PROMOTING LIFELONG
HEALTHY EATING HABITS

SETTING UP AND RUNNING A SCHOOL GARDEN

Teaching Toolkit

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ACKNOWLEDGMENTS

The Teaching Toolkit was prepared by the **Nutrition Education and Consumer Awareness Group of the Nutrition and Consumer Protection Division** in consultation with the **Horticultural Crops Group of the Plant Production** and **Protection Division in FAO**.

Ellen Muehlhoff of the Nutrition Education and Consumer Awareness Group, Nutrition and Consumer Protection Division, had overall responsibility for developing and guiding the preparation of this publication. She also served as technical editor. **Jane Sherman** is the main author of this text.

Hitomi Sato of the Horticultural Crops Group reviewed and ensured the technical accuracy of the horticultural lessons. **Mel Futter** was responsible for the illustrations and photos, and the overall design and layout were carried out by **Frédéric Loward**.

CONTENTS

INTRODUCTION

Some of today's biggest crisis points are nutrition, the environment, livelihoods and education. In all these areas, school gardens are making a proven contribution to children's wellbeing, understanding and life prospects. FAO's manual *Setting up and running a school garden* helps schools, governments and NGOs to establish gardens and to make them successful. This Toolkit is a companion to the Manual.

School gardens can help to provide healthy school meals and generate income for school funds, but they are primarily a platform for learning - learning how to grow food for a healthy diet, improve the soil, protect the environment, market food for profit, enjoy garden food and, not least, advocate it to others.

There is strong evidence that classroom lessons and practical learning in the garden reinforce each other, indeed that often one does not work without the other. New garden projects and programmes are therefore making sure that the classroom curriculum finds room for garden-related learning about agriculture, nutrition and the environment.

This Teaching Toolkit is FAO's contribution. It contains lessons which supplement and support gardening activities. These "garden lessons" should have a regular place in the classroom timetable, on top of gardening time. The "garden curriculum" aims to give learners some control over the "food cycle" process, through planning, organizing, promoting, evaluating and - not least - celebrating achievements. The lessons therefore aim not only at knowledge and practical skills but also at awareness, attitudes and life skills.

The garden mix of theory, practice, enjoyment and ownership is a winning combination for improving lives.

PRINCIPLES

The school garden should be mainly for learning: about life, better eating, livelihoods and the environment. "Garden lessons" therefore have enormous educational value. They bridge theory and practice, reinforcing classroom learning with hands-on experience and observation, and vice versa.

"Tell me, and I will forget.
Show me, and I may remember.
Involve me, and I will understand."

Attributed to Confucius, 450 B.C.

Some of the principles of this Teaching Toolkit are:

1. **Growing food for healthy eating** Children need to learn not only how to grow food and how to have a healthy diet, but also how to combine the two in *growing food for healthy eating*. This aim should guide the whole gardening process from planning what to grow to deciding how to prepare and consume the produce. A secondary aim for older learners is to learn how to grow food for the market, to supplement their future incomes.

2. **The environment** Learners must be aware of the impact a garden has on the environment, *to respect the environment and learn to work with it*. Organic approaches, if well understood, put this awareness into action.

3. **Ownership** To learn how to run a food garden, learners must "own the process". Every year's work is a project, to be *planned, executed, monitored and evaluated by learners*. They should make decisions, undertake responsibilities, manage activities, record and report events, find out, discuss the garden and promote garden food to the outside world. Life skills and communication are part of the syllabus.

4. **Families and community** *Garden learning should involve families, the whole school and the community* - as helpers, supporters, informants, experts, sponsors, audience, objects of observation, and as learners themselves. Schools should have policies for the garden and for healthy eating; school gardens should set an example for home gardens and should contribute to school snacks and school meals; teachers should be role models for children; learners should discuss food at home for homework, open their eyes to what is going on in the community, and talk to neighbours, farmers, stallholders, vendors, cooks and local gardeners.

5. **Motivation** The garden project will be successful if it results in free and willing changes in lifestyle and attitude. If gardening has a negative image in the local community, effort must go into revaluing the garden by creating pride in it and making sure the activities are enjoyed and the results are appreciated. *Enjoyment and motivation are paramount*, to be cultivated through ownership (of process and product), achievement, recognition, competition, display, self-congratulation etc. All garden projects should end with a celebration.

THE MATERIALS

Age range Most lessons can be done with all learners in the age range 9-14, but in some lessons alternative activities are suggested for younger (9-11) or older (12-14) learners. Check through each lesson beforehand to see what will suit your own learners. **Set E: Market gardening** is suitable for older learners.

General approach The lessons try to engage learners actively and encourage them to observe and experiment. The reflective element of experiential learning – monitoring, reporting, recording, reviewing, discussing, listening to others – is built into the lessons.

Contents There are eight sets of outline lessons. Each set relates to a different part of the Manual. Each lesson contains

- *Teachers' Notes*, which give learning objectives, preparation and resources required, a lesson outline, ideas for homework and follow-up and links with other subjects. Some features are:

  - **Objectives.** The lessons aim not only at knowledge and skills, but also at awareness, life skills, attitudes and routine behaviour.

  - **Technical content.** The technical content of the lessons is as simple as possible. For example, there is no attempt to explain photosynthesis, the physical basis of evaporation, capillary action or the structure of seeds. These are left to the normal curriculum.

  - **Lesson preparation.** This includes lesson preparation by learners, who are expected to explore questions before coming to class and bring their findings to the lesson.

  - **Lesson activities.** These may take place in the classroom or in the garden or both.

  - **Lesson follow-up.** This may be specific homework or more extensive project work.

- *Guides* (one or more) The Guides present relevant ideas, processes, practices and procedures in pictures and captions. They are often essential to the lesson. They can also help in discussions with parents, helpers, community members, agricultural experts, farmers, education advisers and other school staff. To make them available teachers can photocopy them, get learners to re-draw them poster-size, or make them into a separate booklet.

SEQUENCE OF LESSONS

The sets of lessons have been organized in roughly chronological order, with planning and decisions about what to grow followed by lessons on gardening activities and ending with evaluation and celebrations. However, some sets (e.g. **Set D: Growing Food** and **Set H: Overview**) need to be distributed through the gardening season at appropriate times.

Set A: First Things First (Ref Manual Part 3: *What is our garden for?*) These lessons can be done even before you have a garden. They discuss the reasons for having a garden, give essential background information, set up principles of good gardening and suggest ways of keeping records.

Set B: Entry Points (Ref. Manual Part 4: *Where do we start?*) can also be done before the gardening season begins. These lessons aim to raise environmental awareness. They focus on the existing ecosystem in the garden and plan a project for "greening" the whole school grounds. They also deal with making compost, since this has to be started well before the gardening season begins.

Set C: Preparing the Ground (Ref. Manual Part 5: *What does our garden need?*) These lessons are mainly about planning. They encourage learners to look at what is needed, and they help with preparing the site and planning garden layout. If you already have a garden, some lessons will be more important than others – for example you may feel learners already know how to use garden tools, but have a lot to learn about water and watering.

Set D: Growing Food (Ref. Manual part 6: *What shall we grow to eat?*) After several lessons on diet, nutrition and food plants, learners discuss what they would like to grow to eat and become "experts" on particular food crops and how they are grown.

Set E: Market Gardening (Ref. Manual Part 7: *What shall we grow to sell?*) These lessons are aimed at older learners. They take learners through the process of planning and carrying out a market gardening project: from market research through product proposals, budgeting, drawing up a business plan and keeping accounts, to marketing the products and publicising the project.

Set F: Growing Plants (Ref. Manual Part 8: *How do we grow things?*) goes through the process of growing plants from planting through plant care to harvesting - preparing for, explaining and supporting garden activities. The lessons are to be done at appropriate times during the gardening season. They try to make sure that learners not only know what to do and why, but also enjoy what they do and take pride in it.

Set G: Preparing Food (Ref. Manual Part 9: *How will we eat our garden food?*) Once food is harvested, learners prepare for processing and preserving garden produce by learning about food hygiene, how to keep food, preserving food, cooking to conserve food value and saving fuel.

Set H: Overview (Ref Manual Part 10: *What's the plan?*) gives a framework to the whole garden project. Learners reflect on and talk about their work, explain their activities to others, evaluate what they have done, plan for the future, and celebrate their achievements. These lessons are spread through the gardening season; the last two (evaluation and celebration) round off the year's garden work

WHICH LESSONS DO WE DO?

You will not want or need to do all the lessons. To draw up your teaching programme for the year:

- Make a preliminary decision on whether you are mainly interested in growing food to eat, in growing food to sell, or in both, and whether you want to have a garden project for improving the school environment (**Set B**).

- Review the lessons to see what your learners really need. Learners may already know (for example) how to water plants, while some topics (e.g. food hygiene) may already be covered in other parts of the curriculum.

- Decide on the order of the lessons. They are in roughly chronological order, but you will need to decide how to distribute the gardening lessons from **Set F** and the overview lessons from **Set H**.

This should give you about one lesson a week over the school year. Alternatively you can spread the lessons over two years, or repeat some the following year and add on others.

YOUR CONTRIBUTION

It is difficult to produce lessons which will suit schools in all parts of the world and in many different circumstances. We welcome feedback from users on what they find useful, gaps they think should be filled, or tips they would like to share with other users. For feedback and suggestions, and additional ideas for lessons, please contact:

Ellen Muehlhoff
Senior Nutrition Officer
Nutrition Education and Consumer Awareness Group
Nutrition and Consumer Protection Division
Food and Agriculture Organization of the United Nations
Viale delle Terme di Caracalla, 00153 Rome, Italy
email: Ellen.Muehlhoff@fao.org
Fax: (+39) 06 57054593
www.fao.org/ag/humannutrition/nutritioneducation/en

www.fao.org

To open discussion about the aims and uses of gardens:

1. Shall we have a garden?

For background information and ideas of good gardening:

2. What plants like

3. Starting with soil

4. Soil quality

5. Seeds and germination

6. Growing plants

7. Organic gardening

To establish garden records:

8. The Garden File

ABOUT THESE LESSONS

Set A starts with general gardening questions, basic information and principles. It aims to find out what learners know, think and want, and it introduces learners to the idea of consulting gardeners in the community. An option is to open a Garden File or Garden Portfolio, which can serve many purposes – motivation, publicity, revision, evaluation.

1. SHALL WE HAVE A GARDEN?

This discussion lesson helps teachers to find out what learners know, what they can do and how they think and feel about gardening. Most information in this lesson comes from the learners.

LEARNING OBJECTIVES

Learners

- become aware of the various uses of gardens
- recognize their own potential ("I can do it too")
- appreciate some positive aspects of gardening
- discuss reasons for having a school garden
- feel motivated to start.

RESOURCES NEEDED

- paper "plant strips" (see **Guide**) representing small plants, bushes, trees
- (for younger learners) paper, colour pencils and glue for a follow-up collage

PREPARATION

Before the lesson, ask learners to

- look at what is grown in home gardens in the area and try to identify three or four different fruits and vegetables
- find out what tasks have to be done in a garden
- (for older learners) find out about the times of year when different tasks have to be done.

LESSON

1. **What do our gardens grow?** Display the "plant strips". Learners say what is grown in home gardens in the area. As crops are named, learners write the names on the plant strips.

2. **What happens to them?** Ask what happens to each crop (e.g. sold, eaten, burnt as fuel, used for medicine or for making things, kept just to look pretty etc.).

3. **What other things do we have in gardens?** (e.g. trees, flowers, hedges/fences, gates, chickens, compost, sheds, taps, pipes).

4. **What do we do in a garden?** Learners say what work has to be done in gardens. Individuals explain and demonstrate garden tasks (e.g. digging, planting, watering, weeding, harvesting). Praise all knowledge and skills so as to establish a positive idea of gardening knowledge.

5. **When do we do them?** If there is time, older learners explain when in the year each activity is done.

6. **Do we want a school garden?** Discuss what learners would like to do with a school garden.

FOLLOW-UP

Drama Turn the question-and-answer into a little play. Present it to other classes when they are about to harvest, so they can discuss how it applies to their own crops.

LESSONS IN OTHER SUBJECTS

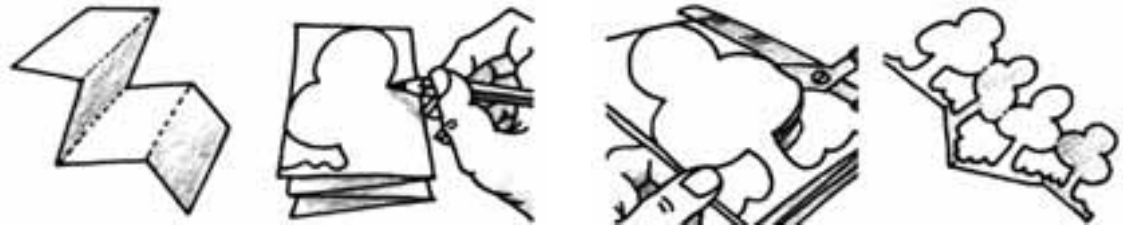
1. **Collage** (for young learners) Using the "plant strips" as a basis, map out a classroom collage with three different heights (tree height, bush height, small plant height) and a few climbers. Learners draw and colour in particular plants and add pictures of garden activities.

2. **Table** (for older learners) Learners draw up a table of Garden Produce and Uses.

3. **List** Older learners draw up a list of ideas for the garden, copy it and take it home for discussion.

PLANT STRIPS

Fold a strip of paper into a concertina. On the top draw a picture of a plant (tree, bush etc.). Make sure you leave a strip at the bottom of the picture so that the pictures will join up. Cut around the plant, then open up the strip.



1 2 3 4

EXAMPLES

2. WHAT PLANTS LIKE

This early lesson, which is best done in the garden, raises awareness of good growing conditions. It should be recalled many times in following lessons.

LEARNING OBJECTIVES

Learners

- become aware of plants' needs
- can identify the needs of some real plants.

RESOURCES NEEDED

- real plants, some weak and some healthy

PREPARATION

Ask learners to find a growing plant in the school grounds which looks healthy and one which looks sad, old or sick. They should also ask their families what makes plants grow well.

LESSON

1. **Lead-in** Learners show and describe plants, first sick ones, then healthy ones. It is best to do this in the garden. Bring out the features:

Sick: small, dry, bent/drooping, yellow/brown, spotty, leaves eaten etc.

Healthy: strong, erect, straight, green, big, juicy, bushy, whole leaves, new leaves

Learners speculate on why some plants are not well.

2. **What plants like** Younger learners stand in a circle and imagine they are plants, with roots (feet) and leaves (fingers). Ask questions, demonstrating physically while learners copy. Older learners can answer the questions without the physical demonstration.

- Do your roots like space to move, or do they like to be squashed together?
- Do your roots like to be fixed firmly in the ground?
- Do your roots like to be very dry? very wet? or nicely damp?
- Do your leaves like to be in the dark, or to have some sun and light?
- Do your leaves like to be in the open air, or under the ground?
- Do your leaves like to be blown in the wind all the time, or protected?
- Do you like to be growing under a lot of big weeds or in your own space?
- Do you like to have nothing to eat, or plenty of good food from the soil every day?
- Do you like bugs and insects? (Learners speculate – some insects are good and some bad).

3. **Happy Plant Mime** (for younger learners) Tell learners they are happy plants. Chant and mime:

- Our roots are firm and damp and have space to grow (Learners wriggle their feet.)
- Our leaves have light and air and not too much wind (Learners wiggle their fingers.)
- We have plenty of food (Learners pat their stomachs.)
- We have plenty of space (Learners open their arms wide.)
- We have plenty of bees and butterflies (Learners wave at the insects.)

4. **What's wrong?** (for older learners) Learners look at the **Guide** and discuss what's wrong with the plants in the outer circle (they lack the elements of light, air, water etc). Praise (but do not demand) scientific explanations.

FOLLOW-UP

1. **Plant hunt** Learners find happy/unhappy plants in the garden and speculate on the causes.

2. **Drama** Learners write/act a play about the dramatic adventures of an orphan tomato plant: overshadowed by a family of sunflowers greedy for light; saved by being moved to a row of onions; nearly eaten by a large slug; invaded by leaf-sucking bugs; rescued by a child.

3. **Poster** Learners make a poster of the **Guide**. It will be useful in future lessons.

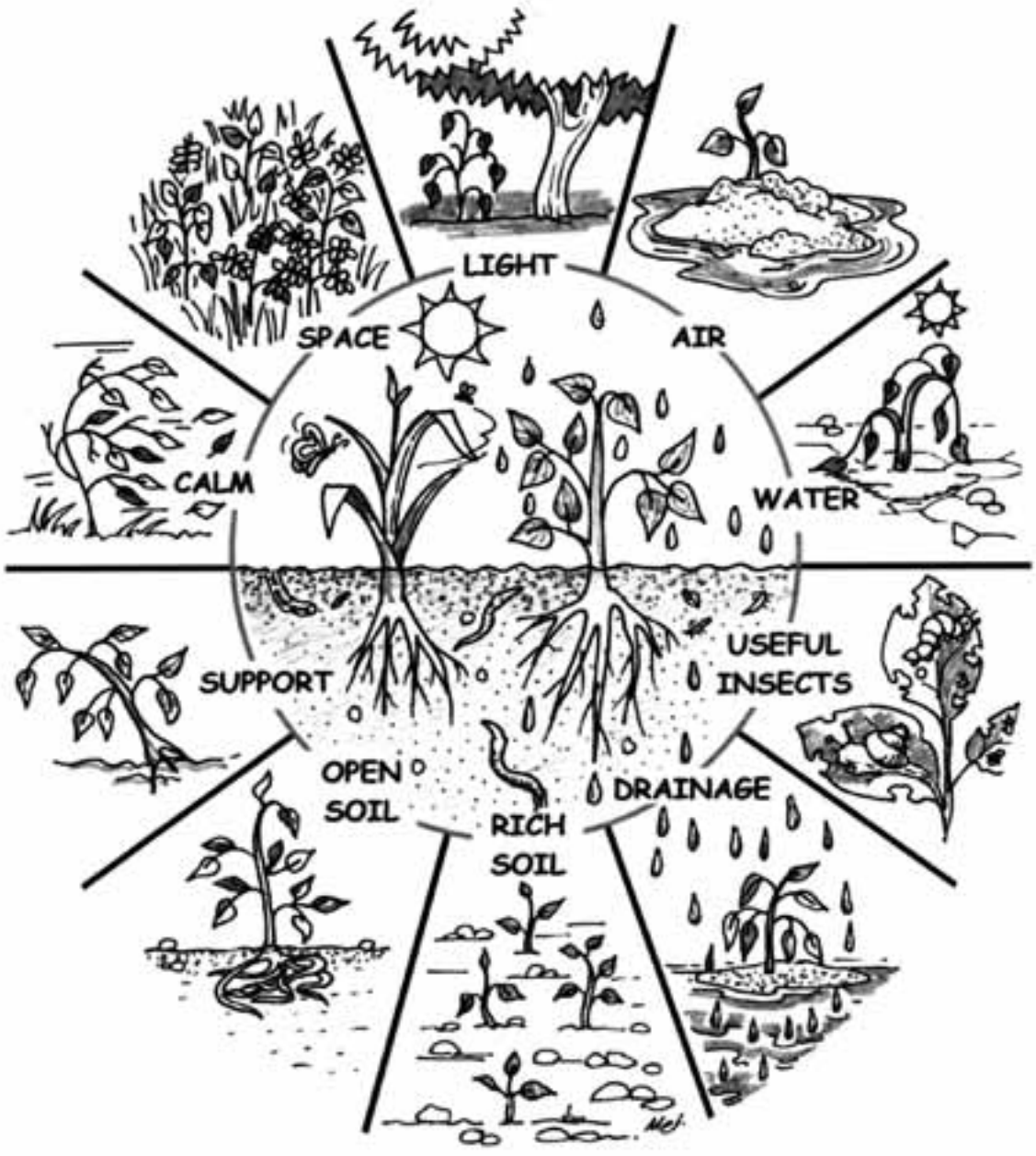
LESSONS IN OTHER SUBJECTS

Science Photosynthesis, capillary action, plant form and function

Drama Struggle for life in the plant world

WHAT PLANTS LIKE

The plants in the inner circle are fine.
The plants in the outer circle are not doing well.
What are their problems?



