Putting the buzz back in pollination

> *“Some plants are adapted to hold onto their pollen and only release it when a bumblebee enters its flower”*

Bumblebees

Bumblebees are probably the UK’s most iconic insect and possibly the ‘bee’s knees’ of the pollinators. *CPM* finds out more about them and picks up a few ways to make room for them on the farm in a webinar hosted by Nature Friendly Farming Network and the Bumblebee Conservation Trust.

By Lucy de la Pasture

Mention biodiversity loss and even those with few connections to the natural world will be able to tell you that the bees are in trouble. People care about bumblebees and more often than not, their decline is attributed to agriculture.

Their gradual decline began at the end of World War II, explains Clare Flynn of the Bumblebee Conservation Trust (BBCT). “Loss of habitat has been the single biggest driver due to changes in food production practices in the post-war period which led to the loss of species-rich grassland, in particular.”

Eighty years ago food security was a government priority and farmers were encouraged to ‘dig for victory’ and as a result the landscape changed significantly, which had impacts on its flora and fauna. It began a push for productivity which was supported by synthetic inputs to remove competition from weeds and some quite unpleasant insecticides, which are now confined to the history books. The humble bumble simply ran out of suitable habitat and food.

Pollinating services

Pollinators are required by 75% of global crop plants to facilitate fertilisation — a prerequisite for seeds or fruits to develop. In the UK, it’s estimated that the bumblebee contributes more than £690M to agriculture, says Clare.

For agricultural crops that require open pollination, such as beans and oilseed rape, it’s common for farmers to work with local honeybee keepers, utilising the colonies’ pollinating services in return for the honey the hives provide their keeper. But what about using nature’s ‘free issue’ of wild pollinating insects?

“We have approximately 280 different species of bee in the UK,” explains Clare. “Of these, the vast majority are solitary bees, made up of 250 different species. Solitary bees nest close to one another in big aggregations but, as their name suggests, they don’t form colonies and the females work alone.

“The solitary bees are very diverse and often overlooked but are actually very important pollinators,” she adds.

The honeybee is the only bee that ▸

Ditch management can play an important part in ensuring food supplies for pollinating insects.

This adult hoverfly feeding on yarrow provides pollinating services, but her larvae carry out pest control by voraciously eating aphids.

▸ produces honey. "There are different strains of *Apis melifera* present in the UK and these give the honeybee its different colour forms and regional specialists.

"In the UK, bumblebees belong to one of 24 different species — 18 of which are social but, of these, only eight species are common in the UK."

Social bumblebees have a very similar lifestyle to the honeybee, with a queen and daughter workers, with generally 50-200 in a colony compared with tens of thousands of workers in a honeybee colony, she explains.

There are also six 'cuckoo' species of bumblebee. Females of these species act in the same way as their namesake, invading the nest of social bumblebees, killing or replacing its queen and using the colony's workers to bring up grubs of its own, says Clare.

The 'bee's knees'

Bumblebees are known to be the bee's knees when it comes to pollination, so much so that buff-tailed bumblebees are imported to lend a helping hand to pollinate some horticultural crops. "These are factory bred, which can have massive implications in some countries where the species isn't native. In the UK the implications are more subtle as the imports are the same species but a different strain."

So why is it that bumblebees are so important as pollinators? The reasons are multifold, explains Clare.

"The female workers are corbiculate — meaning they have 'pollen baskets' on their tibia, which are formed from hairs. The female combs the pollen from her body, which she mixes with regurgitated nectar, to form pollen 'lumps', which are then transported in these baskets.

"Male bumblebees also get covered in pollen, but unlike the workers, they don't comb the pollen — only females have this behaviour to take food back to the nest for its young," she says.

In the matriarchal bumblebee society, it's the females that do just about everything, with the males existing for one purpose only. "They really just sip nectar until their services are required later in the season."

Bumblebees rely on pollen and nectar for 100% of their food supply. Known for their 'fuzziness', the hairs covering the bee's surface are electrostatically charged, so pollen literally jumps onto their coats, explains Clare.

But that's not the only way bumblebees collect pollen. They're equipped with a neat trick that ensures they're the only insects that some flowers will give up their pollen for.

"Some plants are adapted to hold onto their pollen and only release it when a bumblebee enters its flower, and then disengages its muscles to relax its wings. The 'buzz' from the wing muscles triggers pollen to be released from the flower's anthers — known as buzz pollination."

Flowering plants such as these recognise that bumblebees have the ability to make relatively long flights, which helps them survive in a 'patchy' landscape. They are also better adapted to cold conditions than some other pollinators, meaning they can forage on cool and cloudy days, adds Clare.

The social bumblebee year

The bumblebee year begins in spring when rising temperatures — often in early March — awake the queen, who has been hibernating alone in the soil having been mated the previous autumn. At this time the flowers of willow and catkins provide crucial food supplies as she drinks nectar to gain energy after her long sleep.

Once re-energised the queen searches for a nesting site, which is often underground or in tussocky grasses at the base of hedges. Having found a suitable site, she collects pollen and nectar to bring back to her nest.

