QuESSA - the benefits of nature

Different coloured water traps were used to catch bees and pest natural enemies.
© John Holland/GWCT

KEY FINDINGS

- Hedgerows, woodland edges and grassy strips all contained pollinators and pest natural enemies.
- Floral resources in hedgerows, woodland edges and grassy strips peaked in May whereas wild bees peaked in August.
- The floral resources of these semi-natural habitats on farmland could be improved by increasing flowering plant density and diversity.

John Holland
Niamh McHugh
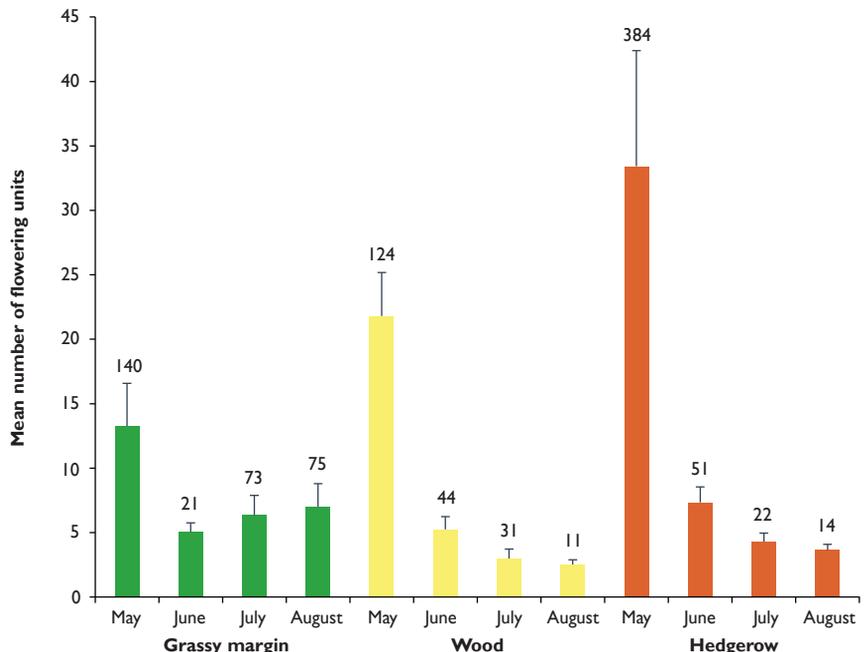Steve Moreby
Matthew Brown
Tom Elliott

The lowland areas of Britain's farmland are interspersed with a network of woodland, hedgerows and grassy field edges. Such areas support a diverse array of invertebrates, and some of these provide useful services such as control of crop pests or pollination of crops and wild plants. Over the last two years, we have been measuring the contribution of these semi-natural habitats to some of these services as part of the EU-funded project QuESSA (Quantification of Ecological Services for Sustainable Agriculture). Our ultimate goal, alongside our 13 partners across Europe, is to provide guidelines and tools that will enable land managers and their advisors to better exploit these ecosystem services and so contribute to the development of sustainable farming systems.

The first step was to evaluate the potential resources that the main types of semi-natural habitats on farmland could provide, such as floral resources for pollinators and over-wintering cover for insects. In three habitats (woodland edge, hedgerows and grassy strips) on 12 farms, we conducted surveys of the vegetation species composition and structure at the border and inside each habitat using a combination of transect walks (coarse scale) and quadrats (fine scale). Transect walks were conducted to assess the abundance of pollinators, and water traps were also deployed to collect a wider range of beneficial insects in June, July and August.

The average plant diversity was relatively low in all three habitats – usually less than two species per quadrant – but on some farms was 3-5 times higher. Floral resources were most abundant in May for all three habitats, with only between a quarter and half of the amount in the following months (see Figure 1). Again, on some farms much higher levels were found, indicating that there is potential to improve these habitats.
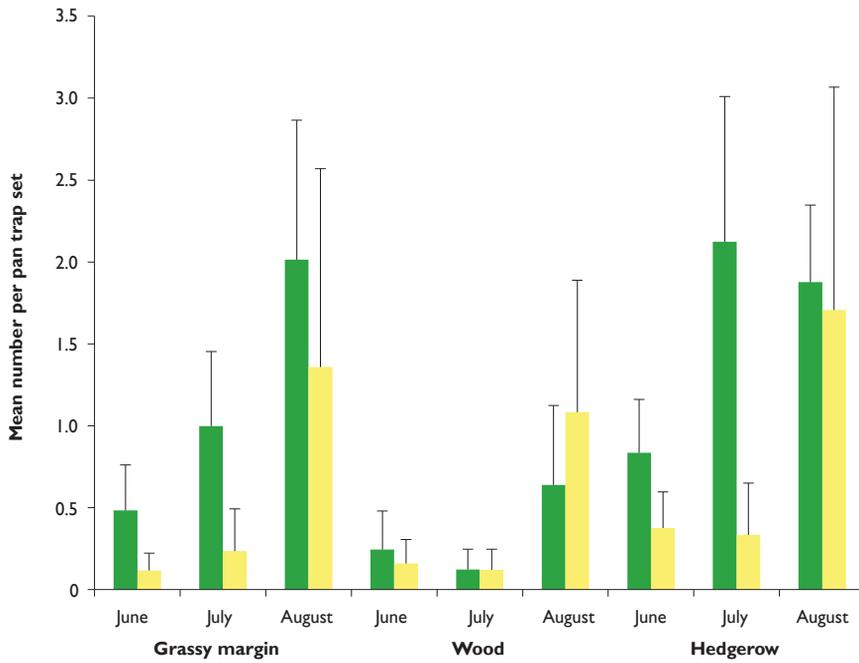
Figure 1

