

## 1b Turf troubles - which liquid?



1 hour 45  
mins and  
10 mins  
per day

A letter from a company that grows turf sets the context in which children investigate the effects of different liquids (drinks) on plant growth.

### OBJECTIVES

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- Setting up simple practical enquiries, comparative and fair tests
- Reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions
- Explore the requirements of plants for life and growth (air, light, water, nutrients from soil, and room to grow) and how they vary from plant to plant

### APPROXIMATE DURATION

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1 hour 25 minutes (split by 2 weeks of 10 minutes daily recording).

### RESOURCES

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(Per group of 4)

- Activity sheet 1b, 5-7
- 2 seed trays with previously germinated grass seed<sup>1</sup>
- Packets of grass seed
- Labels (plant labels will be ideal)
- 50 ml measuring cylinder
- 2 small screw top pop bottles (280 ml/330 ml size)
- Range of liquids e.g.:
  - salt water
  - cola
  - sugar water
  - tea
  - white vinegar
  - coffee
  - lemonade

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<sup>1</sup> The trays of grass seed will need to be prepared 10-14 days in advance, by either the teacher or children. The seed is then allowed to germinate normally, so that there is a crop of grass to test and observe.

## INTRODUCING THE ACTIVITY (10 minutes)

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Read the letter on Activity sheet 1b to set the scene. The discussion can then begin by looking at types of grass in general. Brainstorm suggestions about where grasses grow and the characteristics of the grasses that grow in different places. Questions to encourage ideas can include:

- *Where does grass grow?*  
They can be found almost anywhere there is a place for their roots to hold.
- *Are all grasses the same?*  
No. There are lots of different types.
- *Can you describe different types of grass?*  
Tall, short, flowering, broad leaves, narrow leaves, soft leaves, hard leaves, short leaves, etc.
- *Are there differences between the grass on a lawn, and on a bowling green?*  
*What about a football pitch, or a cricket pitch?*  
Grass sold for lawns is usually 'hard-wearing' rye grass, while that for bowling greens is much finer and susceptible to wear.
- *What sorts of grass characteristics might be needed for particular sports?*

The detail found on the backs and sides of grass seed packets can be used to help develop and inform their ideas.

Children are now reminded of the conditions plants require for healthy growth, and that water is one of these. You may choose to discuss some of the reasons why plants need water, in simple terms. You could include:

- Seeds will not germinate without water.
- Water carries dissolved materials from the roots to the leaves.
- Water is used up during photosynthesis, when the plant makes starch, etc. from carbon dioxide, air and water, using the energy from the sun.
- Water provides support for leaves and stems of plants like tulips, which do not have a 'skeleton'.
- Water in the leaves evaporates during hot weather, and so cools them, stopping the leaves from being scorched by the sun.

The question to be investigated asks whether other liquids might stimulate growth in plants like grass.

### Safety note

- Keep the liquids in clearly labelled screw top bottles.
- Use commercial compost rather than garden soil in the seed trays.
- Children should always wash their hands after handling the soil and the liquids.

## MAIN ACTIVITY (45 minutes, and 2 weeks of 10 minutes daily recording)

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Using the Investigation planner on Activity sheet 5, the groups of 4 children spend about 15 minutes planning their investigation. The teacher may stimulate discussion to help this by asking questions such as the following:

- *Should groups have a control experiment?*  
Since no two experiments are likely to be identical, there should be individual controls for each group.
- *Which liquid(s) should you use?*  
If they run a control, one liquid will be ordinary water. Since there are several groups, each group can investigate one other liquid.
- *How much liquid should you use?*  
25 ml would be a good starting point, and this could be varied as the test proceeds, as long as the amount is kept the same for the control as well.
- *What equipment will we need?*  
This is partially answered for them on the Planner, but they will need to add some items to this.
- *How can we make sure we have a fair test?*  
Decide what are the important variables to keep the same (e.g. it does not have to be the same person pouring the liquid on each time, or how quickly it is poured on, but the quantity is important) and what that 'sameness' should be (e.g. continuing to pour 25 ml of liquid onto water-logged plants is not a good strategy! Perhaps the amount and frequency of adding should be reconsidered).
- *How can we record our findings?*  
Select a method from the list below, depending on the ability of the children.  
Measure:
  - the tallest and shortest and divide by 2 for the mean
  - 10 blades of grass and choose most 'common' height
  - several blades of grass e.g. 10, and find the average
  - using a grid (Activity sheet 8) and counting squares coverage
  - using a grid, and converting squares of coverage to percentages.

Once the teacher is satisfied with a group's plan, they set up their investigation. The trays should be labelled clearly with the liquid used for watering, and then placed in the same area near the windows, so that all other conditions remain the same.

The following two weeks are spent watering and recording the effects on Activity sheet 6. Some will undoubtedly wilt, change colour or die during the recording period. The recording sessions will take about 10 minutes, and should be done at roughly the same time of day.

Groups plot charts of the growth (or otherwise) of the grass, showing the rate at which the liquids have stimulated, or harmed growth.

Ideas can be developed as to dealing with missing data from weekends. For example, a space can be left on the recording sheet, the results plotted, and the missing results *interpolated* into the graph (that is, the missing results of coverage can be estimated and placed on the graph perhaps in a different colour to show that they are not measured, but merely estimated).

## PLENARY (30 minutes)

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The final session should draw together the results from all the groups, so that discussions can identify the effects of the different liquids. The final record sheet can either be filled in individually or by the groups, or a flip-chart sheet or similar can be prepared from Activity sheet 7. Once all the results have been collated, they can be used to draw final conclusions. For instance:

- *Have any liquids caused damage to the grass?*
- *Have any liquids killed the grass?*
- *Have any liquids increased the growth of the grass?*
- *What has happened to the control experiments? Have different groups' control experiments grown in a similar way?*

The children can note any surprising results; for instance, it is often suggested that lemonade is added to cut flowers in a vase to keep them fresh for longer. Is there any evidence that this has helped the grass grow?

- *What effect does lemonade or cola have on grass growth?*
- *Are there any hints which ground staff or gardeners might find useful if they want to avoid harming their grass?*
- *Is there any information which ground staff and gardeners might find helpful to enhance the growth of their grass?*

Finally, the children can write a letter to gardeners/ground staff explaining their findings, and explain how they could make use of them.