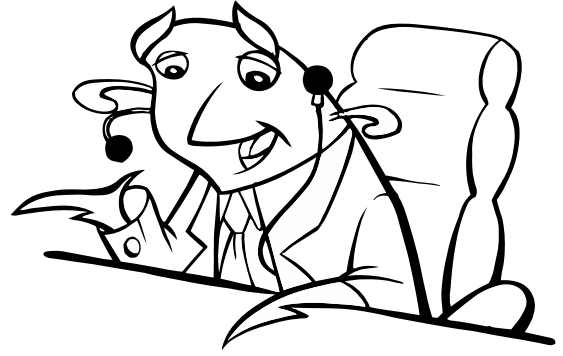


Life and Living

- 2.3 Students make links between different features of the environment and specific needs of living things.
- 3.3 Students describe some interactions (including feeding relationships) between living things and between living and non-living parts of the environment.
- 5.3 Students evaluate the consequences of interactions between the living and non-living parts of environments.



7 Getting to know your dung beetles

Focus

Investigating

Aim

To help students to identify the various species of introduced dung beetles in Queensland and to understand their behaviour.

Materials

- Resource sheet 3—*Queensland distribution of common introduced dung beetles*
- Resource sheet 5—*Common dung beetles in Queensland: colour identification sheet*
- Resource sheet 6—*Agent Doug the dung beetle and his dungbusters!*

Sequence | 60 minutes x 2

Part A

1. Ask students to compile a file on each dung beetle with reference to resource sheets 5 and 6, indicating what their special abilities are and how they work the dung. Ask students to analyse and compare the photos of the beetles and identify what makes each unique. (If you have conducted activities 4–6 already, the students could refer to the dung beetles collected when making their notations.) Their 'D' Files could be illustrated showing what tools and activities each dung beetle has at its disposal.
2. Ask students to choose **one** dung beetle to study further. It may be helpful to ask the students to choose a dung beetle which is found in your region. (See resource sheet 3—*Queensland distribution of common introduced dung beetles* and resource sheet 5—*Common dung beetles in Queensland: colour identification sheet* for more information.) Ask students to prepare a dossier on:
 - how this 'secret agent' operates
 - what its mission is
 - how it goes about 'dungbusting' on an average day.

Part B

Ask students to write a descriptive story or develop a picture book about their chosen dung beetle, highlighting an adventure it could be involved in. Activities of the dung beetle could include:

- collecting dung
- rolling dung
- attracting a female
- burying dung.

Other details could include:

- where in Queensland the beetle might live
- what the land looked like before your 'agent' came along
- how your 'agent' helps the environment
- how your 'agent' competes with the buffalo fly for dung.

Think about other characters who may be in the story such as the buffalo fly, cattle, a farmer, etc. Students might like to illustrate the story and make it into a picture book. This could be used to help educate the wider community about the benefits of introduced dung beetles.

Life and Living

- 2.2 Students illustrate changes which take place in the course of the life span of living things (including the growth of a plant and animal)
- 3.1 Students draw conclusions about the relationship between features of living things and the environments in which they live.
- 3.3 Students describe some interactions (including feeding relationships) between living things and between living and non-living parts of the environment.

8 Dung beetles and plant growth

(Source: Adapted from the Australian Dung Beetle Program and *Bioscan*, 1995)

Focus

Investigating

Aims

To investigate the effect that the activities of dung beetles can have on plant growth. (It can be linked to other activities that show how dung beetles are an effective tool for sustainable natural resource management.) The activity can be conducted in a classroom situation where there is good natural light.

Materials

- 4 lots of 16–20 small dung beetles (e.g. *O. gazella*) (If you can't get dung beetles, conduct the alternative sequence in treatment 3.)
- 12 x 250 g of fresh cattle dung
- 16 plastic flower pots (20 cm diameter, 20 cm high—small squares of weed mat or fibreglass flyscreen in the bottoms will minimise soil loss and help to prevent beetles escaping during burial)
- 16 lids for the flower pots (use gauze and a rubber band to make a lid)
- 16 x 5 kg lots of sand or sandy soil (from the one location)
- 16 x 10 millet seeds (or 16 x 4 sweet corn seeds)
- 16 labels for pots
- Scales or top pan balance
- Disposable gloves
- Ruler or tape measure
- Paper bags
- Resource sheet 7—*Dung beetles and nutrient recycling*
- Optional—camera and film, or a digital camera

Sequence | Over a series of lessons

In the following experiment we will be looking at four different treatments, with four replicates of each.

