

Suitable for Key
Stages 1 and 2

The Bee Cause

A pack for educators

- to help children find out about bees and their importance
- to explore British wildlife and food chains
- activities and advice to help your school or youth club become more bee-friendly



Why teach about bees?

Bees are very interesting creatures; we are used to seeing them on flowers and their buzzing is part of summer, but we often don't appreciate quite how much they do for us.

We mainly think of bees as producing honey, but honey bees are just one of Britain's 267 species. The rest are wild bumblebees and solitary bees. All species of bee collect nectar and pollen as food, and at the same time they pollinate a large proportion of our fruit and vegetables. If they didn't, the plants would not produce the fruit, berries and seeds that we eat. This is explored in both the infant and junior activities.

Much of our wildlife also relies on bees and other pollinators (butterflies, moths, hoverflies, flies and beetles) – to pollinate plants so new ones can grow and so those plants can feed many insects, birds and animals. So not only are bees interesting in themselves, they are a way to explore the wider ecosystem and the food chains that link it all together. This resource pack

provides lots of games and activities to help primary school children develop a good understanding of British species and ecosystems.

But honey bees are in trouble and the numbers of many wild bumblebees and solitary bees are dropping. Two bumblebee species are already extinct. Bee decline is caused by many things – changes in land use, habitat loss, development, disease, pesticides, farming practices, pollution, invasive species and climate change. This is all the more worrying because bees are such a key species in the ecosystem.

But the aim of this is not to make the children feel sad about the bees. There is an opportunity here to do a little bit to help them by making a bee-friendly area in your school grounds. That way, the children can not only find out about how important bees are, they can also make a positive difference.

We believe everyone can make a difference – and hopefully this pack will inspire you to do so.





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There are additional resources to complement this pack on the Friends of the Earth website at www.foe.co.uk/beeseducation. The resources include videos, worksheets and A4 phylo cards. You can also make up your own Bee-Friendly flowers recording sheet, to include flowers that are found in your own school grounds.



Why do we need bees? Assembly/Talk – KS 1/2

Preparation

Collect together bee-friendly flowers, honey, baked beans, tomato ketchup, strawberry (or other fruit) ice cream, binoculars, bird book and a box they will all fit into.

If you are going to use the pantomime version of the talk (for two people with audience participation), you will also need to photocopy onto card the Bee on page 10 and the 'I hate bees' and 'I love bees' badges on page 11. Tape a safety pin to the back of each badge and attach the bee to a stick.

This script doesn't need to be read word-for-word. It is an outline that can be adapted to suit your style, the way the audience reacts and the age of the children.

Pantomime version

You will need two educators – one a bee lover, ('Bee'); and one wearing the large badge saying 'I hate bees' ('Badge'). Badge could also have a large red bee sting on their arm or face (lipstick/pen). By the end, the children will have convinced 'Badge' that bees are important.

- Bee:** Hello everyone, I'm ...Bee's name... I've been finding out about bees and they are fascinating creatures – and very important to people and to other wildlife as well. I've brought in a box of things to show you. Oh, here comes ...Badge's name...
- Badge:** *[Walks in]* Hello ...Bee's name..., hello everyone. I'm feeling quite upset – I was in the garden today when I saw a bee. I find them very scary, so I tried to flap it away *[arm flapping actions]*. But then it stung me! I don't know why we need bees, I wish there weren't any at all.
- Bee:** I think I know why it might have stung you – does anyone here know? *[Ask audience]* Yes, it's all the flapping you were doing – the bee was probably far more scared of you than you were of her. She thought you were attacking her!
- Badge:** Oh, I see! So what should I have done? *[Ask audience.]* Right, so next time I'll just stand still and watch and she'll just carry on buzzing round the flowers and ignore me!
- ... but I still don't know why we need bees. *[Sits down / stands at side, not taking notice.]*
- Bee:** I've brought in a box of things that might help with that – and I'm going to need help from all of you *[indicate audience]* as well. There are lots of reasons why we need bees that ...Badge's name... doesn't realise. I'd like you to help me tell ...Badge's name... about how important bees are. Can you help?
- I need a volunteer. *[Choose from audience.]* Each time ...Badge's name... picks something he/she likes that is connected to bees, I need you to walk across in front of us holding this bee / hold up this bee *[give them the bee on a stick, show where to walk, then ask them to sit down with it ready for next time]*. When the bee is held up, I want everyone else to say 'bzzzzzz'.
- Let's do a practice. *[Nod at child to walk across front, children buzz.]*
- I didn't hear that *[pantomime style]*. Can we try again a bit louder? *[Child walks across front, children buzz.]*
- A bit louder, but I still don't think ...Badge's name... is going to take much notice. Let's try one last time. *[Child walks across front, children buzz.]*

Additional Resources

These can be used as part of the assembly/talk or afterwards to reinforce the learning.

FACT CARDS

There are extra bee facts in text boxes like this one, placed in the script where they could be read out. They are also available printed larger for pupils to read from at www.foe.co.uk/beeseducation

VIDEOS

There are three short clips from the BBC documentary 'Bees, Butterflies and Blooms' at www.foe.co.uk/beeseducation

- 'A breakfast without pollinators'
- 'Protecting Britain's bees'
- 'Which flowers are good for pollinating bees?'

BEE QUIZ

This is on page 8.





That's brilliant, now let's see what ...Badge's name... is going to pick out of my box. Hey, ...Badge's name..., come and see what I've got here!

Badge: What's in the box? *[Takes FLOWERS and shows to audience.]*

These are pretty flowers, I do like to see them in my garden

Bee: *[Nod at child with bee on stick, they walk across front, children buzz]*

Badge: Why are you all buzzing? Do you think flowers have something to do with bees – they don't, do they?

Bee: *[Ask audience, give hints and help out if necessary]*

Yes, bees collect nectar and pollen from flowers as their food.

Badge: *[Takes HONEY and shows to audience.]*

Mmmm, I love honey on my toast in the morning.

Bee: *[Nod at child with bee on stick, they walk across front, children buzz]*

Badge: Surely honey hasn't got anything to do with bees, has it?

Bee: *[Ask audience, give hints and help out if necessary]*

Yes, bees make honey from nectar.



Fact card 1: There are three types of bee – honey bees, bumblebees and solitary bees. There are 24 species of bumblebee and more than 250 species of solitary bee in the United Kingdom.

Fact card 2: Different bees collect pollen and nectar from different flowers – short tongued bees like open flowers like daisies and long tongued bees like deep flowers like foxgloves.

Note: If you have a bunch of flowers and you are doing this as a talk to one class, you could pass the flowers round. Or you could share the flowers out between the tables of children and ask them to write down the names of all the ones they know.