Mean (± 1 se) and maximum number of flowering units per quadrant in each semi-natural habitat

Mean number of flowering units (y-axis), maximum values shown above bars:

Grassy margin: May 140, June 21, July 73, August 75
Wood: May 124, June 44, July 31, August 11
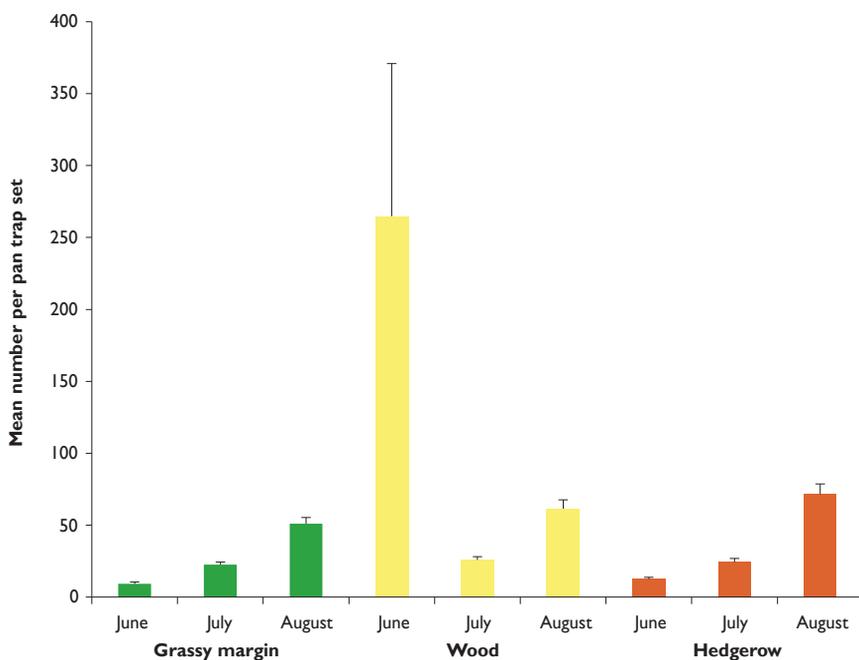**Hedgerow:** May 384, June 51, July 22, August 14

A third more bumblebees were caught in hedgerows compared with grassy strips.
© Peter Thompson/GWCT

Transect walks revealed that hedgerows had more bumblebees than woodland. The water traps caught across all sampling occasions two to three times more bumblebees than solitary bees, and most of them were captured in August. A third more bumblebees were caught in hedgerows compared with grassy strips and at least a third less were caught in woodland (see Figure 2). Pest natural enemies were three or four times more numerous in August along hedgerows and grassy strips, but most abundant along woodland edges in June (see Figure 3).

The study showed that all three habitats can provide floral resources for pollinators and pest natural enemies. We suggest that a range of habitats are needed on farmland and that they should be managed to encourage a greater number of flowering species, especially as our surveys revealed that many contained relatively few species. We are now developing a scoring system from the 16 case studies across the whole project that will represent the potential contribution that semi-natural habitats can make towards these ecosystem services. This will then be used to inform simulation models that can predict the amounts, type and location of semi-natural habitat needed to improve levels of ecosystem services. For further information on QuESSA see www.quessa.eu

BACKGROUND

Semi-natural habitats such as woodland and hedgerows contain plants that provide resources for a diverse array of invertebrates. Some of these invertebrates assist with services such as pest control and crop pollination. To make better use of these of the services supported by these habitats and improve their management we first need to determine which plant and invertebrates are present and when within existing habitats.