Information, recipes and resources





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Introduction

Sue Hudson (<u>www.breadworkshops.co.uk</u>) working in partnership with LEAF Education (formerly FACE), provided a workshop for teachers and on-farm educators which was an introduction to bread making skills and cross curricular links for a bread based topic in school. This resource has grown from that workshop. Further details about Bread Workshops can be found at the end of this booklet.



In addition, LEAF Education in the East of England started partnership working with the SAW (Science, Art and Writing) Trust (www.sawtrust.org) which is based in the John Innes Centre in Norwich, and together developed a programme called Lunchbox Science. Using the SAW Trust model whole day activities for KS2 learners have been developed based around foods that might be found in a typical school child's lunchbox. SAW Projects extend science learning through poetry and art sessions linked to the theme. Science activities from the wheat and yeast lunchbox science lesson plans are included in this resource and further details about the SAW Trust can be found at the end of this booklet.

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Information about bread and wheat flour

In the UK most bread is made with wheat flour although alternatives such as spelt (a primitive wheat) or rye flour are available in many specialist shops and fun to experiment with.

Ideally the flour you use for making bread should be milled as locally as possible, that way you are supporting your local mills and local farmers! If there isn't any available, always choose the best quality you can and the one with the highest gluten content to ensure a plump loaf. Most supermarkets now sell strong flour for bread making – don't use plain or self-raising flour – these are suitable for cakes, biscuits and pastry but not bread.

Strong or extra strong flour is ideal for bread making as it has a lot of gluten and will produce a lovely loaf. Gluten acts like an elastic band and holds the loaf's shape, a very important factor when making bread.

Some different sorts of flour for bread making:

Strong white flour: contains 72-75% of the wheat. The bran and wheatgerm which give wholemeal and brown flours their colour have been removed – the resulting white flour makes a closer textured bread.

Strong flour: contains a large proportion of flour made with wheat that is high in protein – when mixed with water the proteins combine to form gluten which gives the dough its elasticity when kneaded and allow it to trap the bubbles given off by the yeast.

Wholemeal (or wholewheat) flour: The entire wheat grain is milled to produce wholemeal flour. This results in a course textured, nutty tasting bread which is brown in colour.

Brown flour: contains about 85% of the wheat grain – some bran and wheatgerm have been extracted.

Granary flour: malted wheat flakes are added to a brown flour – sometimes wheat and rye flour are mixed to produce granary flour.

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Stoneground: this name refers to the grinding process during which the flour is heated and has a slightly roasted, nutty flavour as a result.

Rye flour: There are different sorts of rye flour – different colour and coarseness. Rye flour contains some gluten but is sticky to work with so bakers generally mix it with other flours.

For information about mills in your region use an internet search engine and search for flour mills.

www.sourdough.co.uk/british-artisan-flour-mills-by-region/includes quite a long list.



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Information about yeast

Yeasts are living single celled organisms that are found everywhere in the world around us. For example there are varieties of yeast on our skin, in the air, and on the skins of fruit and vegetables. The yeast used in baking bread is responsible for the fermentation – producing carbon dioxide which creates the rise in the dough. When the yeast comes in to contact with warmth (water) and carbohydrates (flour) it produces carbon dioxide hence the bubble holes in bread.

Yeast used in baking

Readily available dried yeast is a convenient way to buy and store this product, either **fast** action dried yeast or active dried yeast. The advantage of fast action yeast is that it can be put directly in to the flour without fuss). It is more concentrated than fresh yeast so usually less is required in a recipe.

Fresh yeast is a lovely product to use, it can be obtained from some supermarkets – those that have an in-store bakery.

10 grams fresh yeast = 7 grams dried yeast

Whichever yeast you use, it will produce carbon dioxide when it is mixed with warm water and carbohydrate and create the rise in the bread dough.