Fact card 3: When a honey bee finds nectar, she goes back to her nest and does a waggle dance to tell the other bees where it is.

Fact card 4: If you add up all the journeys made by the many bees needed to produce a jar of honey, it totals over 40,000 miles. That's nearly twice round the world.

Badge: *[Takes tin of BAKED BEANS and shows to audience.]*

Baked beans are my favourite lunch!

Bee: *[Nod at child with bee on stick, they walk across front, children buzz.]*

Badge: You're teasing me – surely baked beans don't have anything to do with bees!

Bee: *[Ask audience, give hints and help out if necessary.]*

Bees spread pollen from one flower to another. This is called pollination.

When the flower is pollinated it grows into a seed. Beans (like in these baked beans) are the seeds of a bean plant.



Fact card 5: Without bees to pollinate them, bean flowers wouldn't grow into beans, apple flowers wouldn't grow into apples and there wouldn't be seeds to grow into new carrots.

Fact card 6: We wouldn't starve without bees but we would have to eat much more rice, pasta and bread. A healthy diet would become much more expensive – some people might not be able to afford it.

Fact card 7: Without bees there would be no pizza, jam, apple pie, fruit yoghurts, juice, or most types of fruit and vegetables. There would be hardly any herbs either, so food would be less tasty.

Badge: *[Takes TOMATO KETCHUP and shows to audience.]*

Ooh, tomato ketchup to put on my chips.

Bee: *[Nod at child with bee on stick, they walk across front, children buzz.]*

Badge: Bees can't make honey from tomato ketchup!

Bee: *[Ask audience, give hints and help out if necessary.]*

Bees need to pollinate the flowers on tomato plants or they don't grow into very big tomatoes. The seeds are inside the tomatoes.

Badge: *[Takes STRAWBERRY ICE CREAM and shows to audience.]*

Yummy, strawberry ice cream!

Bee: *[Nod at child with bee on stick, they walk across front, children buzz.]*

Badge: Don't tell me even the strawberry ice cream needs bees!

Bee: *[Ask audience, give hints and help out if necessary.]*

Strawberry flowers need to be pollinated by bees – then they grow into strawberries with the seeds on the outside.

[Ask audience] Why do all these plants need to make seeds anyway? (The beans, the seeds inside the tomatoes, the seeds on the strawberries?)

So more plants can grow from the seeds – more beans, tomatoes and strawberries.

Badge: *[Takes BINOCULARS and shows to audience.]*

Ah, binoculars to watch birds! I do like to do that, I have lots in my garden.

Bee: *[Nod at child with bee on stick, they walk across front, children buzz.]*

Badge: Now wait a minute – binoculars are definitely not pollinated by bees!

Bee: *[Ask audience, give hints and help out if necessary.]*

Note: Pollination could be demonstrated with the Bee on the stick, flowers and a bean or fruit.



Fact card 8: A bumblebee pollinates a tomato flower by pulling it downwards, putting its tummy against it and buzzing. The pollen then falls onto the bee's fuzzy tummy.

Fact card 9: Most of our tomatoes are grown in huge greenhouses. The growers buy hives of bumblebees, which they put inside to pollinate the tomatoes.

Fact card 10: In pear orchards in China, there are so few bees that people need to pollinate the pears by hand. They climb through the trees with 'pollination sticks' made of chicken feathers, dip the sticks into bottles of pollen and touch the stick to each of the billions of blossoms.



Lots of birds eat seeds and berries from plants that have been pollinated by bees – they would have far less to eat without bees.

[Ask audience] Why do plants make their seeds tasty and full of energy so birds and animals eat them?

Yes, so when the birds do a poo somewhere else the seeds are dropped on the ground there and grow into new plants.

Badge: *[Takes BIRD BOOK and shows to audience.]*

Oh yes, there are lots of birds in here that I like – the robin is my favourite.

Bee: *[Nod at child with bee on stick, they walk across front, children buzz.]*

Badge: Aha, I've caught you out now – robins don't just eat seeds, they eat worms and insects! They have plenty of other things to eat without bees.

Bee: *[Ask audience, give hints and help out if necessary.]*

The robin eats insects and they eat a lot of plants which are pollinated by bees.

Badge: I didn't realise everything was so connected. Who would have thought that bees are so important? Now I know how important bees are, can you tell me more about them?

Bee: Yes I can – but as you seem to have changed your mind about bees, would you like a new badge first?

[Gives Badge the 'I love bees' badge.]

Bee: Bees' biggest problem is that there aren't as many wild flowers as there used to be, so there is less food for them to eat. Bees can collect nectar and pollen from crops like oil seed rape as well, but they only flower for a few weeks. If that is the only flower, then the bees go hungry when the crop has finished.

Badge: So what can I do to help?

Bee: Explain any plans that have been agreed about the school planting a bee-friendly garden or taking other bee-friendly actions. (See '10 things you can do in school for bees')

Also, you could talk about types of plants bees that like and ways to help them at home. Not using weed killers like 'Roundup' and pesticides in gardens helps a lot, as does leaving grass to grow a bit longer.

There are then links to short videos at www.foe.co.uk/beeseducation, which either provide a background for discussion to reinforce what has been learnt or provide additional information.

Discussion version

If you do not want the children to buzz, or there is only one of you doing the talk/ assembly, you can do a 'discussion' version instead of the pantomime.

Simply take in the box of items and say you have brought in some things that have something to do with bees. You can show them to the children and they need to guess what the connection is. You can use the script, but without the buzzing and the words spoken by 'Badge'.

Fact card 11: Some plants tempt birds to eat their seeds by surrounding them with a filling meal full of vitamins and energy – a berry.

Fact card 12: In most cases, the bird digests the pith and juice but the seed can't be digested. It can be dropped many miles away in the bird's poo. The seeds can then grow into new plants.

Fact card 13: A robin could eat a large white caterpillar, which has been munching on some cabbage – which is pollinated by bees. 'Robin eats large white caterpillar which eats cabbage' is a food chain.

Fact card 14: Pollination by insects is the main way that three quarters of the UK's flowering plants make seeds. Fewer bees would mean fewer of these plants and fewer of all the animals and birds that eat berries, seeds and insects.

Fact card 15: We've lost 97 per cent of our wildflower meadows since the 1930s. Wildflower meadows have been turned into farmland to grow food for people. Bigger fields are worse for bees because wildflowers and nesting sites are pushed to the edges.

Fact card 16: Scientists are finding that chemicals are affecting bees' health when they feed on plants sprayed or treated with pesticides. There are also pests and diseases that weaken bees.

