Potential and historical Uses for bracken (*Pteridium aquilinum* (L.) Kuhn) in organic agriculture

Eric Donnelly, Jamie Robertson, David Robinson
Aberdeen University Centre for Organic Agriculture, Mac Robert Building, King Street, Aberdeen AB24 5UA
e.donnelly@abdn.ac.uk

ABSTRACT

Bracken is considered a serious weed species, due to its toxic constituents and negative impacts on agriculture and conservation. Historically however, this fern was a highly prized commodity due to the many uses for cut fronds. Cutting bracken is one of the few bracken management options open to organic farmers. Many traditional uses for the material resulting from harvesting material may have potential in modern organic agriculture, putting a modern value on the plant for its sustainable use or its eradication. This poster reviews some traditional and potential uses within agriculture, investigated as part of a MPhil research project. These uses for bracken include; use as a source of fertility from raw material and ash, weed control for vegetable crops, animal bedding, cover mulch, insect repellent, seed treatment, anti-fungal agent, and biofuel.

Keywords: Bracken; organic farming; control; fertiliser; weed control; potassium; mulch; insect repellent; anti-fungal agent; biofuel.

INTRODUCTION

The cutting of bracken fronds is permitted as part of bracken control in organic agriculture. Large yields of bracken material from this operation have many historical and potential uses. Some uses for this material are being investigated over two years at University of Aberdeen.

Uses for bracken material

Bracken has been used for livestock bedding for many years (Lightfoot, 1777) as it is highly absorbent due to its high surface area, and does not compact during use (Russel, 1908), allowing for ease of handling after use. Bracken is still used as livestock bedding today, especially in parts of Wales.

Bracken has also been used in the past as a compost ingredient and is produced and sold today as peat free compost, as it has low pH and high nitrogen and potash content (Pitman and Webber, 1998).

Bracken contains Flavanoids (Voirin, 1970), which have antibiotic properties (Swain, 1974). These compounds may have potential against some fungal agents harmful to organic food production, including potato blight.

Bracken mulch for winter soil protection has been used in the past, possibly due to its high surface area and slow rate of decomposition. The allelopathic content

of bracken (Gliessman, 1976) may also aid weed control in early spring. Experimentation into the use of bracken as mulch continues in 2002, comparing soil fertility and weed density in autumn and spring under bracken mulches and black plastic against bare ground.

Bracken produces various anti-insect chemicals, such as ecdysones (Cooper-Driver, 1976), which may have potential for insect deterrence. Experimentation is taking place looking at the possible effects of these compounds on turnip flea beetles and the incidence of external and internal damage on field turnips.

Bracken has been used as a biofuel for centuries, probably due to its high calorific value of 21 GJ/t (Callaghan et al., 1981), compared with 19 GJ/t for straw (Christian and Riche, 1999). Experimentation with bracken pelletisation and incineration will be carried out in 2002, in collaboration with commercial partners.

The ash from burning of bracken has been used as a fertiliser, due to high levels of potassium and high pH. Ash from Aberdeenshire bracken in 2001 showed potassium levels ranging between 41 and 27%, depending on time of harvest. Experimentation into the production of ash and response of bracken to harvesting at different times of the year will continue in 2002.

Experimentation into the use of bracken ash as an organic fertiliser will continue in 2002, including its use as fertiliser for clover and main crop potato production. Effects of the addition of ash to the soil will also be investigated.

ACKNOWLEDGEMENTS

We are grateful to Kintail Land Research Foundation for funding, Scottish Natural Heritage and Dinnet Estates for access to bracken and the Skea Family, east mains for use of land for experimentation.

REFERENCES

Callaghan, T V, Scott, R and Whittaker, H A (1981) The yield development and chemical composition of some fast growing indigenous and naturalised British plant species in relation to management as energy crops. *Natural Environment Research Council Contract Report to the Department of the Environment*.

Christian, D G (1999) Establishing fuel specifications of non-wood biomass crops. ETSU B/U1/00612/REP.

Gliessman, S R (1976) Allelopathy in a broad spectrum of environments as illustrated by bracken. *Botanical Journal of the Linnean Society,* 73: 95-104.

Lightfoot, J (1777) Flora Scotia, 2: London.

Swain, T (1974) Biochemical evolution in plants. In, M. Florkin and E. H. Stotz (Eds), Comprehensive biochemistry, 29 part A, Comparative biochemistry, molecular evolution. Amsterdam: Elsevier.

Russel, E J (1908) On the use of bracken as litter. *Journal of the Board of Agriculture and Fisheries,* 16: 481-7.Pitman, R. and Webber, J. (1998) Bracken as a peat alternative. *Forest Authority*.

Voirin, B (1970) Recherches chimiques, taxonomiques et physiologiques sur les flavaiodes des pteridophytes. Thes Doct. L'Universite de Lyon.

From: Powell et al. (eds), *UK Organic Research 2002: Proceedings of the COR Conference, 26-28th March 2002, Aberystwyth*, pp. 255-256.