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Baking bread

Making a traditional split tin loaf

Equipment

Scales (digital if possible)

Mixing bowl

Measuring jug

Spatula or Dough scraper (optional)

2lb loaf tin

Baking paper tin liner (optional)

Sharp knife with serrated edge (such as a steak knife)

Shower cap or tea towel to cover bowl for the prove

Wire cooling rack

Ingredients

500g strong white bread flour

8g table salt

10g fresh yeast (7g dried yeast)

300g tepid tap water (measuring water by weight is more accurate)

Flour for dusting



Method

Place flour and salt into a bowl, mix together, then flake yeast into mixture and combine with fingertips until it resembles breadcrumbs.

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 Add water and mix in the bowl until dough starts forming into a loose ball, tip out onto work surface and knead for 10 minutes



Skill: You should not cheat and knead for less than 10 minutes, kneading is the most important part of your bread creation and where people often go wrong. Try to knead the dough with a stretching motion, using both hands, trapping the dough with one hand and pushing it away with the other, then roll up the dough and start again. This action develops long chain molecules.

• Form kneaded bread into a ball and put it in the mixing bowl – cover and prove for about an hour until the dough has doubled in size.

Skill: Proving the bread for around an hour or at least until the dough is doubled in size "proves" that the yeast is alive and creating bubbles, but also the flour is softened and the gluten rested.



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- Tip dough out of bowl, flatten and roll up to form a flat sausage about the size of your loaf tin.
- Place dough, joint underneath, into the loaf liner and then into tin.
- Leave to recover for about 30 minutes, dust with flour and then slash a deep cut the length of the dough



- Bake at 200C (400F, Gas 6) for 30 minutes until the loaf sounds hollow when tapped on the base.
- Cool on wire rack.

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Making a pizza base – recipe makes two pizzas

Equipment

Scales (digital if possible)

Mixing bowl

Measuring jug

Spatula or Dough scraper (optional)

Tbsp measure



200 g strong white bread flour

10g yeast (7g dry yeast)

120g tepid tap water (measuring water by weight is more accurate)

2 tbsps Extra virgin olive oil

3g table salt

Place flour, yeast and salt in a bowl, add the water and 1 tbsp olive oil.

Skill: When mixed together tip on to work surface and knead for about 5 minutes until soft and elastic. Return to the bowl and cover, prove for 30 minutes.

- Tip dough onto work surface and divide into 2. Push each dough ball out to create 2 pizza size discs (about 10" diameter) and place on oiled baking trays.
- To create pizza margherita spread top with passata, cubes of mozzarella cheese (about one ball of mozzarella) and drizzle with olive oil or toppings of your choice.



LEAF Education minutes in hot oven

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Discovering wheat

- 1. **Wheat is a cereal crop** like barley, oats and rye. These cereals belong in the grass plant family and look similar to grass as they are growing.
- 2. Wheat is grown for food the wheat seeds contain the food, for people and for animals. The seeds are at the top of the stem often up to 30 seeds per head or ear of wheat.
- **3.** Wheat is a monocot plant i.e. one leaf grows from the seed. The growing plant will probably send out side shoots called tillers which will each grow a stem that will produce an ear, so one wheat seed may yield 500 seeds at harvest time.
- 4. There are two sorts of wheat:

Milling wheat which is used as food for people, mostly ground into flour in a mill (modern mills look like enormous factories) which would be used for baking – bread, pasta, biscuits cakes etc. Also rolled to make breakfast cereal such as Weetabix.

Feed wheat – the grains are used as food for farm livestock such as chickens, pigs or calves.

- **5. Wheat grows well** where there is plenty of warm (not too hot) weather and rain to keep the ground moist while it is growing.
- 6. Farming year for wheat:

Wheat seed is sown into a prepared field in either early autumn or late winter. The autumn sown seed sprouts and grows through the winter and is called winter wheat. Seeds sown at the end of the winter grow during the spring and are called spring wheat. Both types grow on through the spring and early summer and will be harvested in July/August.