Fact card 17: Houses, supermarkets, offices and roads have also been built on wildflower meadows. Climate change is making the weather more changeable – causing floods, droughts and high winds. The weather can be warmer or colder than is normal for the time of year. All this makes life more difficult for bees.

Bees Quiz

As an alternative to using the fact cards in the Bee Assembly / Talk, you can do this quiz at the end with the children in teams.

1. Q. About how many species of bee do you think there are in the UK? About a) 10, b) 100 or c) 250?

A. *The answer is c), there are more than 250 species of bee. Some are bumblebees, some are honey bees and some are solitary bees.*

2. Q. In a foxglove, how do you think pollen and nectar are collected by bees? With a) Long tongues, b) Long legs or c) Long tails?

A. *The answer is a), bees usually (but not always) collect pollen and nectar with their tongues. Long tongued bees can collect from deep flowers like foxgloves and short tongued bees like open flowers like daisies.*

3. Q. When a honeybee finds nectar, how does she tell the other bees where it is? Does she a) Do a dance, b) Draw a map c) Sing a song?

A. *The answer is a), a 'waggle' dance is something bees do to tell other bees where the nectar is. They waggle in the direction of the flowers.*

4. Q. If you add up all the journeys made by the bees needed to produce one jar of honey, how much would it total? a) 10 miles, b) 1000 miles or c) 40,000 miles?

A. *The answer is c), 40,000 miles, that's nearly twice around the world!*

5. Q. If we didn't have bees to pollinate food such as beans for us, what would happen? a) We would starve, b) Healthy food would be much more expensive or c) It would not affect us?

A. *The answer is b), it would cost farmers around £1.8 billion a year to pollinate crops without bees and that would make it more expensive for us as well. Some people wouldn't be able to afford healthy food.*





6. Q. How does a bumblebee pollinate a tomato flower? Does she a) Dip her legs into it, b) Stick her tongue into it or c) Buzz against it so the pollen falls onto her tummy?

A. *The answer is c), bees 'buzz-pollinate' tomatoes with their tummies, but they stick their tongue in most flowers. Some bees dip their legs into flowers like thistles.*

7. Q Which of these foods don't need bees for pollination? a) Beans, b) Sweetcorn or c) Watermelon?

A. *The answer is b), sweetcorn is really a type of grass and it is pollinated by the wind. However, most fruit and vegetables are pollinated by bees and other insects. Bees still visit sweetcorn for nectar or pollen to eat.*

8. Q. How do plants use berries to spread their seeds to new places? Do they a) Make them tasty so birds eat them, b) Shake the berries off or c) Wait for someone to pick them off and plant them?

A. *The answer is a), the bird digests the flesh of the berry, but the seed is dropped out in its poo. The seed can grow into a new plant in a new place.*

9. Q: When a bee pollinates a flower, which of these is NOT true? a) Some flowers grow into berries that birds eat, b) Some flowers grow into seeds that birds eat or c) Some flowers grow into caterpillars that birds eat?

A. *The answer is c), no flower grows into a caterpillar. But caterpillars do eat a lot of bee-pollinated plants, and birds do eat caterpillars. Bees, plants, caterpillars and birds are all important parts of the food chain and they all need each other.*

10. Q. Why are bigger fields with either lots of crops or lots of grazing animals not as good for bees? Is it because a) The bees can't find each other, b) There are fewer flowers and nesting sites for bees or c) The bees can't feed from crops?

A. *The answer is b), wild flowers for food and hedges for nesting sites grow around the edges of fields, so there are less of them in large fields. The bees can feed from some crops like oilseed rape but they only flower for a few weeks and bees need food all year.*

11. Q. Which of these do you think are bad for bees? Pesticides, extreme weather, climate change, building on wildflower meadows or disease?

- You might need to check with the children what these things mean before they vote for the one they want:
- Pesticides are chemicals used to kill insects so they don't eat farmers crops.
- Extreme weather includes things like drought (very hot weather with no rain) and very windy conditions.



- In order to build on a wildflower meadow, the meadow must be removed.

A. *The answer is all of them. Pesticides affect bees brains so they can't live normally, be active or remember where the good nectar is. Climate change causes extreme weather conditions like high winds and droughts, it can also cause the weather to be cooler or warmer than it would normally be at a certain time of year. Also wildflower meadows that bees like are often cleared and used to build on, so the bees cannot live or get their food there anymore. Bees need your help!*

Bee to use in the assembly/talk (Pantomime version)

Photocopy onto card and attach to a stick. Choose a volunteer to hold up the bee if something is taken out of the box which is to do with bees. When the bee is held up, the whole class needs to buzz.





Badges to use in the assembly/talk (Pantomime version)

Photocopy onto card and attach a safety pin to the back of each one. Two educators are needed for the pantomime version and one of them wears the 'I hate bees' badge at the start of the talk. By the end of the talk, they are convinced by the children that bees are very important and put on the 'I love bees' badge.



Phylo Ecosystem Games – KS2

The Phylo cards consist of 45 species cards (plants, insects, birds and other animals), seven event cards and two key cards. The species cards contain information about that plant or animal. The event cards show some things which can happen, affecting the environment these species live in and either making it better or worse. The key card can be used as a reminder during the games, as it shows what different parts of the card mean and how food chains are made.

There are three different games to play with the Phylo cards – ‘Phylo Snap’, ‘Phylo Dominoes’ and ‘Phylo Rummy’. There are also worksheets and activities. The Phylo games are all designed to help children find out about British plants and animals. Phylo dominoes is played by making food chains and the role of pollinators needs to be taken into account. Phylo Rummy shows the effects that different events have on ecosystems, good and bad.

If the children have already come across terms such as ‘herbivore’ and ‘predator’, these games and activities will help them practise their knowledge. However, the terms can also be introduced at the same time as the cards.

Key for the Phylo Species cards

Most of the cards are ‘Species cards’, giving information about one animal or plant:





FOODCHAIN - number

Position in food chain:

- 1 - producers - plants
- 2 - consumers - eat plants
- 3 - secondary consumers - eat consumers (and maybe plants)
- 4 - top predators - eat secondary consumers (and maybe consumers and plants)

DIET - circle colour


What the species eats:

-  plants (energy from sunlight)
-  herbivores (eat plants)
-  carnivores (eat animals)
-  omnivores (eat plants and animals)

SIZE - number



- Size 9 - eg. oak tree
- Size 8 - eg. hawthorn
- Size 7 - eg. maize / sheep
- Size 6 - eg. poppy / rabbit
- Size 5 - eg. bluebell / greenfinch
- Size 4 - eg. moss / woodlouse

POLLINATOR - picture

 - a pollinator

HOW POLLINATED

- background colour

-  needs an insect pollinator
-  does not need an insect pollinator





Making food chains


The phylo cards can be used to make food chains, and this is a key part of phylo dominoes and phylo rummy. There are a set of rules about which species can eat each other, which means that the food chains which are built up are quite realistic:

Food chains must start with a plant – **1** – FOODCHAIN number 1

An animal can only be added to the food chain if it has a higher FOODCHAIN number than the species it is placed next to.

