

Primary

1 Ready, Set, Grow!

Aim: To understand that the growth of a plant depends on the composition of the soil.

Students:

- Explore ideas about soil including what might be found in it and the notion of different soils.
- Discuss how soils might be compared by seeing how well plants grow in them.
- Discuss what a fair plant race would entail (for example what sized pots, where to put them, how much soil, matching the amounts of sunlight and water). Beans or peas are suitable as they grow quickly (a week or so to sprout). Some seeds may be 'sick', so 3 to 4 per container is a good idea.
- Work in small groups to make their own soil samples from components supplied (sand, loam, compost, manure, mulch and gravel and any other suggestions).

To get a variety of mixed soils, each group can be allocated random amounts by picking straws, for example:

- long straw = 2 scoops
- medium straw = 1 scoop
- short straw = none of that component.

Students should label each soil mix clearly.

Over a period of a few weeks, students regularly check their plants' progress, measuring height and noting general health, not forgetting to water the plants regularly. At the end of an agreed time period, discuss the results and consider reasons for different growth rates.

If a still or video camera is available, then taking time-lapse pictures of the growing process would enhance this activity.

2 Food webs

Aim: To trace the origin of some of the food we eat **back** to the soil.

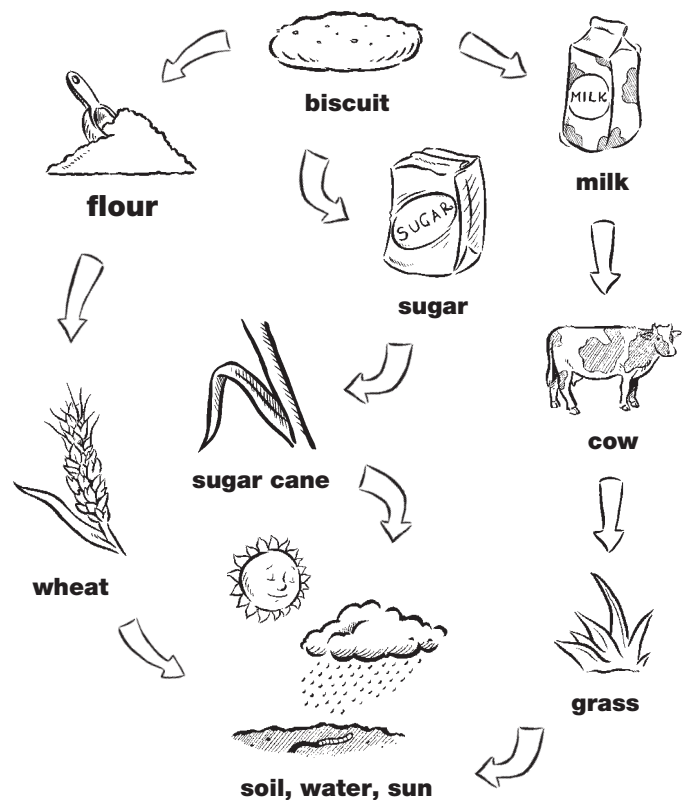
Students:

- Work individually or in small groups to develop pictorial representations of food pathway. An example is shown below.
- Share their work through oral reports or a display.

For example, in considering a sandwich, students can ask questions such as:

- What is the sandwich made of? (bread)
- What is the bread made of? (flour)
- Where did the flour come from? (wheat)
- What did the wheat need to grow? (sun, water and soil)

Other examples include orange juice, milk, hamburger, cheese, potato chips or vegemite.