3. STARTING WITH SOIL

A feel for soil is the beginning of good gardening. Hands-on experience is the best way to learn. This needs a double lesson.

LEARNING OBJECTIVES

Learners
- recognize topsoil and subsoil
- recognize good soil by feel and sight
- become aware of all the components of soil.

RESOURCES NEEDED

- spade
- water
- large pieces of newspaper or cloth
- containers (e.g. cups, old tins, jars with lids)
- twigs or sticks for separating out soil
- plates/pieces of glass

PREPARATION

Find an area in the school grounds with good soil (lots of humus), and an area with poor soil (e.g. plain sand or clay). If it is very dry, moisten it before the lesson.

LESSON

1. **Cross-section** Take the class outside. Ask: *What will we see if we dig a hole? Is the soil the same all the way down?* Dig a hole in good soil and get learners to see the difference between topsoil and subsoil. Ask them to describe all the things they see in the soil.

2. **Feeling** Learners pick up a handful of soil each, smell it and feel it with their fingers. Ask: *Is it damp? Is it nice and dark? Is it crumbly? Is it full of life (bits of plant and animals)?* Then it's good soil. Let them feel a sample of poor soil too, describe it and conclude that it is not so good.

3. **Experiments** Say that we are going to find out EVERYTHING that is in the soil. Start with two experiments.

a) **Experiment 1: AIR** Learners put a sample of soil in a container and fill it up with water. Ask them what they see on the surface (bubbles). Explain that there is air in the soil.

b) **Experiment 2: WATER** Explain that this experiment will take a little time. Learners put a little soil in a dish, cover it with a plate or lid and leave it in the sun or a warm place. Ask them to guess what will happen. Say we will come back to it later.

4. **Sorting components**

a) Divide the class into groups. Give each group a large sheet of newspaper/cloth, a small box (for crawling insects) and a jar or can (for hopping insects).

b) Put a small spadeful of soil on each sheet. Ask groups to see what they can find in their soil, and to separate elements on the four corners of the sheet like this:

- anything coming from plants (seed, bark, bulb, leaf, root, twig, flower, pip, grass)
- anything coming from animals (e.g. dung, bone, bit of insect wing, dead beetle)
- anything live (keep it but don't hurt it) in a box or jar
- anything else (e.g. stones, household rubbish).

5. **Feedback** Groups say and show what they have found. Show your approval of the organic elements (vegetable/animal matter). Older learners estimate what proportion is organic matter.

6. **Water** Go back to the water experiment. Learners remove the plate/glass carefully, without turning it upside down, and look underneath. Ask what they can see (drops of water). Ask where the water comes from (from the soil).

7. **Recap** Learners recap by calling out everything that is in the soil (including air and water). Back in the classroom they compare what they have seen with the **Guide**.

FOLLOW-UP

Poster Learners draw a cross-section of soil (including air and water). They write and learn the caption *Good soil is damp, dark, crumbly and full of life* and undertake to show good soil to others.

LESSONS IN OTHER SUBJECTS

Science Decomposition
Drawing Animals, plant parts

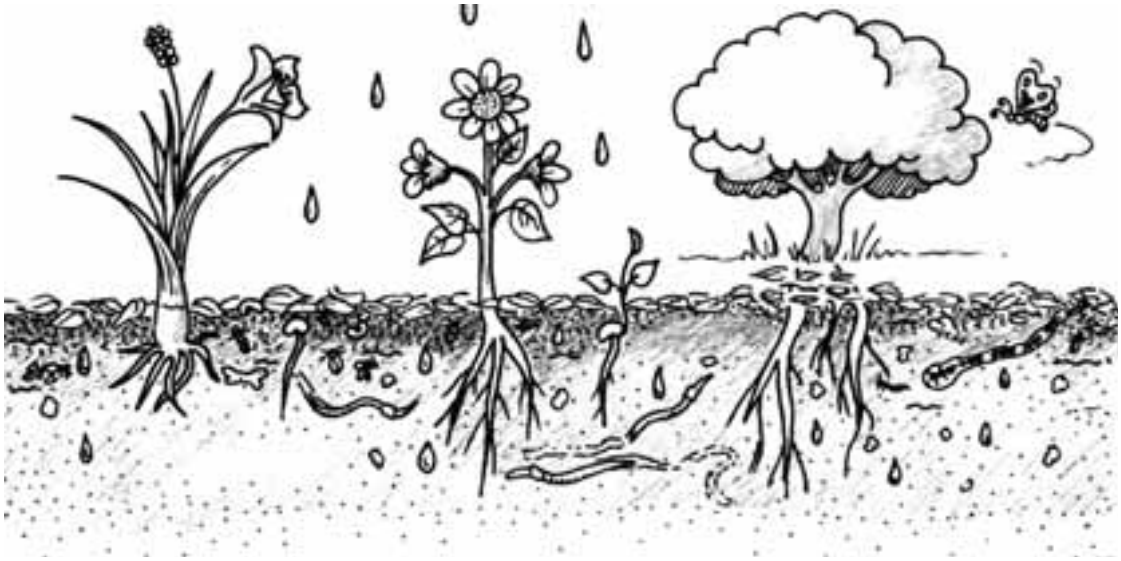
GOOD SOIL IS ALIVE AND ACTIVE

Plants grow and take nutrients from the soil.

Plants die where they grow. They drop leaves, fruit, seeds.

Dead plants are eaten by ants, worms and bacteria. The nutrients go back into the soil.

New plants grow in the rich soil.



GOOD SOIL HAS

air

water

organic material

living things

!

GOOD SOIL IS

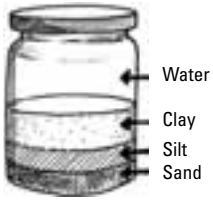
damp

dark

crumbly

full of life

4. SOIL QUALITY



Good soil is the basis of good gardening. This lesson deals with the structure of soil. The first half of the lesson should be in the garden.

LEARNING OBJECTIVES

Learners understand what makes good soil – components and structure.

RESOURCES NEEDED

- a little water
- a patch of good soil
- a little compost

PREPARATION

In preparation for the lesson, learners consult gardeners, families etc. to research the questions: *What is good soil? What happens in the soil? What kind of soil have we got? How do we improve it?* Groups or individuals may take one question each. Teachers (or learners) copy up and display the diagram in **Guide A** for class use.

LESSON

1. **What makes good soil?** Take learners outside and dig up some good soil. Get them to notice the qualities of a "good loam" - rich dark, fertile, moist, crumbly but firm, full of organic matter and life. Review the contents of soil from observation, recapitulating the previous lesson – air, water, organic matter, plant roots, insects etc.

2. **What happens in the soil?** Display **Guide A**. The whole class discusses the roles of all the elements observed.

- What opens up the soil, makes space for air, water, roots? (worms, organic matter, roots)
- What keeps the soil surface soft? (organic matter, water, cultivation, nobody walking on it)
- What provides essential food/nutrients for plants? (organic matter, water)
- What holds the plants firm, so they don't wash away or fall over? (roots, soil in general)
- What allows animals and bacteria to live and breathe? (water, air, organic matter)
- What traps the water so it does not drain away too fast? (organic matter, clay)
- What helps the water to drain away? (organic matter, sand, worm holes)
- What holds the soil in place? (roots, organic matter, mulch, rocks)
- What dissolves the nutrients so roots can drink them? (water, worm urine)

3. **Clay/silt/sand** Learners rub some soil with a little water between their fingers. Ask:

- Does it feel gritty? (it is sand: big grains)
- Does it feel smooth, like flour? (it is silt: medium grains)
- Does it feel sticky? (it is clay: tiny particles).

They try to roll the soil into a worm (with a little water).

- Does it fall apart? (sand)
- Does it stick together? (clay).
- So is this soil mostly clay, silt or sand? Will water run through it easily?

4. **Drainage** Sprinkle a little compost in the hole. Explain that compost will help to keep water in, or help it to drain away. Whatever kind of soil we have, compost will make it better.

FOLLOW-UP

1. **Chart/diagram** Learners prepare a chart showing soil elements and their functions.

2. **Hole-in-the-ground experiment** (for older learners) Dig a hole in the ground about 35 cm deep, fill it with water and leave it to drain. Once drained, fill it up again and get learners to time it as it drains away. Discuss what kind of drainage we want – not very fast, not very slow, but a gradual trickle (about 6-10 cm per hour). If the drainage rate needs improving, add compost.

Adapted from Guy et al. (1996)

3. **Mudshake experiment** Fill a large glass jar about one-third full with soil. Add a tablespoon of table salt and one of laundry detergent, then fill with water. Close well, shake vigorously for 5-10 minutes and leave to settle. After about two days you will be able to see clearly the composition of the soil: sand and gravel at the bottom, then silt, then clay, and organic material floating on the top. The ideal proportions are clay 4, silt 4, sand 2 and about 5% organic matter.

Adapted from Guy et al. (1996)

LESSONS IN OTHER SUBJECTS

Science/Geography/Environment Weathering and soil formation, soil erosion.

SOIL HAS A STRUCTURE

ELEMENTS OF SOIL

air

organic matter

roots

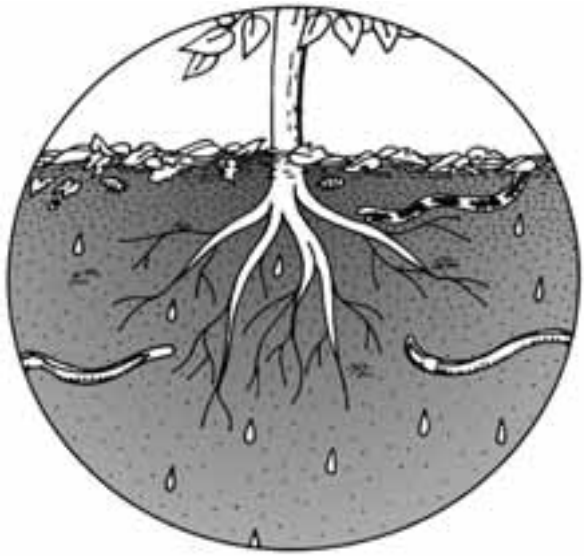
animal life

bacteria and fungi

water

clay soil

sandy soil



FUNCTIONS

to open up the soil

to keep water in

to let water drain out

to keep the soil soft

to feed plants

to give support

to keep soil in place

to let animals and bacteria live

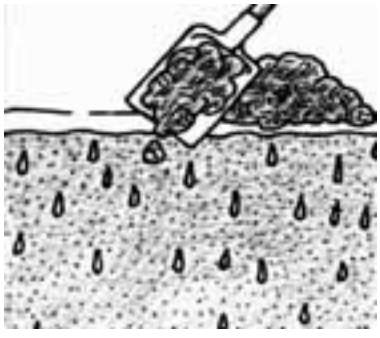
air	Air is essential for roots, for animal life, for bacteria and for keeping the soil open.
organic matter	Organic matter (e.g. bits of plants and animals, dead bacteria) opens up the soil, makes space for air, traps water, provides essential nutrients.
roots	Roots "cultivate" the soil, take up the nutrients, hold the soil in place.
animal life	Animal life (e.g. earthworms, beetles) opens up the soil for air and water, digests organic matter.
bacteria and fungi	Bacteria and fungi break down organic matter, release nutrients.
water	Water is essential for growth of plants, dissolving nutrients and bacterial activity. It needs to get into the soil, but also needs to run away so that the soil is not waterlogged.
clay soil	Clay soil helps to trap water, holds plants in place.
sandy soil	Sandy soil helps water to drain away.

SOIL IS SAND, SILT OR CLAY

Sand has large grains.

Water drains fast.

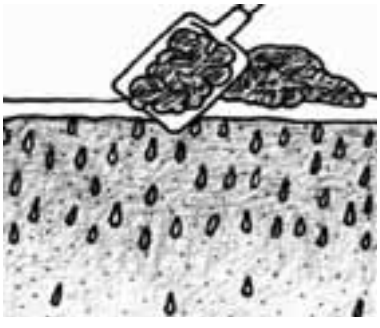
Add compost and anthill material.



Silt has medium grains.

Water drains more slowly.

Add compost.



Clay has very fine particles.

Water drains very slowly.

Add compost.

5. SEEDS AND GERMINATION

Combine science with healthy snacking by using seeds with edible sprouts to demonstrate germination. The activities for this lesson are spread over several days, and begin the day before the lesson.

LEARNING OBJECTIVES

Learners
- identify some common seeds of food plants
- understand the nature of seeds
- know how seeds germinate
- know how to produce edible sprouts
- eat and savour edible sprouts.

RESOURCES NEEDED

- some common seeds of food plants, including seed pods
- seeds for sprouting, e.g. alfalfa, barley, broccoli, celery, lentils, beans, pumpkin, sunflower, wheat (the bigger the seeds the more spectacular)
- a glass jar, a piece of thin cloth to cover it and a rubber band to keep it in place
- clean water

PREPARATION

The day before the lesson, learners put the seeds to be sprouted in water to soak.

LESSON

1. **Lead-in: what is a seed?** Show some common seeds of food plants and ask learners to guess which foods they grow into. Ask: *What are seeds?* and praise all good ideas – e.g. a seed is
- a plant egg (like a chicken egg)
- a packet of things needed for growing (with a hard cover for protection, like a box)
- a food store
- a sleeping plant which will be wakened by water and light.

2. **Setting up the experiment** Learners pour off the water from the seeds they put to soak, put the seeds in a glass jar, cover the top with the cloth and label it with the date (see **Guide A**). Explain that the seeds will be kept damp (but not wet), warm and dim (as if under soil). Learners find a suitable place in the classroom and place the jar there on its side.

3. **Predictions** Ask learners what they think will happen. For older learners ask detailed questions, e.g: *When will seeds start to grow? Will root or stem come first? Which will be longer? When will the leaves come out? How many? Will new leaves come under old ones or on top? What will happen to the seed cover?* Older learners write up their predictions so they can later compare them with reality.

4. **Finishing the experiment**

a) Twice a day learners rinse the seeds with cool water and drain the water through the cloth.

b) They describe what happens each day and compare it with predictions. Older learners keep an observation schedule as in **Guide A** and match events with **Guide B**.

c) When the seeds sprout after a few days, learners move them into the light for a day or two. The shoots will then turn green and will start to develop vitamins. Raw sprouts contain substantial amounts of vitamin C and some good B vitamins.

d) Give the sprouts a last wash, then boil, steam or stir-fry them before eating them, alone or with other foods. Make a ceremony of it!

FOLLOW-UP

1. **Food seeds** Glue seeds of common foods onto a big sheet. Add labels giving the names and/or pictures of the plants. Turn this into a guessing game.

2. **Watching seeds sprout** Display the completed observation schedule in poster form.

3. **More sprouting** Learners repeat the sprouting experiment at home and persuade families to eat the sprouts. (Brief parents in advance and ask them to show enthusiasm!) Do not forget that the sprouts should be cooked before eating.

EXTENSION LESSONS IN OTHER SUBJECTS

Biology Growth, germination

OBSERVATION SCHEDULE

Day 1	Day 2	Day 3	Day 4	Day 5, 6, etc.
Soak the seeds.	Put the seeds in a jar in a warm, dark place.	Rinse the seeds twice a day.	The seeds start to germinate.	..... (to be completed by the learners)
				
	Observations:	**Observations:**	**Observations:**	**Observations:** (to be completed by the learners)
	Seeds are about 1.5 cm long.	The seeds are now twice as big.	Some seeds have split. They have tiny roots.	.....

GERMINATION

The seed is damp.

It absorbs water and swells.

A root begins to grow.

The stem begins to come out.

The stem lifts up the seed. Side roots grow.

The seed coat slips off. Root and stem grow.

The seed leaves come out (cotyledons).They open to catch the light.

Real leaves appear.

6. GROWING PLANTS

This lesson is an overview of the process of growing plants, to be done just before or after planting.

LEARNING OBJECTIVES

Learners become aware of the process of plant growth and the plant's life cycle.

RESOURCES NEEDED

- a few seeds
- (if possible) a seedling, a young plant, a flowering plant, a fruit and a seed head
- a sketch of each stage of plant development (**Guide A**, copied and enlarged by learners)
- cards or small pieces of paper
- something for sticking paper on walls (glue, pins etc.)

PREPARATION

Ask learners to prepare for class by asking gardeners about one crop they grow (e.g. maize, beans, pumpkin) and what they have to do to look after it (e.g. transplanting, watering, weeding etc.). Older learners make a list of these gardening activities. Before the lesson, display the sketches of plant development *in any order but the right one.*

LESSON

1. **Lead-in: How plants grow** Show some seeds and say what plant they are from. Ask: *What will happen to them first? And then?* Learners suggest the stages that a plant goes through. Display the plants or the sketches. Ask learners to find the seedling, growing plant, flowering plant, fruit and seed head and put the pictures in order of development. Post the pictures or plants all around the room to form a cycle.

2. **Harvest** Talk about one or two crops which learners know well, or are planning to grow. Ask: *Do we harvest the leaves, stems, roots, fruit or seeds?* Learners show when in the cycle these crops are harvested.

3. **Gardeners** *What do we do to help plants grow?* Older learners take the displayed stages one by one and brainstorm ideas about what needs doing (e.g. weeding, watering, mulching, fertilizing, tilling, getting rid of caterpillars, thinning, transplanting, training up), calling on what they have learnt from talking to gardeners. They write or draw suggested activities on cards and stick them up on the development cycle. Some activities (e.g. watering) should come up several times. N.B. If learners do not mention some important activities (e.g. mulching), introduce them yourself.

