Great burnet © Peter Roworth/Natural England

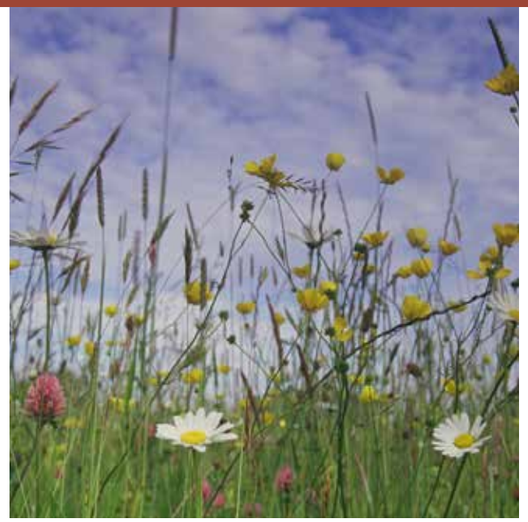
Plants

From hay meadows to downland, and cereal fields to hedgerows and field margins, farmland supports hundreds of plant species. As well as being important and beautiful in their own right, plants are the essential providers of food and other resources for farmland wildlife, including pollinators, other beneficial invertebrates and wildlife higher up the food chain. Management of farmland for floral diversity ranges from the continuation of traditional management for habitats such as species-rich floodplains, to active restoration measures on more intensively farmed land, aimed at enhancing and encouraging a greater diversity of plants.

Key points

- **Management for plant diversity depends on the existing flora and the conservation objectives**
- **Many plant communities, such as rare arable or species-rich meadow communities, have specific management needs**
- **Other measures, for example reducing herbicides and fertilisers, will benefit wild plants across the farm**

Plants



Species-rich meadow © Paul Glendell/Natural England

Lowland farmland encompasses a range of habitats crucially important for plants. Many species of farmland plants have declined during the last sixty years, some to the point of extinction. Arable farmland contains some of Britain's endangered plants, once regarded as 'weeds', while ancient meadows have a rich variety of grassland plants. Species-rich areas that have been farmed in the same way for many years need protecting, as these rare habitats are irreplaceable. While intensification of farming has had an impact on plants of both arable and grassland habitats, there are nonetheless a number of ways in which wild plants can be encouraged or restored back to farmland.

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Shepherd's-needle (above) and cornflower (below) are rare arable plants

Arable plants

Many species of arable plants are rare, declining or of conservation concern. Just a few of the rare plants that can be found in arable fields are cornflower, pheasant's eye, corn buttercup, Venus's-looking-glass, prickly poppy and blue pimpernel. Presence of arable plants such as small toadflax or dwarf spurge, often on lighter soils, may indicate that one or more of the rare plants may also be present. Reasons for the declines in arable plants include the increased use of herbicide, the development of more competitive crop varieties, the increased use of nitrogen, and improved seed-cleaning.

To survive and thrive arable plants need conditions that allow them to flower, fruit and return their seed to the soil. In general, arable flowers benefit from open cultivated margins or in-field areas where there is limited competition from aggressive weeds, cereal stubbles left uncultivated over winter, or cropped headlands that are unsprayed and unfertilised. Rare arable plants can be difficult to spot. Field edges, corners and gateways which have missed herbicide applications are often the areas in which they are found. Their seeds can lie dormant for many years, germinating when conservation management practices are adopted. Rare arable plants may suddenly appear in fallow fields or in the first year or two of establishing grass margins; if this happens, advice should be sought, as management may need to be changed.

Hay meadows, Lower Derwent Valley NNR
© Peter Roworth/Natural England

© Peter Wakely/Natural England

Snake's head fritillary (above) and green-winged orchid (below) are iconic plants of lowland meadows

© Paul Glendell/Natural England

Grassland plants

Lowland meadows

Lowland meadows are wildflower rich grasslands on neutral (neither acid nor alkaline) soils. They may be traditional meadows cut for hay, or pastures managed through grazing alone, and can support rare and iconic plant species such as snake's head fritillary and green-winged orchid.

A staggering 97% of lowland meadows were lost between 1930 and 1983 through conversion to cereal crops and improved grassland. Those that remain are now highly localised and fragmented. Significant concentrations can still be found on the floodplains of the Thames, Yorkshire Ouse and Derwent, Severn, Avon, on the Somerset Levels and in drier situations in Worcestershire. The high nature conservation value of these meadows stems from their species richness - sometimes supporting up to 40 species of plant per square metre. Many sites are ancient grasslands and have not been ploughed for many hundreds of years (the earliest record for hay-making on Pixey Mead, near Oxford, dates as far back as 1142). Ancient wildflower meadows can be conserved by continuing to graze or cut in a traditional way. However, such meadows need careful management and advice should be sought.

