

Helping bees: wild flowers in a Sussex lawn

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One of the most important challenges facing bees and beekeeping is the availability of forage. Even without pests and diseases, which are undoubtedly a challenge, bees still need to eat. Bees get almost all of their food from flowers in the form of nectar and pollen. The solution is simple to state: provide more, or at least maintain, flower numbers. But where will these flowers grow?

Approximately three quarters of the UK land area is agricultural, and this has almost certainly experienced a decrease in flowers. Hay meadows have been greatly reduced in number, apparently with a 97% decline since the second world war. Fields of wheat and other arable crops generally have fewer flowering weeds.

The intensification of agriculture has not been good for wildlife but on the positive side it has helped increase the human food supply. Humans now number some 7.8 billion worldwide. This is a huge increase, quadrupling in 100 years from 1.9 billion in 1920¹.

Flowers on farms

However, farmland can provide more flowers. Oilseed rape, for example, is a relatively new crop and is now the third most important UK arable crop, after wheat and barley, covering approximately 2–3% of the land area. In addition, there are various stewardship schemes to incentivise farmers to provide additional flowers on farms, such as by planting buffer strips to provide flowers around arable fields and by maintaining hedges.

Farms may also have areas that already have many wild flowers. In one LASI study, we surveyed an area 2–3 km to the south-east of the Sussex University campus and near the Castle Hill Nature Reserve in the South Downs. We already knew this was a foraging hot spot for honey bees because we had decoded honey bee waggle dances that showed many dances indicating this area². We found that field margins, consisting of the hedge and the wild flowers beside the hedge, had more flower-visiting insects than the nature reserve itself³. Two of the most important summer-flowering plants in the field margin were bramble (*Rubus spp.*) and hogweed (*Heracleum spp.*). No one had planted them. Hedges also have many spring-blooming shrubs such as hawthorn (*Crataegus monogyna*) and blackthorn (*Prunus spinosa*) and often have ivy (*Hedera helix*), which is by far the most important plant for honey bees and other flower-visiting insects in autumn⁴.

Flowers in grass

Another type of farmland that can potentially provide large numbers of wild flowers is pasture. Pasture is mainly grass which is wind pollinated. But pasture can also contain many insect-visited flowers, whether growing wild or deliberately planted. Last summer, close to the university, we noticed a field almost white with clover flowers (*Trifolium repens*). The field had about a dozen horses in it and had been planted with a clover-grass mix, heavy on the clover, to benefit them. Grazing animals can eat the clover as well as the grass. Clover can also help the fertility of the soil



Photo: F.Ratnieks

by fixing nitrogen. Of course, as a bonus, it is also a significant foraging resource for bees. The bees are not foraging on flowers that are weeds or are grown on land taken out of agricultural use, such as with a buffer strip – the clover is actually part of the crop.

Managed grasslands also occur in urban areas where their main purpose is recreation. In another LASI research project, we surveyed insects foraging in two sections of a Brighton park, the Saltdean Oval⁵. In one section the grass was mown regularly and kept short. In another section the grass was allowed to grow long and mown annually. In the long grass were large numbers of wild flowers that had been there all along. They had not been planted. Reduced mowing resulted in an amazing display of colour that was much appreciated by the locals. In addition, there were 50 times as many flower-visiting insects in the long-grass area compared to the short-grass area.

The potential of lawns

Another type of managed grassland is almost a British institution: the garden lawn. There must be millions of these in the UK, and collectively they cover a large area. Besides grass, lawns will usually have at least a few wild flowers and these will often be visited by bees and other insects.

We made a survey of wild flowers and their insect visitors in a domestic garden lawn in Uckfield, a small town in East Sussex, from 28 June to 10 July 2019⁷. The lawn had an area of 161 square metres (192 square yards) and had not been cut since 14 June. By 28 June there was a striking display of wild flowers.

