Its control on Sites of Special Scientific Interest (SSSIs) may require consent from Natural England. In addition, where the objective of control is the agricultural intensification of uncultivated land and semi-natural areas, the 2006 Environmental Impact Assessment (EIA) Regulations apply, and Natural England must be consulted to give approval for control measures.

The EIA regulations are reinforced under Cross Compliance, Good Agricultural and Environmental Condition (GAEC). GAEC 5 specifically relates to EIA. If bracken control involves cultivation or soil management, GAEC 1, which relates to soils also applies, particularly in the uplands.

If considering the use of pesticides the Environment Agency should be consulted and they may need to give their consent if there are water courses in the vicinity. For further information see:

- Application to use herbicides in or near water **www.environment-agency.gov.uk/commondata/acrobat/wqm1_form_1797463.pdf** and
- accompanying guidance notes **www.environment-agency.gov.uk/commondata/acrobat/wqm1_notes201_1797478.pdf**.

Burning bracken is controlled by the Heather and Grass Etc. (Burning) Regulations revised 2007.

Issues

Wildlife

Bracken can benefit wildlife, particularly where it is found as part of a habitat mosaic. It is associated with a number of National Vegetation Classification (NVC) communities and notable species, including some that are rare or scarce. Although bracken can be valuable to some wildlife, its spread is a risk to other important habitats. For more details see the TIN047 *Bracken management: ecological and archaeological issues and priorities*.

Agricultural

Bracken dominance reduces the grazing area available for livestock and can prevent effective livestock husbandry.

Poisoning

If eaten, bracken can cause poisoning in grazing animals. Stock and wild animals usually avoid it unless there is nothing else available and in exceptionally dry summers where grazing is sparse there may be few other alternatives. Like a number of other cacogenic plants, bracken has evolved complex chemically-acting anti-herbivore defences, and these are at highest concentrations in the young fronds.

Bracken poisoning affects an animal in a number of ways. It damages blood cells and destroys thiamine (Vitamin B1) which is one of the causes of beriberi, a disease linked to nutritional deficiency and resulting in heart failure. Bracken has also been found to be highly carcinogenic, inducing intestinal tumours in animals that have fed on both fresh bracken and bracken in fodder.

Disease

Bracken is a favoured haunt of the sheep tick which, affects deer as well as sheep. The sheep tick is a known carrier of the bacillus which causes Lyme Disease in humans. If not treated in the early stages with antibiotics, Lyme Disease can cause permanent health problems.

Historic environment

Historic uses of bracken Historically, bracken has been exploited by humans in several ways. In some parts of the world, notably Japan and Canada, the young fiddleheads are eaten as a delicacy in spite of the plant's well-known toxic properties. It has traditionally been popular for use as animal bedding. In many areas, cutting rights were considered a valuable asset and local by-laws forbade anyone to cut bracken before the 1st September. When used as stock bedding, bracken breaks down into a rich mulch which was used as fertiliser on the spring crops.

Dry bracken fronds were used extensively as a packaging material for products such as slate and earthenware. Another use, not recommended today, suggests; *Dead bracken, shoved up the chimney and ignited, sets light to the soot and saves bothering with sweeps*. It has also been used as a form of thatch, fuel and tinder and for dressing kid leather. It was cut and burned in 'potash kilns' a common feature in some parts of the country. The resulting ash was used for cloth processing (used to degrease woollen cloth) or to make lye, used as the alkali in soap making.

Bracken and archaeological sites Bracken has two major impacts on archaeological sites. Firstly, it destroys and reduces the significance of sub-surface archaeological evidence, including the ability to reconstruct past environments. Secondly, it obscures sites, thereby reducing accessibility to them and making them more vulnerable to inadvertent damage.

Management operations

A number of different operations affect the growth of bracken. Note, herbicide treatment is the most appropriate method where archaeology is present as the other methods risk damaging the archaeological features.

Burning

Bracken is thought to be a fire-adapted species therefore burning is not generally recommended as a method of control. Heathland with small bracken stands should not be managed by burning as this will encourage future abundant growth of bracken. However, where deep litter has built-up under a bracken stand, especially where complete eradication is not required burning may be useful. Burning of bracken has been carried out on Exmoor by the National Trust as a method of restoring heath fritillary butterfly sites. The operations have been successful in their objective in the short term. Re-growth of bracken is being monitored to assess the need for further management by cutting or by herbicide treatment.

Cutting

Cutting is never likely to eradicate bracken. However, as a method of management and control it may be useful. Cutting for a period of years where there is a litter layer underneath bracken is likely to lead to a sward dominated by grasses. This may be useful in conjunction with shepherding of agricultural stock where the

objective is to encourage stock away from more sensitive semi-natural habitats such as heather heath. It may also be useful in producing some grazing for stock within bracken stands that are in themselves valuable as fritillary butterfly habitat.

Bruising

Bruising or crushing is an alternative to cutting. It may be done using agricultural rollers or manufactured bracken bruisers. The advantage of this method is that the equipment used is less likely to be damaged during use. Cutting equipment is vulnerable to damage if used on uneven or rocky ground. The relative effectiveness of rolling compared to cutting has yet to be proved.

Herbicide treatment

Only asulam and glyphosate are approved for the control of bracken. Asulam is the recommended herbicide treatment for bracken in species rich areas where you wish to minimise the effects on the underlying vegetation. It is approved for application by back-pack spray or weed-wiper, ultra-low volume application, application by boom and aerial application.

A single application of herbicide will not eradicate bracken. Re-growth needs to be treated in at least the following year and follow-up treatments in future years. A three stage approach may be necessary:

- Primary treatment to reduce dense bracken.
- Initial follow-up treatment of isolated fronds by roller-wiping methods or spot application.
- Final follow-up methods - spot application of isolated fronds at low density.

There are a number of higher plants that are susceptible to damage by asulam and all other ferns may be severely damaged by it. It is also thought that a number of moss species may be affected by contact with this herbicide.

Light reduction

In certain situations it may be possible to control bracken growth by exclusion of light. For example, planting trees after bracken treatment with asulam. The use of a black plastic mulch over the ground surrounding the planted tree could prevent frond growth in that area.

General principles

Bracken management for environmental benefits should be planned as part of a site management programme. Before embarking on a bracken control programme it is important to identify clear goals of what is to be achieved and the problems likely to be encountered. Note:

- It is unlikely (and undesirable) that bracken can be completely eradicated from a site.
- Cutting bracken two or three times a year may not get rid of it, but should maintain it at a low density.
- Rolling bracken is appropriate in some circumstances, but in others may not significantly reduce bracken vigour or density.
- Spraying with asulam generally needs doing twice in two years to get a high percentage kill, but in ten years time the bracken may have recovered and require further spraying.
- Ploughing and trampling are unlikely to be suitable on many SSSIs.

Bracken management may not be appropriate on sites near water courses or that have:

- a significant and important ground flora
- other non-target fern species, or
- protected species associated with bracken.

Further information

Natural England Technical Information Notes are available to download from the Natural England website: **www.naturalengland.org.uk** . In particular TIN047 and TIN048:

- *Bracken management: ecological and archaeological issues and priorities*
- *Bracken management and control.*

For information on other Natural England publications contact the Natural England Enquiry Service on 0845 600 3078 or e-mail **enquiries@naturalengland.org.uk**

This leaflet has been developed from various sources including the RDS Technical Advice Note *Bracken control, vegetation restoration and land management*.