THE HEATHER TRUST
Promoting Integrated Moorland Management

The Heather Trust contributes modest funding each year to a range of research which is relevant to moorland management. This helps to answer important questions about good practice and it's important that farmers, gamekeepers and other moorland managers can make use of it.

One way we can do this is through our *So What?* Guides. They explain the scientific conclusions so that practitioners can make good decisions based on the latest research.

So What? Bracken Control

Background

Bracken is part and parcel of a healthy moorland ecosystem, but in some places it can dominate large areas and suppress the balance of other plants.

Moorland managers work hard to keep bracken in check, not only to boost the diversity of upland habitats but also to control the harmful effects of excessive bracken growth.

The problem with bracken is that it is an "iceberg" plant; most of it is hidden below the soil in rhizomes which contain a massive energy store. It is easy to manage the growth which appears above ground, but persistent treatments are crucial to prevent the plant from bouncing back from underground reserves. Dormant buds can emerge after ten years, and there are no shortcuts to bracken control.

There are three main ways to control bracken:

- **Mechanical control** – (**cutting**) – cutting breaks up bracken fronds, forcing the plant to depend upon its underground reserves. Bracken will die if cutting is sufficiently persistent and thorough, but this treatment is slow and may take many between 8-20 years to be really effective.

- **Mechanical control** – (**bruising**) – a variant on the mechanical approach is to use a bruiser, crusher or roller. The fronds are "crushed" or "bruised" by specialized machinery which damages, mangles and dehydrates the plant. Bruising is also based on the theory that constant treatment will exhaust the plant's energy stores, and this technique is particularly useful where there are environmental concerns about spraying or cutting.

- **Herbicidal control** – (spraying) – This technique is usually based on the selective herbicide known as asulam. The active ingredients are drawn into the plant's underground system via the fronds, and asulam then travels into the rhizomes and kills the buds, stopping new fronds from growing. Asulam only kills bracken and can be applied to a mixed sward without harming non-target species.

  A single asulam application is usually very effective in reducing bracken frond density and cover in the year after treatment, but there is often a relatively rapid recovery within 5–10 years. Follow-up treatments are needed with asulam, otherwise bracken will quickly recolonize. At the moment, asulam is banned by EU legislation but available for use in the UK under conditions. Glyphosate ("roundup") is also effective but is non-selective and its use may affect other species.

The Study

To improve our understanding of bracken control, the Heather Trust contributed funds to two Defra studies to find out which is the most effective way to manage bracken on acid grassland. The studies took place over an eight year period on a steep hillside of well-established bracken at Bamford Edge in the Derbyshire Peak District.

How

Five treatments were tested against an untreated "control". The treatments were -

1) Cutting twice a year using a petrol strimmer (June and July)
2) Cutting three times a year using a petrol strimmer (June, July and late August)
3) Bruising twice a year with a "Bracken Bruiser" (June and July)
4) Bruising three times a year with a "Bracken Bruiser" (June, July and late August)
5) Spraying with asulam in early September of year one and then spot-spraying follow-up growth in each subsequent year.

Results in a Nutshell

- Asulam and the two cutting treatments were the most effective means of controlling bracken.

- Bruising was ineffective at Bamford Edge.

- Once the bracken had been removed, new plant communities were formed. Cutting and spraying produced a very similar mix of plant species, but there were some subtle differences. Scientists found that cutting resulted in a more agriculturally productive mix of grass species. This may have an impact on management objectives for farmers and land managers, but the primary objective should be to limit and contain bracken coverage.

So What?

A single asulam application is usually very effective in reducing initial bracken density and cover, but this progress can be undone without rapid follow-up treatments. Asulam should be used as part of a rigorous long term management strategy.

Other studies suggest that cutting and bruising work best on well-established bracken sites where there is a deep layer of bracken litter and few other plant species still survive. Scientists suspect that this is because cutting reduces the litter layer and provides a good seed bed for other species to germinate.

Asulam produced faster results and was less expensive to implement where bracken was less well established and other plants were still holding on beneath the canopy.

Bruising was ineffective at Bamford Edge. Bracken was just as abundant in the bruised areas as it was in the areas which went without any management at all. Careful analysis revealed that the bruised bracken plants were not badly damaged enough to drain the plant's resources and inflict a meaningful injury on the underground rhizome stores.

Bracken bruising has a varied history, and bruisers come in many shapes and designs. Some will work better than others, and other machines may damage bracken more efficiently. There is no doubt that bracken bruising has some advantages over cutting; the machines can be pulled faster over rougher ground, and lightweight bruisers can be pulled by quad bikes and even horses.

The study also suggested that there might be some advantage in prioritizing bracken control work on lighter, less well-established areas. These are more likely to contain a variety of plant species so that natural and productive revegetation is possible. Bracken control sometimes leads to erosion, and a speedy resurgence of other plant species may help to limit soil loss once the bracken has gone.

More Detail...

for the full studies, read:

The effectiveness of old and new strategies for the long-term control of Pteridium aquilinum, an 8-year test.

by G Milligan, E S Cox, J G Alday, V M Santana, H A Mcallister, R J Pakeman, M G Le Duc & R H Marrs, published in Weed Research, 2016 European Weed Research Society

Change to ecosystem properties through changing the dominant species: Impact of Pteridium aquilinum-control and heathland restoration treatments on selected soil properties

by G. Milligan, K.E. Booth, E.S. Cox, R.J. Pakeman, M.G. Le Duc, L. Connor, S. Blackbird & R.H. Marrs, published in Journal of Environmental Management 207 (2018) 1-9

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