



**FOREST OF
BOWLAND**

Area of Outstanding Natural Beauty

Spring 2013

Introduction

(Based on an activity developed by Croal Irwell Valley Countryside Warden Service)

These activities can be used in a variety of suitable locations. As an example, they would be great to use on those profiled farms in the Forest of Bowland which are managing their meadows for wildflowers; particularly traditional, species-rich hay meadows. The hay is used as winter feed for stock.

You can play these activities separately, to reinforce particular concepts if time is short, but it's great if you can play them together as a "Suncatchers" session: that way, children see the whole cycle from germination through to seed dispersal.

National Curriculum Subject: Science

Key Stage: Upper KS2

Learning Outcomes:

- Children can name, and give a simple account of, the different stages in the life cycle of flowering plants
- Children can name some of the more common hay meadow plants found in Bowland.

Please note: You will need a large, safe space for running around
A number of the downloadable resources will need laminating once you have printed them

Activity 1: Germination Stations (or "Seed Tig")

Key Theme

The conditions which seeds need in order to germinate and some of the different factors which might prevent successful germination.

Resources

Downloadable:

[Water](#), [temperature](#) and [oxygen](#) tokens

[Water, temperature and oxygen "station" cards](#) (you will need to thread these with string for tying)

What to do

- The aim of the game is for the "seeds" to collect a token from each of the three "germination stations" whilst trying to avoid being tiggered.
- Get the children to think about the things which seeds need in order to germinate: water, temperature and oxygen then talk about what might stop a seed from germinating - being eaten by a bird, for example.
- Choose three adults and give each of them one of the germination station labels to put round their neck, plus a supply of the relevant tokens, and get them to stand around the edges of the space. Choose one of the children to be the "bird" and get them to stand next to you. Gather the "seeds" into the middle of the space. When you give the word to go, the seeds must run around collecting a token from each station whilst the bird tries to tig them. (NB. Seeds are safe whilst stood at any of the stations and once they have collected all three tokens.) Successful seeds can go and stand in the "seed bed" to grow, whilst any tiggered seeds have to go and stand in the seed "bin" as they won't be able to germinate. (Designate these areas at the start of the game.)
- After the first round of the game it will be obvious that most of the seeds have managed to germinate, whilst only a few have been tiggered. Get the children to give their tokens back to the right adults then gather everyone together again. Explain to the children that in real life, seeds might face a whole range of obstacles to germination, such as drought, fire, pesticides and floods. Play the game a second time, but this time introducing a few more "tiggers". At the end of this round the balance should have shifted, with far fewer seeds making it to the seed bed. At this point you can explain to the children that this is why plants generally produce such a large number of seeds – all because only a small proportion will make it through to germination and maturity.

Activity 2: The Photosynthesis Game

Key Theme

Chlorophyll gives plants their green colour and allows plants to use energy from sunlight, water from the soil and carbon dioxide from the atmosphere to produce food through a process called photosynthesis.

Resources

Downloadable:

[Sunshine symbol](#)

[Carbon dioxide/Sugars labels](#)

[Water/Oxygen labels](#)

You will need to provide:

"Leaf" mats (pieces of green material big enough for a pair of children to stand on)

What to do

- Explain to the children that green plants contain a substance called chlorophyll by which, using energy from sunlight, carbon dioxide from the atmosphere is combined with water from the ground to produce sugars (used by the plants for energy) and oxygen (given off by the plants through holes in their leaves). Humans benefit from this both directly, as we are able to eat many types of green plant, and indirectly, by eating animals which themselves have eaten green plants. This is the way in which we get our energy. We also use the oxygen given off during photosynthesis to help us breathe. (It's worth explaining to the children that, as plants need sunlight energy in order to photosynthesise, they can only do this during the day.)
- Divide the class into two groups. Give one group of children the carbon dioxide/sugars labels to hold – keeping the carbon dioxide label outermost. Give the second group the water/oxygen labels to hold – keeping the water label outermost. Lay six or eight (depending on the number in the group) leaf mats out in a line on the floor, leaving a gap of a foot or two between each one. Get the two groups of children to line up one behind the other, making an elongated circle around the mats.
- Set the children off walking in one direction around the leaf mats. After a while, hold the sunshine symbol up to represent daylight (just like turning the music off in "musical chairs": at which point the "carbon dioxide" children must find a "water" partner, jump onto a leaf mat together and have a chemical reaction. (Make up a funny wiggly dance for this!) NB/Only one pair of children allowed per mat.
- Once the children have "reacted" the carbon dioxide children turn their labels round to show "sugars" whilst the water children turn their labels round to show "oxygen". Explain to the children that the plant would now use the sugars to help it grow, whilst the oxygen would be given off through holes in the plant's leaves. All those standing on the mats then move off to the side of the playing area.
- Take one or two leaf mats away now and run the game again with the remaining children. Keep playing the game, removing leaf mats as you go, until there is only one "carbon dioxide" and one "water" left.