An animal can only be added to the food chain if its DIET includes the species it is placed next to. (E.g. a carnivore can only be placed next to an animal, not a plant.)

An animal can only be added to the food chain if it is a larger SIZE than the animal it is placed next to (unless there is an additional rule on the card – most predators eat smaller animals than themselves, but the garden spider and stoat can kill other animals that are the same size as themselves). When placing an animal next to a plant, the size of the plant does not matter as small animals frequently feed from large plants.

POLLINATORS  can only eat plants that need them (yellow background). Those plants need to have a pollinator placed next to them. Pollinators are not the only species that eat from plants that need pollination. In phylo rummy, once plants have been pollinated other species can eat them.

Food chain examples

These cards form a food chain of species that can eat each other. Look at size, food chain number and diet. Note that there does not need to be a species with food chain number 3, the buzzard can eat any animal (it's a carnivore) that is smaller than itself and lower in the foodchain. Food chains can have two, three or four cards but must always start with a plant.

Stinging Nettle
Urtica dioica 7 1



• Stinging nettles are eaten by the caterpillars of several different butterflies and moths. They lay their eggs on the underside of the nettle leaves so when the caterpillars hatch, food is nearby

Image by Uwe H. Friese
commons.wikimedia.org


Rabbit
Oryctolagus cuniculus 6 2



• A rabbit warns of danger by thumping with a hind foot. A flash of white tail is also an alarm
• Rabbits keep the grass around their warren nibbled short, leaving space for low growing plants which attract insects, and the insects attract birds

Image by a_jo
flickr.com

Buzzard
Buteo buteo 7 4



• Buzzards mate for life. To attract a mate, the male performs a spectacular display is known as 'the roller coaster'. He will rise high up in the sky, to turn and plummet downward in a spiral, twisting and turning as he comes down

Image by Spencer Wright
wikipedia.org

In reality, there are many more factors that determine the species in a food chain or food web. For example, the species must live in the same habitat and part of the country; they must be active at the same time of the day or night; and some species are specially adapted to only eat particular foods. There will be food chains that you can make with the Phylo cards that do not happen in real life, but they are a good approximation.

This food chain includes a pollinator and a plant that needs one:

Hawthorn
Crataegus monogyna 8 1



• Hawthorn provides food and shelter to many birds, insects and mammals. A large number of moths lay their eggs on hawthorn
• The fruit, called 'haws', are eaten by birds and can be made into jam as well

Image by Gordon Gibbons
northpeakphotography.co.uk

Small Tortoiseshell
Aglais urticae 4 2



• Small tortoiseshells roost and lay large batches of eggs on the underside of nettle leaves
• When they hatch, the larvae stick together, building webs across the nettles. If disturbed, a group of larvae will jerk their bodies from side to side in unison to scare off predators

Image by Gordon Gibbons
northpeakphotography.co.uk

Robin
Erithacus rubecula 5 3



• Robins like to come close to people or animals who are digging the soil, to look out for worms and other food. They can catch insects in flight
• Robins protect their territory aggressively and drive away intruders

Image by Gordon Gibbons
northpeakphotography.co.uk



Introducing the cards to a class

The purpose of this activity is to familiarise the children with the cards and the information on them and to enable them to make food chains. How much of this activity you want to do will depend on which game you want to play. The games are described on the next 3 pages.

Each child has an A4 size species card (not event) and 'becomes' that species, moving to a different table depending on the information on their card. The A4 cards can be printed from www.foe.co.uk/A4phylo

Ask the children to sit at a table with other species that have:

- The same colour circle
- Then the same number in the circle
- Then the same number to the left of the circle



Each time the children have sorted themselves onto tables, ask them to work out what the colour / number means – what is the connection between the species on their table? If they get stuck, you can ask each table to read out what species they have to the class or give hints.

Ask children to come to the front and show their species cards if they have:

- A bee picture next to the numbers
- Then a yellow background
- Again, ask the class to work out what this picture and colour mean

Making food chain pairs

Introduce the DIET, FOODCHAIN, SIZE and POLLINATOR rules from page 13. Ask the children to get into a pair with another species so one of them can eat the other. Ask various pairs to explain why their species is a food chain pair, clarifying the rules. Repeat as necessary

PRINTING THE CARDS

The small cards and A4 cards are at www.foe.co.uk/beeseducation

ALTERNATIVE

As an alternative to using the A4 Phylo cards, each table of children could have a pack of small cards (species only) and move the cards around on the table instead.





Food chains

Introduce the rule that food chains must start with a plant – these can find their own energy from the sun. Ask the children to make food chains, discuss and repeat as necessary.

Practicing making food chains

You could ask the children to make these food chains with their set of small cards and decide whether they are correct or not. If not, why not?

- Cocksfoot Grass, Greenfinch, Cat (yes)
- Apple, Hoverfly, Common Lizard (yes)
- Red Clover, Cow, Robin (*no, the Robin is too small to eat a cow*)
- Bluebell, Elephant Hawk-Moth, Garden Spider, Yellowhammer (*no, the Spider and Yellowhammer are both foodchain 3. Note that this foodchain would happen in real life but doesn't in the rules of this game*)
- Maize, Badger (yes)
- Beech, Noctule Bat, Buzzard (*no – the Noctule Bat is a carnivore so does not eat plants*)
- Oxeye Daisy, Honey Bee, Grey Squirrel, Stoat (*yes, the Stoat can eat other species of size 6 – see card*)
- Field Poppy, Blackbird, Red Fox (*no, the Blackbird is not a pollinator*)



Food Chain Worksheet

The team can make their own food chains – see page 21 for a Food Chain worksheet template.

The Phylo Games

These are described on the next 3 pages. Whichever one you choose, you might want to use the A4 phylo cards to demonstrate it by gathering the children round a table. Children could play in pairs to help each other out.

Phylo Trivia

This is intended to interest children in British wildlife, by finding out some new facts and learning about species they might not have come across before.

Each table comes up with a list of questions about the facts and information on the cards – e.g. In which species do the females sometimes eat the males? Is a hoverfly a pollinator? Which plant has seeds that give animals indigestion – so they bury them for later? Is a cat bigger than a buzzard? The cards are then removed from the tables.

