What is the best material for a polytunnel?

Lesson overview:

In this lesson, children learn about how polytunnels are being used to make farming more sustainable and then explore materials by investigating the best material for a polytunnel.

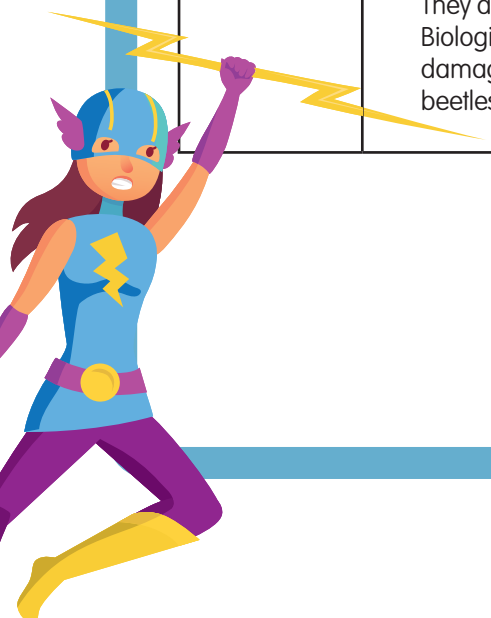
This lesson could be used to introduce some of the ways that British farmers are tackling climate change and start the children thinking about how they might design an idea, invention or innovation that will help farmers continue to care for the environment and be climate superheroes for their Farmvention competition entry.

Equipment needed:

- A range of materials for testing (see notes below for suggestions)

Teacher guidance:

Slide 2: Introduction	• Use the presentation to introduce polytunnel technology and how it is being used to support sustainable farming. • Polytunnels are usually either shaped like a semi-circular arc or a high tent shape. They are typically made form a steel frame with a type of plastic, called polythene, placed over the top. • They are especially useful for growing soft, delicate fruits such as strawberries, as they reduce the risk of rainy weather destroying crops.
Slide 3:How polytunnels help farmers to protect the environment	There are many reasons polytunnels lead to more sustainable farming. Some reasons include: • Crops are protected from the (sometimes unpredictable!) British weather. Heavy rains can destroy soft fruit crops, meaning all of the time and resources put into them was wasted and large amounts of food ends up being thrown away. Growing fruits like strawberries, raspberries and cherries in the controlled environment inside a polytunnel means they can survive whatever the weather and far less food is wasted. • Using polytunnels extends the growing season for strawberries so that they can be grown from May to mid-autumn, rather than just over eight weeks in June and July as it is without polytunnels. This means supermarket and farm shop shelves are filled with local produce rather than fruit that has been shipped in from other countries, carrying a hefty carbon footprint. • Polytunnels protect crops from insects and other small creatures that can damage crops. They also provide an environment where biological pest control can be used effectively. Biological pest control involves introducing predatory insects to target those that are damaging crops. Some polytunnels even have 'beetle banks' which house the ground beetles which are natural predators of the weevils and slugs that like to eat soft fruit crops.



