



# Bees (Order Hymenoptera)

- Very important pollinators
- They rely on flowers for pollen (protein) and nectar (sugar)
- Two pairs of wings
- Long segmented antennae
- May have a long tongue (especially bumblebees)



# Bees (Order Hymenoptera)

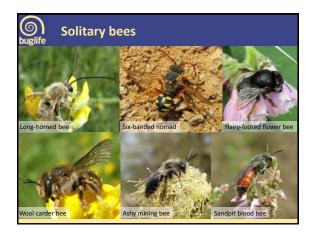
- Bumblebees 24 species
- Solitary bees ~225 species
- Honeybee 1 species



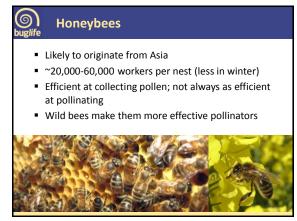












### Bees - life cycle

- Solitary or colonial (societies dominated by a queen)
- Colonies vary from hundreds (bumblebees) to 10,000s (honeybees)
- Solitary bees only live for around 8 weeks (seasonal), bumblebee queens live for one year, honeybee queens usually live for two or three years





### **Bees - feeding requirements**

- An unbroken food supply is essential from March to October
- Nectar and pollen sources required (some species rely on a single plant species)
- Species morphology (tongue length) can affect flowers visited
- Distance to nesting habitat is important - central place foragers





### **Bumblebee - nesting**

- Nest sites disused mammal holes, under rocks, tree holes, grass tussocks, open grassland
- Nests are formed of wax cells and contain 30-200 workers
- Hibernation sites northfacing banks with soft soil, hedge and ditch banks, deadwood
- Bumblebee queens must reach a certain weight to survive the winter





### Solitary bee - nesting

- Nest sites mine into bare soil, aerial nesters, snail shells, woody stems, construct nests with mud or leaves, cleptoparasites
- Social, communal or solitary
- Distinct seasonality most have only one season per year





### Bees - distances travelled

- Foraging distances range from tens of metres to kilometres
- The availability of a range of food sources along with shelter for nesting and hibernation within a local landscape is a critical factor

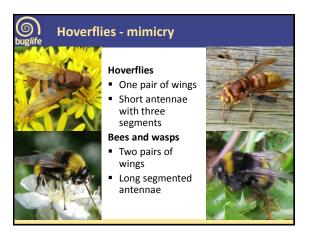


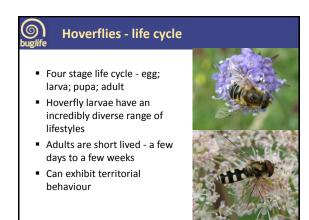


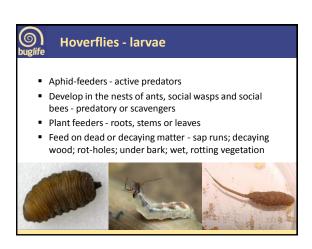
### **Hoverflies (Order Diptera)**

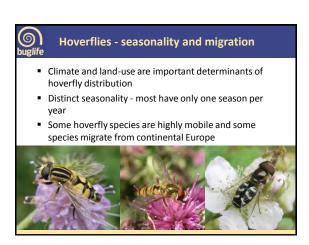
- Very important pollinators
- They rely on flowers for pollen (protein) and nectar (sugar)
- One pair of wings the hind pair are modified into halteres used for balance
- Short antennae with three segments
- Most have short, sponge-like mouthparts
- Often mimic bees and wasps through behaviour, appearance and sound

