

# Bracken ruin?



Graham Paul's latest BASIS article looks at the invasive fern bracken and how to control it

**Bracken is a rhizomatous species of fern belonging to the Dennstaedtiaceae family that are characterised by large, highly-divided fronds. Fossil records show that it's been around for 55 million years and for almost half of that time has enjoyed worldwide distribution.**

Originally classified as a single species *Pteridium aquilinum*, bracken has now been reclassified into about 10 species.

It's a survivor – able to adapt to a wide range of climates and conditions, so it needs to be kept in check for the benefit of the environment, wildlife and those farmers whose livelihood depends on grazing livestock on clean pastures. In this article I shall look at the plant; how it spreads, its positive and negative attributes and measures available to control it.

There are about 12,000 species of fern that belong to the plant kingdom group Pteridophyta. They reproduce by spores rather than by flowers and seeds and have an alternating life cycle but, like flowering plants, they do have a vascular transport system (xylem and phloem), roots, stem and leaves (known as fronds). Once established bracken will spread and colonise an area with fronds sprouting directly from the rhizomatous root system.

Bracken thrives in most habitats except for deserts and poorly drained land, occurring in all parts of the world except Antarctica. In the UK it was originally an inhabitant of woodlands, moorlands and lowlands but today it can also be found in upland regions, where the removal of large areas of trees to make way for sheep pastures has allowed it to become more invasive.

Bracken will tolerate soils with

a pH ranging from 2.8 to 8.6 and is found growing in the saline mists of coastal areas, although a combination of high winds and salt can cause scorching of the young fronds. Cold inhospitable climates in the higher regions of the UK limit the spread of bracken to those areas below 600 metres.

In cooler climates, bracken is a deciduous plant dying back completely in the autumn and sprouting again in late spring from the underground rhizomes. The first shoots are often referred to as the 'crozier' or 'fiddlehead' stage as they resemble a shepherd's crook or the curved end of a violin.

The underground root system for bracken consists of thickened storage organs found deep in the soil that are attached to thinner rhizomes growing much nearer the surface (see Figure 1 on page 42), from which the bracken fronds sprout.

These young fronds have a covering of bronze coloured hairs and are easily damaged by late frosts. The emerging shoots develop into large individual triangular fronds, each growing directly from the rhizomes and forming dense thickets. The fronds may grow up to 2.5m or more in height.

Bracken conquers new ground mainly by extension of the rooting system, however there is also a sexual stage involving the spores. These are microscopic and produced in structures known as 'sori', located in a linear fashion on the undersides of the fronds.

Production of spores takes place only in bracken that has been established for three to four years. The spores ripen from July to August but are not released until the autumn – usually in October.

A single frond can produce several hundred million spores



but many do not survive to become new bracken plants, as successful development of the sexual stage of the life cycle is dependent on frost-free conditions with adequate moisture, and without fungal attack on the germinated spores. Those spores that do germinate will eventually form a small immature sporophyte stage to complete the life cycle but, due to the size, these are rarely seen.

Once established in a new area, bracken will dominate and squeeze out the existing vegetation by a combination of tactics.





One of these involves the release of allelopathic chemicals into the soil. These are antagonistic molecules that discourage other plant species from taking root and may remain in the soil long after the bracken has been removed.

Allelopathic chemicals, together with the dense shading canopy produced by the fronds and deep litter on the surface from several years of decaying bracken, will make it difficult for other vegetation to get established again even after total loss of cover by fire damage.

Looking at some of the positive

characteristics of this plant, it has provided man with a source of food - the immature fronds have been eaten as a delicacy after thorough cooking to remove toxins.

The deeper rhizomes that contain stores of starch were used in baking by some cultures in remote parts of the world and both fronds and rhizomes have been used to brew beer.

However, medical authorities and toxicologists advise against consuming any part of the bracken plant as it is known to contain substances toxic to humans and

**“Once established in a new area, bracken will dominate and squeeze out the existing vegetation by a combination of tactics”**

animals. Today bracken is still harvested in parts of the UK to make commercial composts.

Bracken can offer the right conditions of shading and humidity to support several plants normally found in woodland areas such as wood anemone, bluebell,



chickweed-wintergreen and common dog violet. The presence of dog violets and bracken on south-facing hillsides provides a valuable habitat for the pearl-bordered fritillary – a rare butterfly listed in the UK Biodiversity Action Plan. This is also an important habitat for reptiles, such as adders.

Two British birds, the whinchat and nightjar, have adopted bracken as their preferred habitat as it provides good cover and a degree of protection for their young.

Some other birds such as the skylark, lapwing and yellowhammer use thick bracken as a protected feeding site.

However, where bracken has invaded moorland it then excludes many bird species that are common to this habitat.

Apart from the invasive characteristics of bracken the main negative aspects of this plant are its poisonous properties when consumed by man and other animals.

Bracken may poison some grazing animals although they will normally avoid it when alternative food

## “Apart from the invasive characteristics of bracken the main negative aspects of this plant are its poisonous properties when consumed by man and other animals”

is plentiful. It is in times of hardship that sheep may suffer blindness and cattle can get severe stomach ulceration from consuming significant quantities of the plant.

Raw bracken contains the enzyme thiaminase, which can cause a vitamin deficiency in horses, leading to a condition known as ‘staggers’. The young emerging fronds contain the most toxins with levels decreasing as the plant matures through the season.

The discovery of carcinogenic substances in the spores and in the plant tissues of bracken is a major concern.