3 Consequences

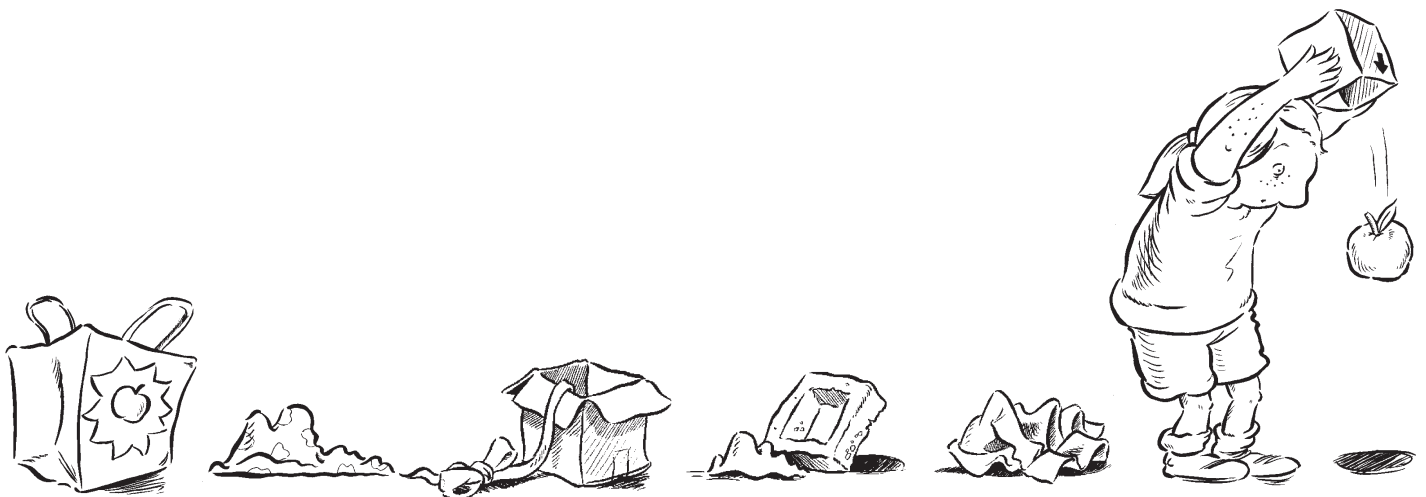
Aim: To develop preliminary ideas about the concept of sustainability through speculating on causes and consequences of changes to an environment.

Students:

- List a number of possible events which could affect the plants, animals and humans in a particular environment. The list of events could include the school ground flooded, a plague of flies, a long period without rain, more native birds appearing around the school, a hillside cleared of all trees or a forest is devastated by a fire.
- Choose one of the events listed and discuss possible causes.
- Suggest possible effects of the event on living things (including humans) in the area. The widespread consequences of these events should be emphasised.
- Work in groups with one statement allocated to each group. Groups discuss and list possible causes and consequences of the event. A tree diagram showing a chain of events could be used to display results of their discussions.

Each group in turn presents their results to the rest of the class. The class can be given time to respond with further consequences of the event.

In general, flexible, diverse systems are able to cope with changes and so are more sustainable. Human activities often limit the capacity of a system to cope and can make an event a disaster. For example, heavy rains have a more severe impact on land that is cleared of vegetation. Vegetation slows down surface water flow and hence allows the soil to absorb the water, resulting in less erosion and flooding.



4 School environmental survey

Aim: To investigate environmental strategies used within the school and promote sustainable practices.

Students:

- Use the School Environmental Survey sheet (see Appendix 2, page 31) to investigate which practices are used within the school. Groups can be allocated a specific area to investigate and report findings.
- Discuss benefits of those which are implemented and reasons why others are not.
- Develop a strategy to implement a new initiative, for example, recycling, ground beautification, reducing energy use, composting organic waste or developing a worm farm.

The strategy should:

- have achievable aims and justification for implementation
- include the resources required (including possible funding)
- include a timeline
- involve marketing the program to students and all staff as part of a school policy
- involve key people from the school.

The completed strategy should be presented at an appropriate forum such as school assembly, Junior School Council, staff meeting or parent group. If desired, the wider community could be involved. The strategy could be presented to people outside the school, for example, other schools, local Rotary chapters, local conservation and Landcare groups and community radio programs.

There are a few organisations that can help schools to develop environmental programs like this, for example 'Schools for a Sustainable Future' and 'Ecorecycle'. For contact details, see *Future Harvest* website www.museum.vic.gov.au/futureharvest/gcplinks.html

Discussion

Students could consider the effect of extending the savings in one household to all the households in a region, state or country. For example, composting 10 kg of food scraps a week means that 500 kg per year is not going to landfill. If 1000 households were involved, that would be 500 tonnes less food scraps going to the tips!