FOLLOW-UP

1. **Garden tour** Learners find seeds, seedlings, young plants, flowering plants and seed heads in the school grounds.

2. **Collage** Learners create a collage of the plant cycle using real seeds, pressed flowers/leaves and paper cut-out roots, stems and fruit.

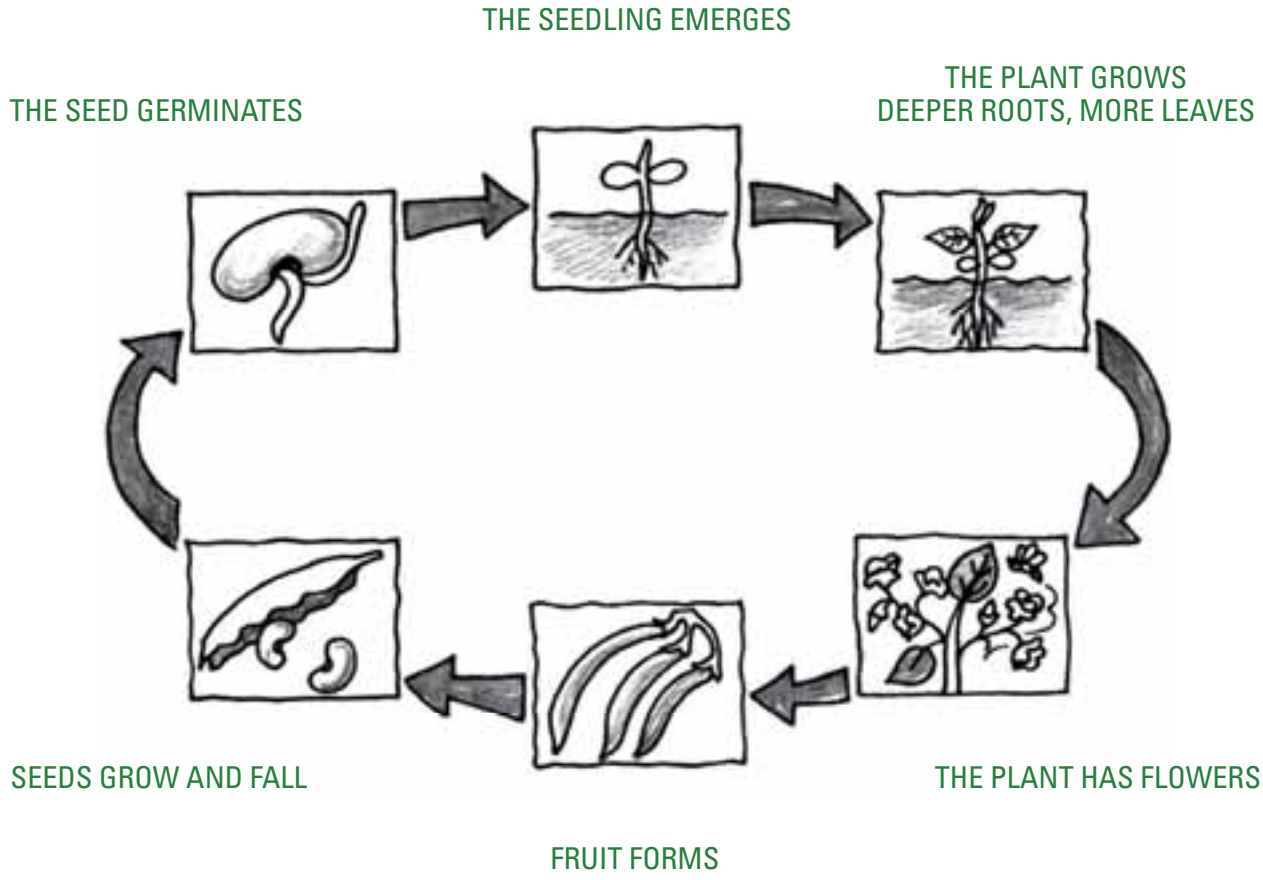
3. **Life story of a plant** (for older learners) Each learner adopts a plant to monitor through its whole life. S/he keeps a notebook entitled "The Life Story of a ....." (see **Guide B**). Younger learners can make up a fictional life story.

4. **Frieze** Learners make a frieze of gardening activities and display it. Use it to pick out the activities needed each week.

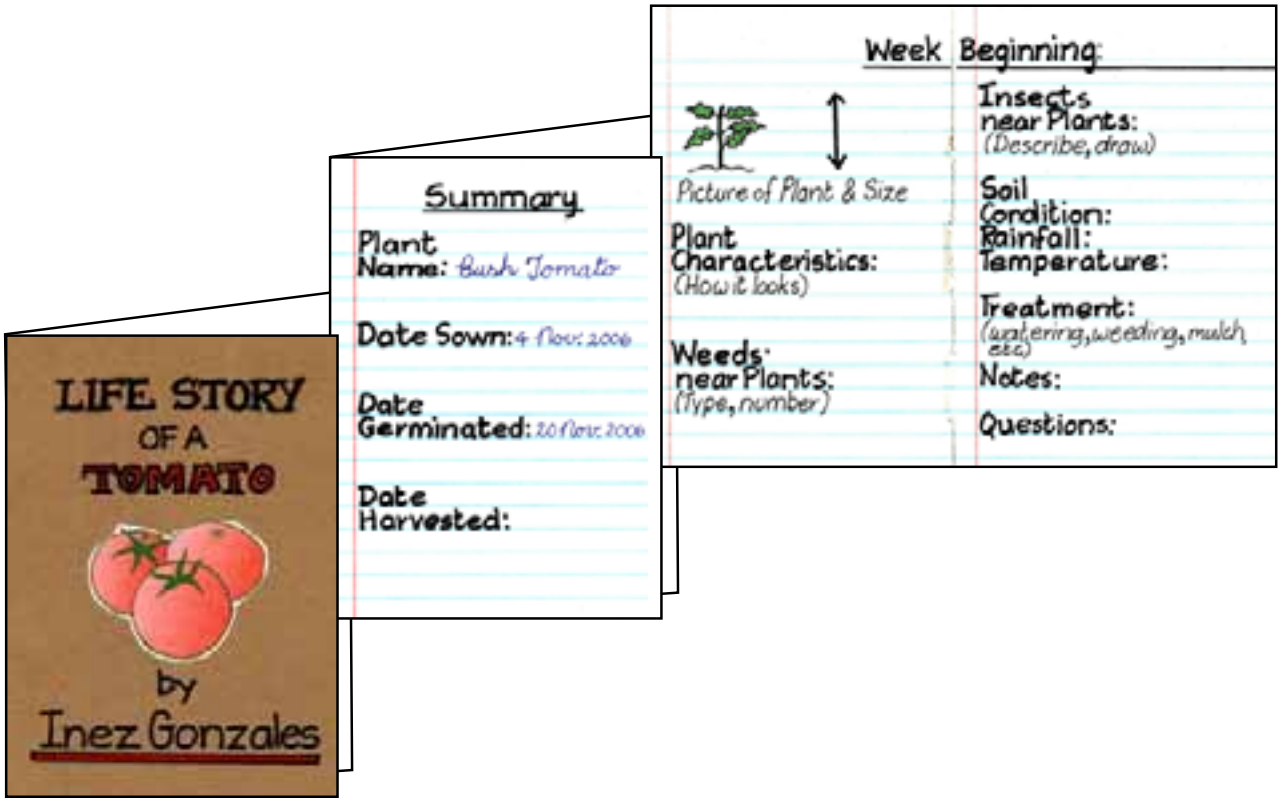
LESSONS IN OTHER SUBJECTS

Biology Life cycle of plants; life cycle of animals for comparison

PLANT LIFE CYCLE



PLANT BIOGRAPHY



The first page is a summary record. On the following pages, learners draw a weekly picture of the plant's development and describe its condition and treatment. They compare notes each week, discuss questions and show each other interesting features of their plants.

Adapted from Kiefer and Kemple (1998)

7. ORGANIC GARDENING

Learners should learn about organic gardening gradually, through

- practical activities (e.g. mulching, composting, careful watering)
- sharing values (e.g. about beneficial insects, earthworms, compost)
- understanding (about soil, plants and the environment).

This lesson introduces the idea of caring for a plant's basic needs in a natural way. It should be done in the garden. (For further information, see "Organic gardening" in the Manual's *Horticultural Notes*.)

LEARNING OBJECTIVES

Learners know how to improve conditions for plants using natural methods.

RESOURCES NEEDED

- a little compost or mulch
- labels for plants – e.g. strips from a plastic bag
- one sad plant – preferably overcrowded, in poor hard soil, and afflicted with bugs
- for each group, a pointed stick for loosening the soil and a small container for pouring water

PREPARATION

Before the class learners find some plants around the school which look unhappy (the type of plant does not matter).

LESSON

1. **Lead-in** Learners repeat the *Happy Plant Mime* from Lesson 2 **What plants like**. Show your own sad plant and ask learners to give it a name (e.g. Betty).

2. **Planning discussion** How can we make life better for Betty? Learners discuss the questions below, inspecting the plant and feeling the soil. As they suggest answers, demonstrate how to "make life better for Betty". At the end, label the plant with its name, the date, and action taken.

Questions

a) Has it got enough space and light?
- If not, clear a space around it.

b) Is the earth around it very hard?
- If so, loosen up the earth and make a little hollow around the plant to hold the water.

c) Is it too dry?
- If it is, water it around the base until the soil is damp.

d) Does it have rich soil to feed it, full of life?
- If not, put a little compost or mulch around the plant.

e) Is it being attacked or eaten?
- If it is, find the bad bugs and pick them off.

f) How can we go on helping it grow?
- Keep it moist, keep the weeds away, keep the bugs off.

3. **Garden work** Ask learners if they can remember the six questions (and what to do with earthworms). Give out labels. Each group finds a sad plant, decides what is wrong, makes life better for it, and labels it with name, date and action taken. As they work, go round to check they have the right idea.

FOLLOW-UP

1. **Picture** Learners draw a picture of the sad plant they found; older learners describe it in writing. They write in the name, the date and the action taken, as on the label.

2. **Before and after** Learners tend their chosen plant regularly for two weeks and study its progress. At the end they draw another picture or (older learners) write a before-and-after report.

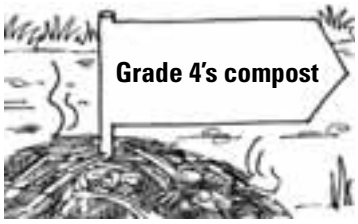
3. **Organic ideas** Older learners research the following questions by consulting families, farmers etc., then scan the Guide to find answers.

- Is it good to use fertiliser? Why/Why not?
- Is it good to use insecticides/pesticides? Why/Why not?
- Is it good to use compost? Why/Why not?
- What is green manure? Why is it good?
- What is mulching and what is the point?
- What is crop rotation? Is it a good idea?Why/Why not?
- How is it best to water plants? Why?
- What worms and insects are bad for the garden? Why?
- What are the best kinds of garden bed?
- Why? What worms and insects are good for the garden? Why?

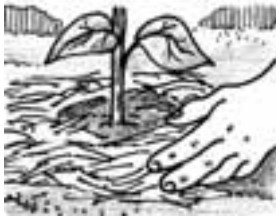
ORGANIC GARDENING

IMPROVE AND MAINTAIN THE SOIL

Rotate crops to restore the soil.



Add compost and manure.



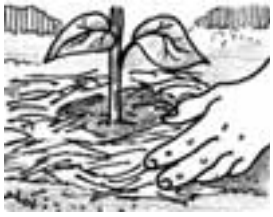
Mulch.

Grow green manure.

Encourage earthworms.

Make raised permanent beds.

REDUCE COMPETITION

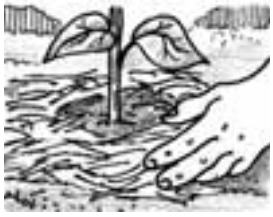


Use mulch to stop weeds growing.

Pull out weeds by hand. Do not use weedkiller.

ORGANIC GARDENING

SAVE WATER



Use mulch to stop evaporation

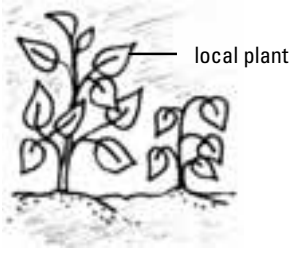
Use waste water. Harvest water.

Don't waste water.

CONTROL PESTS AND DISEASES NATURALLY

Encourage beneficial insects.

Do companion planting.



Use good seeds, grow local varieties.

Remove or prevent pests - use few artificial pesticides.

Rotate crops to avoid diseases.

Give good growing conditions (space, light, water, good soil).

8. THE GARDEN FILE

A record of the life of the garden reinforces learning and can be a strong focus for motivation, especially if learners create the record. A "yearbook" (for one year, one crop, or one season) is one way to try out the idea (see **Guide A**). Older learners can create portfolios for group or individual projects (see **Guide B**). All can keep regular garden records (see **Guide C**). Learners must feel that these records belong to them, so they should be always accessible, frequently updated and often consulted. Do this lesson as soon as there are some suitable documents ready to put in the file.

LEARNING OBJECTIVES

Learners
- are motivated to keep a record of gardening events and activities
- learn how to make a documentary record
- become aware of the value of records.

RESOURCES NEEDED

- a hard-cover file which holds pages firmly
- a large felt-tip pen for writing titles, dates etc.
- a blank sheet for the title page
- a few documents ready to go into the file – e.g. a photo, learners' writing/drawing, a map of the garden site

LESSON

1. **Lead-in** Pin up the documents you have collected. Ask learners to recall what they are about and to arrange them in chronological order (*Which one comes first? And then?*).

2. **Garden documents** Say that these are our "garden documents". Ask what we should write on each one so we will remember what it is and when it was made. Learners suggest titles, captions and dates and nominate writers to label the documents.

3. **A Garden File** Ask: *Where shall we keep these documents?* Suggest starting a Garden File and produce the file. Show how to insert the documents (e.g. punch three holes, use plastic sleeve etc.). Discuss and decide what order to put them in – first first, or last first? (both have advantages). Individuals come forward to insert the documents one by one.

4. **Cover and front page** Ask: *What should we have on the cover?* (e.g. title, name of class, year, picture). *What will go on the front page?* (e.g. title, list of contents, year). *Where shall we put the title?* etc. The class nominates learners to do the lettering, draw the cover picture etc.

5. **Contents** Discuss briefly what we will put in the File. Best homework? Pictures of the class? A picture of the garden? A message from the Head Teacher? Older learners will have more ideas; younger learners will pick up ideas as time goes by. See **Guide A** for some ideas.

6. **Where shall we keep the File?** Let the class decide a good place: accessible, but also safe.

7. **Telling others** Learners volunteer to show absent learners the file and explain what to do.

FOLLOW-UP

Keep the file on display. Make a habit of discussing what should go in it. Get learners to select the best classwork and homework: it should be seen as an honour to have a piece of work in the file. Remind them to add dates and captions, and to file documents in the right order. Use the file frequently in class: get learners to look back, recall events and decisions, explain choices etc. Train them to explain items in the file to visitors.

LESSONS IN OTHER SUBJECTS

Literacy and reading: Making a book

GARDEN FILE

A Garden File or Yearbook can be kept for the whole school, for a particular project or for a class. Most contributions should come from the learners, or at least be inserted by them.

HISTORY, e.g.
Background
Notable events
Successes and failures

RECORDS, e.g.
Weather
Visits
Site maps
Meetings
Garden log
Photos
Reports
Letters

FOODS, e.g.
Nutritious foods
Food groups
Foods from different parts of plants

PEOPLE, e.g.
Pictures
Comments
Photos of helpers
Visitors' page

CROPS, e.g.
Crop factsheets
Flowers and seeds
Crop rotation plan

DIET, e.g.
Dishes prepared
Recipes
Diet descriptions
Diet records

PLANS, e.g.
Aims
Action plans
Ideas for projects

MANAGEMENT, e.g.
Garden programme
Work schedules
Evaluation
Celebration

INVENTORIES AND ACCOUNTS, e.g.
Accounts
Equipment
Receipts
Budget
Transactions

RESEARCH, e.g.
Experiments
Pressed flowers
Bug portraits
Soil cross-section
Plant observations

WRITING, e.g.
Poems
Descriptions
Stories
Reports
Letters and invitations

REFERENCE INFORMATION, e.g.
Leaflets
Catalogues
Advice
Addresses of local farmers

GARDEN PORTFOLIO

A Garden Portfolio can be kept by older learners as a record of a garden project. If it is to be presented by groups or individuals for assessment, specify contents and length. For example:

YOUR PROJECT PORTFOLIO SHOULD CONTAIN :

A	A title page with title, date, name of student, institution
B	A Contents page, listing sections with page numbers
C	Four main parts: **Part 1** Why did you choose this project? (½ p) Reasons, including personal motivations **Part 2** What did you want to achieve? (½ p) Objectives (material, personal, educational) **Part 3** What happened? (3 pp) Description of project activities and outcomes **Part 4** Was it a success?(1 p) Evaluation of project in terms of its objectives
D	Appendices: Project log (for example, weekly reports) Data (e.g. figures, tables, graphs, diagrams) Pictorial records (e.g. drawings, photos, maps)

After running the project once, collect good examples of learners' portfolios which can be used as models by future learners.

A WEEKLY GARDEN REPORT

Learners can keep a weekly log of events and work done.

WEEK BEGINNING ....

11 JULY

PROGRESS

First tomatoes should be ready to pick in a week.
They are going orange.

OTHER OBSERVATIONS

Tomatoes are still small. Need more water?

JOBS DONE

Watering and weeding. Picked stinkbugs off tomatoes and sprayed with soapy water. Put in more stakes. Made boxes for tomatoes from coconut leaves.

PROBLEMS

The tomato stakes are not strong enough or tall enough. The branches are bending to the ground. Next time use longer sticks.

..... **(Signed)**

For environmental awareness, before preparing the site:

1. Ecological audit
2. Garden citizens
3. Insects and others

To get started with organic gardening:

4. Compost
5. Cooking compost
6. Ideas for the school grounds

ABOUT THESE LESSONS

The lessons in **Set B** aim to raise learners' environmental awareness at an early stage. A lot can be learned before planting time, especially if the garden is still to be established. Lessons 1 to 3 build an awareness of the ecosystem, the existing life of the garden site, look at the role of insects and other "garden citizens" and lay the basis for later lessons on integrated pest control. Lessons 4 and 5 introduce learners to composting and waste recycling. Lesson 6 raises ideas for improving the school grounds.

1. ECOLOGICAL AUDIT

Adapted from Kiefer and Kemple (1998)

The garden site is already an ecosystem. Soil, plants, insects, birds, all interact and depend on each other. The plants may change, but the system remains. This lesson prepares learners to understand the system as a whole so that they can work with it. It should be done before starting work on preparing the site. Older learners will need a double lesson.