The first table reads out their first question, which the second team try to answer. If they get it right, they score the point. If not, the third team tries and so on until the question has been answered correctly or there are no more teams to ask.

Then the second team reads out their question for the third team and so on. The team with the most points wins.



Phylo Snap

In this game, children will learn to identify different species and/or look at some of their characteristics. The game can be played at the most basic level, where children snap when they see the same species. Or they can snap when one of the characteristics is the same (e.g. the same size). Or they can snap when they can see any connection that they can explain (e.g. both birds, same colour, four legs)

Aim: To have the most cards at the end.

Set-up: Phylo Snap only uses the species cards, so remove the event cards. To snap the same species, combine four packs and split so each new pack has four repeats of each species. To snap characteristics, the species cards from one pack can be used. This can be played with 2-6 players.

Playing the game: All the cards are dealt out to players in piles face down on the table. Decide on what will be snapped – same species, which characteristic, or any connection.

Players take it in turns to put their top card face up on a pile in front of themselves. They can be asked to say the name of the species as they do it. When matching cards are showing on any two piles, the first person to say the correct name (e.g. “rabbit”), characteristic (e.g. “herbivore”) or connection (e.g. “birds”) wins all the cards on those two piles, which they add to the bottom of their face-down pile. Play continues with the player who has just won the cards adding a card to their face-up pile.

When one player runs out of cards to play, all players add up the number of face-down cards in front of them and the one with the most wins.

Optional rule – *could be added after children have got used to the basic game:*
If someone puts a pollinator on their pile, the first player to say ‘pollinator’ can take any face-up pile on the table and add it to the bottom of their face-down pile. Play then continues from that player.





Phylo Dominoes

This turns making food chains into a game.

Aim: To place all of your cards in the chain.

Set-up: Remove the event cards, 3 yellow plant cards and 2 blue plant cards (it doesn't matter which ones). This is so the game doesn't finish too quickly as plant cards can be placed anywhere. Keep the key card visible at the side. This can be played with 2-6 players.

Playing the game: Deal out 4 cards each, which the players put on the table in front of them. Find a plant card from those remaining and put it at the left hand end of the table to start the food chain. Put the rest of the cards in a pile face down in the middle.

Each player in turn places a card to the right of the food chain if they have one that follows the food chain rules. A plant can be placed at any time to start a new food chain. If a player can't place a card, they take one from the pile instead.

If a player places a pollinator, they can place an extra card if they want to.

The winner is the first player to put down all of their cards.



Phylo Rummy

In this game, children need to build food chains. They protect them with positive event cards and they can be damaged by negative event cards, modelling what happens in the real world.

Aim: To place all of your cards in a food chain on the table

Set-up: Use the whole pack of cards, keeping the key card visible at the side. This can be played with 2-5 players.

Playing the game: Eight cards are dealt to each player, which they hold in their hand. The rest of the pack is put face down in a pile in the centre of the table, and the top one is turned over to start the discard pile.

Each turn, a player:

Takes the top card from either the pack or the discard pile

Can put ONE food chain of three or more cards on the table (but doesn't have to)

Can add to or change their own food chains

Can place event cards (see below)

Finish by discarding a card (unless the player has played all their cards)

Event cards: If a player has a food chain on the table, they can place ONE negative event card on an opponent's species card in their turn. Both cards are put to the bottom of the pack and the opponent must put the rest of the food chain back in his/her hand. Positive event cards can be placed at the end of a food chain to protect it – no negative event card can be placed on it. The positive event card is not counted as part of the food chain (there still need to be three other cards).

Pollinators: As well as being placed to the right of a plant that needs pollinating in a food chain, pollinators can be placed to the left. In this case, the main food chain (to the right) can include a non-pollinator next to the plant. The pollinator counts as one of the three cards in the food chain:

Winning: The first player to play all the cards in their hand has won.



DISCUSSION

Were the pollinators important in the game? What happened?

How is being able to place the pollinator as an extra to help build the food chain like real life? *Pollinators mean plants make seeds and fruit for other animals to eat.*

Which cards were hard to place and why? *The farm animals – nothing else can eat them, they are there for us.*

What effect did the event cards have? How was it like real life? *If a negative event was placed, it damaged the whole food chain not just the one species – just like in real life. Positive events help the whole food chain in the game and real life.*

Willughby's Leafcutter Bee  4 
Megachile willughbiella



- Willughby's leafcutter bee bites a piece of rose leaf to wrap up each of her eggs with nectar and pollen. She places the egg parcels in holes in dead wood or in the ground.
- After the larva feed, they hibernate and come out the next summer

Image by Gordon Gibbons
northpeakphotography.co.uk

Bramble 7 
Rubus ursinus



- Bramble seeds are spread by animals and birds that eat the blackberries. The seeds don't get digested and are dropped in a new place in their poo where they grow into new brambles
- They are probably the wild food most commonly eaten by people in the UK

Image by Brian Robert Marshall
geograph.org.uk

Wood Mouse 5 
Apodemus sylvaticus



- Wood mice have large hind feet that enable them to leap away from danger like kangaroos
- They dig burrows where they store food, make their nests and live during the day - they are nocturnal
- Old burrows are often used by bees

Image by Rui Saraiva
©iStockphoto.com



Event Cards

The event cards are needed for Phylo Rummy. Each one shows something which can happen to affect the environment these species live in.

Crop Spraying

Event card



- Pesticides are used to kill insects that damage crops, but this also harms pollinators
- Herbicides kill weeds and stop them taking space and water from crops. But many 'weeds' are important for insects and wildlife

Image by Brian Robert Marshall
geograph.org.uk

Farming for Wildlife

Event card



- Farmers can help wildlife by growing a variety of crops and creating wildflower strips and hedges
- Some crops are good for bees as well, like clover and field beans. They also improve the farmer's soil and mean less fertilisers are needed

Image by Bob Embleton
geograph.org.uk

NEGATIVE EVENT CARDS

These are some of the many things which are harming our bees, pollinators and other wildlife. They might only affect some species directly, but they can have a knock-on effect on the whole food chain and ecosystem.

POSITIVE EVENT CARDS

'**Bee Friendly Spaces**' are areas of plants and flowers that bees like. Because so much other wildlife depends on bees and pollination, bee-friendly spaces are good for other species as well.

'**Farming for Wildlife**' includes wild plants, hedges and trees that provide homes and food for wildlife. Using less herbicides and pesticides gives wildlife a chance.



Make your own Phylo card

Children could choose an animal or plant and find out all about it. They could take a photo to put on the card, or draw a picture of their species. They will need to work out what information needs to go on the card.