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Discovering wheat

- 7. **Scientists**, for example at the John Innes Centre in Norwich, are researching to improve wheat yields and disease resistance.
- 8. **Technology,** for example computers on board combine harvesters that record the yield in each field as the crop is harvested, help arable farmers make the most suitable and economic use of fertilisers or sprays against wheat diseases.

See the notes and illustrations in the Lunchbox Science Wheat lesson plan on page 22 for more information about wheat plant structure and how wheat grows.



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Ideas for classroom activities

Introduction

What does wheat look like? Where does it grow? How is wheat used?

This is best done showing children real wheat on the stem – this could be obtained from an arable farmer if you have such a contact, or your FACE Regional Coordinator may be able to help or stems of wheat can often be found in florists or garden centres.

Use Wheat notes from page as appropriate for the age group.

Foods we eat that are made from wheat:

Make a display of a variety of food packaging the majority made from wheat e.g. e.g. Loaf of bread, flour, Weetabix, shredded wheat, pasta (made with durum wheat), and with several non wheat products e.g. rice, cornflakes, baked beans, sweetcorn, yogurt, potato crisps

and with some foods that include wheat *e.g. biscuits, cakes, crumpets, pancakes* for older groups you could include eggs or bacon (feed for hens/pigs usually contains wheat)

Use the display for a quiz, with children working in pairs or teams to sort out which foods contain wheat.

For younger groups (KS1) use the traditional story of **The Little Red Hen** to introduce wheat, how it grows and how it is made into bread.

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Take a closer look at wheat

Health and safety: check first if anyone has a wheat allergy and cannot handle wheat.

Use the Lunchbox Science Wheat Lesson Plan for KS2 groups (page 18) and simplify the activity for younger groups.

If possible give each child a stem of wheat to dismantle or work in pairs.

Use hand lenses to look at the plant structure.

Sort the parts of the plant when it has been dismantled:

Seeds – for maths and craft activity

Stems (straw) - for craft activity

Chaff - probably bin

Record number of seeds in each ear - work out average seeds/stem and also link to the numbers in a square meter mini field.

Farm machinery used to grow wheat.

Technology: Investigate how the farmer uses each of these: plough, seed drill, fertilizer spreader, combine harvester, trailer, bulk lorry, computer, drone with camera

See PowerPoint presentation at http://www.countrysideclassroom.org.uk/resources/1166

History: How were the same jobs done 150 years ago? 550 years ago?

Online resource: on www.grainchain.com you will find lesson plans, videos of baking LEAF Education flour based cooking, printed resources to order etc all key stage linked.

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Recording the project on a 'memory stick'

The 'memory stick' is based on a journey stick activity often used with KS1 groups during sessions outside the classroom.

This version is designed to be used at the end of a discovering wheat session to record the main points that have been learnt. For many children tying the labels and items onto the stick is challenging and the task requires knot tying skills and teamwork.

To speed the memory stick activity at the end of a busy moment we have used photocopied labels but ideally the children would create their own.

On this memory stick they recorded:

An ear of wheat

Pasta – a reminder that foods other than bread are made from wheat

Some farm livestock feed includes wheat seeds.

The largest machine used on farms for wheat production is a **combine harvester**.

The **amount of wheat produced in a square metre field** and the bread that it will make.

We also attached name labels and wrote one extra wheat discovery on the back of the

label.



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A square metre mini-field

WHEAT

In 1 square metre a farmer will plant

about 300 wheat seeds

At harvest time they will produce

1 kg of wheat seeds

which is enough to make

800grams of flour

which is enough to bake 1 large loaf of bread

1 kg wheat seed included in chicken

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WHEAT – one square metre of wheat crop

Input per m2		Wheat is a cereal crop – like
Seeds	250 - 300	barley, oats, rye
Pesticide/spray	1.5 ml	Cereal crops are members of the
PK fertiliser	30g	
N fertiliser	58g	grass plant family
Harvest		Wheat is either sown in the late summer/
Yield	1 kg	autumn and grows through the winter or is sown in the late winter/spring Winter and spring wheat is usually harvested in July/ August Different varieties of wheat have different qualities, for example flour is more suitable for bread or for biscuits.
Which will make	800 g flour	
Which will make	1 large loaf of bread	
In chicken feed	11 eggs	
		A lot of wheat is used as animal feed

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Wheat

Extracts from wheat lesson plan

Background information

Wheat developed from wild grass plants in the middle east (Syria, Lebanon, Iran, Iraq) about 10,000 years ago. It was one of the earliest crops to be cultivated and is now the third most widely grown crop in the world - after maize (sweet corn) and rice.