The microscopic spores are readily spread by wind that might blow them towards nearby human habi-

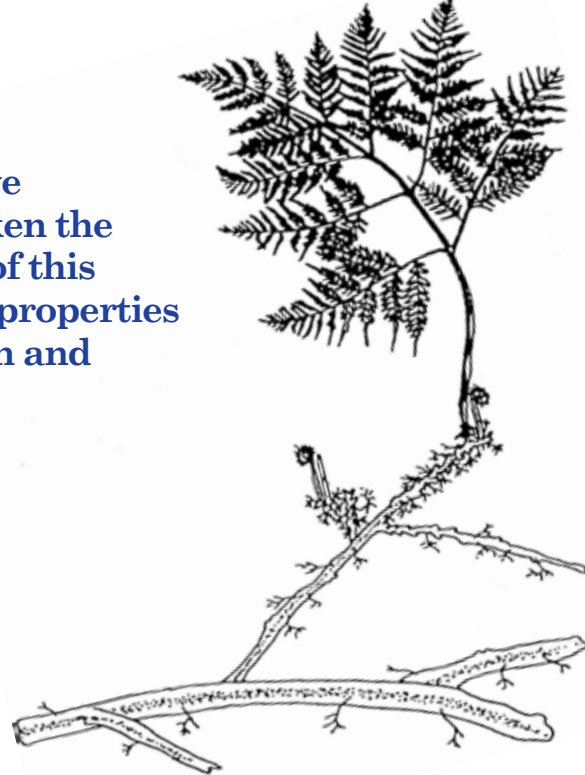


Figure 1

Bracken at the crozier stage



### SELF ASSESSMENT

Use the questions below to check your understanding of this topic. Readers can claim BASIS points if the questions are answered correctly!

- 1) According to the fossil records, how long has bracken been on this earth?
  - a) 12 million years
  - b) 300 million years
  - c) 55 million years
  - d) 350 million years
- 2) What is the approximate altitude limit for bracken in the UK?
  - a) 600 feet
  - b) 12000 feet
  - c) 1000 metres
  - d) 600 metres
- 3) What is the name given to the structure on the bracken frond that bears spores?
  - a) sori
  - b) sporangia
  - c) acervulus
  - d) sporoglyph
- 4) What is the name given to the carcinogen that has been isolated from bracken?
  - a) Cyclosporine
  - b) Phenacetin
  - c) ptaquiloside
  - d) Etoposide
- 5) How long will the emergency approval of ‘Asulox’ last?
  - a) 12 months
  - b) 120 days
  - c) 2 years
  - d) 6 months



Bracken *Pteridium aquilinum*  
early stag

tations, whilst decaying bracken can release a carcinogen known as 'ptaquiloside' that can leach into water supplies. Factors that are now being linked to the high incidences of oesophageal and stomach cancer in many areas of the world where bracken is abundant.

### Control measures

Ecologically, a small amount of bracken can be a benefit to the biodiversity of an area. However, the other side of the argument suggests that the careful removal of bracken will encourage displaced species to return, which is ultimately more beneficial to man and to wildlife. Mechanical methods of control include:

- Damaging the fronds by partially cutting or bruising each stem several times. This can be repeated through the summer as the fronds grow back and if such treatments are maintained for several years, it can have the effect of reducing the reserves of the underground rhizome system causing a gradual weakening of the growth.

- Use of livestock to trample down the fronds. The animals must be provided with sufficient food (hay/silage) to prevent them from grazing the bracken. This can open up the ground and allow frost to penetrate the soil and damage the rhizomes. This method is not usually applicable to amenity situations.

### Chemical control

- Glyphosate – e.g. 'Roundup ProBactive 450' Bracken should be treated after the frond tips are fully

unfurled, but before senescence. Apply using a suitable sprayer depending on the situation and take care to avoid treating desirable vegetation.

A knapsack sprayer or weed-wiper may be most suited to difficult and remote sites. Before choosing glyphosate for bracken control, the user should make sure there are no valuable plants or wildlife sheltering under the cover of the fronds.

- Asulam e.g. 'Asulox' is probably the best chemical treatment for bracken control as it is selective for ferns.

General use of this active ingredient was withdrawn completely in 2012 by the EEC.

However, UK emergency approval was granted to come into force on 20 May 2013 when it will last for 120 days. It will allow 'Asulox' to be advertised, sold and used solely for the control of bracken and will have a new label putting restrictions on the methods of application and dose rate.

Full label details will not be available until the approval start date but some details have been released by the Chemical Regulations Directorate in a special briefing. For details see [www.brackencontrol.co.uk/Documents](http://www.brackencontrol.co.uk/Documents).

Application through weed-wipers and drift sprayers will not be allowed under this emergency approval.

The Bracken Control Group intend to make further requests to the CRD for subsequent years bracken control, until a decision can be made on a more permanent approval.



GREENOR\* is the result of more than five years research into micro-emulsions. It's unique technology increases herbicide activity, resulting in a more thorough kill with lesser amounts of active ingredient.

There's more...

The micro-emulsion of GREENOR has a low odour.

Weeds do not exhibit that burnt appearance as GREENOR will not scorch the leaves.

It has a unique safety to fine turfgrasses, even on worn patches that have been recently re-seeded.

# Greenor

SELECTIVE SYSTEMIC  
WEED CONTROL



\*GREENOR is a trade mark of Dow AgroSciences LLC. Greenor contains 40g fluroxypyr, 20g clopyralid, 200g MCPA per litre. Use plant protection products safely. Always read the label and product information before use. For further information including warning phrases and symbols please refer to the product label.