Lowland dry acid grassland

Lowland dry acid grassland typically occurs on nutrient-poor, generally free-draining soils. Often forming a mosaic with dwarf shrub heath, acid grasslands, particularly parched acid grassland, can provide habitat for a number of rare plants including mossy stonewort, sticky catchfly and spring speedwell. It is also an important habitat for invertebrates. Important concentrations of this habitat occur in the Breckland, the New Forest, Dorset, Suffolk Sandlings, the Weald, and Dungeness, and specific management is needed to maintain their condition. Advice should be sought.

Plants

Chalk downland flora, Hampshire
© Chris Gomersall/Natural England

A chalk downland mosaic of shorter grass, bare ground, tussocks and scrub is rich in wildlife © Ruth Feber

Sheep grazing can help maintain an open and varied downland sward © Ruth Feber

Chalk and limestone grassland

Chalk and limestone grasslands comprise some of the most species-rich habitats in lowland England. They vary widely from the south-facing, shallow soils of the chalk Downs in the south, to the north-facing slopes of the limestone Dales. Whatever the location, if they are in the right condition, chalk and limestone grasslands can support a huge number of plants and animals.

An open and varied sward is best achieved through grazing by cattle or sheep in combination with rabbit grazing. However, it is vital to avoid overgrazing, which will result in a uniform expanse of close-grazed short turf. Cessation of grazing may result in the encroachment of rank grasses or scrub, which will shade out the specialist chalk or limestone flora. A mixed regime of heavy and light grazing may be needed to create areas of bare ground, short turf and longer grassland including tussocks. Where possible livestock, rather than cutting, should be used to manage the sward. Correct management will allow and encourage more plants to flower over the summer months.

Lowland heathland

Lowland heathland occurs on acidic, impoverished, dry sandy or wet peaty soils, and is characterised by the presence of a range of dwarf-shrubs, including heather and gorse. Lowland heathland is a rare and threatened habitat. It has declined greatly in extent during the last two centuries – in England it is estimated that only one sixth of the heathland present in 1800 remains – and it still faces major pressures. Lowland heathland is generally dependent on regular grazing by livestock, controlled burning, and prevention of encroachment by bracken, scrub or trees to maintain it in favourable condition.

Grassland restoration and arable reversion

The restoration of species-rich, semi-natural grassland, normally from semi-improved swards, is an important means of increasing the plant diversity of grasslands. This may be achieved by simply amending management practices, for example, changing the timing and intensity of grazing. However, on sites where the potential for natural regeneration and re-colonisation of desirable plant species is judged to be low, then pro-active restoration will be required. This will involve the introduction of seeds and the creation of gaps in the sward to allow them to establish. Seeds can be introduced by over-sowing, slot seeding or the spreading of green hay. Adding yellow rattle to a seed mixture can help establishment of other wildflowers. Yellow rattle is a native annual which parasitises other plants, particularly grasses. It can reduce the dominant biomass in grasslands, allowing other wildflower species to establish.

Yellow rattle is often used to help wildflowers establish in restoration projects © Sannse GFDL

Arable land can be reverted to grassland to increase the variety of habitat in predominantly arable areas, or to link areas of grassland, either as whole fields or field margins (Boxes 19,20). The objective may be to create a species rich sward (comprising species characteristic of semi-natural grassland communities) or a grass dominated sward (often comprising productive, agricultural species or varieties). Seed used to establish the new grassland can come from a variety of sources, from natural regeneration to the addition of complex commercial seed mixtures. Seed used in seed mixtures should be of UK, and preferably local, provenance as this will help conserve local genotypes and ensure a flora that is visually appropriate to an area and likely to thrive there.

The importance of grazing

Livestock grazing is often crucial in maintaining species-rich habitats by controlling more aggressive species and preventing scrub encroachment. For example, grazing hay meadows after they have been cut helps control competitive coarse grasses, and trampling creates gaps in the vegetation which allow seedlings to grow. Grazing calcareous grassland can prevent too much scrub encroachment. Different types of livestock favour different plants for feeding, and graze in different ways, which shapes the structure and composition of the vegetation. Even within livestock types individual breeds can graze differently.

Cattle grazing is an important management tool © Paul Glendell/Natural England

Livestock grazing removes plant material more gradually than cutting or burning. It also supports other farming activities such as hay-making which provides active management for valuable meadow habitats, allowing slower-growing grasses to flower and seed. This ensures a variety of species continues to flourish. To ensure that wildlife habitats are managed for greatest environmental benefit it is important that the type, number and timing of livestock grazing is tailored to the needs of an individual site.