Slide 4: Properties of materials	• Discuss properties of materials how they are chosen for certain purposes based on their suitability. • Some commonly-learned properties of materials in Key Stage 1 include flexible, rigid, hard, soft, rough, smooth, waterproof, permeable, magnetic, transparent (completely see-through, like window glass), translucent (partially see-through, like sunglasses or a frosted window) opaque (not see-through at all), stretchy, shiny, dull (not shiny). • The covering for a polytunnel needs to be waterproof and flexible. Many polytunnels use translucent, colourless plastic for a covering, but depending on what types of crops are being grown inside and their needs, some are more transparent or are different colours. Polytunnels covers for some kinds of mushrooms tend to be opaque as they grow better in darker conditions.
Slide 5: The challenge	• Set the scene: You are a farmer who would like to start using polytunnels to help you grow crops. Your challenge is to investigate which is the best material to use for the cover. - Ask the children to consider the following questions: - Which properties should the material covering a polytunnel have? - Which property should we investigate? - How could we test to find out if a material is waterproof/flexible? - Depending on which property you are testing, your investigation will be carried out differently. • Children will likely need a lot of support to plan their investigation. Some possible suggestions for investigations are: - To investigate whether materials are waterproof or not, place them over a cup or paper towel and drop a few droplets of water on using a pipette, empty washing up liquid bottle or teaspoon and observe what happens. If the material is waterproof, the water will rest in a blob on the surface. If it is not waterproof (permeable) it will sink in. This may not happen instantly, so make sure you observe what happens for a minute or so before moving on to the next material. - To investigate whether materials are flexible stretchy you could try bending or pulling them. You could extend this by measuring how stretchy they are, comparing their original size to the size they can stretch to when pulled. - For a more challenging investigation, you could see which materials keep the area contained inside them warm and/or allow the heat from the Sun to pass through them. Create some frames using objects such as drinking straws, pipe cleaners or building blocks and cover them with different kinds of materials. Place an ice cube inside each one and place them in the Sun, then watch to see which ice cube melts the quickest. - For an investigation that requires observation over a longer period of time, you could build some model polytunnels as suggested above and try growing some food in them. If you cannot get hold of seeds, some vegetable off-cuts can be grown again, including carrot tops, spring onion roots and celery bases. You could also gather seeds from fruits like apples or strawberries. • A broad range of materials for your investigation can be easily gathered from around the home, for example: - Card and paper can be gathered from packaging, such as cereal boxes or shopping receipts - Different types of plastic can also be gathered from packaging, such as carrier bags, ready-meal films and cartons, drinks bottles and fruit and veg packaging - Tin foil or wrappings of sweets or Easter eggs can be used to test the properties of metal. Pie dishes and some takeaway cartons are made of a more firm metal that could be used after it has been cleaned - Kitchen or toilet roll can be used to test more absorbent types of paper

	- Foam or polystyrene that can be found under frozen pizzas or as takeaway cartons could be used after cleaning - Fabric from old clothes or towels could be used. • **Health and Safety:** Supervise children when using scissors.
Slide 6:	• Discuss what we found out from the investigation. - Ask the children to consider the following questions: - Which material do you think was the best? Why? - Were you surprised by any of your results? - Does this material have the other properties that a polytunnel cover would need? • Children could also use junk-modelling materials to create a model polytunnel and try growing some crops inside (if you don't have access to seeds, children could plant the pips from their fruit or the off-cuts of vegetables that re-grow such as carrot tops or the roots from spring onions). They could draw a labelled design of a polytunnel, noting their choices of materials and explaining why they are useful. They could create and advert selling their design to farmers. They could carry out a further investigation into the shape of polytunnels, comparing how different shapes can stand firm against windy conditions.
Slide 7: Farmventing	• Encourage the children to think about how they could use their learning about how polytunnels work to help them design an idea, invention or innovation that will help farmers continue to care for the environment and be climate superheroes.

Possible links to the National Curriculum

Subject	Topic	Objective
Science	Working Scientifically	• During years 1 and 2, pupils should be taught to use the following practical scientific methods, processes and skills through the teaching of the programme of study content: - Observing closely, using simple equipment - Performing simple tests - Identifying and classifying - Using their observations and ideas to suggest answers to questions
	Year 1 Materials	• Distinguish between an object and the material from which it is made • Identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock • Describe the simple physical properties of a variety of everyday materials • Compare and group together a variety of everyday materials on the basis of their simple physical properties

	Year 2 Materials	• Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses • Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching
Design Technology	Make	• Select and use from a range of tools and equipment to perform practical tasks [for examples cutting, shaping, joining and finishing] • Select from and use a wide range of materials and components, including construction materials, textiles and ingredients, according to their characteristics
	Evaluate	• Evaluate their ideas and products against design criteria