

HOW DOES YOUR GARDEN GROW?



LESSON 5: WHERE DOES THE WATER GO?

Key vocabulary:

root, stem, petals, trunk, predict/prediction, water, nutrients

Resources:

Prepared carnations and celery, one white carnation, magnifying glasses (one per child), red and blue food colouring, containers, celery with leaves, carnations (one carnation and one stalk of celery both with the stem divided per group)

Key information:

It is important for children to notice that the colour is contained within the coloured strands or tubes, the xylem, which are columns of reinforced hollow cells that transport the water. Children do not need to know the word xylem. They do need to know that water has to be transported to all parts of the plant for the plant to survive.

LESSON SUMMARY:

In this lesson children will observe the transport of coloured water in carnations and celery and will set up an observation over time to investigate this in more detail in lesson 6. By the end of these two lessons children will know that water is transported in a plant and understand the function of the stem.

Preparation needed: Stand carnations and celery in red-coloured water for 1–2 days prior to the lesson – this preparation could be done by the children. The coloured water will be taken up faster if the celery and carnations are allowed to wilt a little before they are put in the water. Cut the celery into both cross sections and lengthways strips, with enough for one of each kind per pair.

National curriculum links:

Investigate the way in which water is transported within plants

Working scientifically links:

Using results to draw simple conclusions and suggest improvements, new questions and predictions for setting up further tests

Learning intention:

To explain observations of water being transported in plants and make predictions based on observations

Success criteria:

- I can make observations.
- I can describe what happens to water in a plant.
- I can make predictions based on what I have observed.

Scientific enquiry type:

Observing over time

EXPLORE:

Show the children one of the coloured carnations and one that is still white. If children were not involved in the preparation of the carnation:

Ask: *What do you think happened to the coloured one?* Distribute the prepared carnations and tell the children to look closely at the petals, leaves and stem.

Ask: *What do you notice?*

Show the time-lapse video (Video 1) of the carnation in coloured water. Explain that the video shows what has been done to the carnations. If children were involved in the preparation of the carnations, this will act as reinforcement of the process.

Ask: *What does this tell you about what the stem does?*

Distribute the prepared celery. Ensure that each pair has both a piece that has been cut lengthways and a cross section. Tell children to look closely at the celery.

Ask: *What can you see? What are the coloured dots on the slices and at the ends? What are the coloured strands in the pieces cut lengthways? Pull one out. What does this tell you about the transport of water in plants?* If necessary use a digital presenter or microscope or show the images on slide 1 of Water transport in plants Slideshow 1 to draw attention to the details.

ENQUIRE:

Show slide 2 of Slideshow 1, which features the following statement: Water goes up the left of the stem to the left-hand side of the plant, and the right of the stem to the right-hand side of the plant.

Ask: *Do you think the statement is true or false? Why?* If they all agree, challenge children by disagreeing with the statement. Encourage children to refer to their observations of the carnation and the celery to support their decision.

Ask: *How could we find out?* If necessary prompt children by showing a carnation with a split stem.

Tell the children that their challenge is to work in small groups (ideally in fours) to set up an observation-over-time investigation to find out if the statement is true or false. Groups completing challenge 1 or 2 need a carnation and a stick of celery, each with the stem divided, four containers

and food colouring (red and blue). There will be a better result if the carnations are left in a warm, sunny spot. Those completing challenge 3 need a second stick of celery instead of the carnation. The challenges are differentiated by the level of detail and explanation required.

Challenge 1 Children draw and label a diagram.

Children draw and label a diagram to show what they think will happen to the carnation and the celery.

Ask: *Why do you think this will happen?*

Challenge 2 Children draw an annotated diagram.

Children draw an annotated diagram to show what they think will happen to the carnation and the celery and explain what this shows about the transport of water in plants. It should include a cross section of the celery.

Challenge 3 Children investigate the role of leaves in the movement of water through celery.

Children investigate the role of leaves in the movement of water through celery, drawing and labelling diagrams.

Work with this group. Show the children an additional statement: The leaves help plants to take up water.

Ask: *How can we adapt the investigation to find out if this is correct? What will we need to do? What will happen if it is correct? Do you think it is correct? Why?* Support the children in setting up an investigation where the leaves are removed from some of the split celery sticks before they are placed in the different colours of ink. This group will need to check their celery at intervals to establish how quickly the coloured water is taken up. Ask them to draw and label diagrams showing what they think will happen and what this shows about the transport of water in plants. It should include a cross section of the celery.

REFLECT AND REVIEW:

Share some of the predictions.

Ask: *What do you think will happen? How will this show that your ideas are correct? What would happen if the statement was true/false?* Discuss any differences in what children expect to happen. Encourage children to justify their predictions by referring to their earlier observations of the celery sections and carnations.

EVIDENCE OF LEARNING:

Look at the children's diagrams. Do the children relate their earlier observations to water being carried in tiny tubes from the roots through the stem to the leaves and flowers? Is their prediction consistent with this? Can they explain their prediction? Can they describe evidence for the statement being true/false? Do they understand that all parts of the plant need water in order to survive?