Teasel © davidpiano92 CC BY ND 2.0

Long-term changes in field margin plant communities

We established a large-scale experiment at Wytham, Oxford to look at different ways of establishing and managing uncropped arable field margins. Field margins around arable fields were either sown or left to regenerate naturally, and were managed by cutting, with the timing and frequency of cutting varying. We monitored the experimental margins for thirteen years to see how the plant communities changed over that time period.

In the early years, naturally regenerated margins were dominated by annual species, but this did not persist and annuals were lost from both naturally regenerated and sown margins, most rapidly from sown margins. After thirteen years, sown margins still had distinctly different, and richer, plant communities from those that had naturally regenerated, and in all of the margins the number of plant species present declined over the thirteen year period. Leaving cut hay lying led to field margins that were less diverse than those where the cuttings were removed. Overall, the changes we recorded over the first three years did not necessarily predict the longer term outcomes, either for weed control or the development of biodiversity on the field margins.

Many agri-environment agreements last for around 10 years. Long-term studies, such as the one described here, are vital if conservation advice and management recommendations are to be appropriate for more than just the first few years of a management plan.

Key results

- **Field margin plant communities continue to change over many years**
- **Some types of management take a long time to affect plant diversity**
- **Long-term studies are vital to help inform conservation recommendations**

Thirteen years after establishment, nettles were more common on margins where cut hay was left lying
© Frank Vincentz GFDL 2.0

Tussocky field margin © Phil Caterall CC BY SA 2.0

Do field margins affect weed occurrence in the crop?

One potential concern with uncropped field margins or buffer strips is that they may result in unwanted weed infestations in the adjacent crop. We collected data from ten experimental field margin types, which varied in whether they were sown or naturally regenerated, and in the frequency and timing of cutting, to investigate this question.

Within the uncropped field margins, the annual plants that were initially the most abundant (including some major weeds of cereals, such as wild oats and sterile brome) declined rapidly, particularly in sown field margins. But did the adjacent crop have higher numbers of undesirable weeds? The only weedy species which was initially frequent in the crop adjacent to margins, particularly those cut in spring and autumn, was wild oats. This species declined rapidly in the uncropped margins as perennial cover increased, from the first year of fallow onwards, and was also lost from the crop edge within two years of the margins being fallowed. The management of uncropped arable field margins for wildlife is unlikely to affect weed levels within the crop, especially where they contain, or are sown with, non-invasive perennial species.

Key results

- **Wild oats were initially more common in the crop next to new margins**
- **This did not last and they were no more frequent than anywhere else within two years**
- **Once established, uncropped field margins will not usually increase weed levels in the crop**

Wild oats were temporarily more common adjacent to uncropped margins, but this did not last
© Keith Edkins CC BY SA 2.0

Plants

Management summary		
	Key actions	Potential benefits
Rare arable plants	• Where conditions allow, leave crop headlands unsprayed and unfertilised, establish open cultivated margins or field corners, leave cereal stubbles over winter	Will create the conditions arable plants need to germinate and set seed each year
Grassland plants	• Management of species-rich grasslands should not be changed without advice	Traditional management, usually by grazing or cutting for hay, maintains species-richness
	• Calcareous grasslands are best managed by grazing, and regimes may need to be tailored to the site	An open and varied sward will allow a range of chalk and limestone grassland species to flourish
	• Dry acid grasslands and lowland heaths need careful management, seek advice	The right management will be needed to maintain these habitats in good condition
Grassland restoration and arable reversion	• Follow agri-environment scheme guidelines	Can help restore species-rich grasslands with many ecological and environmental benefits
Uncropped field margins	• Establish margins by natural regeneration or sowing. Margins should not be sown where rare arable plants are present.	Can help restore diverse plant communities around arable and grass fields.

Options especially relevant for plants		
Code	Countryside stewardship options	Tier
AB7	Whole crop cereals	Mid
AB10	Unharvested cereal headland	Mid
AB11	Cultivated areas for arable plants	Mid
AB14	Harvested low input cereal	Mid
GS2	Permanent grassland with very low inputs (outside SDAs)	Mid
GS5	Permanent grassland with very low inputs in SDA	Mid
GS6	Management of species-rich grassland	Higher
GS7	Restoration towards species-rich grassland	Higher
GS8	Creation of species-rich grassland	Higher
GS15	Haymaking supplement	Mid

Find out more at:
www.plantlife.org.uk www.naturalengland.org.uk www.floodplainmeadows.org.uk