There is a blank A4 phylo card template which gives plenty of space for the picture and information and would make a nice display.

There is also a blank template of 9 phylo cards, the same size as the small pack. If these were filled in, the cards could be added to the printed set and the phylo games could be played again with the children's own cards.

There is a bee-friendly flowers recording sheet on page 26. The children could look for new species to put on their phylo cards at the same time as doing this in the school grounds.



PHYLO WORKSHEETS

The blank A4 phylo template is at www.foe.co.uk/beeseducation

The blank template of 9 phylo cards is at www.foe.co.uk/beeseducation

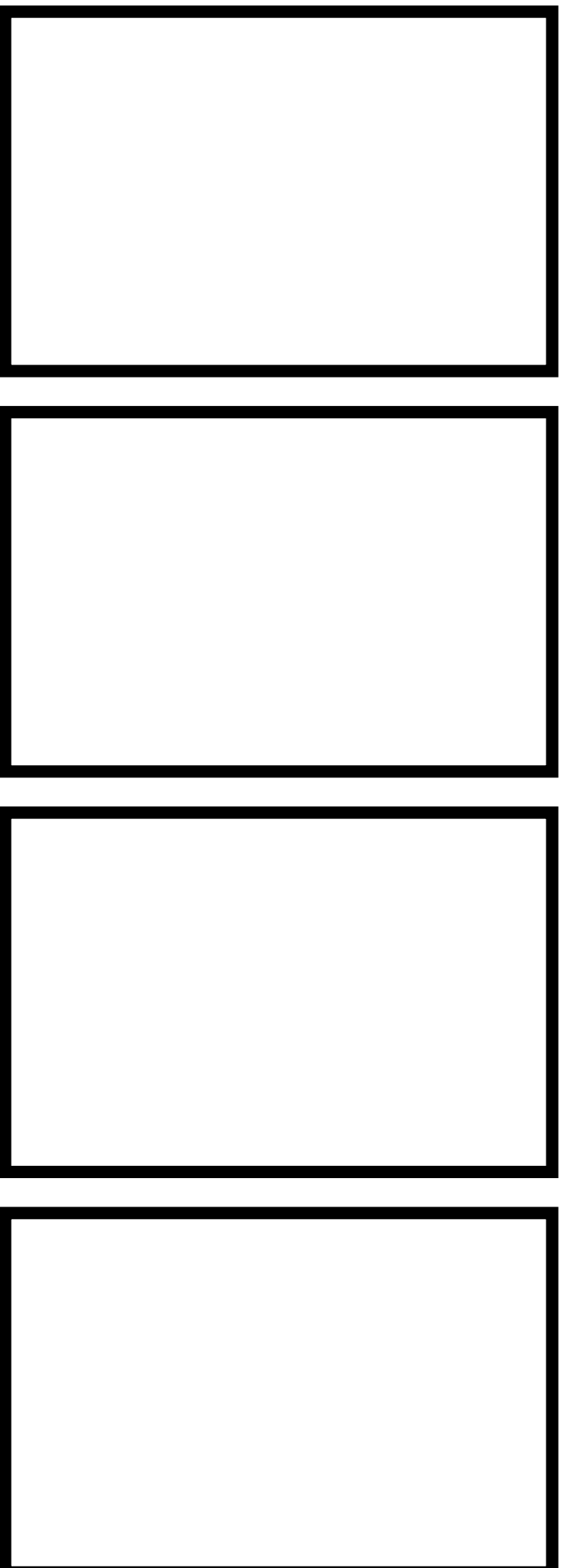
The food chain worksheet can be photocopied from the opposite page.

More phylo cards and games

These cards and games are a British version of the open source ecosystem game Phylo, <http://phylogame.org>. The word 'phylo' is a prefix relating to the classification of organisms. There are many more species and event cards on this website, from ecosystems around the world. There is also a description of the original ecosystem game, which models food webs and is a challenging and strategic game to play.

Food Chain Worksheet

Make a food chain of up to four species with your cards, then draw them on this worksheet.
Make sure you follow the rules - diet, food chain and size. Do you need a pollinator?

The form consists of four large, empty rectangular boxes arranged horizontally. Each box is defined by a thick black border and is intended for drawing a food chain of up to four species.

Can you find out something interesting about your species?

What do these animals really eat? Use a book or the internet to find out whether this is a true food chain.
Put a tick, a cross or a question mark between the species cards to show which are true.

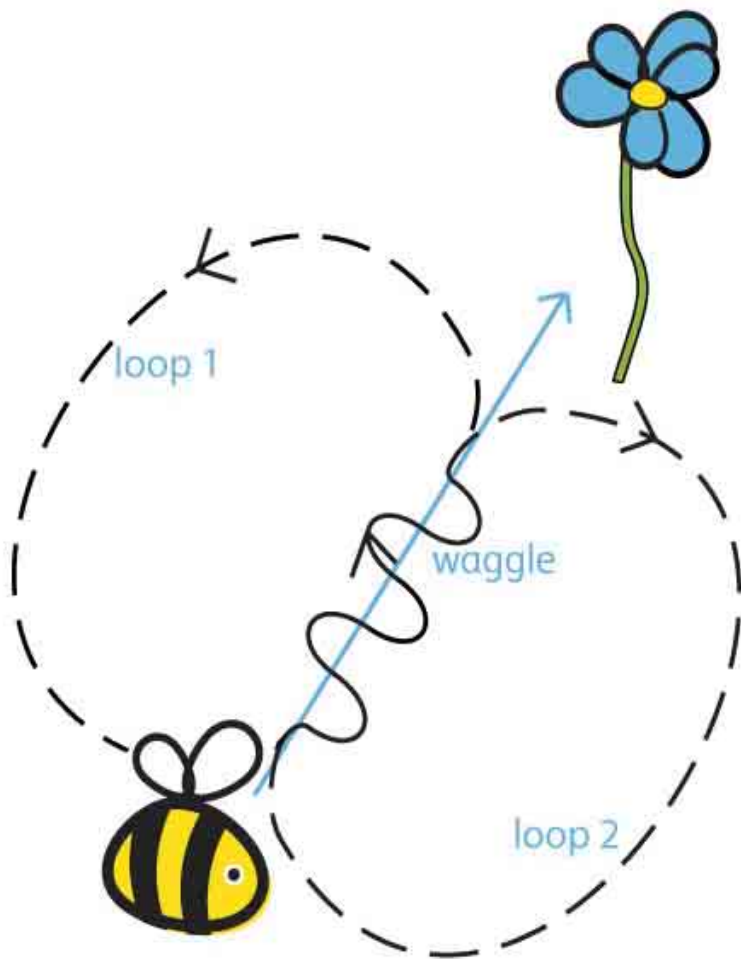
Bee Games – KS1

Bees and Waggle dancing

If a honey bee finds flowers with a lot of nectar and pollen, she goes back to the nest. She tells the other bees where to go so they can find the flowers as well.