LEARNING OBJECTIVES

Learners
- become aware of the existing ecosystem, its diversity and interdependence
- recognize that it is a habitat for many forms of life.

RESOURCES NEEDED

For older learners:
- four sheets of poster paper
- field guides if possible (e.g. books about local birds, wild plants, insects, animal tracks)

PREPARATION

To prepare for the lesson, learners look around the school garden site and memorise it (suggest they take a "mental photograph"). If possible, invite an agricultural extension agent or a biologist to visit.

LESSON

1. **Lead-in** Say we are going to take a journey through the garden site to see what is happening there. First we will do it in imagination, then in reality.

a) **Flying: The big picture** Learners imagine they are flying slowly over the site like birds. What terrain do they see? (e.g. meadow, scrub, dry grass, thorn bushes) What colours? What shapes?

b) **Landing: One plant** Learners imagine they see a particular plant and decide to land on or near to it. What is it? What does it live on? What does it produce? What lives on it? Does it give shelter?

c) **Creeping: Ground level** Learners "shrink" to beetle size. What plants are around them? What is going on? Who lives here? What passes by? What food is there? What eats it?

d) **Burrowing: Underground** Learners imagine they are burrowing into the soil like worms. How does it feel? (soft? dry?) Who lives here? What's happening around? What eats what?

Adapted from Kiefer and Kemple (1998)

2. **Observation** With younger learners: Repeat the exercise in the garden, getting feedback at each stage, then conclude the lesson.

With older learners:

a) In class, learners prepare "observation sheets" for each observation stage (see **Guide A**). Pin them round the room.

b) Learners copy the sheets into their notebooks, leaving room for field observations.

c) Learners choose their own small groups of two or four (one or two sheets each).

d) Take the class to the garden site and help them with their observations. If possible bring in a biologist who can explain the highlights of the habitat.

3. **How does it all fit?** Get feedback from learners. Ask what they saw and write up what they say about animals and insects, plants, terrain and other things (as in **Guide B**). Ask: *What things go together?* (e.g. ants carrying leaves, birds eating seeds, pods rotting in soil). Bring together learners' observations in a "garden web" on the board or on a poster. Learners draw lines to make the connections they have seen, as in **Guide B**, and suggest others.

FOLLOW-UP

Learners press plants found on site (**Guide C**) and make a wild plant book.

LESSONS IN OTHER SUBJECTS

Environment Eco-systems and habitats.

NATURE'S GARDEN

Page 1

FLYING : THE BIG PICTURE

What can you see? Make a sketch.

Observe, talk, write

What can you hear/smell/feel?
What lives here?
What kind of land is it? (e.g. bush, grass, forest)

Page 2

LANDING : ONE PLANT

Choose a plant. Make a sketch.

Observe, talk, write

What does this plant produce?
What does it depend on for survival?
What depends on it to survive?
(e.g. insects, birds, other plants)

Page 3

CREEPING : GROUND LEVEL

Choose a little square of ground.
Kneel down. Make a sketch.

Observe, talk, write

What can you see? What is going on?
What lives here? What passes by?
What animal signs can you detect?
What food is there? What eats it?

Page 4

BURROWING : UNDERGROUND

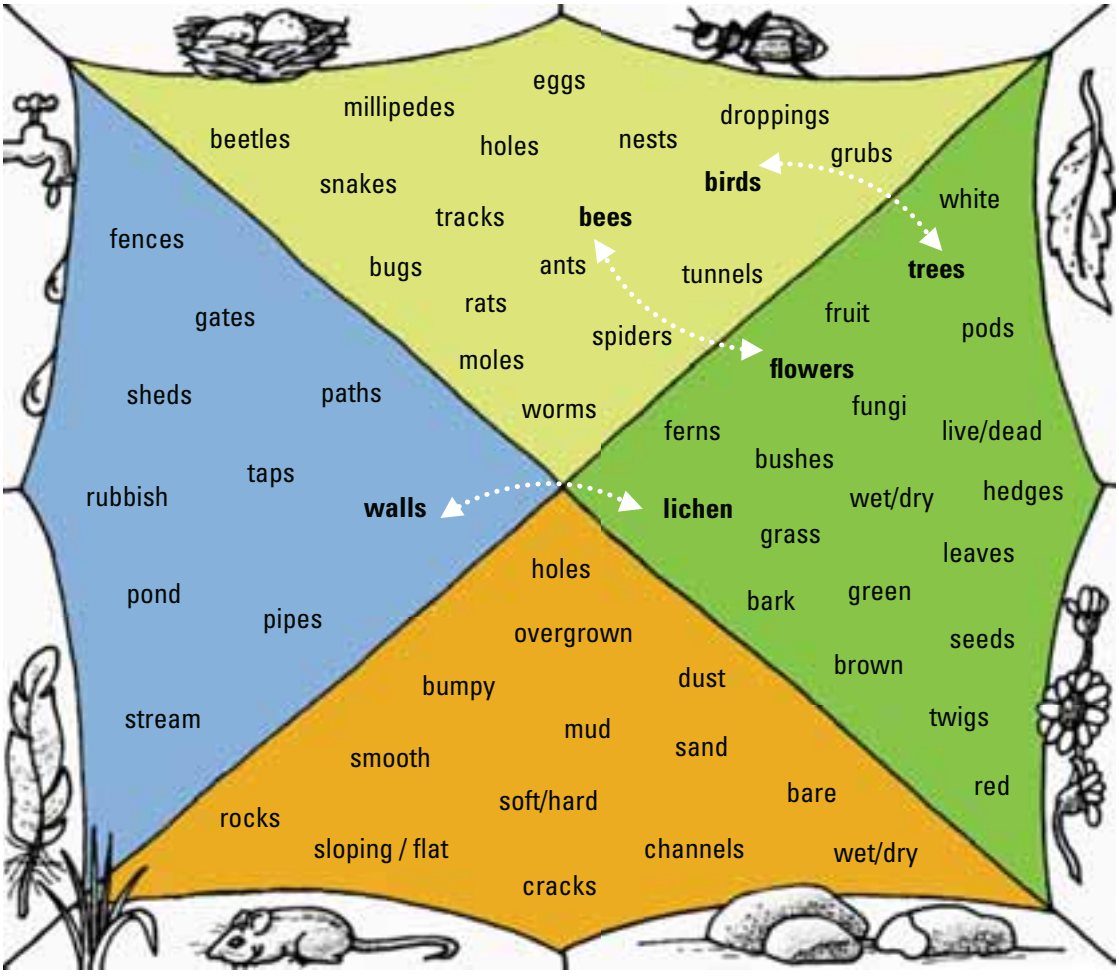
Dig up a little soil. Make a sketch.

Observe, talk, write

What can you see in the soil?
Is the soil damp, dark, crumbly and full of life?
What colour and texture is the soil?
Is there a lot of organic matter?
Can you see signs of decomposition (rotting)?

GARDEN WEB

ANIMALS



OTHER THINGS

PLANTS

TERRAIN

I SAW:

spiders' webs on the bark of a tree,
ants carrying away seeds,
a lot of plants growing around the tap.

I SAW:

insect eggs on a leaf,
lichen on the wall,
a dead beetle in the sand.

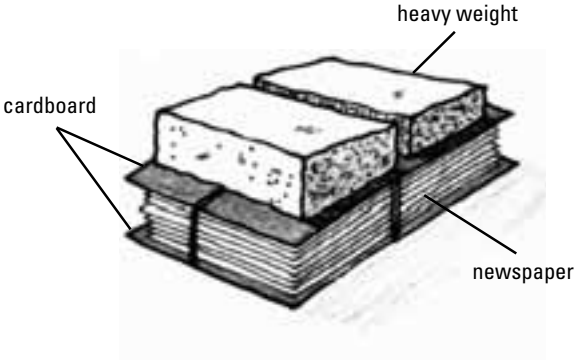
PLANT PRESS

Keep a record of the plants on your site. Think about how to preserve any special ones.

1

Put plants between newspaper.

2



Press plants for 3 to 4 days.

3

Glue the pressed plants into a Plant Book.

4

Write all you know about the plant.

2. GARDEN CITIZENS

Less than 1% of insects are dangerous to crops. Most, such as spiders and bees, are beneficial and many more are harmless. Learners should know that most garden life is friendly and that using pesticides can do more harm than good. N.B. It is useful for learners to know something about the life-cycle of insects before doing this lesson (see **Guide A**).

LEARNING OBJECTIVES

Learners
- start the practice of observing insects and other garden creatures
- recognize that most garden creatures are friends, not enemies.

RESOURCES NEEDED

- "garden citizen" cards (see Preparation)
- some blank cards

PREPARATION

- Learners prepare for the class by looking for "garden citizens" and come to class able to name or describe two. They can also bring specimens to class, dead or alive. Older learners find out local gardeners' opinions.
- Select five or six "garden citizens" well known in your area (e.g. moth, beetle, mite, bee, butterfly, wasp, caterpillar/grub, hopper, snail, slug, frog, centipede, spider, ant, worm, lizard). They should include at least one that is "beneficial", one "harmful" and one "harmless". Sketch them on cards, or get learners to do so, with a description on the back of the card. These are the "garden citizen" cards.

LESSON

1. **Lead-in** Learners name, describe (and possibly show) garden creatures and say what they were doing when observed. Show warm approval of close observation. Pass round "garden citizen" cards. Ask if learners recognize them and what they are called.

2. **Feelings**

a) Ask how learners feel about each creature. Allow free responses, including negative ones.

b) Ask what we should do about these creatures - keep them or kill them? Again, allow free responses: we must know what learners believe. Start to introduce the idea of helpful creatures and harmful creatures, to be followed up in the next lesson.

3. **Garden web** (for older learners) Focus on insects: what do they have to do with the garden?

a) Turn the classroom into a "garden". Divide the class into four groups: INSECTS, OTHER ANIMALS, PLANTS & FLOWERS, SOIL.

b) Ask groups to say how insects are connected to other groups (e.g. *We're birds; birds eat insects*) and to each other. (Some ideas are given in **Guide B**.)

c) Ask the INSECT group to "die" (sit down or put their heads down). Discuss what would happen if there were no insects (e.g. no birds, no fruit, poor soil). Learners should draw the conclusion that insects are essential to life and we must make sure that they have room to live.

FOLLOW-UP

1. **Bug hunt** (homework) Learners try to spot all the creatures named in class and say where they saw them. Older learners can draw up a table.

2. **Study specimens** To catch live specimens, learners make a paper box with breathing holes, or use half a plastic drink bottle, with a cloth cover fastened with a rubber band. They put the specimen in the box with a bit of its own leaf, using a small stick in case it bites. They draw it, observe it for a day and write a log, then release it.

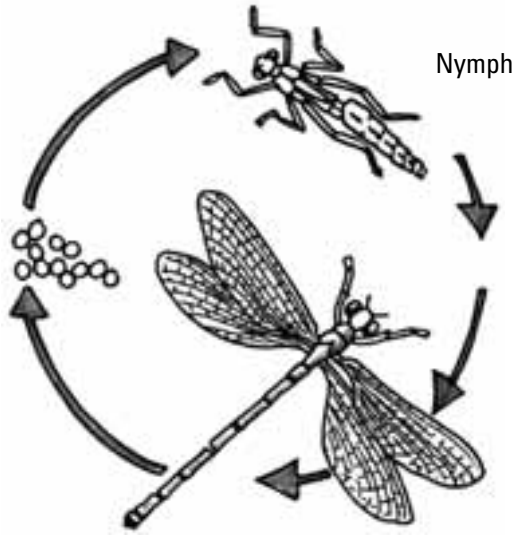
3. **Study insects in class** Offer a prize for a clutch of insect eggs and the leaves the eggs were found on (their favourite food). Watch them hatch into caterpillars, eat, turn into chrysalises etc. Try silkworms: they are large and spectacular.

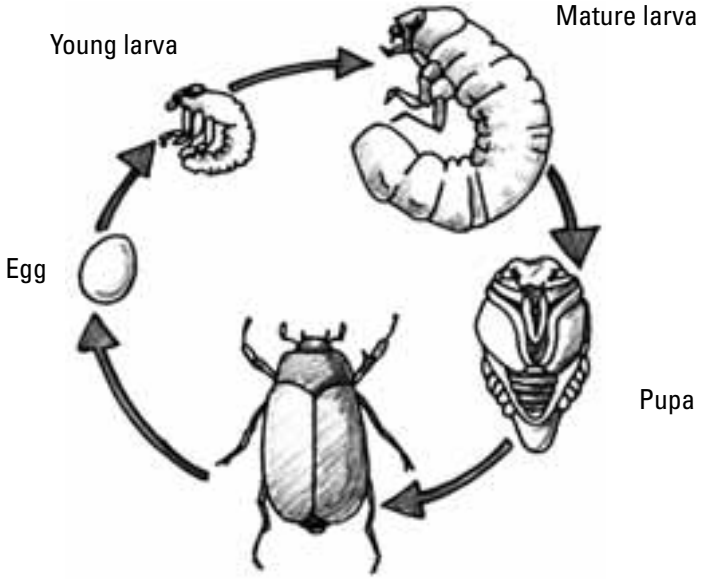
LESSONS IN OTHER SUBJECTS

Biology Pollination, life cycle of insects

AN INSECT'S LIFE

CAN YOU RECOGNIZE ALL THE STAGES OF AN INSECT'S LIFE?





INSECTS IN NATURE

INSECTS AND OTHERS

PLANTS

Insects eat leaves, fruit, flowers.

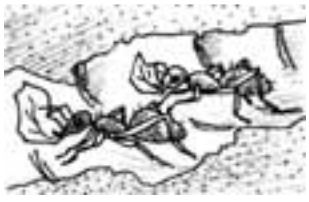
Insects pollinate flowers, so we have fruits, grains and vegetables.

OTHER ANIMALS

Animals live on insects.

Insects eat other insects.

SOIL



Insects break down organic matter so that the soil can use it to grow plants.

WHAT WOULD HAPPEN IF THERE WERE NO INSECTS?

3. INSECTS AND OTHERS

Insects are vital to plant life. It's important to counteract the idea that it is good to use insecticides indiscriminately. Children should recognize that insects are not all the same.

LEARNING OBJECTIVES

Learners identify particularly beneficial insects and common harmful pests.

RESOURCES NEEDED

If possible, use real specimens collected in clear plastic bags or on pins. If not, use "Garden Citizen" cards (see Lesson 2) showing common local garden creatures - beneficial and harmless ones as well as dangerous pests.

PREPARATION

Check with a local expert which common local garden creatures are dangerous, which are beneficial and which are harmless.

LESSON

1. **Lead-in** Recall the garden creatures mentioned in the previous lesson. Hold up picture cards (or real specimens) and ask for some information about each one. Make sure everyone knows most of the creatures by sight.

2. **Friends and enemies** Some of these are friends, some are dangerous enemies and some are harmless. Emphasize that (as in any school or village) there are only a few really dangerous ones. Can they say which creatures they are?

a) Present two "garden enemies" (e.g. slugs, aphids). *What do they do?* (chew or suck the leaves or roots). *How can we see this?* (holes in leaves, plants wilting or falling over).

b) Present two "garden friends" (e.g. earthworms and ladybugs). *What do they do?* (fertilise flowers, catch pests, turn garden waste into nutrients, open up soil).

c) Older learners discuss and separate the remaining cards or specimens into friends and enemies, calling on their own knowledge and the **Guides** where appropriate.

3. **Garden walkabout** Walk around the garden with the class. Learners pick out garden friends and enemies or the signs of them, look at what they are doing, and where.

FOLLOW-UP

Some more ways of raising awareness of garden creatures are:

1. **Bug Diary** Teams keep a Bug Diary for a week. They record insects seen, where they were, how many there were and what they were doing. This can lead into a regular pest patrol (see Lesson F7 **Keeping the garden healthy**).

2. **Posters** Make two posters entitled "Garden Friends" and "Garden Enemies". Learners practise explaining them to visitors. Note: Insects' names are often different from place to place. Older learners can research different local names and add them to the posters.

3. **Asking the experts** Invite gardening experts to talk (or be interviewed) about common local pests and beneficial creatures. They should describe their life cycles, what they do to plants, and how to combat or encourage them. Highlight the need for pictures and practical demonstrations.

4. **Insect collection** Kill off your specimens (a drop of alcohol is quick) and make an insect collection. Or use drawings and observations to make a Bug Book like the one on predators (see Lesson C4 **Protecting the garden**).

LESSONS IN OTHER SUBJECTS

Environment Food chain

BENEFICIAL GARDEN CREATURES

Ladybird

Ground beetles

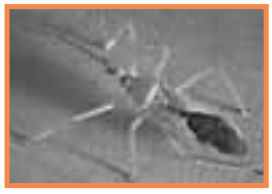
Soldier beetles

Spiders

Lacewing fly

Hoverfly

Centipedes



Assassin bugs

Bees

Praying mantis

Photos: Ken Gray, © Oregon State University, www.govlink.org

DANGEROUS PESTS

Whitefly

Ground beetles

Slugs

Mealybugs

Caterpillars

Aphids

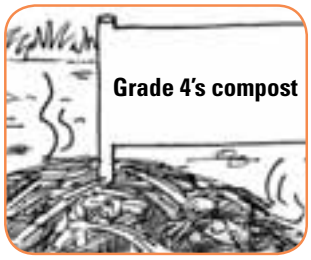
Leafhopper

Shield bugs

NOTE There is further information about these garden creatures in the Horticultural Notes in the School Garden Manual, under "Beneficial garden creatures" and "Pests".

Photos: Ken Gray, © Oregon State University, www.govlink.org

4. COMPOST



Compost, "brown gold", is at the heart of good gardening. Catch learners' interest and form the compost habit when they are young! Do this lesson in the garden before you start the compost heap.

LEARNING OBJECTIVES

Learners
- recognize compost
- appreciate the value of compost
- know how to use compost.

RESOURCES NEEDED

- some mature compost in a bag
- newspaper
- a plant
- a hole or a plant pot for planting the plant
- some soil
- pebbles
- water
- some compost ingredients

PREPARATION

Collect some compost ingredients (see **Guide**).

LESSON

1. **Brown gold** Ask learners what their favourite foods are and get a few replies. Hold up a bag of compost and say this is plants' favourite food. Can they guess what it is? Distribute handfuls of compost to small groups.

Ask them to

a) look and tell (brown and crumbly)

b) smell and tell (like earth, damp)

c) feel and tell (damp and light)

d) squeeze and tell (makes a ball but falls apart again).

Tell the class that this is compost, "brown gold": plants' favourite food.

2. **Planting a happy plant** Demonstrate planting the plant, with a running commentary. Pause each time before adding compost, so that learners can call out COMPOST!

A few stones to drain the water
A little soil
    A little COMPOST to keep it damp
A little soil to hold the roots
Now the plant….
    A little COMPOST to feed it
A little soil to hold it in place
    A little COMPOST to keep it airy
A little soil to fill up the space
    A little COMPOST to make it grow
A little more soil
    A little COMPOST for leaves and flowers and fruit
Press it down on top
A little water
Now we're done.
Ask: Is this a happy plant? (Yes!)
    What makes it grow? (Answer: COMPOST!)
    What keeps the soil airy?
    What gives it food?
    What keeps it damp? (Answer: COMPOST!)