Activity 3: Build a Plant

Key Theme

Children understand how different parts of a plant work together and how water, nutrients and food are moved around the plant.

Resources

None

What to do

- Explain to the children that plants have lots of different parts and that each one has a very important role to play. The children are going to build their very own living plant – out of themselves!
- Choose three children and get them to stand up straight, back to back with their arms folded. These children are the very core of the plant (the heartwood in woody plants) which helps to give it strength. They have to remain upright and sturdy.
- Choose another three children and get them to sit on the floor close to the "core" children, with their legs pointing outwards. These children are the roots, which help to take water and nutrients from the soil. Get them to practice making a slurping noise!
- Choose a further three children and get them to stand between the roots, facing outwards. These children are the xylem tissue, which helps to transport water and nutrients from the soil up to the leaves. They start crouched down with hands on the floor then, as they stand up straight and throw their arms in the air, they all say "weeeeeee".
- The next three children stand in front of the xylem, a couple of steps away, facing inwards. These children are the phloem tissue, which helps to carry food made in the leaves round to the rest of the plant. They start upright with their hands in the air and their fingers wiggling. As the xylem children stand up, the phloem children crouch down to the ground saying "woooooooo". (Each of the pairs making a kind of seesaw motion.)
- Finally, arrange the remaining children around the inner group, facing outwards and linking arms – making sure they don't step on the "roots". They have the important job of protecting the "mechanics" of the plant from disease and attack, but they have to do this without moving their feet or using their hands. (This helps to stop things getting too boisterous!) Get all the children to practice their actions and sound effects a couple of times so that everyone knows what they are doing. Then get one of the adults to play the part of a plant-boring beetle (the fancier the name, the better!) who wants to drill its way into the middle of the plant (perhaps to get at the sugars in the phloem or to lay its eggs). The outside children have to keep a tight ring around the plant as it carries on "working", making sure there are no gaps where the beetle can get through.
- Run the game through a couple of times until you have a nice, "working" plant.

Activity 4: Flower Jigsaw

Key Theme

The names of the different parts of a flower and the role each part plays, particularly in relation to pollination.

Resources

Downloadable:

Flower jigsaw parts ([petal/stamen 1](#), [petal/stamen 2](#), [petal/carpel/ovule](#), [stem-receptacle/sepals](#)) (You will need to cut these out into the individual pieces – 10 all together.)

[Flower jigsaw master](#)

[Bowland hay meadow flower cards](#)

Link to external resource:

[Field Studies Council identification guides](#)

[Yorkshire Dales Millennium Trust hay meadow leaflet](#)

What to do

- Sit the children in a semi-circle. Group the children sitting near each other into twos or threes, depending on the numbers in the class. Give each small group a piece of the jigsaw puzzle and a number: 1, 2, 3.... etc up to 10.
- Once all the pieces have been distributed call the first group up and get them to place their puzzle on the floor where everyone can see. (To make it a little easier, or for younger children, you could call the groups up in the "correct" order so that the picture builds logically.) Then call the next group up and get them to place their piece where they think it should go. Carry on calling each of the groups up to place their pieces. (If other groups think a piece is in the wrong place they can make suggestions, but it's up to the group in question to make the final decision.)
- Once all the pieces are down, you can let the children know if they are all in the right place, and if not, then children can be invited to come out and move things around until everything fits correctly.
- Once the jigsaw is correct, go through each of the separate pieces telling the children the name of the flower part and discussing its role. E.g. petals are colourful (and sometimes scented, or perhaps "dance" in the wind) and attract insects, such as bees and butterflies, which pollinate the flower; sepals, which are often green, are a type of leaf which protects the flower whilst it is in bud. Once the bud opens they are often found behind the petals; the stem helps to hold the flower up towards the light. The top of the stem is called the receptacle and is where all the different parts of the flower are attached; the stamens are the male part of the flower, where the pollen is made. The anther at the top stores the pollen, whilst the filament holds the anther up; the carpel/pistil (stigma, style, ovary) is the female part of the flower. Pollen gets passed from the anther to the stigma, either by pollinating insects looking for nectar, or by wind, and then grows down the style into the ovary where it joins with the ovules. If the ovules are successfully fertilized they become seeds.

- As a final stage, show the children a selection of Bowland hay meadow plants, using the downloadable flower cards provided or the information available through the external links. Name the flowers and point out some of the things that children could use in order to help them identify the flowers in the field e.g. colour, petal shape, leaf arrangement, height etc.

