

Wildflower power

James Bullock and Richard Pywell report how farmers can increase hay yields by planting more wildflowers.

Conventional wisdom suggests that the best way for grassland farmers to get a high yield of dairy products, meat and wool is to add large amounts of fertiliser to fields sown with a few rapidly growing grass species. This goes against the desire of conservationists to restore traditional hay meadows and other grasslands with many plants and associated animals. Our experiment growing wildflowers in hay meadows on two farms has shown that these aims need not be in conflict.

The huge intensification of agriculture in the second half of the 20th century led to the ploughing of ancient grasslands, heavy applications of fertilisers and spraying with pesticides. These combined to cause huge losses of biodiversity including drastic declines in farmland birds, bumblebees, butterflies and wild flowers.

Since the mid-1980s, governments in the UK and parts of Europe introduced voluntary agri-environment schemes which require farmers to remove some of their land from intensive production and manage it in a more wildlife friendly way. Although they are recompensed, it is proving difficult to persuade farmers to undertake this huge change in their practices.

For example, many years of research have shown farmers that to increase livestock production they need high-yielding grass fields. These should be resown with a few grasses and then fertilised heavily. Now, they are being asked to stop fertilising and to sow a variety of wildflowers and grasses to recreate traditional hay meadows. Surely, this goes against the whole aim of farming – to produce food?

We investigated this question by taking fields at two English farms and recreating hay meadows with many wildflower species. We contrasted their agricultural output with plots where we had

sown only a few grasses. Surprisingly, the wildflower plots produced over 40 percent greater hay yield than the grass plots. This hay had as good or better food quality for cattle in terms of nutrient content, than that from the grass plots. We also showed that the effects lasted and increased over eight years, countering suggestions that this effect is temporary.

Why does this seem to go against received wisdom? Work by ourselves and others has shown that the greater variety of species, especially wildflowers, results in a greater range of growth forms and life-styles. Species root to different depths, grow to diverse heights, and develop at different times of the year. This means that, as a whole the diverse plant community uses soil nutrients and energy from the sun more efficiently than can a community with fewer species.

This effect is especially strong when soil fertility is low. These fields were not fertilised. If they had been we could have achieved about double the hay yield we got and would have largely wiped out the diversity effect, but we would also have lost many species and potentially polluted watercourses with the run-off. So, this study suggests that biodiversity has an important economic role for humans and that maintaining and restoring species and habitats can contribute to more sustainable use of the planet. More specifically, it shows farmers that scientists can develop 'win-win' solutions which give both biodiversity conservation and economic gain.

Following on from this project we are now working on simple methods to increase farmland biodiversity and how this may bring a wide range of benefits including increased hay quality and soil properties and decreased pollution. We are also working with social scientists to look at how we can help farmers approach agri-environment schemes. ❖

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