Wheat has a relatively short growing season and thrives in temperate climates.

The wheat seed is the part that we use, mostly ground into flour for baking into bread, biscuits etc (milling wheat). The stems (straw) and roots are usually recycled by the farmer: ploughed back into the soil or the straw used for animal bedding. A lot of the wheat grown in this country is fed to farm livestock (feed wheat).

One wheat seed grows several shoots and so at harvest farmers expect to gather about 500 wheat seeds for every one seed that has been planted. On average a square metre area of wheat will produce a kilo of wheat seed that will grind into 800 grams of flour – enough to bake a large loaf.

There are generally two types of wheat, which are called hard wheat, and soft wheat. The hard wheat produces flour with highest levels of gluten – essential for bread making. Hard wheat grows best in the USA and Canada so much of the bread that we eat is made from wheat grown abroad. However plant breeding has produced some harder wheat varieties that will grow in this country so it is possible to buy 'locally grown bread' mostly from small scale 'artisan bakers' who use wheat from local farms. Most of the milling wheat produced in the UK is used for biscuits etc.

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Activity 1: Question and Answer game

- 1. Place paper with one of the following letters (A, B, C, D) in each corner of the class.
- 2. Ask the children one of the questions below and tell them to go to the letter they think is the correct answer.
- 3. When you reveal the answer, only the children who were correct continue. The children who have the most answers correct win the game (last people playing).

Question 1

If we planted one wheat seed – How many roughly could we expect to get back when the wheat plant is harvested?

A) 5

B) 10

C) 100

D) 500

Question 2

What does a wheat seed need to germinate?

A) A nice bedtime story

B) Sunshine

C) Warmth and water

D) Coca Cola

Question 3

Which of these plants is most related to wheat?

A) Carrots in a farmer's field

B) Grass on a playing field

C) Cabbages in a garden

D) Peas on a plate

Question 4

What is the smallest part of a wheat plant?

A) Leaf

B) Seed

C) Cell

D) Root

Question 5

Who grows the biggest yields of wheat in the world?

A) New Zealand

B) Germany

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Activity 2: Discover wheat plants

- 1. Have a look at the wheat plants on your table. How many different plant parts can you identify?
- 2. Measure your plant.

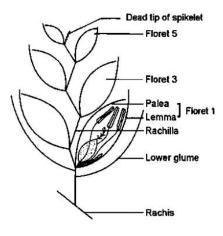
How tall is your plant? How many stems and leaves can you count? How many seeds are in a single wheat ear?

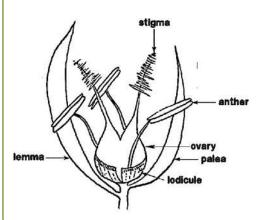
3. Take off different parts of the plant. Use a magnifying glass to see more details.

Where are the flowers? Do they look like flowers? Are there any other interesting patterns?

Class wheat collage

On a piece of paper, draw around the shape of your hand with a pencil. Once you are happy with it, go over the shape with a pen. Now use some of the wheat grains you collected to cover your handprint, sticking them on with glue.