Activity 5: The Pollination Game

Key Theme

Bees and other insects help to pollinate flowers by transferring pollen between different plants (and between male and female parts of the same plants) as they search for nectar.

Resources

Downloadable:

[Bee head band](#) (Print the circles onto yellow/black card then stick them onto each other, slightly off-centre, and attach to headband strip)

[Flower head band](#) (Print onto coloured card)

[Nectar tokens](#) (print onto coloured card)

You will need to provide:

Small "pom poms" for pollen (a different colour for each flower)

Plastic cups (two for each "flower")

Small container for bee to carry

What to do

- Get the children to sit or stand in a group. Choose one of the children to play the part of a bee. Give them the bee head band to wear plus the small container to carry. Choose three or four children to be flowers and give them each a flower headband to wear, a plastic cup with "pollen" pom poms in (a different colour pollen for each flower) and a plastic cup of "nectar" tokens. Space the flower children out amongst the group.
- Get the bee to buzz its way amongst the group, stopping at each flower in turn. At flower "A" the bee takes a couple of pollen pieces and a nectar token, which it puts into the container. When it gets to flower "B", the bee takes a nectar token from this flower and some of its pollen (again, putting them into the container), then puts the pollen from flower "A" into flower "B's" pollen cup. Keep the bee flying around until it has visited each of the flowers, collecting nectar tokens and new pollen and leaving different pollen behind each time.
- Once all the flowers have been visited, let the rest of the children see how the pollen from each of the flowers has become mixed up in the flower cups. Explain to the children that this is how the bee transfers pollen from the anthers of one flower to the stigma of a flower on another plant on its search for nectar, so helping to pollinate the flowers as it goes. This is called cross-pollination. (In real life, the pollen would stick to the bee's furry body, with bits being brushed off and left behind each time it visited a flower.) It's also a good idea to point out to the children that pollen can be transferred from the anthers of one flower to the stigma of the same flower, or other flowers on the same plant. This is called self-fertilization.
- Bees and other insects, such as butterflies, are very important pollinators but flowers can also be pollinated by creatures such as birds and bats and also even by wind and water.

Activity 6: Seed Olympics

Key Theme

Seeds need to be dispersed from the parent plant in order to find suitable germination conditions and to reduce competition from other seeds. There are a number of different dispersal methods and this activity looks at three examples.

Resources

Downloadable:

Team labels: [Drifters](#), [Hitch-hikers and Exploders](#)
[Rabbit headband](#)

You will need to provide:

2 plastic tubs and a plastic spoon
 Plasticine
 Long length of ribbon or similar

What to do

- Get the children to think about what might happen if all the seeds from a plant fell in the same, small area e.g. competition for sunlight and water; vulnerable to all being eaten; danger of all falling on unsuitable ground. Explain that plants have lots of different ways of "scattering" their seeds in order to give them the best chance to flourish. Hitch-hiking seeds are often sticky or have hooks and get caught up on the fur of animals as they brush past the parent plant, then fall off later some distance away. Drifting seeds are very light and get blown away from the parent plant when the wind blows. Exploding seeds are often held inside a pod and have to wait for a trigger to release them – often the seed pod dries out and splits open suddenly – at which point all the seeds fly out together. The children are going to pretend to be seeds and see which method is best at getting them across the "germination" finishing line. Split the class into three groups and get each group to stand, one behind the other, behind a "starting line". Give each team a label – Drifters, Hitch-hikers or Exploders.
- For the Hitch-hikers. Give the person at the front of the group the picture of the rabbit headband to wear. This child has the job of getting all the seeds in his/her group across the finishing line one by one, but there must only ever be two feet on the ground at once so the "rabbit" must link each team member and both hop down the course together.
- For the Drifters. These seeds have to wait until the wind (a member of staff) starts to blow them off the plant. (You can set them off one by one or in pairs, depending on how quickly the other teams are getting on!) Once the staff member sets them off the children must spin (carefully) down the course and across the finish line.
- For the Exploders. Put one of the plastic tubs in front of the group and give the spoon to the first team member. Put the second tub about two thirds of the way along the course. Into this second tub put small "energy" balls made from the plasticine (enough for each member of the Exploders team). When the game starts, each team member – in relay fashion – runs to the second tub, picks up a

plasticine "energy" with the spoon, runs back and drops the ball into the first tub then hands the spoon to the next team member and goes to stand at the back of the line. Once all the energy balls have been transferred the whole team can "burst" out of the pod and run over the finishing line together. If there is time, it's good to give each team a chance to have a go at all three dispersal methods.