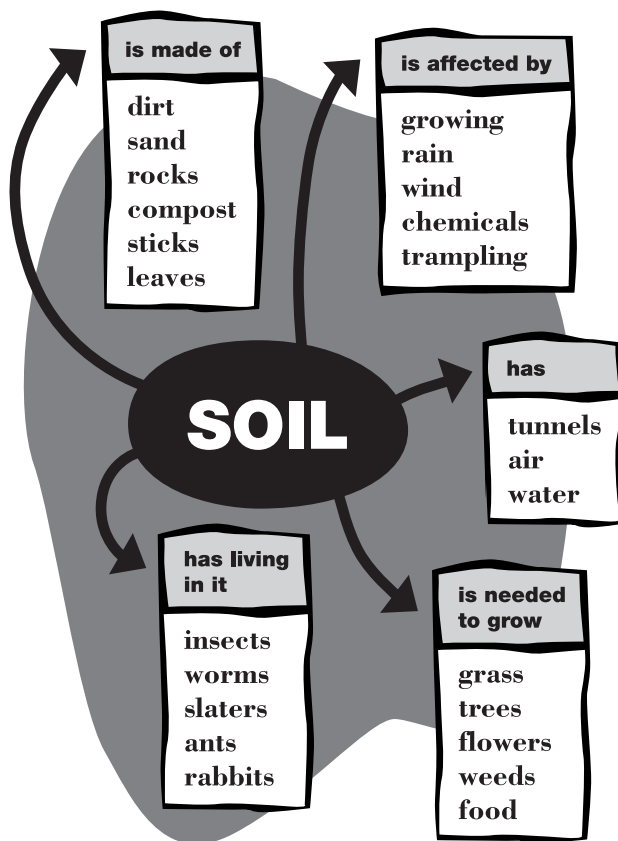
See Activity 11, 'A Lot of Rot', page 12 for specific ideas on how to go about composting and farming worms.

5 Soil concept map

Aim: To explore the relationship of soil to plants, animals, wind, water and the sun.

Students:

- As a class, brainstorm ideas relating to soil.
- As a class or in small groups, design a concept map.
- Report back to the class with their findings and display the concept maps.



6 Demonstration of soil erosion

Aim: To demonstrate the effects of environmental forces, such as wind and water, on the soil.

Students:

- Discuss the effects of wind and water on the soil.
- In small groups develop a demonstration (see below for suggestions) which illustrates the effect of erosion.
- Present a science ‘stage show’ to the class. Presentations could also be recorded on video and screened as a class show.
- Follow up with a field trip to study local areas affected by erosion.

Suggested demonstrations:

- Wind power

Sprinkle dry soil onto a sheet of paper. Blow over the sample with a straw. Which parts travel the furthest? Why? Moisten sample and repeat. What happens?

- Washing away

Place and shape a mound of dirt in a large tray. Pour water to create a river and observe where erosion occurs. Repeat the exercise but this time add ‘plants’, ‘rocks’ and barriers along the river’s course.

- Nature’s forces

Build a model river, hillside and valley in a sandpit and leave for a few days. A photographic record or sketches can be made of the process.

- Bare and covered soil

Place a sod of soil with grass in one foil pan and a layer of plain soil in another. Angle the pans and allow a cup of water to run over the surfaces into another container to collect debris. Compare the amount of debris eroded in each case.

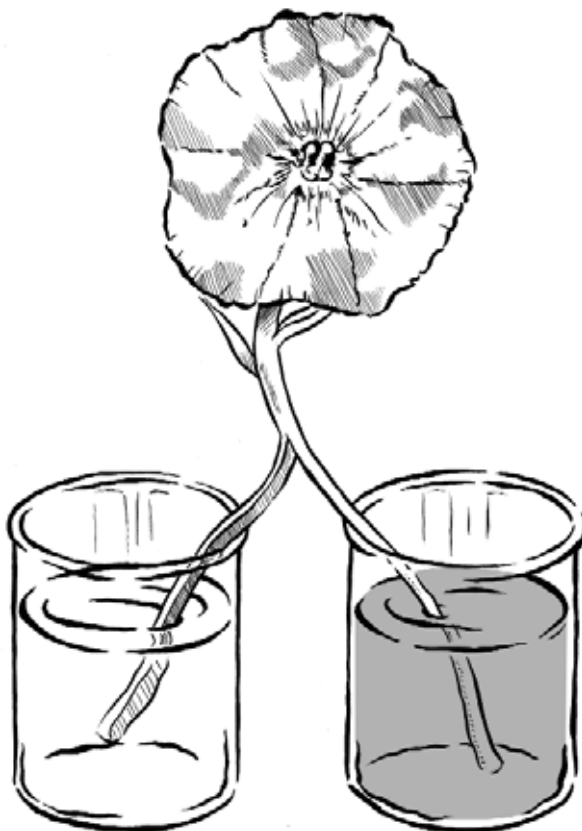
7 The capillary action of plants

Aim: To observe the way in which plants take up water.

