

**Review of the diet and micro-habitat values for wildlife and the agronomic potential of selected grassland plant species**

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### Introduction

Grasslands cover 5.6 million ha of agricultural land in the UK. The intensification of management practices over the last 50 years has increased productivity, but has had significant impacts of grassland biodiversity. Much work has focussed on the restoration of the remaining species-rich areas of grassland. However, in order to meet the requirements of wide-ranging farmland species, consideration needs to be given to methods of enhancing the diversity of species-poor grasslands dominated by ryegrass.

The aim of the project was to review two important aspects of any attempts to increase wildlife on improved, relatively fertile grasslands. These issues are firstly, the value to invertebrates, birds and other vertebrates of particular grassland plants that could be introduced into such swards or maintained in them, and secondly the agronomic potential of such species, so that the fit of these swards into viable farming or equine business can begin to be assessed.

### What was done

A list of grassland plant species considered to be of potential wildlife value and able to establish and persist in fertile grasslands was identified, comprising 14 grasses, 11 legumes and 25 other forb species. In addition, 6 grassland weeds were included in the review.

Information was collected on the associations between the selected plant species and insects, including herbivores and pollinators. Data was also gathered on the value of the plant species to bird diets, both directly through the provision of foliage and seeds, and indirectly through the supply of invertebrate food.

Information was also gathered from agronomic literature on the feed value of the plant species, any impacts on animal health and their productivity in grazed and mown grassland management systems. In addition, data on the success of establishment of the species in grassland restoration experiments was collected.

### Results and conclusions

Plant species supporting specialist associations with greater than 70 insect species were found among the grass species, the legumes and the other forb species. Most insects forming associations were classified as general shoot feeders, feeding on a range of above-ground plant parts. However, significant numbers of species dependent on the presence of stems or flowers and seed heads were found for the legumes (Fabaceae) and composite forbs (Asteraceae). *Cirsium* species, including pernicious grassland weed species included in the study supported some of the highest numbers of associated invertebrates.

The review of the importance of the plant species for provision of direct (seeds, foliage) diet items for birds showed that large-seeded forb species, ie vetches (*Vicia* spp.) and smaller-seeded species particularly docks (*Rumex* spp.), plantain (*Plantago* spp.) and buttercups (*Ranunculus* spp.) and the foliage of clover (*Trifolium* spp.) were important diet items for farmland bird species. The plant species with the highest number of specialist insect associations (*Dactylis glomerata*, *Festuca ovina* and *Lotus corniculatus*) provided one possible measure of the diversity of insect taxa important in bird diets, although different plant species had higher numbers of general insect associations (*Taraxacum officinale* and *Rumex* spp.).

The review has highlighted a group of grassland species that have diet and microhabitat value for insects and birds and have useful agronomic characteristics in terms of productivity and feed value. This group includes grasses (*Dactylis glomerata* and *Festuca* spp.), and legumes (*Lotus corniculatus*, *Trifolium pratense*, *T. repens* and *Vicia sativa*). Some of these have been established successfully in experiments on the restoration of

grassland diversity while others are agriculturally-sown species. *Lotus corniculatus* and *Festuca ovina* are probably the most difficult to establish in more fertile swards. Other forbs, such as *Achillea millefolium*, *Centaurea nigra*, and *Plantago lanceolata* are of high value for wildlife and are reasonably easy to establish but have lower values for livestock production. The *Cirsium* species have high value for wildlife but along with other pernicious grassland weeds are actual management problems rather than of being of benefit for livestock production. *Rumex acetosa* poses less of a weed problem than *R. crispus* and *R. obtusifolius*, if not present in quantity, and is able to grow in fertile grasslands.

For a significant element of the diet and microhabitat value of the identified grasses, legumes and other forbs to be realised, it is necessary to allow them to develop stems, flowers and seed heads. Thus, rotational grazing and/or infrequent mowing are the optimum management regimes. However, allowing the development of structural heterogeneity in the sward canopy can compromise the agronomic value of the sward. Research is needed on the relative balance between potential biodiversity gains and agronomic implications of relaxing grazing, mowing and fertilizer inputs in areas of improved grassland.

Given the management constraints on the provision of beneficial diet items and microhabitats, along with the high biodiversity value of some of the grassland weed species included in the study, it may be more beneficial to focus management aimed at promoting biodiversity on portions of fields, including field margins, for grasslands used for agricultural production. Research is needed to identify the optimal size, density and landscape positioning of such features.

The study identified a large number of insect species for which only limited information on microhabitat requirements is available. Whilst systematically acquiring data on the ecology of insect species may be useful for species of conservation concern, it is clearly impractical for the large number of common or widespread insect species listed in this review.

Research might be better focussed on providing management tools that promote spatial and temporal heterogeneity in grassland swards. Such tools might include modified mowing regimes, use of mixed stocking or particular livestock types (including horses), and the use of farm yard manure. Such heterogeneity is likely to lead to diversity in botanical composition, canopy structure and spatial patterning within fields, thus providing a range of microhabitats for associated species of grassland fauna.

The review pointed to major gaps in the understanding of the value of grassland plant species beyond conventional livestock production, in particular their potential role in improving the sustainability of pastoral systems and value for enhancing the suitability of species-poor grassland for horse grazing. If the area devoted to livestock grazing declines, identifying opportunities for biodiversity enhancement in non-agricultural grasslands is likely to become increasingly important. There is now increasing interest in the secondary dietary attributes of pasture species in terms of their ability to contribute towards animal health and nutrition and to affect the qualities of meat and dairy products from livestock for human nutrition.

There is also a need to identify livestock production systems that can meet the demands imposed by changes in climate. The role of multi-species swards is one promising area. Many forbs and some grasses can utilise lower soil horizons for water, or exploit temporal niches for regeneration, and thereby provide a degree of resilience to drought, or ability to recover from floods, compared to the predominant grassland species which are currently grown. This review has confirmed the high value of legumes for invertebrates and birds. The wider use of grass/legume mixes as forage crops has the potential for multiple benefits, including not only biodiversity benefits but also reduced fertilizer inputs and enhanced soil characteristics. Research is needed on the suitability of novel grass/legume mixes and their potential utility in the face of climate change. The introduction of legumes into established swards is likely to yield similar benefits. In this situation, research is needed on methods to promote the persistence of introduced legume species.

## English Nature's viewpoint

The review is a vital first stage in understanding how the biodiversity of species-poor grassland can be enhanced. The review reveals some potentially useful plant species that have both biodiversity and agronomic value. English Nature needs to work with farmers, horse owners, policy makers and researchers to come up with practical grassland management prescriptions that achieve these multiple benefits.

### Further information

For the full report or other publications on this subject, please contact the Enquiry Service on 01733 455100/101/102 or email [enquiries@english-nature.org.uk](mailto:enquiries@english-nature.org.uk)

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