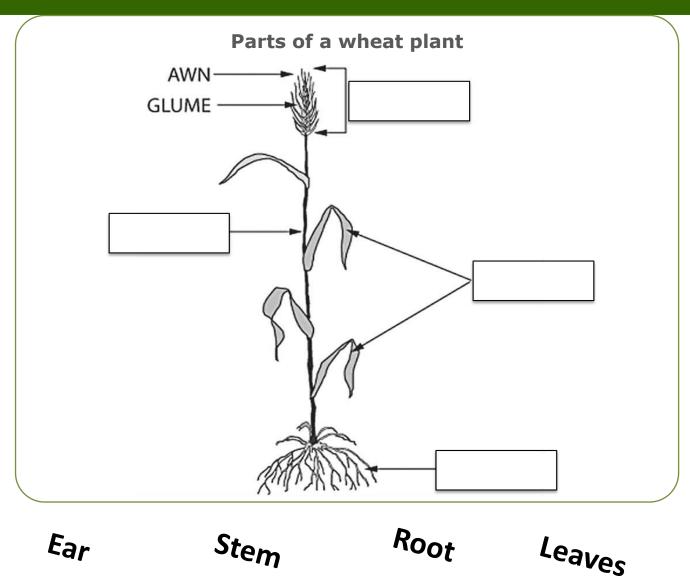


This is one wheat flower. As a class, draw a wheat stem and ear on a large piece of paper and then stick all your flowers on the ear in the pattern of a real wheat plant. You can also glue bits of stem on to make it look even more like a giant wheat plant!

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Thesoak up water and minerals from the ground. They also store food for the plant.

Thesupports the plant. It contains thin tubes for carrying food, minerals and water.

Thecontains the grains of wheat that are milled to make flour.

Themake food for the plant by absorbing energy from sunlight. They take in carbon dioxide and release oxygen.

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Wheat – Activity guidance for teachers

Activity 1

Correct answers: 1 - D, 2 - C, 3 - B, 4 - C, 5 - A

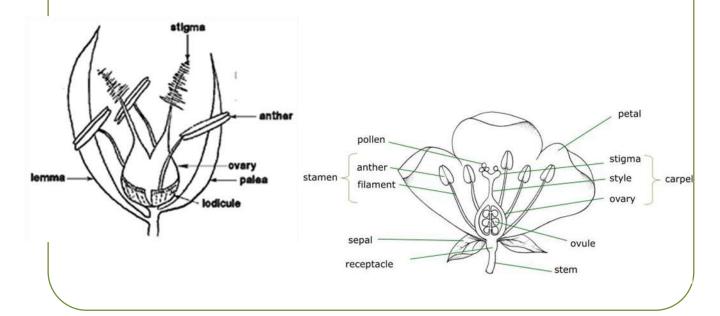
Activity 2

Samples used

Fresh plants can be sourced by asking local farms or growing your own. Bunches of dried wheat plants can be bought through florists and some craft bakers.

Other wild grasses can be used as an alternative if they are of a similar structure.

The almost hidden flowers (florets) of wheat and grass plants may look completely different to the colourful flowering plants in our gardens but they share a common structure. The female reproductive part (stigma or carpel) in the centre of the flower receives pollen from the male reproductive part (anther or stamen) arranged around the centre. Instead of having colourful petals, the reproductive parts in wheat are surrounded by green sheets (palea and lemma). They serve as a protective barrier for the florets and the seeds later on.



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Wheat - Activity guidance for teachers

Class wheat collage.

Getting the children to draw around their own hand (or working in pairs and drawing around a friends enables them to create a shape that is loosely similar to that of the wheat flower pictured above. By creating one giant stem and ear of wheat, the individual handprint wheat flowers can be assembled onto the ear of the wheat. This is an optional step.

Useful Links

Organisations

www.sawtrust.org The Science Art and Writing trust

<u>www.face-online.org.uk</u> Farming and Countryside Education

<u>www.jic.ac.uk</u> John Innes Centre, Norwich

http://www.wheatisp.org Wheat Improvement Strategic Prog.