3. **Compost ingredients** Show some sample compost ingredients. Explain that to make compost we put all the ingredients together, keeping it damp and airy. They will get warm and slowly turn into compost. Read out a list of compost ingredients (see **Guide**). Get learners to see how many they can remember and to call them out.

4. **Using compost** Ask older learners when else we should use compost – for example:

- Use it in the early evening, when it is cool. Do not let it dry out.
- Spread compost before planting.
- Put compost in when potting.
- Put compost around growing plants every two weeks. Mulch to keep it damp.

FOLLOW-UP

Learners ask at home for something that can be used for making compost and bring it to the next lesson.

INGREDIENTS OF COMPOST

YES !	NO !
Straw, cut grass	Cooked food
Organic waste from kitchen	Large pieces of wood
Weeds, plants, leaves, green manure	Tough weeds, seeding grass
Animal manure	Plastic, nylon, synthetic fabrics
Wood ash	Metal, wire
Animal and fish bones	Glass, crockery
Soil	Coal ash

5. COOKING COMPOST

This lesson prepares for compost-making and can be done in the garden or inside.

LEARNING OBJECTIVES

Learners
- appreciate the value of compost
- know how to make and use compost
- get the habit of making and using compost.

RESOURCES NEEDED

- a little compost, ordinary soil and sand
- some compost ingredients, e.g. soil, peel, dry grass, fresh weeds, cotton rags, fishbones
- an old bucket or can with holes in it
- paper and scissors to make "quote bubbles" with the two quotations above already written in

PREPARATION

To prepare for the lesson, learners should
- find out about compost by asking gardeners, parents etc.
- bring some compost ingredients to the lesson.

LESSON

1. **Lead-in** Assemble all the compost ingredients brought by the class. Show the three soil samples and ask which one is compost. What is the difference? Emphasize that compost is mainly rotted parts of plants and animals - "organic matter". Call out some items from the **Guide** in the previous lesson so learners can decide what is organic and suitable for compost.

2. **Quotes** Ask what learners have heard about compost. Pin up the prepared quote bubbles.

Discuss what is good about compost. Some ideas:
- It has all the food plants need; it gives back the nutrients to the soil.
- It makes soil roomy and airy (for roots to breathe and bacteria to work).
- It helps to hold water in the soil, but also lets it run through.
- It is natural; it is cheap; it uses things we have already.

Older learners can write short answers in speech bubbles to go with the first two bubbles.

3. **Compost experiment** Explain that making compost is like cooking. You need food, heat, air, water and a pot. (Tell older learners that you also need bacteria/fungi). Make some "mini-compost" in the bucket to demonstrate. As learners answer the questions, make the compost.
- What kind of "pot" do we need? (a container with holes for air and drainage)
- What do we put in first? (a few twigs for drainage)
- And next? (some green material, then some brown, animal manure, soil, and so on)
- Why do we add soil? (to bring in the fungi/bacteria)
- And to finish? (a little water, a layer of soil, some grass on top to keep it damp)
- What will happen now? (it will get hot and rot; it will need to be turned over)

4. **Organizing garden work** The experimental bucket compost will be ready in about two weeks. Learners should keep checking it. Decide on a day to make the real compost heap (see **Guides A** and **B**).

FOLLOW-UP

1. **Compost spots** After creating the compost heap, keep interest alive by treating it as a serial story with a new episode/activity every week – e.g. make a compost collage of the ingredients, turn over the heap, make a signpost/flag for the heap, measure its heat, keep a pictorial record of the process, have a ceremonial "compost opening" when it is ready.

2. **Next heap** Revise the process by getting groups to start their own heaps.

3. **Experiment** Do experiments with plants grown with and without compost.

4. **Drama** Role-play: a compost enthusiast explains to novice gardeners why they need compost, how to make it etc.

LESSONS IN OTHER SUBJECTS

Biology Plant life cycle, bacteria

COMPOST CONTAINERS

COMPOST BIN

Three bins is best.
Let air in. Keep damp.

COMPOST PIT

Turn over the compost
to get air in.

COMPOST BOX

Keep contact with soil.
Let air in. Keep damp.

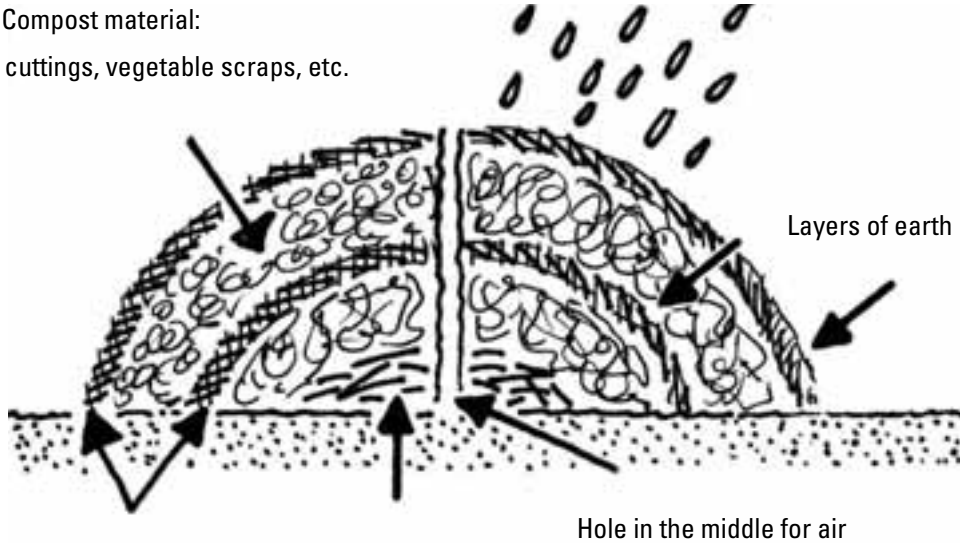
COMPOST BAG

Make holes to let air in.
Leave for six weeks.

HOW TO MAKE COMPOST

A little water to keep it damp.

Compost material:
leaves, grass cuttings, vegetable scraps, etc.



Layers of earth

Hole in the middle for air

Sticks for drainage

Grass to keep it damp

6. IDEAS FOR THE SCHOOL GROUNDS

The school grounds express the school's identity, provide amenities, create an idea of a healthy environment, and act as an outdoor classroom. The way learners learn to think about them will affect their attitudes and behaviour to their future environments all their lives. This lesson aims to lead to action to enhance the school's physical environment by airing some ideas and getting learners to think about the practical details.

LEARNING OBJECTIVES

Learners

- make practical proposals for improving the school grounds
- initiate action.

RESOURCES NEEDED

(for younger learners)

- rough sketches on cards representing two or three ideas for improving the school grounds

(for older learners)

- a sketch-map of the school grounds
- a list of questions on display: Where will it be? How big? What kind? How do we make it / grow it? What will we need? Where will we get what we need?
- large blank cards

PREPARATION

For younger learners, select two or three ideas for the school grounds which you think can realistically be achieved by your learners or with their help (for possibilities see **Guide A**). This way, you can exclude impractical ideas but at the same time allow learners a real choice. Sketch each idea simply on a large card. Older learners prepare by studying the ideas in **Guide A**.

LESSON

(For younger learners)

1. **Lead-in** Outline two or three possible improvements in the school grounds which the class can undertake. As you do so, pin up the cards. Say why you have chosen each one (e.g. real benefits, available materials, not too much work, inexpensive, good for learning).

2. **Questions and garden exploration** Go into the garden and explore the ground. For each idea, discuss the questions: *Where will it be? How big?* etc. Let learners make the final choice.

3. **Action plan** Learners suggest the first steps to take and who is to take them.

(For older learners)

1. **Lead-in** Invite proposals for improving the school grounds and discuss which are most feasible. Sketch or write each idea on a large card and pin it up.

2. **Questions** Divide the class into groups, one for each idea and give out the cards. Go through the questions on display. Learners write the questions on the cards.

3. **Garden exploration** Groups explore the school grounds with the questions in mind. Set a time for reporting back. In the meantime, pin up the map of the garden.

4. **Discussion and decision** Learners report back and discuss each other's ideas, referring to the site map and giving detailed suggestions. Let a consensus emerge on which idea to go ahead with. If learners are divided, suggest that one idea can be kept to next year.

5. **Action plan** Learners suggest the first steps to take and who is to take them. N.B. There is advice on planting trees in **Guide B**.

FOLLOW-UP

1. **Written proposal** Older learners write up proposals for these ideas, or others, and present them to class, school, families or visitors (for an example see **Guide C**). Class artists illustrate the proposals with sketches of the imagined end-result.

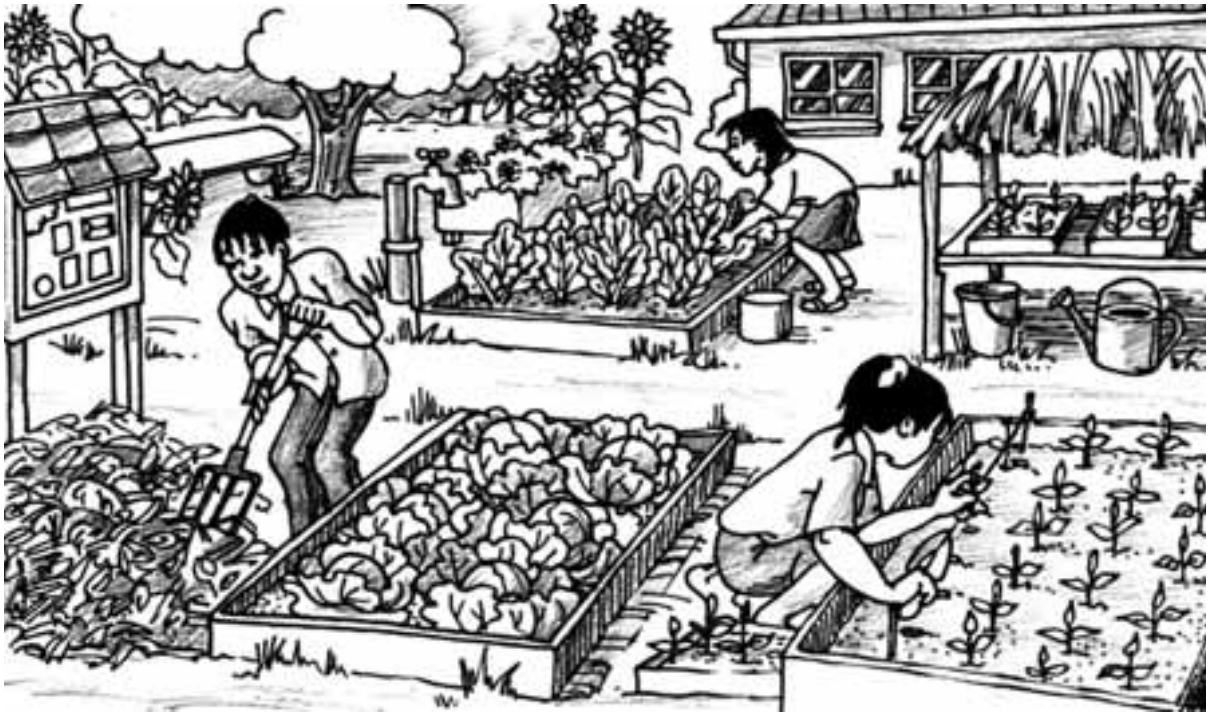
2. **Diary** Learners start a diary of the project or a project file.

LESSONS IN OTHER SUBJECTS

Civics Urban planning, civic amenities

GARDEN IMPROVEMENTS

SOME IDEAS FOR IMPROVING THE SCHOOL GROUNDS



- a bulletin board
- raised beds
- flowers and ornamental bushes
- a compost heap
- water harvesting
- shade trees
- a nursery for seedlings
- a table for potting

GARDEN IMPROVEMENTS

SOME IDEAS FOR IMPROVING THE SCHOOL GROUNDS

- a toolshed
- a scarecrow
- signs and signposting
- a tree house with a rope ladder
- a compost heap
- grassy areas for sitting and playing
- swings, seesaws, sandpit, roundabout
- a pond
- a herb garden
- fruit trees

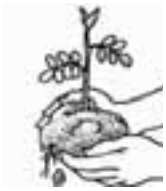
OTHER IDEAS

- hedges, gates
- a woodlot of dense bush or trees
- a cooking area
- a hard paved area for hopscotch, marbles etc.
- an eating area
- a map or plan of the garden on display
- an entrance arch
- a stand or stall for serving/selling garden produce
- a bird house or bird table
- an enclosed "quiet area" or "outdoor room"
- a wildlife habitat/wilderness
- some outdoor art (mosaic paving, giant chair, scrap sculptures)
- a central courtyard for meetings or performances, with places for spectators to sit
- tables, benches, logs, rocks for sitting, reading and writing garden journals

PLANTING YOUNG TREES

You can grow a tree from seed, but it is quicker to find or buy a small sapling and plant it where you want it. Two metres high is ideal. If it is smaller, make sure it is protected well from animals, wind and too much sun.

GROWING A TREE FROM A PIP



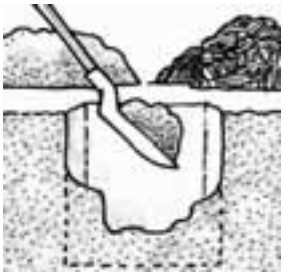
Seedling in soil

Avocado

Loquat

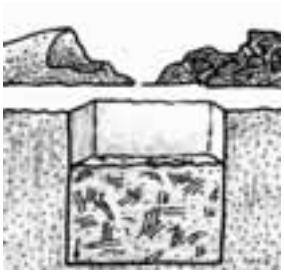
PLANTING A SAPLING

1



Dig a square hole
1m x 1m deep.
Have compost ready.

2

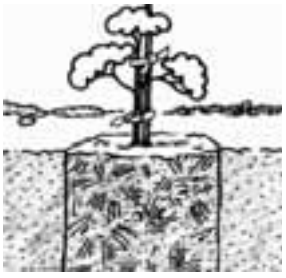


Fill two thirds of the hole with half soil and half compost.

3

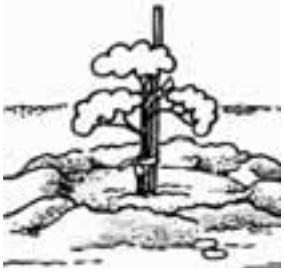
Put in the tree. Stake it if necessary.

4



Drop the remaining soil gently around the tree. Press down firmly.

5

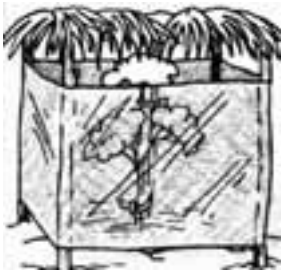


Make a soil wall around the tree. This catches and holds water.

6

Cover the ground around the tree with 20 cm of mulch or compost. This keeps soil moist, keeps down weeds and feeds the tree.

7



Protect the tree from wind, sun and animals.

8

Water well...
... and continue to water regularly.

WRITTEN PROPOSAL

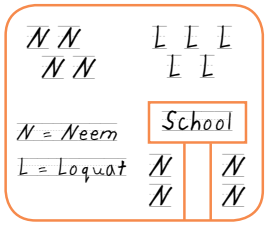
Older learners can work up a detailed written proposal as a public writing exercise.

PROPOSAL: SHADE TREES

Reasons We would like to have shade trees behind the school, where we can sit and talk, play and study. We would also like an avenue of trees leading to the school. Our trees should also give us fuel for cooking, stakes for the garden, medicine or fruit as well as shade.

Recommendations We would like neem trees. They grow fast, are big and shady and live a long time. They are evergreen and give shade all year. They also give a natural pesticide and the wood is good for fuel. We would also like some loquat trees. They produce delicious, nutritious fruit; they are evergreen and you can make tea from the young leaves.

Sketchmap



Inputs We need pips or saplings, compost, mulch, stakes, a spade and water.

Cost We could

- grow the trees from pips, which would cost nothing but would take a long time
- buy small saplings from the nursery (cost 60p each)
- find saplings in the neighbourhood and dig them up (with permission).

What we have to do

- Discuss where to put the trees.
- Draw a picture of how the school yard will be when the trees are grown.
- Plant saplings in October, when they are not growing. Mulch, stake and label. Plant spare ones in tubs as backups.
- Germinate seeds, grow seedlings, plant them out, label them, mulch well and protect from wind, pests and predators.
- Water and check every week during the growing season. Record growth.
- Keep a record of the project, with pictures (e.g. a photo every month).
- Thank volunteers and donors personally.
- Organize an event to inaugurate the trees. Provide garden refreshments.
- Publicise the project.

Who will be responsible

Class 3 will be responsible and will water the saplings in the school holidays. Our parents will help us dig up the saplings and plant them. Our teacher will help us to prepare publicity.

To analyse gardening needs:

1. **Tools and equipment**
2. **Water management**

For understanding what's going on:

3. **Preparing the site**
4. **Protecting the garden**

For planning and laying out the garden:

5. **Garden layout**
6. **Garden beds**

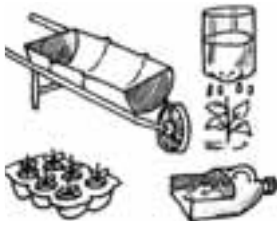
ABOUT THESE LESSONS

These lessons enable learners to take stock.

Learners may not do the heavier work of preparing the site (e.g. ploughing, laying pipes, fencing), but they should help if they can. Lesson 1 is a preliminary check on learners' knowledge of garden tools and how to care for them. Lessons 2 to 5 help them to understand what is going on through observation, enquiry and activity, and to take part in decisions.

There is plenty more for learners to do before planting begins. Compost-making should be continuing. The clearing of the site is also a good time to start collecting mulching material - dry grass, weeds, straw, leaves – which will be needed throughout the gardening season.

1. TOOLS AND EQUIPMENT



Learners quickly pick up the use of garden tools by imitation and demonstration. It is good to make sure that everyone uses the same names and that learners develop good routines for caring for and storing equipment.

LEARNING OBJECTIVES

Learners

- recognize common gardening tools and can show how to use them
- care for tools properly, take safety precautions, and can tell others what to do
- decide how to implement garden rules
- (for older learners) identify high-quality tools and know what they cost.

RESOURCES NEEDED

- garden tools and equipment, or the pictures in the **Guides**

PREPARATION

Learners find out what gardening tools/equipment they have at home, their names and how they are used. They should come to the lesson prepared to demonstrate how to use some of them.

LESSON

1. **Lead-in** Learners say what tools and equipment they have found at home and agree on what they are called. If necessary use **Guide A** to identify the items.