The honey bee does a waggle dance, where she waggles in the direction of the flowers then loops back round, waggles again and loops back round the other way. She repeats this many times. *

To do this dance, walk in the direction of the blue arrow (towards the flower), wiggling your body, then walk back round the start.



Note: when the bee is inside the dark nest on the vertical surface of the honeycomb, she can't actually dance directly towards the flower. She dances at the same angle to the top of the nest as the flower is to the sun. However, we are simplifying the dance.

There is a link to a video of bees doing the waggle dance here: www.foe.co.uk/beeseducation

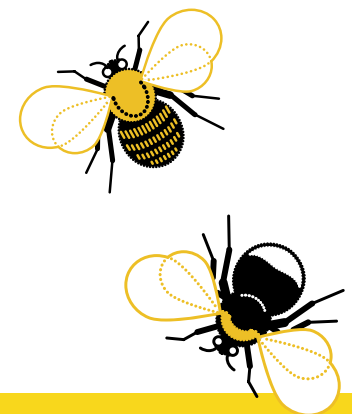


The waggle dance game

This game will reinforce the fact that bees collect nectar and pollen from flowers. It will show them how honey bees do a waggle dance. The game will take 15-30 minutes.

Set-up: This is a game to play in the hall. Stick flower pictures around the walls. Split the children into teams and place a mat on the floor for each team as their 'nest', spread out around the hall.

Discuss: Bees feed on pollen and nectar, which are found in flowers. Bees take pollen and nectar back to their nests to feed their larvae (babies) and make it into honey to store for winter.



THE FLOWER PICTURES

If you are also doing the bee-friendly flower hunt in your school grounds, you might want to choose the same flowers as you will use for that – see page 25.

The A4 flower pictures are available to download and print at www.foe.co.uk/beeseducation



Playing the game:

Children pretend to be bees and buzz slowly round the room, visiting the flowers to see what they look like and pretending to take nectar and pollen back to the nest.

Tell the children which flower needs pollinating. They need to go and stand next to the right flower. To start with say the name of the flower, then give clues until all the children have found the right picture. E.g. Lavender...it's purple...it's got spikes of little flowers... Repeat until they can find all of them. You could do this as a race between teams, where each team sends one person to the right flower.

Children sit on their mats. Ask them to tell you how to get to the dinner hall. Say the bees need to tell each other where their dinner hall is too, which for them is flowers with nectar and honey in. They can't talk or point so they do a waggle dance. Show them how to do a waggle dance and which flower you are waggling towards.

Ask for a volunteer and whisper to them which flower has nectar and pollen. They need to waggle dance towards the right flower. Each team sends someone to the right flower and the first there wins. Repeat.

The Pollen Game

This could continue on from the waggle dance game and reinforces the idea that the flowers turn into seeds once they have been pollinated.

Set up: The children are in teams, sat on mats as before.

Playing the game:

Ask for volunteers and choose a child for each of the flower pictures, taking a similar number from each team. Give each child a pot containing 10 pompoms and ask them to stand by their flower picture and be the flower. The rest of the children are bees.

The pompoms are pollen which the bees must collect. Only one child in each team can be off the mat at any one time and they can only collect one pollen and bring it back to the mat. Then the next child can go and collect one.

As each of the flowers runs out of pompoms, they curl up and turn into a seed as they have been pollinated.

The team with the most pompoms when they have all run out wins – their bees will have the most food through the winter.

Make a Bee

Put on each table:

- A print out of the 'Identifying Bees' sheet on page 24 so they can choose which bee to make.
- Glue, tissue paper – yellow, black, orange, white, brown
- Tape

Give each child:

- a card bee body – head, thorax (middle) and abdomen (tail)
- four half pipecleaners (legs and antennae), two black pom-poms (eyes)

Stronger glue will also be needed to stick on the eyes



Bee Hotel

Using clay make a 3D sculpture, poke lots of holes in it, then fire in a kiln. It's a bee hotel that is also a work of art. You can place them in your bee friendly area in the school grounds.

Roll a Bee

Discuss how many of each body part a bee has before you start and where they join together. You could draw the bee picture shown in the margin.

Play this in groups about 4 children. Each takes it in turns to roll the dice. They need a 6 to start, when they can draw a body (abdomen and thorax). After that, each time they roll, they can add the right body parts

- 5 for the head
- 4 for legs
- 3 for the wings
- 2 for the eyes
- 1 for antennae.

First to complete and shout BUZZY BEE wins each round.

BEE HOTELS

There are also instructions for making a bee hotel with more easily accessible materials at www.foe.co.uk/beeseducation



Bee Friendly in School – KS 1/2

Bee-Friendly plants survey

The children will by now have found out about bees from playing the bee games or phylo games, and will hopefully think it is important to protect them.

The bee-friendly flower hunt can be done simply to learn to identify the bee-friendly plants and to have a closer look at nature. It is even more valuable if it leads on to some practical work in the school grounds to make them better for bees and other wildlife.

There is a bee-friendly flowers recording sheet on page 26, with 10 spring flowering plants that you might find in the school grounds. However, you might want to make a recording sheet specifically for your school. You could choose:

- flower pictures that are growing in the school grounds so the children can find them
- or if there are not many, you could put on the ones there are and some others and challenge the children to see how many they can find – are they sure they haven't missed any? What can be done about the ones that aren't there?

For infants, you could take the A4 flower pictures that were used in the waggle dance game outside with you and a small group could hunt for each one. You might want the children to tick the sheet when they have found the flowers or to write where they found them.

How many did each person/group find? Did you see any bees or find anything else interesting?

How good are the school grounds for bees? Even if you found all the flowers on the sheet, were there lots of each or just one or two? Is there water and shelter for them and are the bee-friendly areas joined up? Could it be improved?

BEE-FRIENDLY FLOWERS RECORDING SHEET

The bee-friendly flowers recording sheet is on page 26.

To custom-make a recording sheet for your school grounds, go to www.foe.co.uk/beeseducation



Red campion



Poppy



Goldenrod













Thistle



Cornflower

Can you find these plants in the school grounds?

All of these plants have plenty of pollen and nectar to feed the bees so they are good to have in the school grounds.