In total, we counted ten wildflower species in bloom. Of these, the six most abundant were white clover (*Trifolium repens*, 5.0% lawn area), bird's-foot-trefoil (*Lotus corniculatus*, 2.8%), selfheal (*Prunella vulgaris*, 2.5%), red clover (*Trifolium pratense*, 0.8%), daisy (*Bellis perennis*, 0.7%) and hawkbit (*Leontodon spp.*, 0.6%).

There were few insects on the daisy and hawkbit, but quite a few on the other four species. We made 41 insect counts during insect-friendly weather on these four species, each time quickly surveying the lawn to make a 'snapshot count' of the insects on each flower species and then working out an average number of insects per square metre. In total we counted 303 insects. The most attractive flower to insects was white clover at 0.55 insects per square metre per count. Then came red clover (0.54), bird's-foot trefoil (0.41) and selfheal (0.10). These rates of insect visitation are quite good. In a study at LASI where we counted insects on ornamental garden flowers, we found that they varied from an average of seven, on marjoram, to just above zero, on pelargonium, per square metre⁷. However, these were deliberately planted and weeded, at full bloom, and often half-a-metre high or more.

When counting, we also identified the insects and came up with an interesting result. The four flower species were each visited by a different mix of insects. The white clover was predominantly visited by honey bees (45%) and solitary bees (48%) with a few bumblebees (6%) and almost no other insects. By contrast, bird's-foot trefoil had almost no honey bees (1%), quite a few solitary bees (26%) and many bumblebees (71%). The bumblebees were mainly the red-tailed *Bombus lapidarius* (47%) and the brown *B. pascuorum* (22%). Red clover had no honey bees and was mainly solitary bees (48%), bumblebees (38%) and insects that were not bees (14%). The red-tailed bumblebees were less common than the browns (7% v 31%). The selfheal was mainly bumblebees (47%), all of which were red tails, and insects that were not bees (53%), mainly hoverflies and butterflies.

Across just four flower species that were growing without human intervention, the lawn seemed to be providing for a wide range of bee species plus other types of insect. The honey bees were only abundant on white clover, which had hardly any bumblebees. Bumblebees were abundant on the other three plant



Photos: F Ratnieks, Richard Rickitt

PREVIOUS PAGE
White clover in a lawn on the University of Sussex campus. If your lawn looks like this, it will be providing much nectar and some pollen for honey bees.

LEFT Honey bee foraging on white clover. White clover is particularly visited by honey bees and is an important nectar source.

Bumblebee, *Bombus terrestris*, on red clover. Red clover is little visited by honey bees but attracts many bumblebees.

species, each of which had a different ratio of browns to red tails, but almost no honey bees. From the perspective of helping bees it was no surprise that the honey bees were mostly visiting white clover, which is well known to be an important source of nectar and can provide significant honey crops if abundant. The honey bee tongue is generally too short to reach the nectaries in red clover. See table below.

Low-mow gardening

The owner of the house (HF) had made no effort to encourage the wildflowers, but neither had she tried to discourage them other than by removing dandelions which have rosette leaves that tend to smother the grass⁷. The lawn was not fertilised or treated with herbicides. The result was that in late June and July the lawn was almost as colourful as the flower beds, with the bonus of not requiring any gardening

SUMMARY OF OVERALL RESULTS. Insects foraging on four species of wild flowers growing in a lawn of 161m² in Uckfield, East Sussex, were counted and identified 41 times from 28 June to 10 July 2019. A total of 303 insect visitors were seen. Species marked * were not surveyed as almost zero insects visited them.