2. **Using tools** Take the class outside or bring tools into the classroom. If there are no tools yet, learners find and name all tools in **Guide A**. For each one, discuss and demonstrate:

a) What is it for? Who can show us how to use it?

b) How should we leave it so it won't be dangerous? (e.g. Leave hoes/rakes with "head in air".) Show us what could happen if you don't do this! (Stage some fake accidents.)

c) How do you stop it getting rusty? (Keep tools out of the rain in a shed or under house; trowels/forks in a bucket of sand; barrows/buckets upside down so they don't collect water.)

d) What do you do when you have finished using it? (Clean it, then put it back.)

e) Where does it go? (Establish a clear "home" for every item.)

3. **Code of conduct**

a) Learners suggest some good gardening rules or a "code of conduct" for tools and equipment – e.g. *Clean it! Put it back! Stand rakes up!* They decide if they can remember them or if they need to write them up.

b) Learners discuss and decide if they want a Tool Monitor for garden sessions, to check everything is in order. If they do, get nominations.

c) Absent learners also need to know the rules. Who will tell them? Ask for volunteers to brief absentees.

4. **Buying equipment** (for older learners) If equipment is to be purchased, older learners can help.

a) Learners make an inventory of items already in the school, and a list of the items needed. They file the inventory in the Garden File.

b) Teams each research one item needed, asking: *What exactly do we want? Where can we get it? Is it good quality? What does it cost? What is the best buy? Do we get a handle with it?* Advise learners to try tools for weight and to look for well-known brands, strong rust-free metal (no cracks, doesn't bend), easy-to-sharpen blades, re-usable trays, V-shaped joints where the handle joins the metal etc.

c) Learners look at two or three products and present their findings before recommending a purchase.

FOLLOW-UP

1. **Code of conduct** Learners write up the code of conduct and display it. Ask them to remind each other of the rules/code of conduct.

2. **Routines** Allow five minutes at the end of each garden lesson for clearing up tools and putting them back.

LESSONS IN OTHER SUBJECTS

Technology Quality tools

Life skills Rules and responsibilities

THE GARDEN AT WORK

Find and name all the tools and equipment.

HOMEMADE TOOLS AND EQUIPMENT

Homemade wheelbarrow

Watering can from a plastic bottle

Simple instrument for marking channels for seeds

Shovel made from a plastic bottle

Baskets made from old tyres

2. WATER MANAGEMENT

This lesson is for areas where water is a problem. Children cannot themselves do much about the supply, but they should understand the need to conserve water and how it can be done, and if possible take some ideas home to their families. The whole lesson can be done in the school grounds. Watering plants is covered in Lesson F5 **Watering (2)**.

LEARNING OBJECTIVES

Learners

- know various sources of gardening water
- appreciate the need to conserve water and have some ideas how to do it
- (older learners) can assess some irrigation systems for cheapness, labour-saving and effectiveness.

PREPARATION

- Learners prepare by finding out where school garden water comes from and inspecting the equipment (e.g. taps, pumps, pipes, tanks, well, oil drum with rainwater).
- Before the class the school janitor gives a guided tour of the water system (if possible).
- Older learners can research local irrigation systems to see how many different ways there are of getting water to plants.

LESSON

Write up the following questions and discuss them. Questions in brackets are for older learners.

1. **Where does our school garden water come from? How does it get to the school? (What equipment is used?)**

2. **(Is the supply reliable? Does the equipment need maintaining? Who maintains it? What does maintenance cost?)** If possible, invite the janitor/ head teacher to be interviewed by the learners on these questions, and to say if there are any plans for developing the school water supply.

3. **Could we get water from anywhere else? (Can we get more water if we need it?)** Learners should be aware of the possibilities of rainwater harvesting, making ponds, and using "grey water" from washing and cooking. Older learners can find alternative sources of water in **Guide B** and discuss their feasibility in their own situation.

4. **(How much water do we need for our garden every day? Will we have enough all the year?)** A garden of 25m^2 needs about 40 litres a day. Older learners can work out what their own garden needs. They may also need to decide if they plan to grow crops in part of the dry season.

5. **How can we use less water?** Some ideas are mulching, composting, drip irrigation – see **Guide B**. Older learners can explain how these methods save water (e.g. by trapping water, preventing evaporation, keeping water in the soil).

6. **How will we get the water to the plants?** Younger learners can suggest the most obvious ways (hosepipe, watering can, bucket). Older learners can say what they have found out about local irrigation systems. Discuss which ways are cheapest, most labour-saving and most effective in conserving water (e.g. sprinkler systems are very wasteful).

FOLLOW-UP

1. **Family angle** Learners select and copy one of the questions to discuss with their families.

2. **Waterworks** If any works are done in the school (e.g. pipe-laying, sinking a well), learners question the workmen and record the works in writing or drawings.

3. **Map** Learners make a map showing the source of the water supply, or draw the irrigation system.

4. **Guided tour** The class takes a tour of the water system. Older learners then give the same tour to younger learners in pairs.

LESSONS IN OTHER SUBJECTS

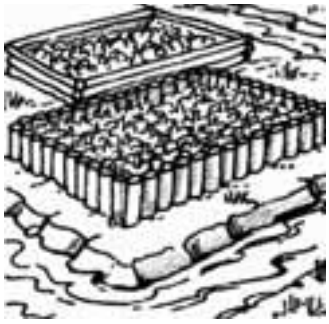
Environment Water supply

Technology Pumps

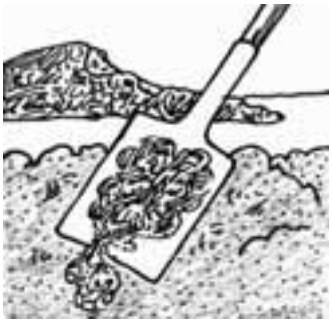
Science Evaporation

WATER WISDOM

Do we have a lot of water? Then we should try some of these:



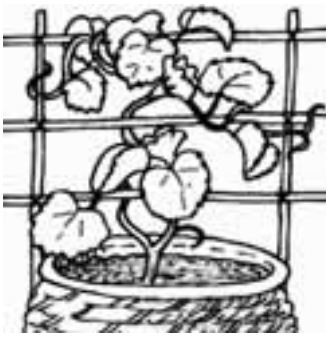
Dig holes and canals to drain water.



Add compost to drain clay soil.

Grow plants that love water.

Protect young plants from heavy rain.



Grow plants on trellises and use containers.

Don't mulch too much.

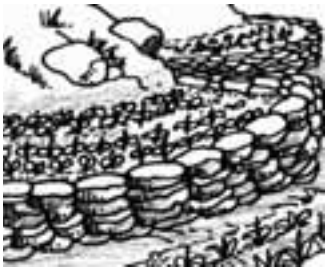
NOT ENOUGH WATER

Do you have very little water? Then try some of these:

Use "grey water" from washing.

Harvest rainwater.

Grow crops near the water.

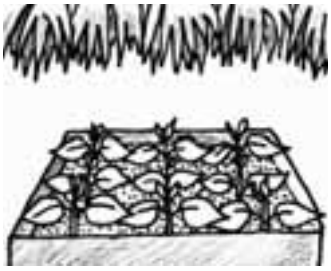


Prevent run-off:
put beds across slopes
and build up edges.

Water conservatively.

DON'T use a sprinkler.

Use a lot of compost and mulch.



Provide shade for young plants.

Remove competitive weeds,
which steal water.

Grow dry-climate crops,
e.g. eggplant, sweet-potato, mango,
mung bean, groundnut, okra.

3. PREPARING THE SITE

Learners may not be able to carry out major site preparation operations (e.g. uprooting trees, clearing rocks, laying pipes, ploughing), but they should understand what is being done and why, and be able to explain it to others. This lesson can be done on the site, before or during site preparation.

LEARNING OBJECTIVES

Learners

- have a clear picture of the garden site
- recognize what the garden site needs (e.g. clearance, soil, water, protection)
- can interpret site preparation activities.

RESOURCES NEEDED

- camera and compass if possible

PREPARATION

Before the lesson, learners observe the garden site closely, including

- the main features (buildings, rocks, bushes)
- the plants, contours (bushes, slopes, bumps)
- the facilities (e.g. tap, tank, shed).

Older learners measure the site exactly, work out the compass points and take photographs if possible.

LESSON

1. **Lead-in** Walk round the garden site. Learners point out and describe what they have observed.

2. **What needs doing?** Discuss any of the questions below, recalling previous lessons on soil, water, compost and what plants like.

Is there any rubbish? What should we do with it?

If it is organic, put it on the compost heap. If not, think how it can be used. If it is useless, bury, or throw it away.

What do we do about bumps/ hollows/ slopes?

Turn a dip into a pond or ditch; level out bumps when ploughing; make a terrace; grow trees on slopes.

Do we need fences/hedges/walls?
Where? What for? How many metres?

See Lesson C4 **Protecting the garden** for ideas.

Are there any trees? What do we do with them?

Keep some for shade, fuel, stakes, improving the soil; use for studying, eating, hanging a swing, sheltering compost.

Are there any bushes? Can we use them?
If not, what do we do?

Cut them back or root them out; keep some for hedges, for flowers and as homes for good insects.

What about grass/weeds? They are competition but they hold the earth in place and provide a home for insects.

Cut long grass, pull weeds, dig them in, use for compost. Leave some patches of grass and weeds for good insects.

Is there a good water supply?

Recap conclusions of Lesson C2 **Water management**.

Are there rocks, stones or anthills?
What do we do with them?

Use stones for borders and paths; leave some large rocks to sit on or play on; anthills make good topsoil.

FOLLOW-UP

1. **Records** Older learners make a labelled drawing of the site, draw a scale plan, or describe it in writing (see **Guide B**). Learners choose the best and use them in presentations, appeals, posters, reports and the Garden File.

2. **Tell the family** Learners describe the site to their families and explain what needs doing, or give them a guided tour.

3. **Helping and observing** Learners help with site preparation, including recording the works in drawings, writing or photos.

LESSONS IN OTHER SUBJECTS

Maths/Technical Drawing Drawing a scale plan

PREPARING THE SITE

KEEP RECORDS

Draw, measure, take photos, make maps.

ANALYSE SOIL

Take three samples of topsoil and subsoil.

DIG DEEPLY

Dig once only, when soil is not too wet or dry.

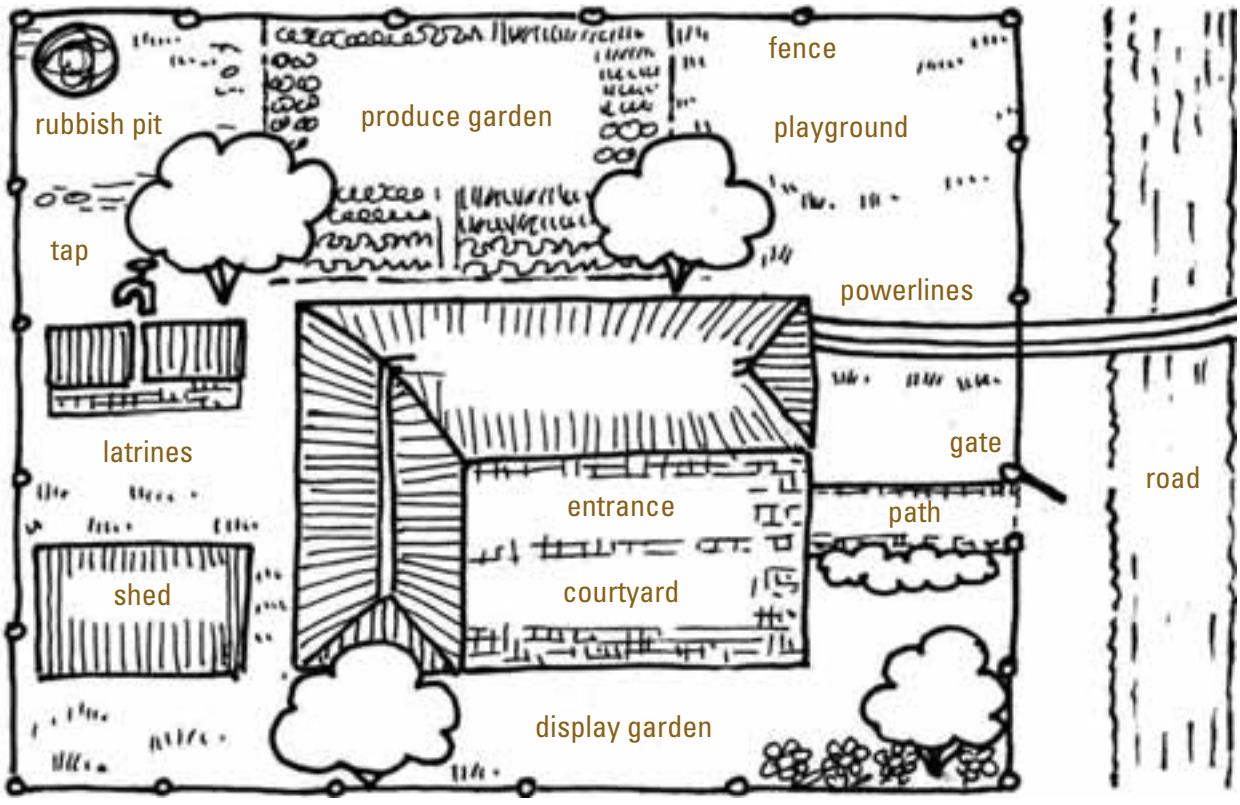
CLEAR THE SITE

Use grass and weeds for compost.

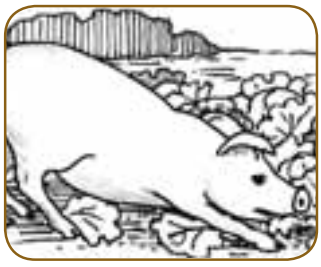
ADD COMPOST

Work compost into the top 25 cm.
Water well.
Add lime for acid soil.

A SITE MAP


fence
rubbish pit
produce garden
playground
tap
powerlines
latrines
gate
road
entrance
path
shed
courtyard
display garden

4. PROTECTING THE GARDEN



Protecting the garden against animal predators is an exciting area of action, if it is presented as a battle of wits against cunning opponents. Learners can usually help with making fences and hedges and can protect plants in many small ways. Local knowledge and practice should be gathered and valued.

LEARNING OBJECTIVES

Learners
- recognize the main predators
- know some ways of protecting the garden against them.

PREPARATION

Before the lesson, learners find out what local animals eat garden plants.

LESSON

1. **Lead-in** Learners say what they have found out about animals (including birds) which eat garden plants. Write them all up. Introduce the word PREDATORS and write it at the top.

2. **The Story**
(For younger learners) Tell the story *The Three Little Predators* (see next page). Change the details (e.g. crops, predators) to fit your own context. Change names to local names, but keep two boys and one girl. Start by drawing a picture of the house (with eating place, garden and grandmother). As the story goes on, draw the plants, predators etc. or ask learners to do this.

(For older learners) On the board, draw a few plants on the board and one local animal predator (or ask the class artist to do this). Explain what happens – e.g. *Chickens scratch up seeds and eat young plants. We can stop them by putting fences, sticks or thorns round the plants.* Learners tell about other local predators, what they do and how they can be stopped. As they are mentioned, draw them around the plants, or ask learners to do this.

3. **Discuss and decide** how to protect the garden as a whole (e.g. with fences, walls, hedges). Use the **Guide** to help.

FOLLOW-UP

1. **Story illustration** Younger learners illustrate the story or present it as a play to families or other classes.

2. **Observing and recording** Learners help with any work done on hedges, fences etc. and document it.

3. **Pest patrol** While the plants are growing, checking for predators should be part of the Pest Patrol (see Lesson F7 **Keeping the garden healthy**).

4. **Protection Project** Older learners research local methods of protecting crops by talking to farmers and smallholders, and produce a handmade booklet. They can complete this table for each predator:

Predator (e.g. animals, birds, people)	
What does it eat? (e.g. root crops, young plants, pods, fruit, seeds, grains)	
What can it do? (e.g. fly, burrow, dig, climb, jump, crawl, hop)	
How can we stop it? (e.g. wall/fence/ hedge/nets/scarers)	
What does it cost? (e.g. in time, money, work)	

N.B. Local research of this kind may produce findings of real value and should be taken seriously. Share useful findings with other schools and local gardening groups.

LESSONS IN OTHER SUBJECTS

Drama Making a play

Technology Walls and fences

Literature Walls, fences and hedges in history, myth and the imagination

THE THREE LITTLE PREDATORS

Peter, Ellen and John lived in a small house with Grandma. They wanted to grow some delicious food to eat. They prepared a rich comfortable garden bed, dark and crumbly and damp. Then they planted their crops.

Peter planted sweet corn. He made a long furrow in the soil. He put in a little compost and he dropped in ten corn seeds one by one and covered them with soil. As he was watering them, Master Goat ambled up. He was thin and brown and friendly. He sniffed the ground.

"Hullo Peter, what are you doing?" he said.

"Hullo, Master Goat. I'm planting some sweet corn."

"Now why are you doing that, Peter?"

"Sweet corn gives us lots of energy to run and play. And it's very good to eat."

"Oh, I do agree, Peter, I do agree. I like a little young sweet corn myself. When will it be ready?" And Master Goat ambled away.

Peter went to Grandma. "Grandma," he said, "I think Master Goat is going to eat our sweet corn. But it's not his sweet corn, it's ours. How can we stop him?"

"Come with me!" said Grandma. "To keep out Master Goat we need a very good fence. He can dig and he can run and jump and climb a little, but he can't fly. And he doesn't like thorns." So Peter and his grandma built a strong thorny fence all round the sweet corn, to keep it safe.

Ellen planted beans. She put up some long thin stakes, three sets of three, and tied them round with strong grass to make a teepee. At the foot of each stake she made a little hole, and put in a little compost. In each hole she put two browny-red beans and covered them with soil. Then she watered them. As she was doing this, Miss Hen strutted up. She was brown and feathery and fussy. She scratched the soil and pecked it with her red beak.

"Hullo Ellen, what are you doing?" she said.

"Hullo, Miss Hen. I'm planting some beans."

"Now why are you doing that, Ellen?"

"Beans help us grow. And they are very good to eat."

"Oh, I do agree, Ellen, I do agree. And there are some good red beans in the ground there. I think I will come scratching here tomorrow." And Miss Hen strutted away.

Ellen went to Grandma. "Grandma," she said, "Miss Hen is going to scratch up all my beans tomorrow. They are not her beans, they are ours. How can we stop her?"

"Come with me!" said Grandma. "To keep out Miss Hen we need some sticks. She pecks and scratches everywhere but she's not very strong." And she showed Ellen how to make a little fence of bamboo sticks around each bean teepee, to keep the beans safe while they were growing.

John was growing tomatoes. He had planted the seeds in a tray. Now he had some tender little seedlings. He made little holes and put a plant in each one, with some of its own soil. He pressed the soil down, then he watered the soil very gently around the seedlings. It was nearly dark when he finished. Just then, Mr Slug came creeping along. He was black and slimy and slow. He was chewing on a leaf.