Resources

https://en.wikipedia.org/wiki/The_Little_Red_Hen Little Red Hen Story

http://daisyshop.co.uk/ Dried Wheat bunch

www.images.norwichresearchpark.ac.uk NRP Image Library

http://www.saps.org.uk Science And Plants for Schools

<u>http://www.countrysideclassroom.org.uk</u> Countryside Classroom



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Yeast Extracts from Yeast lesson plan

Yeasts are living single celled organisms that are found everywhere in the world around us. For example there are varieties of yeast on our skin, in the air, and on the skins of fruit and vegetables. The yeast used in baking bread is responsible for the fermentation — producing carbon dioxide which creates the rise in the dough. When the yeast comes into contact with warmth (water) and carbohydrates (flour) it produces carbon dioxide creating gas bubbles in the dough so it rises.

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Activity 2: Yeast Balloons

You will need:

1 empty plastic bottle

1 x 7g sachet instant yeast

2 teaspoons sugar

Warm water

1 balloon



What to do:

- 1. Pour warm (but not hot!) water into the plastic bottle, so that it measures 4-5cm up the side.
- 2. Add the yeast to the water.
- 3. Add the sugar to the water and yeast mixture. Put the bottle top on and give the bottle a gentle shake.
- 4. Remove the bottle top and attach the balloon to the top of the bottle.

What is happening to the balloon? Why is it happening?

(Teachers: good idea to set up control experiments

- 1. Bottle + yeast but no sugar
- 2. Bottle + sugar but no yeast
- 3. Bottle with just water

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Activity 3: Yeast alive!

You will need:

- 1 petri dish
- 1 block fresh yeast
- 1 teaspoon sugar



What to do:

1. Open the block of fresh yeast. If you want to, squidge it between your fingers. Smell it.

What does it feel and smell like?

- 2. Put the yeast in the petri dish.
- 3. Add the sugar to the petri dish. Stir the mixture until it changes.

HOW DOES THE MIXTURE CHANGE?

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Activity notes for teachers

Activities 2 and 3

The yeast alive and balloon activity prove to the children that the yeast is using the sugar as a food source (fermenting) and creating carbon dioxide gas as a by-product. This shows that yeast can be a useful organism, for example when it is used to ferment waste products like wheat straw where the ethanol and carbon dioxide produced are used as biofuels for cars.

The balloon expands as it fills with gas and yet remains compressed by the balloon, building up energy that would be released if the balloon popped. The children love watching their bottle and by lining them up on a sunny windowsill, a balloon race ensues!

Useful links

Organisations

<u>www.sawtrust.org</u> The Science Art and Writing trust

www.face-online.org.uk Farming and Countryside Education

<u>www.ncyc.co.uk</u> National Collection of Yeast Cultures

www.ifr.ac.uk Institute of Food Research, Norwich

Resources

<u>www.countrysideclassroom.org.uk</u> Countryside Classroom Resources

<u>www.images.norwichresearchpark.ac.uk</u> NRP Image Library

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Bread Workshops

Sue Hudson provides bread making workshops in Norfolk, Suffolk and Essex, often with seasonal themes. From time to time she is able to provide CPD sessions for groups of teachers - please contact her for further information including cost. info@breadworkshops.co.uk

The Science, Art and Writing (SAW) Trust is an innovative, international science education programme that breaks down traditional barriers between science and the arts (www.sawtrust.org).

SAW uses themes and images from science as a starting point for scientific experimentation, art and creative writing and in doing so stimulates creativity and scientific curiosity. SAW project days take a research scientist, a professional writer and professional artist into a classroom to work as a team with the class teacher. SAW also provides training and resources for teachers to enthuse and build confidence in teaching science using a cross-disciplinary approach that is more accessible to students with different interests and learning styles.

The SAW Trust (reg.charity no.1113386) is based at the John Innes Centre (JIC), Norwich and managed by Dr Jenni Rant jenni.rant@jic.ac.uk



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Dr Jenni Rant, the SAW Project www.sawtrust.org



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LEAF Education

LEAF Education (formerly Farming and Countryside Education) works with school communities to help children and young adults understand the connection between farming and their daily lives.

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