ENGLISH NAME	SCIENTIFIC NAME	AREA % LAWN	INSECTS PER M ² PER COUNT	HONEY BEES %	SOLITARY BEES %	BUMBLE BEES %	OTHER INSECTS %	B. LAPIDARIUS PER M ²	B. PASCUORUM PER M ²	B. TERRESTRIS PER M ²
White Clover	<i>Trifolium repens</i>	5.0	0.55	45	48	6	2	5	1	0
Bird's foot trefoil	<i>Lotus corniculatus</i>	2.8	0.41	1	26	71	1	47	22	2
Self heal	<i>Prunella vulgaris</i>	2.5	0.10	0	0	47	53	47	0	0
Red Clover	<i>Trifolium pratense</i>	0.8	0.54	0	48	38	14	7	31	0
Daisy*	<i>Bellis perennis</i>	0.7	*							
Hawkbit*	<i>Leontodon spp</i>	0.6	*							



effort. The flowers just did their own thing and coped fine with mowing approximately every two weeks – although the lawn was not mown at all during the study. The flowers being visited by bees were species that can bloom when only a few inches tall and so are well suited to growing in a lawn. Don't try to encourage foxgloves in your lawn – these and other tall plants cannot take the mowing!

Some people think that a lawn should be very neat and tidy, with nothing but short, dense grass. This is perhaps needed for some lawns, such as a formal lawn or for playing high-level tennis or golf. But if the home owner is willing to let nature take its course, it may be possible to encourage wildflowers that already live in a lawn to reach the point where they provide a wonderful display of colour and are visited by bees and other insects.

How exactly does one encourage wildflowers in a lawn? In this case, nothing was done and nature was allowed to be the gardener. It is possible to spread wildflowers already present by moving small patches, or plugs of them, to parts of the lawn where they don't yet occur, or by gathering seeds and distributing them. Refraining from fertilising the lawn will probably also help, as nitrogen fertiliser gives the grass a greater advantage over the wildflowers and especially over clovers which can 'fix' their own nitrogen. Selective herbicides which promote grass at the expense of broad-leaved plants should certainly not be used. Perhaps the main requirements are patience, tolerance and doing nothing. As the Italians say, *dolce far niente* (it is sweet to do nothing). In this case, quite literally, so that the doing nothing will result in more nectar.

In the US, a few companies have taken advantage of some people's desire to have near-immaculate, bright green lawns, and will come to spray your lawn with fertilisers and weed killers at regular intervals. One of these was known formerly as ChemLawn but changed its name to TruGreen. It is questionable whether it is a good idea to spray chemicals on domestic lawns. Similar companies now operate in the UK. You may have received flyers through your letterbox advising you that your lawn may be infested with *Taraxacum* or *Bellis* or other scary-sounding names. This becomes less scary when you realise they are referring to dandelions and daisies. In a recent visit to a local garden centre, one of us (FR) came across a shelf of herbicides claiming to "Kill Clover in Lawns". Ironically, in other parts of the garden centre they were selling seeds and plants that were supposed to attract bees,

and with various logos to proclaim this, plus other products ostensibly to help wildlife!

Our short project has sparked off LASI's interest in helping bees via wildflowers in lawns. The BBKA has provided part-funding for a LASI project on the 'Availability of summer bee forage in domestic garden lawns: flower species, bee and insect species, and effects of lawn management'. The main aim of this project is to gather data on domestic garden lawns of relevance to better understand and improve their value as sources of summer forage for honey bees and other flower-visiting insects.

The three main questions to be addressed are:

- 1. Lawn wildflowers:** which species are present and in what abundance?
- 2. Insects on lawn flowers:** which species are present and which flower species do they visit?
- 3. Lawn management:** how does lawn management, such as the cutting regime and the use of selective herbicides and fertilisers, affect lawn flower abundance and diversity?

Field work for the project was due to be carried out in Sussex, focusing on lawns in three towns (Brighton, Uckfield, Ardingly) in the summer of 2020. However, coronavirus and its restrictions may result in much of the field work being delayed until 2021.

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FROM LEFT
Solitary bee
(*Andrena* spp) on
hawkbit, *Leontodon*
spp
Common carder bee,
Bombus pascuorum,
worker collecting
pollen from bird's-
foot trefoil, *Lotus*
corniculatus
Selfheal *Prunella*
vulgaris