"Hullo John, what are you doing?" he said softly, in his tiny voice.

"Hullo, Mr Slug. I'm planting some tomatoes."

"Now why are you doing that, John?"

"Tomatoes make us healthy. And they are very good to eat."

"Oh, I do agree, John, I do agree. And your tomatoes are so young and tender. Young tomatoes are just my thing. I will come back tonight."And Mr Slug crept slowly away.

John went to Grandma. "Grandma," he said, "Mr Slug is going to eat the tomatoes tonight! They are our tomatoes, not his. How can we stop him?"

Grandma was stirring a cooking pot for the evening meal. She bent down and scraped up some ash from around the fire. "Come with me!" she said. "Mr Slug works hard but he's very slow, and he doesn't like dry things." She and John made circles of ash round the tomato plants to keep them safe.

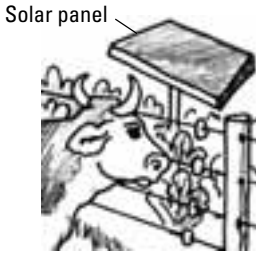
Mr Slug came back that night, but he got stuck on the ash and had to go away. Miss Hen came back the next day and pecked and scratched, but the sticks were in her way. Master Goat came back when the corn cobs were young and green, but he couldn't get through the thorn hedge. None of them managed to eat the crops.

When the corn and the beans and the tomatoes were ripe, Peter and Ellen and John cooked them all together with some oil and salt and spinach and had a great feast with Grandma.

PROTECTING THE GARDEN

WALLS
A lot of work, but strong and permanent
Need maintenance.
Brick, concrete, stone, rammed earth

FENCES
Effective but often expensive
Brushwood, wattle, bamboo, wire and electric fences
Some keep out chickens, some keep out burrowers, some keep out big animals.



HEDGES AND LIVING FENCES
Slow to grow but cheap. Prevent erosion.
Big dense hedges keep out big animals.
Food hedgerows give food and fodder as well.

NETS AND SCARERS
Nets protect plants from birds and insects.
Scarecrows keep away birds and are fun to make.
Shiny things or plastic strips also scare birds away.

AT THE GRASS ROOTS
Mini-fences protect single plants.
Earth blocks stop diggers.
Coverings keep chickens away.

5. GARDEN LAYOUT

This lesson opens up the range of possibilities for the garden and involves learners in planning paths and garden beds.

LEARNING OBJECTIVES

Learners
- recognize the range of possible garden activities
- recognize essential elements of the garden layout (e.g. paths, beds, shed, compost, signs)
- contribute to garden layout planning.

RESOURCES NEEDED

For older learners:

- a site map
- tape measures, pegs and string OR sticks OR pebbles OR old tin cans

PREPARATION

For older learners, prepare, or have learners prepare, a sketch map of the site (see e.g. Lesson C3 **Guide B**).

LESSON

1. **Lead-in** Learners look at the pictures in **Guide A** and say what they see in each garden and what is happening. Discuss which things they would like to have in their garden (e.g. plots, paths, signposts, flowers, plant nursery). Older learners can make a list of desirable features. Explain that today we will look just at beds and paths.

2. **Site inspection and discussion** Go outside and inspect the site with beds and paths in mind. With older learners, refer to the site map. Discuss relevant questions – e.g.

a) **Beds**

How many are needed? (e.g. one for each group/ class?)

Is there a slope? (Beds should go *across* a steep slope, so they collect rain, and *down* a slight slope in order to drain off water).

How big should a bed be? (A bed should be wide enough to reach to the centre without standing on it. Learners work this out for themselves by squatting or kneeling on each side and seeing if they can touch hands easily across the bed.)

b) **Paths**

Where should they be? (Paths should be round beds and wherever there is a path already).

How wide? (Paths should be wide enough for a wheelbarrow or for carrying buckets - learners try this out for themselves.)

3. **Organizing garden work** (for older learners) Show learners how to mark out the site (e.g. pegs and string, pebbles, sticks, old tin cans upside down). Allocate tasks to groups, including final measurements, records and journal.

FOLLOW-UP

1. **Choosing beds** If groups are to have their own garden beds, they should choose them now, find names for them and plan a sign to stick in the bed.

2. **Garden Plan** Older learners finalize and copy garden plans to go into the Garden File or on display. They explain the garden plan to families at home.

3. **Signs** Learners make signs and labels for the garden (see **Guide B** below).

LESSONS IN OTHER SUBJECTS

Maths/Technical Drawing Measuring, making scale drawings, calculating angles and right-angles, creating parallel lines for beds/paths

SCHOOL GARDEN LAYOUTS

What have these gardens got? What are people doing there?
How are they different? Are there any things here that you would like in your school garden?

GARDEN A

GARDEN B

GARDEN SIGNS

Some garden signs and labels which are cheap, weatherproof and durable.

Poker work – burn writing into wood or horn with a blowtorch or hot poker.

Protect permanent wooden signs with preservative.

Cloth is good for banners.

Use oil paint on flat stones, horn and bone, aluminium, plastic, wood, gourds and calabashes.

Small stones with individual letters can be used again.

Tie sticks together to make letters.

Dip them in paraffin to keep off insects.

String and rope also make letters.

6. GARDEN BEDS

Learners may not make the beds themselves, but they can help. They should also know what kind of beds the school garden has and why, and how to treat them. This lesson concentrates on permanent raised beds. It should be carried out when the beds are about to be created. It is done in the garden, but on a very small scale.

LEARNING OBJECTIVES

Learners

- understand how garden beds provide what plants need
- can describe/explain the kind of beds adopted by the school and how they are made
- learn not to walk on raised beds, and why not.

RESOURCES NEEDED

- a small patch of ground for demonstration (about 50cm x 25cm)
- compost
- water
- string, pegs, spade or trowel, rake
- a few small live plants with roots, preferably in their own soil

PREPARATION

Before the lesson, learners study a vegetable patch in their neighbourhood. Is it above the ground / below ground / at ground level? Are there paths around it?

LESSON

1. **Lead-in** Learners report on garden beds they have seen, especially whether they are raised or flat, and whether they have paths around them.

2. **Review previous learning** Recall Lesson A2 **What plants like**: soft rich crumbly soil with (a) lots of organic matter/humus, (b) lots of life and activity, (c) room for air and water, (d) no competition. Recall lessons on soil and the idea of rich topsoil and less fertile subsoil.

3. **Demonstration** Explain that we are going to make a bed which will be a good healthy home for our plants. Give a demonstration following the outline on the next page.

4. **Practice** If there is time, learners repeat the demonstration in groups with other miniature plots. This will show if they have understood, and will help them to talk about it outside class.

FOLLOW-UP

1. **Making beds** Learners help to make full-size raised beds, explaining what is done and why. Younger ones can carry compost; older learners can help with digging and carrying soil.

2. **Showing the family** Learners repeat the demonstration at home for their families.

3. **Cross-section** Older learners draw a cross-section of the soil to show how raised beds are made, and describe the process in writing.

DEMONSTRATION

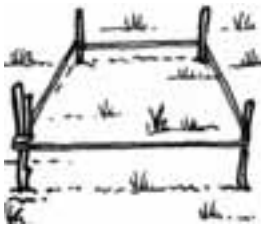
MAKING A RAISED GARDEN BED

Learners should have ready the compost, water and the small plants. Explain that we are going to make a "baby bed", just for demonstration. Agree on the size. As you show how to make the bed, call on learners to help, observe and interpret.

1. With learners' help, mark out the new "bed" (about 50 cm x 25 cm) and the paths around it with sticks and string.
2. Lift the topsoil off the "bed". Learners describe the topsoil (soft, crumbly, full of life) and the subsoil (hard and dense).
3. Dig over the "bed" about 40 cm deep. Explain that this lets in air and water. It should only be done once.
4. Learners add compost to the bed and water it, explaining why this is good.
5. Put back the topsoil. Discuss where we can get more topsoil – e.g. from the paths.
6. Add the topsoil from the paths to the bed, so the bed is now raised.
7. Learners flatten the bed with a rake.
8. Ask: Do we need to dig the paths? (no, paths are for walking, not for growing)
   Why is this bed good for plants? (rich, damp, full of life, room to grow)
   Why is a raised bed good? (water drains out, easy to work with)
9. Prepare the ground for the small plants.
10. Learners plant the small plants and water them.
11. Discuss why one should not walk or lean on the bed (it makes the earth hard for the roots and for the animals in the soil; it squeezes the air out).
12. Arrange who will look after the plants and monitor their growth.

HOW TO MAKE RAISED BEDS

1

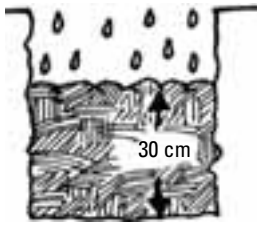


Mark out beds.

2

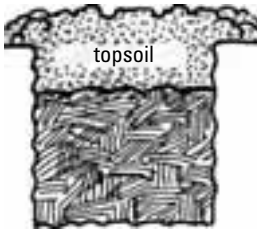
Dig over beds only.

3



Add compost/manure/ organic material (30 cm). Water and put back soil.

4



Add topsoil from the paths.

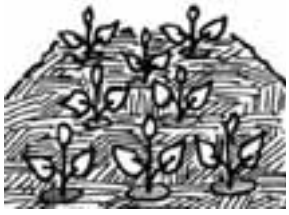
5

Flatten the top of the bed.

6

Don't walk or kneel on it and squash the soil.

7



"Minimum tillage"

Protect soil structure. Add compost and mulch but never dig again.

8

Plant densely.

Keeps down weeds. Conserves moisture.

For understanding and researching food crops and nutrition:

1. **What we eat**
2. **Good eating (1)**
3. **Good eating (2)**
4. **Food plants**

For planning the garden project:

5. **What shall we grow to eat?**
6. **Crop experts**

ABOUT THESE LESSONS

The lessons in **Set D** aim to stimulate learners' interest in home-grown food as an enjoyable experience, a source of health and a personal achievement. They build up learners' skills and knowledge and make good eating a point of conversation in the home.

After deciding what to grow, you will have to decide what lessons you will need on essential horticulture (**Set F**). The garden project will also involve decisions about preparing and processing food products (**Set G**). The overview lessons from **Set H** should be spread through the growing season.

1. WHAT WE EAT

This is the first of three very basic lessons about diet, to be followed by **Good eating (1)** and **Good eating (2)**. The aim of these lessons is to make learners aware of what they eat and of some important dietary messages. It also enables teachers to find out about learners' diet, their feelings about food and their ideas of what "good food" is.

LEARNING OBJECTIVES

Learners

- are able to describe their own diet
- become aware of the idea of variety in a diet
- become aware of how many different fruits and vegetables they normally eat.

RESOURCES NEEDED

- small samples or pictures of the local staple food (e.g. rice, cassava, maize) and some frequently eaten local foods
- a large circle of paper/cardboard to represent a plate/dish
- glue

LESSON

1. **Lead-in** Present the paper "plate" and lay it flat. Ask: *What is the main food we eat every day?* When learners tell you, put a sample of the staple food in the middle of the paper plate and glue it on. Introduce older learners to the term "staple food".

2. **What else do we eat?** (For younger learners) As learners suggest foods, glue on food samples, draw pictures on the "plate", or write on food names. Put animal foods on the left and plant foods on the right – learners should say which side. If they mention mixed dishes (e.g. soup, stew), ask them to say the main ingredients so as to decide where to put them. At the end, display the "plate" on the wall.

(For older learners) Divide the plate into sections, as in the Guide, label the parts, ask learners to say which section each food should go in and write in the names. After a few foods, learners copy the "plate" into their books and work in groups to extend the lists.

3. **Counting** Learners count how many different foods they have thought of, how many animal foods, how many plant foods / fruits / vegetables etc. Ask them to guess how many different foods they eat each day. Explain that for homework they have to count them.

FOLLOW-UP

1. **Food count: one day** Younger learners count and remember all the foods they eat in one day, tell their families, and report in class.

2. **Food count: one week** Older learners draw up a table (as below) showing all the different foods eaten in one week, divided into animal foods/legumes and fruits and vegetables.

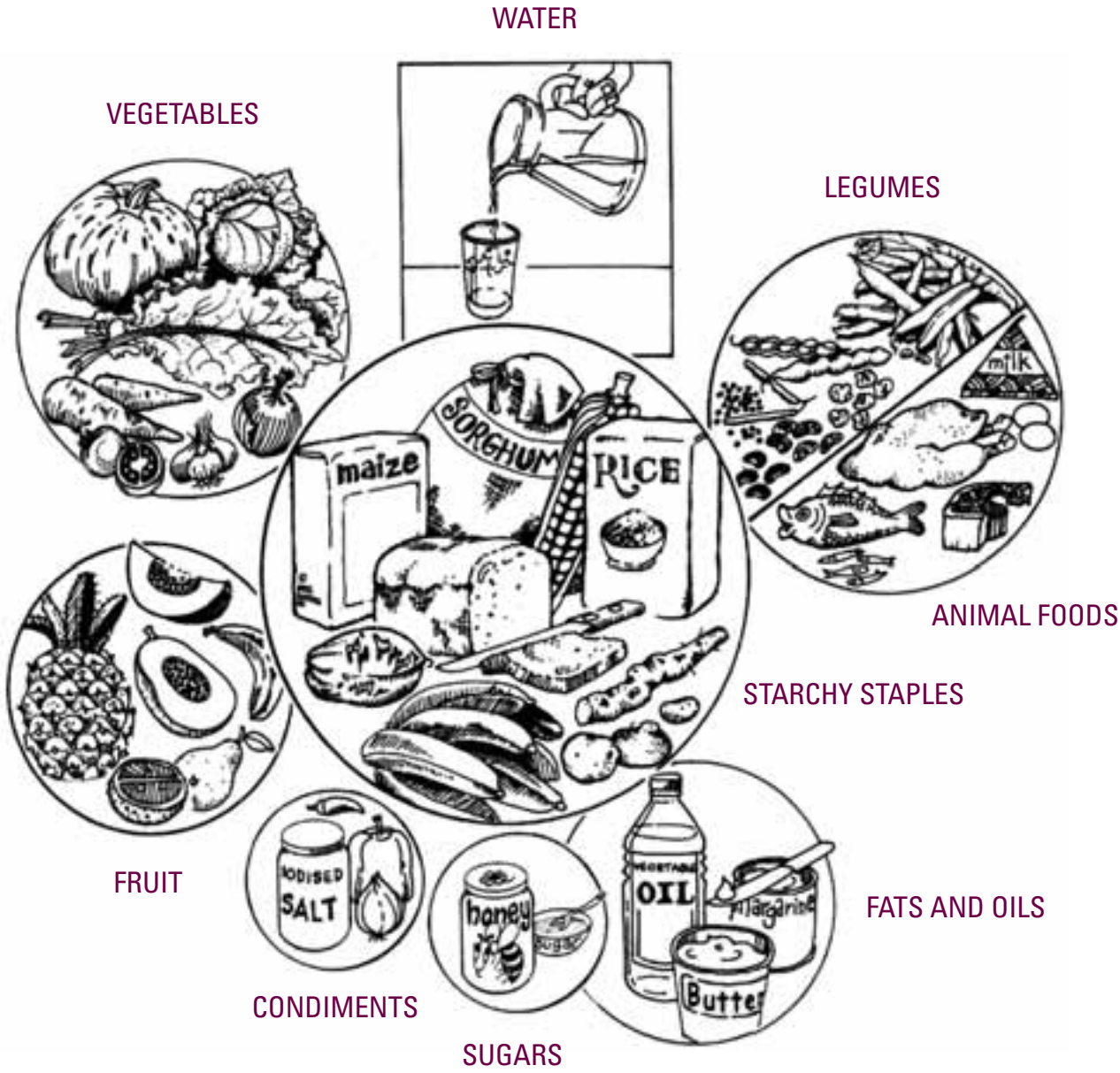
3. **Poster: Our Food** Create a circular poster (like the food plate) with pictures and names of the commonest local foods, and display it. It will be useful for later lessons, in particular Lesson D3 **Good eating (2)**.

FOOD COUNT FOR ONE WEEK		
	Animal foods and legumes	Fruits and vegetables
Monday		
Tuesday		
Wednesday		
Thursday		
Friday		
Saturday		
Sunday		

LESSONS IN OTHER SUBJECTS

Nutrition and health Diet

THE FAMILY MIXED MEAL GUIDE



2. GOOD EATING (1)

This lesson and the next aim to build positive attitudes to fruit and vegetables, first through personal preferences and then with reference to nutritional value.

LEARNING OBJECTIVES

Learners

- become aware that fruit and vegetables should be highly valued
- express personal preferences for particular fruits and vegetables
- learn to appreciate the smell, taste and texture of particular fruits and vegetables.

RESOURCES NEEDED

Bring (or ask learners to bring) samples of fruits and vegetables which are particularly good for the diet (e.g. carrot, tomato, broccoli, mango, guava, red capsicum, orange sweet potato, pumpkin, green leafy vegetables, beans, peas, groundnuts, pawpaw, orange). They should be in edible form and attractively presented (e.g. on leaves, in a basket, in coloured paper). If learners bring them, ask parents to make sure that the foods are washed, and handled with clean hands.

PREPARATION

Learners count the number of different foods they consume in a day or a week.

LESSON

1. **Lead-in: clean hands** Say that today we will be handling foods, so everyone's hands should be clean – i.e. washed *with soap and running water*. Give learners the opportunity to wash hands.

2. **Food count** Ask learners how many different foods they ate in a day or a week. Show you are impressed by a) many different foods and b) a lot of fruit and vegetables. Lead the class in clapping each time there is a mention of beans, green leafy vegetables, yellow or orange fruits or vegetables etc. N.B. Take the opportunity to get an idea of learners' diet. Is there variety? Is there enough fruit? Are there enough vegetable protein foods (beans, peas, groundnuts)?

3. **Personal preferences** Explain that fruit and vegetables are very important foods and very delicious. Display some food samples. Ask which they like best, why they like them and how they like to eat them. Praise ALL positive responses and build up feelings of enjoyment.

4. **Sensory awareness: Five-Star Foods**

Based on Kiefer and Kemple (1998)

a) Choose one food (e.g. a carrot) and keep it hidden. Ask two volunteers to stand in front of the class and close their eyes. Bring out the food so the class can see it.

- Volunteers (and class) "listen" to the food (e.g. break the carrot). What is the sound like? (e.g. sharp, snappy). Can the volunteers guess the food?
- Next, volunteers smell the food. How does it smell? (e.g. earthy, sweet).
- Volunteers handle the food and say how it feels (e.g. cool, hard, damp). Can they guess?
- Ask volunteers to open their eyes and take a good look. With the class, describe the food (e.g. It's long and orange and it has little hairs on it. Inside it has different shades of colours.)
- Give volunteers a piece to eat. Ask them to eat it slowly and say how it tastes (e.g. sweet, crunchy, cool). Join them in eating and show obvious pleasure.

b) Divide the class into groups of five. Each group selects a food. They go through all the senses (smell, taste, touch, hearing, sight) in the same way, then report back. Once they have fully appreciated the food, they can eat it – but wash it first.