See also Activity 19, page 17 to extend this concept.

Students:

- Place a celery stick in a jar of coloured water and leave for two days. Cut longitudinal and transverse sections and observe the way in which the celery has taken up the dye. Use a magnifying glass or microscope and make sketches of what is seen.
- Stand cut flowers in coloured water to produce purple carnations or black daisies. Partially split the stem of a flower up the centre and put each half into adjacent jars with different coloured solutions to create a two tone flower. Draw and label a diagram of the experiment.



Discussion

Plants, such as food crops draw up water. Chemicals found in the soil, such as nutrients and possibly pesticides and herbicides, dissolve in this water. Where could these chemicals end up?

8 Turning wheat into bread

Aim: To engage students in a production process.

Students:

- Make flour by crushing wheat using a mortar and pestle or improvised crushing method.
- Separate the wheat husks from the flour using a sieve. Extra flour will be needed to supplement the small amount of flour produced by the students.
- Mix the flour with water to make a damper. Dampers can be cooked in an oven or rolled onto a stick and cooked over a small campfire. Best results are obtained when the fire has burnt down to a bed of coals.

Alternatively, yeast can be added to the flour and bread baked in an oven.

Discussion

Compare commercial production of bread to manual methods. Does everything have to be done in factories? What are the advantages and disadvantages of making your own bread?

9 Eat or be eaten

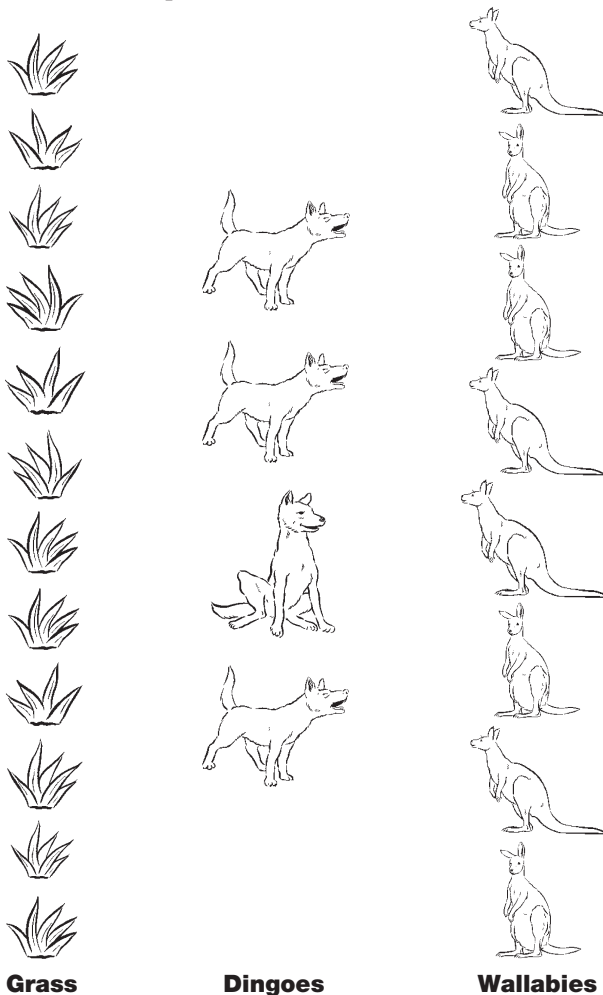
Aim: To have fun simulating a food chain and modelling factors limiting population growth.

Students:

- Play a game in which they role play wallabies, dingoes and grass, and how these might interact with each other in an isolated environment.

