

## Plant dye investigation

Until the 19th century, plant-based dyes were the only dye source available. The discovery of human-made, synthetic dyes that could be produced quickly and in large quantities triggered a decline in the use of natural dyes. However, they are still valued for their purity and used in food, medicines and cosmetics. A natural blue food dye has proven harder to obtain than other colours. After 20 years of research, scientists recently discovered a new brilliant blue pigment in cabbage that could replace synthetic food dye! Explore for yourself with this natural dye investigation.

### You will need:

- Half a red cabbage
- Baking powder
- Lemon juice
- Spoon
- Saucepan
- Knife
- Water
- Sieve
- 1 large bowl
- 3 glasses
- Pencil and paper
- Other fruits and vegetables

**1** With an adult, go for a walk outside. If possible, head to an area where food is grown, such as a community garden or allotment, or visit the Kitchen Garden at Kew. Explore the different fruit and vegetables you see growing.

🔗 Are they fibrous or juicy? Pale or brightly coloured? Leafy or rooty?

🔗 Which ones do you think would make the best dyes? Use the table below to record your hypotheses.

☆ **Top tip:** Some seeds might not be visible, for instance if they are surrounded by soft fruit or a seed pod.



Name of fruit or vegetable	Features that would make a good dye	Features that would make a bad dye
Red cabbage		

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**2** To prepare your experiment, carefully chop up half a red cabbage. Place the chopped cabbage in a pan, cover with water and boil for 20 to 30 minutes. Let the liquid cool.

! **Safety first:** Ask for an adult's help when using a knife and handling hot water.



**3** Set a sieve over a large bowl to strain the liquid. Observe the colour of the fluid you have extracted. Is it as you expected?

☆ **Top tip:** Do not throw away the cabbage – you can still eat it!



**4** Carefully pour some of the purple liquid into two clear glasses. The next stage of the experiment is to add baking powder to one glass and lemon juice to another. Think like a scientist and make a prediction in the box to the right.

🗨️ Do you think the colour will change? How and why?

### Prediction

I predict...

**5** Add half a teaspoon of baking powder to Glass 1. Add the juice of half a lemon to Glass 2. Use a spoon to stir each mixture.



**6** Hopefully, you will have seen the colour of the dye transform before your eyes.

🗨️ Are the results as you predicted?

📝 Record your findings in the section to the right.

	Colour of dye
<b>Glass 1 – with baking powder</b>	
<b>Glass 2 – with lemon juice</b>	

### Taking it forwards:

Flowers also contain pigments, which give them their colour and attract pollinators. With adult supervision, lay some flowers down on paper, cover with kitchen towel, and 'pound' with a hammer to extract their pigment.

As well as pigments, Kew scientists have found that plant colour is sometimes caused by the physical structure of the plant. Find out more here: [kew.org/read-and-watch/plant-colours-not-pigments](https://www.kew.org/read-and-watch/plant-colours-not-pigments)