Bluebell			Flowering Currant
Gorse			Hawthorn
Winter Flowering Heather			Bugle
Apple			Red Deadnettle
Lungwort			Pussy Willow

Images by Gordon Gibbons, Jorg Hempel, Pharaoh Hound, Bernie Kohl, Daniel J Layton, Kurt Stuber



Making a Bee-friendly space

Have a look in the school grounds with the children. You could discuss the ideas in the list below and the children could each draw and describe an area or a way to improve the school grounds. Everyone could vote on the best ideas. Once a plan has been agreed, money will probably be needed to buy seeds or plants, and the sponsor form on page 28 is a way to raise this. It will help the children to feel ownership of the bee-friendly spaces too.

10 ways to help bees in school

1. Plant a 'bee-friendly garden' in part of the school grounds. The poster in this pack shows a few of the plants you could grow – a selection from each season is best, so the bees have flowers all year round. Cottage garden flowers like geraniums, wallflowers, lavender and hollyhocks make a great display. A pond or bird bath can be a useful source of drinking water for bees.
2. You could use our sponsor form to raise money to buy bee-friendly plants. If the children raise the money themselves, they will feel more ownership of the garden.
3. A lot of herbs are good for bees, and smell delicious – they can be added to children's cookery or school meals as well. A herb garden is a relaxing sensory place for children – or even a pot of herbs near a bench if space is limited.
4. Try to link your bee-friendly area to other ones to make it easier for bees to move between spaces. You could do this by leaving a two metre strip of long grass around the edge of your school field unmown and by allowing wildflowers and 'weeds' to grow. Digging up the grass in some areas and planting wildflower seeds or plugs will give them a better start.
5. Another way to link up spaces for bees is to grow a hedge. This can be formed of cotoneaster, and even fruiting plants like raspberry and currant bushes, as well as hawthorn.
6. Don't use herbicides or weed killers – cut weeds back where they really need to be removed, but leave them where you can. You might need to talk to your council if they look after your grounds.
7. Fruit trees are great for bees, as well as encouraging children to eat healthily. Cherries are an especially big treat and even more so if you pick them yourself!
8. Make some 'bee hotels' by tying together bamboo canes, making gaps under paving slabs or drilling holes in wood. Put the bee hotels in your bee-friendly areas.
9. If you have some wall space on a side of the school, a boundary or outbuilding, you could grow honeysuckle.
10. A sunflower growing competition would encourage children to look after their own plant. The sunflowers could all be planted along the edge of a playground or they could take them home to encourage bees in their own garden.



Note: Some bee friendly plants are potentially harmful. There is a link at www.foe.co.uk/beeseducation to the Royal Horticultural Society's list of potentially harmful plants.

There are links to more information about creating bee-friendly spaces, meadow areas and bee hotels on the webpages www.foe.co.uk/beeseducation



Sponsored Bee Hunt

Bees are very important – without them we wouldn't have much of the food that we eat. They are important to all the other animals and birds as well because the berries and nuts they eat wouldn't grow if the bees didn't pollinate them. I am raising money to buy bee-friendly plants for school, so the bees have food and places to nest.

Name	Address	Amount per bee spotted	Total

<p>I spotted this bee...</p>	<p>I spotted this bee...</p>
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Identifying Bees

Tally how many bees you can spot. There are some photos and pictures showing bees you might see. You might also see different bees – there are 267 species of bee in the UK. If you spot any that aren't on the list, you can draw them on the back in the blank spaces.

Tally

How many bees have you seen?



Garden bumblebee



White-tailed bumblebee



Buff-tailed bumblebee



Honey bee



Honeybee



Early bumblebee



Common carder bee
(bumblebee)



Willughby's leafcutter bee
(solitary)



Wool carder bee (solitary)



Red mason bee (solitary)



Tawny mining bee
(solitary)

National curriculum links – Science

Sc2 Life processes and living things

This resource pack about bees will contribute to lessons about:

Key stage 1 (Infants)

<i>Curriculum link</i>	<i>Bee resource</i>
Humans and other animals 2b. Humans and other animals need food and water to stay alive Green plants 3c. Seeds grow into flowering plants	The assembly / talk
Living things in their environment 5a. Find out about the different kinds of plants and animals in the local environment 5c. Care for the environment	Bee-friendly plants survey Making a bee-friendly space Bee waggle dance game and classroom activities



Key stage 2 (Juniors)

<i>Curriculum link</i>	<i>Bee resource</i>
Green plants – Reproduction 3d. The life cycle of flowering plants, including pollination, seed formation, seed dispersal and germination	Assembly / talk, reinforced in Phylo game and activities
Variation and classification 4a. Using keys 4b. How locally occurring animals and plants can be identified and assigned to groups	Phylo cards and games Bee-friendly plants survey
Living things in their environment 5a. Ways in which living things and the environment need protection Feeding relationships 5d. Use food chains to show feeding relationships in a habitat 5e. Learn how nearly all food chains start with a green plant	Assembly/ talk, Phylo game and activities Bee-friendly plants survey Planting a bee-friendly space





Support from Friends of the Earth

Keep in touch

You can sign your school up to get our newsletters by going to <http://www.foeyouthandeducation.co.uk/join/> and clicking on 'Register as a School'. The newsletters contain information about new resources that have been produced by Friends of the Earth, more information about existing resources and other ways we can help your school to become more sustainable.

The Youth and Education Network

Friends of the Earth has a growing network of volunteer educators in England and Wales, who can come into schools to run or support sessions such as these ones about bees. We will not always be able to find an educator to come into your school, but you can request one at info@foe.co.uk

Our educators have passed some basic online child protection training and we have taken up two references. Please note that Friends of the Earth cannot do CRB checks for our volunteers, as they do not visit schools often enough to be eligible.

While we have no reason to think there is any cause for concern, Friends of the Earth School Visitors and Educators should always be supervised by a qualified person and should never be left alone with children

Friends of the Earth educators will show you a risk assessment and plans for the activities they will be doing in your school.

The Learning Website

You can find information about other Friends of the Earth education resources, our campaigns and ways to green up your school at <http://www.foe.co.uk/learning>

MORE BEE EDUCATION RESOURCES

There are extra worksheets, video links and other resources to supplement the activities in this booklet at <http://www.foe.co.uk/beeseducation>

AND FINALLY...

Why not tell people what you've been doing to help the bees? You, or the children, could write to the local paper or invite your MP to open your new bee-friendly space. That way, more people will realise there is lots they can do to help our bees.



Bees help to produce most of our fruit and vegetables, as well as many other crops. Through their pollination of plants, they are also a key species in British ecosystems.

This booklet contains many activities to help primary age children find out about bees, British ecosystems and the problems bees are facing. It also includes information about how you can help bees in school.