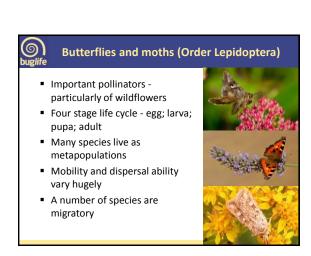




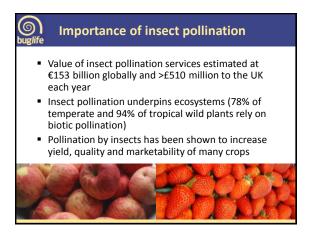


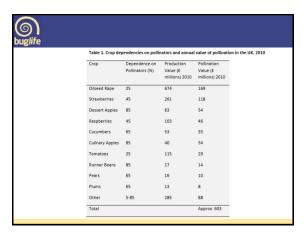


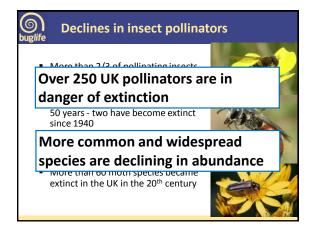


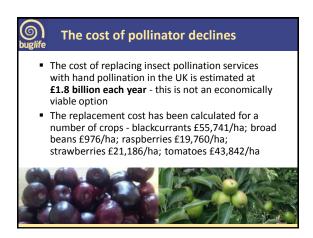


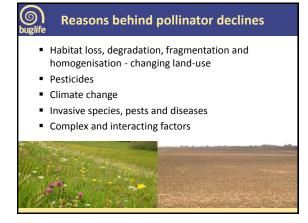




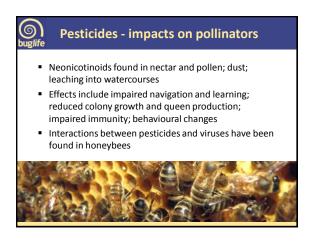






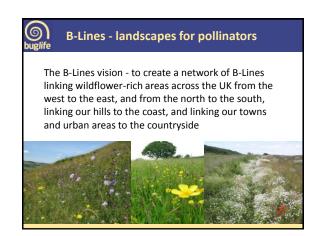


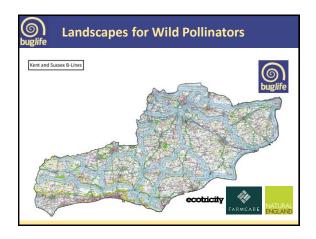




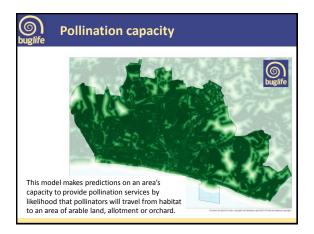


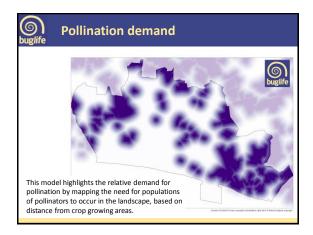








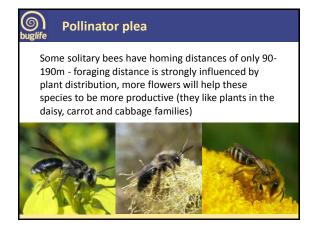














### **Pollinator perk**

Mining bees (Andrena) are the most abundant spring solitary bees and are important pollinators of fruit trees and oilseed rape - they can increase the quantity and quality of crop produced





### **Pollinator perk**

Insect pollination is essential to gala and cox apples affecting quantity, but also quality - influencing size and shape that affects marketability, estimated to add £11k+/ha for cox and £14k+/ha for gala.







### Pollinator plea

Hoverflies mouthparts make them suited to feeding on flat flower heads such as those in the daisy and rose families - planting more of these will give them the food they need





# Pollinator perk

The larvae of around 40% of British hoverfly species are predatory on aphids - each marmalade hoverfly larva consumes 660-1,140 aphids, flower strips adjacent to potato crops increased egg laying by hoverflies (127%) and lacewings (48%).







### **Pollinator perk**

Hoverflies have been shown to double the proportion of marketable strawberries, beepollinated fruits have been shown to be heavier with less malformations and improved shelf life





### Pollinator plea

The availability of forage in close proximity to the nest is crucial for spring bumblebee queens - they need to visit tens of thousands of flowers to found their colonies, easy access to flowering hedgerows and shrubs gives these bees a great boost





### **Pollinator perk**

Some plants have evolved poricidal anthers to regulate pollen dispersal, bumblebees use buzz pollination (creating vibration with their flight muscles) to release the pollen - blueberries, tomatoes, aubergines, potatoes and kiwis all require buzz pollination.







### Pollinator plea

Bumblebee colonies exposed to neonicotinoids sent out more workers - who carried out longer foraging bouts but brought back less pollen, less frequently - and lost more workers, ditch the chemicals!





### **Pollinator perk**

Wild insects provide better-quality pollination as a result of their foraging behaviour - honeybees supplement wild insect pollination but cannot replace it





# Pollinator plea

Butterflies and moths rely on energy from nectar and will have lower breeding success when nectar is limited - simple management in relatively small areas can increase richness and abundance of moths and butterflies





### **Pollinator perk**

Butterflies and moths are vital pollinators of our wildflowers and an important part of the food chain



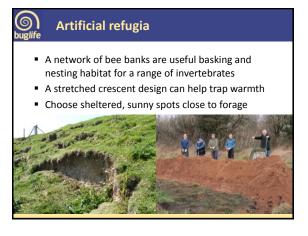


### The top pollinator plants

- Trees and shrubs field maple, hawthorn, roses, willows/sallows, blackthorn, bramble, ivy, elder
- Legumes clovers, vetches, bird's-foot-trefoils
- Open flowers knapweeds, oxeye daisy, hawkbits, dandelions, yarrow, mallows, scabiouses, hemp agrimony, teasel, burdock, cat's-ears, hawk's-beards
- Deep flowers thyme, dead-nettles, ground ivy, woundworts, red bartsia, mint
- Umbellifers wild carrot, hogweed, cow parsley, hedge parsley



# The top pollinator cultivated plants Trees and shrubs - apple, pear, plum, cherry, blackcurrant, gooseberry, raspberry, privet Open flowers - alliums, crocus, sunflower, strawberry, artichokes, hellebore, poppy Deep flowers - columbine/aquilegia, comfrey, globe thistle, honeywort, marjoram, lavender, thyme, mint, phacelia, snapdragon, sanfoin, alfalfa, hyssop











- University of Sussex looking for volunteer 'citizen scientists'
- You would be asked to:



 University of Sussex looking for volunteer 'citizen scientists'

★You would be asked to:

Perform counts of which insects are visiting any crops flowering in your plot (fortnightly)

Sussex will provide training and pollinator ID sheets!



University of Sussex looking for volunteer 'citizen scientists'

You would be asked to:

Perform counts of which insects are visiting any crops flowering in your plot (fortnightly)

Sussex will provide training and pollinator ID sheets!

Keep track of food harvested from allotment using recording sheets/online tool



University of Sussex looking for volunteer 'citizen scientists

You would be asked to:



Perform counts of which insects are visiting any crops flowering in your

Sussex will provide training and pollinator ID sheets!



Keep track of food harvested from allotment using recording sheets/online tool



Optional: upload yield data to calculate how much money saved by



### **Further sources of information**

- Buglife publications https://www.buglife.org.uk/advice-andpublications/publications/b-lines-resources
- The Buzz Club <a href="http://thebuzzclub.uk/">http://thebuzzclub.uk/</a>
- The Solitary Bee Project http://thesolitarybeeproject.org/
- **Bumblebee Conservation Trust**
- **Butterfly Conservation**
- **BWARS**
- Dipterists' Forum

