

# Can widescale grassland biodiversity be created on productive farmland?

## Agri-environment research: farmland biodiversity

### What are the issues?

Most grassland in England is dominated by perennial ryegrass with a low content of legumes and few other plant species. It provides little pollen and nectar and supports a very limited number of species of invertebrates, birds or other animals. And it could be a barrier to movement of many species, hampering their adaptation to climate change. To meet Biodiversity 2020 objectives a coherent ecological network needs to be created, connecting semi-natural habitats and making farmland, including grassland, more permeable to wildlife. And this has to be reconciled with the need to strengthen food security and enable sustainable intensification, improve soil condition and protect the quality of water and air.

### What are the aims of the project?

The objectives of the Widescale Enhancement of Biodiversity (WEB) project are to:

- Quantify the success, compared with an existing species-poor sward, of establishing a number of grass, legume and robust herb species. To be carried out on two sites (Devon and Berkshire) on fertile soils, into seedbeds and existing grassland, providing pollen, nectar, seed, and/or spatial and structural heterogeneity.
- Compare management in which the sward is rested and allowed to flower with more typical grazing or cutting management.
- Quantify the effects on diversity and abundance of pollinators and other invertebrates.
- Assess the impact on forage production and nutritive value, soil nutrient status, water infiltration and nutrient losses.
- Produce specifications for new or modified Entry Level and Higher Level Environmental Stewardship (ELS and HLS) options, and detailed guidance for their successful management.

Legumes included red clover (particularly important for bumblebees), birdsfoot trefoil, white and alsike clovers. Herbs included chicory (highly productive and can protect against intestinal parasites in livestock), lesser knapweed, oxeye daisy, yarrow, common sorrel and salad burnet.



Figure 1: Common carder bee on red clover (Source: Centre for Ecology and Hydrology)

### Which policy areas will the research inform?

The project will inform the design of options within Environmental Stewardship and future agri-environment schemes, and/or voluntary measures for example within the Campaign for the Farmed Environment. It will potentially support achievement of Biodiversity 2020 and the Water Framework Directive.



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## What are the results from the project and how will they be used?

The most important results were that a range of legume and herb species could be successfully established even on heavy, difficult soils, and they supported a wide diversity and abundance of pollinators and other invertebrates.

Detailed findings were:

- Modest enhancement of floristic diversity using simple seed mixtures was shown to dramatically increase the resource base of flowering plants as well as their utilisation by insect pollinators.
- Although more expensive (grass only = £100/ha vs. £230/ha), including both legumes and non-legume forbs within seed mixtures increased the persistence of flowering resources for insect pollinators and also benefitted other invertebrates such as beetles.
- These seed mixtures may reduce some aspects of soil compaction.
- Cheaper cultivars of red clover and other legumes, which are most likely to be sown, will only persist for 1-2 years after the establishment year.
- Cutting management promoted persistence of legumes and herbs and led to higher numbers of pollinators. But it removed all flower resources for a short period. The more gradual impact of grazing, particularly when rested in summer, allowed for a more continuous foraging resource for pollinators albeit at a lower overall density of flowers.
- A rest period led to greater availability of beetle biomass that could be fed on by birds. Access by birds is likely to be easiest in grazed areas.
- Seed resources for birds were higher with resting.

The preliminary results were used to design ELS option EK21 which was made available in January 2013 and will be monitored in 2014. It is proposed to offer this option in the New

Environmental Land Management Scheme due to be launched in 2015. It will be available as a rotational option so can be moved between fields. It allows fertilisers provided they contain no nitrogen, and has outcome-focused prescriptions which require, throughout the agreement, a minimum content of 10% red clover, an additional 10% other legumes plus herbs plus wildflowers (not including white clover, creeping buttercup or injurious weeds). The sward must include at least 5 species of grass, 3 of legume (including bird's-foot trefoil) and 5 of herb/wildflower. And it must be rested for at least 5 weeks in summer.

Most field-scale agri-environment options for grassland involve low production. In contrast this option will maintain or even increase production on many farms.



Figure 2: Grass, legume and herb sward (Source: Centre for Ecology and Hydrology)

### Where can I find further information about this and related research?

For further information, the final report for BD5208 can be found in the [Defra Science Search website](#).

Alternatively, please contact Dr Ben Woodcock ([bawood@ceh.ac.uk](mailto:bawood@ceh.ac.uk)) or Mr Steve Peel ([Steve.Peel@naturalengland.org.uk](mailto:Steve.Peel@naturalengland.org.uk)).

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