She forms a mound of pollen and wax (which she secretes from her body) and lays her first brood of eggs. She also collects nectar, which she stores in a pot-shaped structure made of wax which she places in front of her mound. The queen keeps the eggs warm by sitting on her wax nest, like a bird, and shivering her muscles to keep warm.

Sipping from the nectar pot gives her enough energy to incubate the eggs for several days until little white grub-like larvae emerge. These are then fed on pollen and nectar that the queen forages from nearby flowers. Once they've eaten enough, after around two weeks, the larvae spin a cocoon and develop into adult bees.

As the spring progresses eggs continue to hatch in different cohorts, with the all-female first brood becoming the workers that tend to the needs of their younger sisters in the colony, and they build wax cells as the nest continues to grow through the summer. From this point on the queen no longer leaves the nest. Instead, she will remain inside where she lays more eggs.

The end of the nest cycles varies according to species but as the summer wears on, males start to be produced as well as female workers. The male bees leave the nest and don't normally return. Instead, their days are spent feeding on nectar and trying to mate.

New queens leave the nest and mate with a male from another nest and feed themselves up before going into hibernation. They store the sperm ready to re-start the whole cycle the following spring. All the rest of the nest die.

Female worker bees comb pollen from her body, which she mixes with regurgitated nectar, to form pollen 'lumps' which are then transported back to the nest in 'baskets' on her tibia.

Bumblebees are also able to reach the parts of some flowers that hoverflies, wasps and other pollinating insects just can't get to. The feature which sets them apart from other pollinators is the length of their tongue, with some species able to probe the deepest flowers.

"The honeybee tongue is approx. 6mm long so the flowers they can feed on are limited by its morphology. Bumblebee workers vary in size depending on the species, with the smallest equalling the honeybee tongue at 6mm, but the largest — the queen of the Garden bumblebee — has a tongue that's 20mm long. This means bumblebees can pollinate the widest range of flower species." ■

Hedgerows managed on rotation allow different lengths to flower in spring and provide important foraging for early pollinators.

Making room for bumblebees

The most welcoming thing farms can do for bumblebees is to make sure they have a continued food supply from when the queens emerge in February/March until new queens are produced in September/October, says Anna Hobbs, conservation officer at BBCT.

Her role involves helping farmers enhance their farms for pollinators by surveying the species present and suggesting ways they can be supported. "Our aim is to work at a landscape level and establish clusters of pollinator-friendly farms. That involves looking at each farm as a whole — including semi-natural habitats as well as the farmed area," she says.

As well as food, bumblebees need habitat that's suitable for nesting and hibernating. "That may mean restoring, enhancing, creating or just better managing existing habitats on the farm," she adds.

Often there are gaps in food supply within the year, and for the bees that can mean feast to famine. Planting wildflower areas, with mixed flowering species to extend the flowering period, or delayed grazing or cutting of grassland to increase the number of flowers in the sward in the next season are all strategies that can aid the bumblebee, she explains.

"Increasing diversity is good for bumblebees and other pollinators and managing tracks and margins so that tussocky grasses are present is also helpful."

Reinstating orchards, hedgerows or planting shrubs are some other ways to improve bumblebee habitat.

Some of the strategies to help bumblebees simply requires a change of mindset. Stuart Taylor is farming near Mold in North Wales. Although his land is grassland, the same principles behind the strategies he's adopted apply to arable farms.

Stuart has embarked on a programme of habitat creation in an effort to become more nature-friendly, creating a network of permanent habitats to buffer against his farming operations. For example, the woodland on his farm provides multiple habitats, he says.

"The woodland edge has flowering plants at ground level, beyond that there are small flowering trees such as rowan and hazel before reaching the woodland itself. We cut hedgerows every two years to allow the old wood to flower and fruit, as well as leaving some hedgerow trees for shade and shelter," he says.

Stuart has learnt that set stocking hasn't done his biodiversity much good in the past so now he rotationally grazes. The 60 days it takes to complete a grazing cycle on the farm allows the flowers in his grassland ample time to flower and shed seeds, further enriching his grassland.

"Parasol mushrooms have appeared over the past five years, along with yarrow and mouse-eared hawk weed."

The permanent pasture now has an understory of red clover and Stuart says he's learnt that his older leys are actually more useful than modern farming has perhaps led farmers to believe. Legume-rich and herb rich pasture also supply ample nutrition for his organic dairy herd.

"I have 16 different species in a herbal ley, compared with the 5-6 in more traditional agricultural mixes. They don't all make it but those species that do will be suited to the conditions of that field and thrive. It also gives us a longer flowering period and roots at different depths to help soil structuring," he says.

One of Stuart's top tips is that when cutting for silage, he always leaves a strip in the field to flower. He'll do the same for the second cut but in a different part of the field. It's something that could equally be applied to driveways and areas around the farm, which left uncut could be viewed as untidy.

"The trick to encourage biodiversity is not to be too tidy and leave some areas a little bit wild," he adds.

A network of flowering margins across the farm, containing species with successive flowering, provide food and habitat for pollinators.

Farm tracks can provide valuable sources of food for pollinators, and if verges have to be mown then consider leaving a strip uncut.