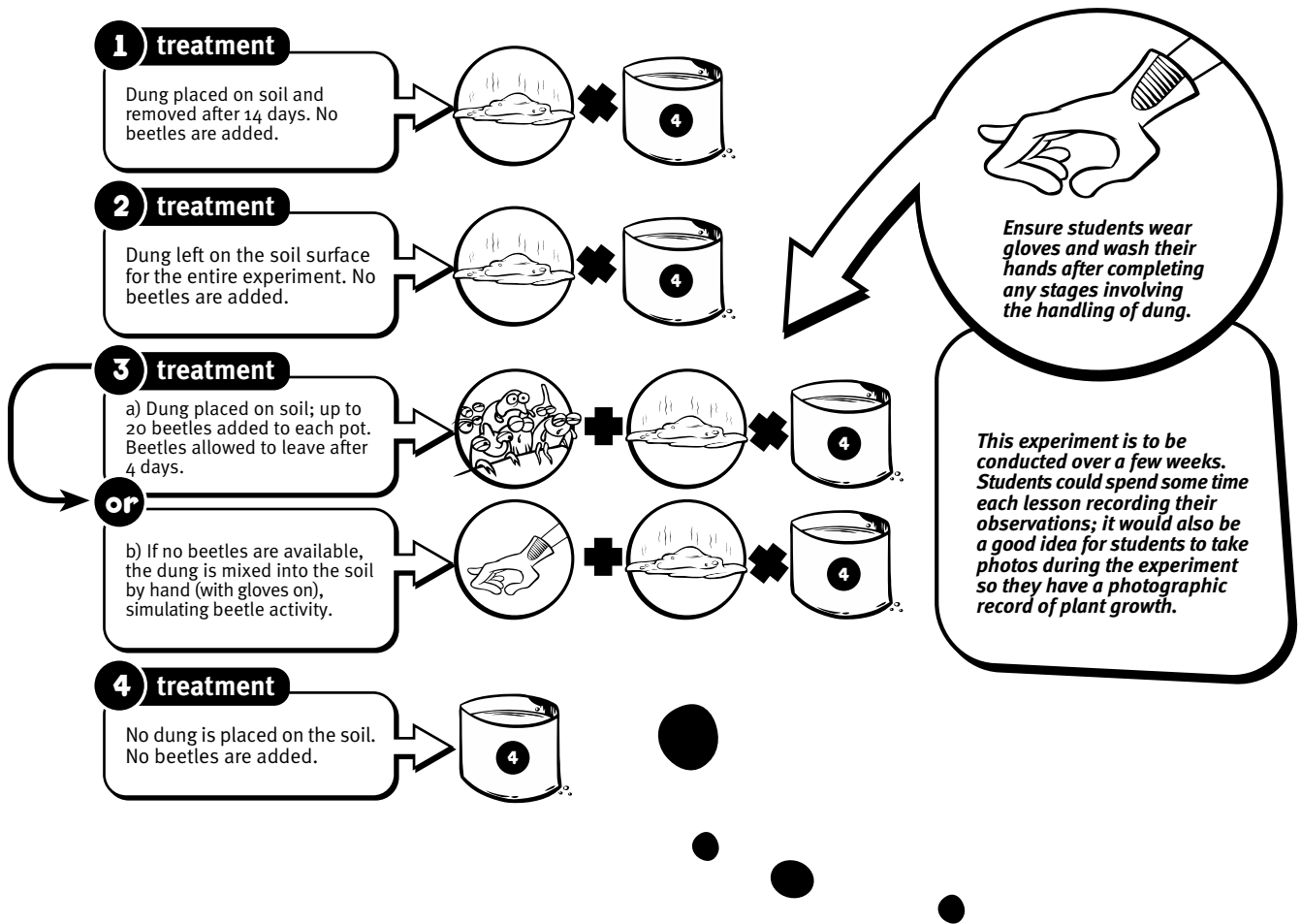
Background notes

In a scientific experiment, scientists try to ensure that all conditions—such as soil type and moisture levels—stay the same. Then, by varying just one condition (a variable) at a time, they look logically at the effect of that one change upon the results. The variables are applied as a series of treatments.

To make sure that the result was not a freak occurrence, several copies, or replicates, of each treatment in the experiment are included. The more replicates, the more sure the scientist is of the validity of the results. In this activity there are 4 replicates of each treatment.

There is always one treatment, known as the control, in which nothing is varied. Here the control (treatment 4) consists of soil alone, without dung or beetles. The control group of pots allows you to measure the contribution that the soil alone makes towards plant growth.

Table 2: Treatments



Procedure

Day 1

1. Prepare 16 pots, each gently packed with about 5 kg of evenly moistened sandy soil. Leave room for the dung pat at the top, under the mesh cover. Pots in treatment 4 should be set up in the same way, although no dung is added.
2. Label each pot with the number and name of the treatment and the number (or letter) of the replicate.
3. Add 250 g of dung to all pots in treatments 1, 2 and 3.
4. Add the beetles to the pots in treatment 3(a); or mix dung in the soil by hand for treatment 3(b). (Beetles can be collected as for activity 4—*Sampling dung beetles in your local area.*)
5. Fit lids to all pots.

After 4 days

1. Remove the lids from all 16 pots. Do this outside so that beetles can escape from treatment 3 without invading your classroom! Make sure the soil in all pots is still moist. (The lids are not required again.)

2. Plant 10 millet seeds (or 4 sweet corn seeds) in each pot and water carefully, using equal amounts of water per pot. Carefully remove any dry dung from the surface of the pot while you plant the seeds. Remember to replace the dung after sowing, but not so that it will impede the growth of any of the plants.

After 14 days

1. Carefully remove and discard the dung from the surface of the pot used in treatment 1.
2. Record the germination or growth in all 16 pots and check that the soil is still moist.
3. Water carefully.

Every week

1. Make a record of the plant growth patterns for every pot (e.g. height, number of stems, general appearance) for up to eight weeks. (Remember to keep the pots watered in exactly the same way until the experiment is terminated.)
2. Water more regularly as plants grow.