Setting up the game

- Divide the class into three groups: grass, wallabies and dingoes (in the ratio 3:2:1).
- Hand out name tags or coloured labels so that identification is easier. (Spares are needed as roles and numbers will change during the game.)
- Appoint a ‘timer’ to start and end each 20 to 30 second game round as well as three ‘recorders’ to count the populations of each group at the end of every round.
- In a large open space, the dingoes take up positions between the other two groups. For example:



Game rules

Wallabies must touch (eat) grass by the end of the round, or die of starvation. Each dingo has to touch (eat) a wallaby before the wallaby touches grass, or die of starvation at the end of a round. Grass doesn't move!

Once touched, a person can no longer participate in the game until the next round.

Outcomes:

- If a grass is eaten by a wallaby, it becomes another wallaby.
- If a wallaby dies of starvation it becomes a grass.
- If a wallaby is eaten by a dingo, it becomes a dingo.
- If a dingo dies of starvation it becomes a grass.
- If a wallaby or a dingo gets its food, it retains its original role.

Playing the game

The timer gives the start signal for a round to begin. Recorders count numbers of each group at the end of each round.

A number of rounds are played with each player taking on the role of wallaby, grass or dingo depending on their outcome the previous round. Students obtain their new name tags if necessary and take up their starting positions before a new round commences. (See diagram.)

Discussion

Suggest explanations for the results. Try graphing the results to identify trends more clearly.

What would happen if the game continued for more rounds? How does this game compare to real situations?

10 Web of life

Aim: To show that animals and plants depend on each other.

The class forms a circle around a tree, preferably in the shade! One student plays the part of the tree and holds one end of a ball of string. Ask for the name of a creature that lives in the tree, for example, a magpie. A student in the circle is assigned the role of the magpie and the string is rolled out so that it connects the 'tree' and 'magpie'. Continue in this way so that all the students are attached to the string and are playing the parts of caterpillars, leaves, soil, worms, birds, and so on. (See diagram below.) If the group is large, more than one of each plant or animal may be included.

Choose an element of the web to be disrupted, for example, soil is washed away or all the caterpillars are poisoned. The nominated element tugs gently on the string. Any other players attached to the web who feel the tug, give a gentle tug of the string as well.

Extension

The students might play the game to explore other situations. They could also think of other games that can demonstrate the interdependence of the components of a web, for example, using dominoes or 'houses of cards'.



11 A lot of rot

Aim: To encourage the school community to be involved in the recycling of organic material and monitoring a micro habitat.

Students:

- Research and then choose a compost bin or worm farm. A good reference for this is: Pears and Stickland. See Resources, page 28.
- Collect compost material such as grass clippings and food scraps.
- Continue to add material and ensure that it remains moist.
- Check the base of the heap every week. When the material has decomposed, remove and use it for planting or spreading.
- Consider the composition and quantity of the material added, for example, worm farms do not tolerate large quantities of acidic components like citrus scraps.
- Consider vermin control for example, by enclosing the bin in wire. Worm farms in the form of stackable boxes are readily available and are vermin proof.

Extension

Students:

- Compare different types of compost heap (aerobic or anaerobic).
- Carry out more rigorous monitoring, for example of temperature and moisture level. The effect on the rate of decomposition could be compared by varying the frequency of turning-over and watering. The effect of including or excluding different materials can also be examined.

To maintain a successful compost heap or worm farm over the long term in a school environment, it is important to have a plan to ensure there is support from the rest of the school community. (See Activity 4, page 8 for details on how to initiate an environmental strategy.)

Discussion

- How will the composted material be used? (Worms and their castings could even be sold.)
- Where should the compost heap be located?
- What should be composted and how it should be collected.

There are a few organisations that can help schools to develop environmental programs, for example, 'Schools for a Sustainable Future' and 'Ecorecycle'. For contact details, see *Future Harvest* website www.museum.vic.gov.au/futureharvest/geplinks.html

See also Activity 24, page 20 for some more hints about worms.

12 Native seed collection and propagation

Aim: To collect seeds and propagate species of native trees and shrubs.

Students:

- Collect a variety of seed vessels from native plants from home, a school walk or field trip.
- Extract seeds. See Appendix 5, page 36.
- Germinate seeds and provide for the needs of growing seedlings.

Extension

Grown plants can be potted and sold at a mini school fete or plant sale. Other plants can be used to re-vegetate an area of the school, planted at home or used as gifts.

