

An investigation into the relationship between preceding break crops and weed populations in barley crops in organic ley/arable rotations

Audrey M Litterick, Christine A Watson

Scottish Agricultural College, Craibstone Estate, Bucksburn, Aberdeen, AB21 9YA, UK

Melissa C Robson

Department of Plant and Soil Science, Aberdeen University, Aberdeen, AB24 5UA, UK

ABSTRACT

The relationship between weed populations and cereal crops following nine organic break crops was investigated in field trials in Warwickshire, Aberdeenshire and Ceredigion in 2001. Weed biodiversity was high on all sites and varied between sites in terms of species present. Severity of weed infestation differed significantly between sites and between cereals following different break crops. The impact of break crop species on the incidence and severity of the weed burden in the following cereal is discussed in relation to the field trials at the three sites.

INTRODUCTION

Previous work has shown that break crops in cereal rotations can affect weed populations in following cereal crops (Karlen *et al.*, 1994; Liebman & Dyck, 1993). Trials were set up on UK organic farms to examine weed numbers and weed species incidence in cereal crops, which followed nine different break crops in organic ley/arable rotations.

MATERIALS AND METHODS

Spring barley was sown in 12 x 6 m plots, which had contained one of nine break crops [lupin, hemp (not in Aberdeen), linola, carrot, potato, field bean, swede, sugar beet or oilseed rape] or oats in the previous year. The trial was set out in a randomised block design with four replicates at three locations, Aberdeen (sandy loam), Aberystwyth (clay loam) and Coventry (silty clay loam). Weed species incidence and cover (%) was recorded in mid July.

RESULTS

Weed biodiversity was high on all sites, with 15 species recorded at both Aberystwyth and Coventry and 23 species at Aberdeen. The species mix and dominant weeds differed between sites. Redshank was dominant at Aberystwyth. Chickweed and red deadnettle were most common at Aberdeen, whilst annual meadow grass and creeping buttercup were dominant at Coventry.

Weed cover (%) differed significantly between all sites ($P < 0.001$; Fig. 1), with Aberdeen having the highest weed cover and Coventry the lowest. Percentage weed cover on the barley plots differed depending on the previous crop. Lupin,

oat, hemp, linola and oilseed rape resulted in a significantly lower weed cover than the other five crops ($P < 0.05$).

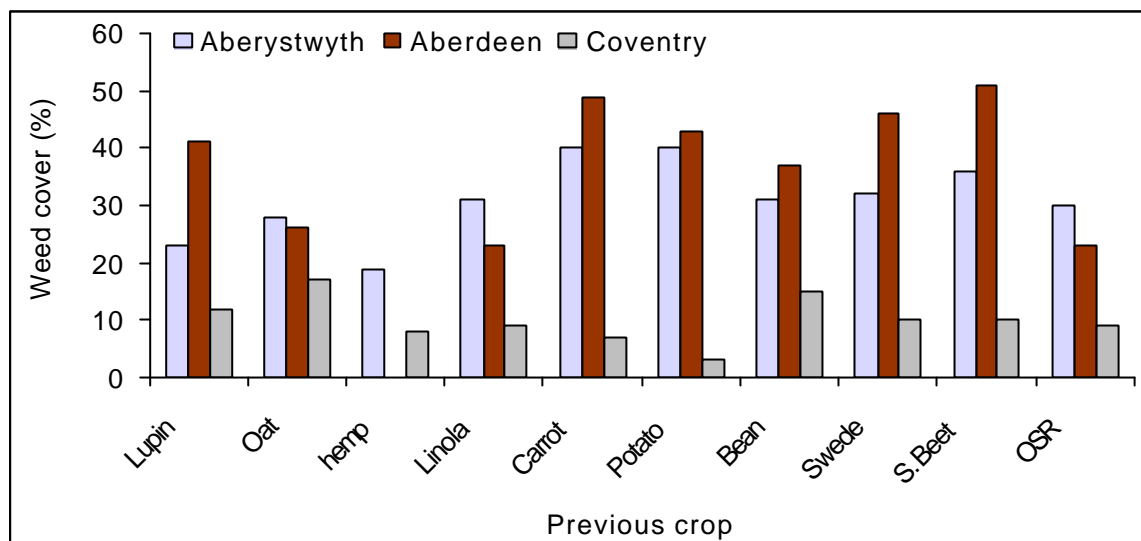


Figure 1. Weed cover (%) recorded in spring barley crops sown after nine different break crops and oat at three sites in 2001

DISCUSSION AND CONCLUSIONS

The combination of soil type and weather pattern at crop and weed establishment play an important role in determining % weed cover in following cereals. The spring weather pattern and silty clay soil in Coventry resulted in soil capping and poor conditions for germination and growth of weeds. The weather patterns in Aberdeen and Aberystwyth were highly suitable for the germination and growth of weeds and a higher % weed cover resulted. Further work is required to investigate the reasons for low % weed cover in cereal crops following lupin, oat, hemp, linola and oilseed rape. In particular, the potential for exploitation of allelopathic effects are being examined in pot and field experiments.

ACKNOWLEDGEMENTS

The authors thank the Dept. for the Environment, Agriculture and Rural Affairs for funding this work.

REFERENCES

- Karlen D L; Sharpley A N (1994) Management strategies for sustainable soil fertility. *In Sustainable Agricultural Systems*, eds J L Hatfield & D L Karlen, pp. 47-108. Lewis Publ. CRC Press: Boca Raton, Florida.
- Liebman M; Dyck E (1993) Crop rotation and intercropping strategies for weed management. *Applied Ecology* 3, 92-122.

From: Powell et al. (eds), *UK Organic Research 2002: Proceedings of the COR Conference, 26-28th March 2002, Aberystwyth*, pp. 227-228.