FOLLOW-UP

Five-star food Learners find a favourite fruit or vegetable at home. They examine it with all five senses and tell families about it (families can participate too!). They then draw them, write a description or poem (as in **Guides A** and **B**), and read them out for others to guess (as in **Guide C**). Collect poems or descriptions together in a Fruit and Vegetable Book.

LESSONS IN OTHER SUBJECTS

Language Vocabulary for sense impressions, poetry

Art Still life

LEMONS

What can you feel? see? smell? taste? hear? How many senses?

I love lemons

The wonderful smell is in the juice, in the skin, in the leaves and the flower. It stays on your fingers. You can smell it when you walk by a lemon tree in the sunshine. Lemons have oily skin and shiny leaves. Tasting a lemon makes your mouth pucker up.

Lemons soft and squeezy
Lemons sharp and pointy
Lemons rough and lumpy
Lemons sour and tangy
Lemons make me sneezy!

By a child in Bradford
http://www.bradford.gov.uk/gallery_education

So when you hold
The hemisphere of a cut lemon
Above your plate
You spill a universe of gold,
A yellow goblet of miracles,
A ray of light that was made fruit

From Ode to the Lemon by Pablo Neruda

FAVOURITE FOODS

"Let me tell you about the **GRAPEFRUIT** of my dreams. The flesh is pink, not yellow. Each little part is free from its membrane, so you don't have to tear it out and spray juice all over yourself.

The taste comes in two parts – first a sharpness which wakes you up, then a wash of sweetness. The tiny globes of juice are the size of tadpoles. Each of them bursts separately in your mouth. This is how a grapefruit should be."

Adapted from Julian Barnes (1990)

"**AVOCADO** is my favourite fruit. It's very strange and heavy to hold. It is dark and rough on the outside but inside it is gold and soft.

The flesh is heavy and oily like thick yellow cream. And in the middle there is a huge solid pip which will grow into a new avocado tree.

With a little salt, it's just perfect. I eat it with a spoon."

WHAT IS IT?

"There are tiny ones and big ones. The thin skin, brown or dark red or silver, slips off like paper. If you cut them into rings you can see that they are leaves, each leaf wrapped inside the other. And in the middle – nothing! The smell fills the house and sticks to your fingers for hours. You can eat them with many foods – fish and rice, meat, tomato, beans."

WHAT IS IT?

Find the picture below!

"This is a strange fruit. Most people think it's a vegetable. Tap it and it sounds hollow. It's about as big as a big fist. It's red or yellow or green. It has ribs inside with little white seeds on them. When it decays, it wrinkles up first, then it goes soft in patches, then it goes liquid, with a very nasty smell."

WHAT IS IT?

Find the picture below!

3. GOOD EATING (2)

Many people undervalue fruit and vegetables nutritionally. This lesson aims first to find out what learners think, then build up positive attitudes and finally send them out as "food missionaries" to promote fruit and vegetables.

LEARNING OBJECTIVES

Learners

- appreciate that fruit and vegetables are essential to health
- recognize the special value of dark green leaves and orange/yellow fruits and vegetables
- can express and explain some simple messages for improving the diet.

RESOURCES NEEDED

- small pictures or names of common local foods on cards / pieces of paper, including several fruits and vegetables, some yellow and orange fruits and vegetables and some dark green leafy vegetables
- some means of pinning up these "food cards"

PREPARATION

The "food cards" can be prepared by the teacher or by the learners.
Draw a "ladder" of about 15 rungs on the wall or board to pin the food cards on.

LESSON

1. **Lead-in** Show the prepared "food cards". Learners each choose one which they think is a really good food, a food they should eat every day or at least once a week. Older learners can say why they think it is good.

As learners make their choices, pin up the food cards on the "ladder". The more "votes" the food gets, the higher it goes. This gives a quick picture of learners' "food values".

2. **Food values** Look at the "food ladder" together. Tell learners that all foods are good foods and everything they say is right. But some foods are particularly good.

a) ALL fruits and vegetables are very important. Ask learners to move all fruits and vegetables one step up the ladder.

b) ORANGE AND YELLOW FRUITS AND VEGETABLES are very good for eyesight and for staying healthy. The class identifies these (e.g. pumpkins, carrots, mango and papaya) and calls them out. Learners move them two steps up the ladder.

c) Finally, DARK GREEN LEAFY VEGETABLES keep us very healthy. Again, the class identifies these (e.g. amaranth, spinach, pumpkin leaves and sweet potato leaves) and calls them out, and learners move them up two steps.

d) Older learners choose a food, look it up in the table in the **Guide** and tell the class what it is particularly good for.

3. **Messages** Teach younger learners these four messages and ask them to tell their families:

Eat many different foods.
Eat many fruits and vegetables.
Eat dark green leaves.
Eat yellow/orange fruits and vegetables.

4. **Advice** Give older learners a mixture of good and bad advice, as below. They have to pick out the good advice (marked with a star*) – e.g.

Eat orange fruits and vegetables.*
Eat mostly meat.
Eat rice/cassava/maize (or other staple food) every day.*
Eat many fruits and vegetables.*
Eat some meat or beans and a lot of fruit and vegetables.*
Eat only fruit and vegetables.
Eat dark green leafy vegetables often.*
Eat many different foods.*

FOLLOW-UP

1. **Food values** Learners ask family members to name good foods as they did in class, then tell them the messages.

2. **Flag** Make a GOOD HEALTH flag with large strips of orange, dark green and yellow paper/cloth. Learners stick pictures or names of dark green leafy vegetables and yellow and orange fruit and vegetables onto the appropriate coloured strips. Display the flag and train learners to explain it to visitors.

3. **Local food guide** (for older learners) Ask a local nutritionist to help learners draw up a modified **Guide** showing local foods.

LESSONS IN OTHER SUBJECTS

Nutrition & Health Nutritional needs and nutritional value

NUTRITIONAL VALUE OF COMMON FOODS

FOOD	VERY GOOD FOR ENERGY	VERY GOOD FOR GROWTH	VERY GOOD FOR HEALTH
Cassava flour	✻ ✻ ✻		
Mealie meal/maize	✻ ✻ ✻	✻ ✻	✻
Rice	✻ ✻ ✻	✻ ✻	✻
Bread	✻ ✻ ✻	✻ ✻	✻
Sorghum	✻ ✻ ✻	✻ ✻	✻
Millet	✻ ✻ ✻	✻ ✻	✻
Yellow/orange sweet potato	✻ ✻		✻ ✻
Orchid roots	✻ ✻		✻ ✻
Pumpkin	✻		✻ ✻ ✻
Okra, fresh	✻		✻
Beans & peas	✻ ✻ ✻	✻ ✻ ✻	✻ ✻
Bambara nuts, fresh	✻ ✻ ✻	✻ ✻ ✻	✻
Dry groundnuts	✻ ✻ ✻ ✻	✻ ✻ ✻	
Green leafy vegetables	✻	✻	✻ ✻ ✻
Tomato	✻		✻ ✻ ✻ ✻
Bananas	✻ ✻		✻ ✻
Pawpaw	✻		✻ ✻ ✻ ✻
Guava	✻		✻ ✻ ✻ ✻
Orange	✻		✻ ✻ ✻ ✻
Mango	✻		✻ ✻ ✻ ✻
Avocado pear	✻ ✻		✻ ✻
Meat	✻ ✻	✻ ✻ ✻ ✻	✻ ✻ ✻
Liver	✻ ✻	✻ ✻ ✻ ✻	✻ ✻ ✻ ✻
Chicken	✻ ✻	✻ ✻ ✻ ✻	✻ ✻ ✻
Fresh fish	✻	✻ ✻ ✻ ✻	✻ ✻ ✻
Dried/smoked fish	✻ ✻	✻ ✻ ✻ ✻	✻ ✻ ✻
Kapenta/chisense	✻ ✻ ✻	✻ ✻ ✻ ✻	✻ ✻ ✻ ✻
Caterpillars (dried)	✻ ✻ ✻	✻ ✻ ✻ ✻	✻ ✻
Grasshoppers	✻ ✻	✻ ✻ ✻	
Termites (fresh)	✻ ✻ ✻	✻ ✻ ✻	
Milk (cow)	✻ ✻	✻ ✻ ✻ ✻	✻ ✻
Breastmilk	✻ ✻ ✻ ✻	✻ ✻ ✻ ✻	✻ ✻ ✻ ✻
Eggs	✻ ✻	✻ ✻ ✻ ✻	✻ ✻
Vegetable oil	✻ ✻ ✻ ✻		✻
Red palm oil	✻ ✻ ✻ ✻		✻ ✻ ✻ ✻
Margarine	✻ ✻ ✻ ✻		✻
Sugar	✻ ✻ ✻		
Sugarcane	✻		

✻ ✻ ✻ ✻ The more stars the better

Note: This chart is extremely simplified. Learners should know that ALL foods give us energy, help us to grow and keep us healthy, but that some foods are particularly good for some of these needs.

4. FOOD PLANTS

Urban children often have no idea how their food relates to the plants it comes from. With processed foods all children may have some difficulty, and even rural children find it hard to say what an onion is!

LEARNING OBJECTIVES

Learners

- are aware of the range of plants that can be eaten
- can recognize and name the different parts of food plants
- can classify foods according to the part of plant they come from.

RESOURCES NEEDED

- a large bag
- large labels saying ROOT, STEM, FLOWER, SEED, FRUIT, LEAF
- samples of foods which come from different parts of plants (see table below) - easy ones for younger learners and a mixture for older learners

Plant part	Easy to guess	Difficult to guess
roots and tubers	carrots, beets, sweet potatoes, cassava root	ginger powder, cassava flour
stems	celery, kohlrabi, sugar cane	granulated sugar
leaves	spinach, sweet potato leaves, lettuce, cabbage	onions, tea
buds	broccoli	brussels sprouts
fruit	citrus fruit, avocado pears, bananas, mangoes, papaya	cucumbers, peppers, okra, tomatoes, pumpkins
seeds	rice, maize, sunflower seeds, millet, tree nuts, beans	bread, maize flour, rice cake, coffee, cooking oil

PREPARATION

Put the collected foods into a large bag.

LESSON

1. **Lead-in** Show three or four plant foods. Learners think of other plants we use for food.

2. **Which part?**

a) Draw a picture of a plant showing root, stem, leaf, flower/bud, seed, fruit (as above). Learners name and label the parts.

b) Set up labelled stations in the room for the various plant parts (Root Corner, Leaf Table etc.).

c) Show the first plant foods again and ask what part of the plant they come from. The class classifies the samples and puts them under the correct label.

d) One by one, learners pull more foods out of the bag. For each food the class decides which category to put it in and learners carry the foods to the correct corner.

Idea from Kiefer and Kemple (1998)

FOLLOW-UP

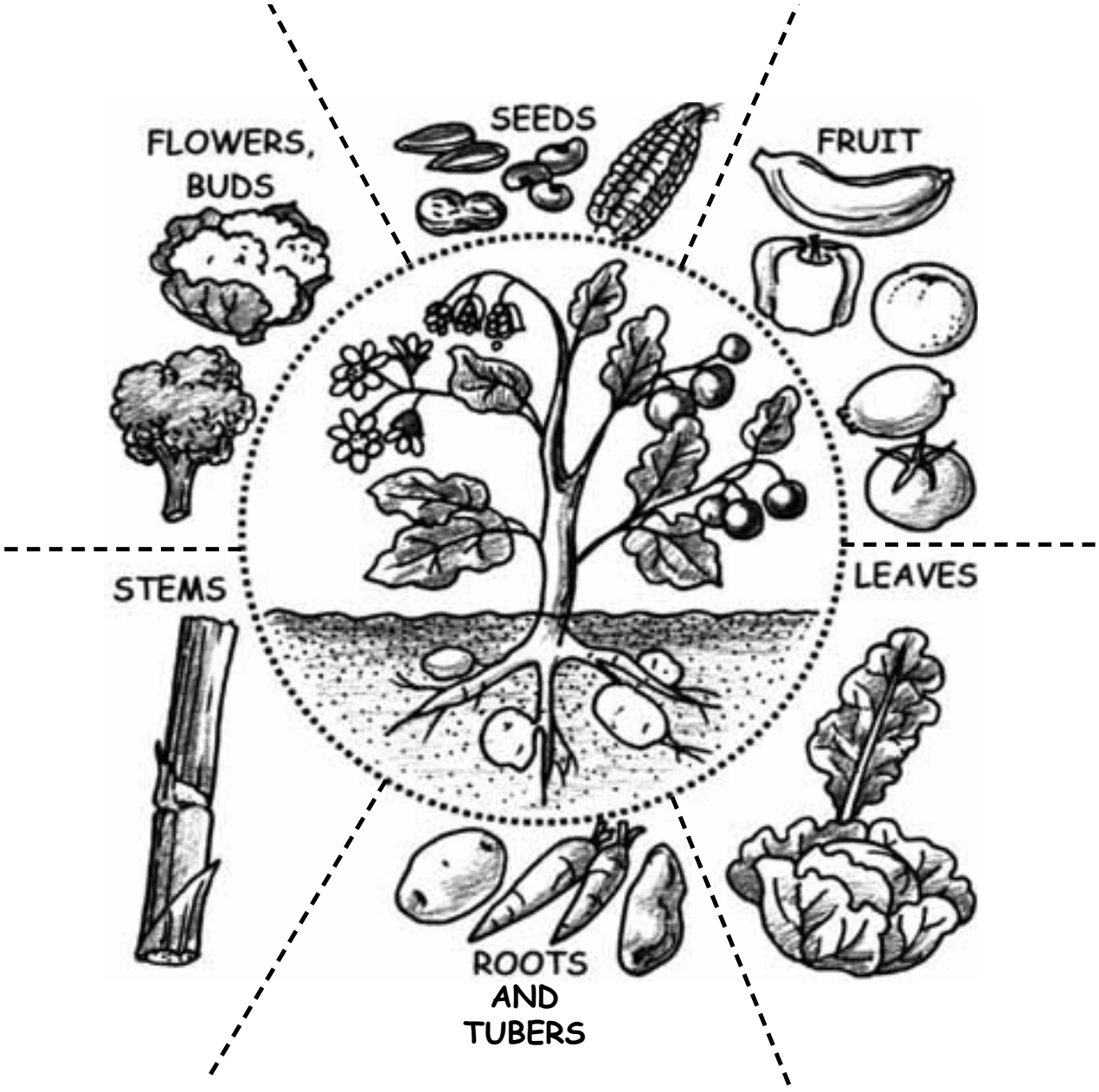
1. **Collage** Younger learners draw foods from plants and say which part of the plant they come from.

2. **Poster** Older learners create a poster with a drawing (as in the **Guide**), showing local plant foods in the appropriate categories. Teams can be responsible for different segments.

LESSONS IN OTHER SUBJECTS

Biology Plant parts, plant life cycle

FOOD PLANTS



5. WHAT SHALL WE GROW TO EAT?

Garden managers may take the final decision on what to grow, but learners should be consulted and encouraged to think of the end result and should if possible make some of their own choices. This lesson, which should be done before planting, develops their capacity for reflecting, deciding and planning. Follow up this lesson with further research in Lesson D 6 **Crop experts**.

LEARNING OBJECTIVES

Learners make decisions/suggestions about what food crops to grow based on preference and understanding.

RESOURCES NEEDED

- cards with pictures or names of local fruits and vegetables from Lesson D 3 **Good eating (2)**.

LESSON

1. **Lead-in** Explain that if we want food to eat we have to decide what to grow. Learners call out a few ideas for crops and pick out appropriate "food cards". Add some choices of your own.

2. **Criteria** How shall we decide? Present the four questions
   - Do we like it?
   - Is it very good for us?
   - Can we grow it?
   - How can we eat it?

For older learners, write up a question in each corner of the board. For younger learners, give one question each to four learners, who stand in the four corners of the room and call out their questions.

3. **The food candidates** Take a card for one of the suggested foods. Discuss all four questions for this food, calling as much as possible on learners' own knowledge.

   a) **Do we like it?** Learners to say how they like to eat this food (e.g. in particular dishes).

   b) **Is it very good for us?** All foods are good for us – but show special favour to orange/yellow fruits and vegetables, dark green leafy vegetables, legumes (beans, peas, groundnuts) and oilseeds. Learners recall what they learned in Lesson 3 **Good eating (2)**.

   c) **Can we grow it?** Discuss how easy or difficult this crop is to grow.

   d) **How can we eat it? How shall we prepare it?** Also ask: *Is it difficult? Will this be a main dish or a snack? What other foods will we need to go with it? Can we grow them too?* This is an opportunity to think about the final dishes and other foods needed to create them.

4. **Selection** If the answer to all the questions is favourable, stick the food card in the middle of the board. Discuss the other proposed foods in the same way until there is a collection of "highly approved" foods on the board. These are the class's recommendations.

5. **Checking** Older learners review the recommendations to check that there are
   - several different foods for variety
   - most of the necessary ingredients for some good dishes
   - some foods for drinks and snacks (see **Guides**).

FOLLOW-UP

1. **Advocacy** Learners tell families some of the foods they have selected and why. Older learners write an "advocacy sheet" for a crop of their own choice, or design an advertising poster responding to the four questions.

2. **Snack book** Compile a "snack book" of local snacks with recipes and pictures by learners.

3. **Special snacks** Learn to make maize/sorghum popcorn (see **Guide B**) and sprouts from beans or pumpkin seeds (see Lesson A5 **Seeds and germination**).

LESSONS IN OTHER SUBJECTS

Home Economics, Nutrition Snacks and drinks.

SNACKS FROM THE GARDEN

FRUIT

Fruit and sugarcane

Eat them raw but wash them well.

Fruit leather….

… can be made from guava, banana or pawpaw.

ROOT CROPS AND CEREALS

Some snacks from roots and cereals are sweet potato, cassava, bread roll, maize cob, rice cake.

LEGUMES, NUTS AND SEEDS

Nuts, beans, peas and seeds are very good foods.

Young beans and peas are delicious raw.

Bean and seed sprouts are delicious and nutritious. Try alfalfa, barley, broccoli, celery, lentils, beans, pumpkin, sunflower or wheat.

Eat sprouts in sandwiches, salads or soups.

HOW TO MAKE POPCORN

1

Use well-dried maize or sorghum grains.

2

Heat in a well-covered pan.

3

Shake it until it has all popped.

4

Mix in salt OR honey OR cane syrup OR butter.

DRINKS FROM THE GARDEN

VEGETABLE AND FRUIT JUICES AND FRUIT NECTARS

Try mixing juices (e.g. carrot and orange).

HERB TEAS AND SPICE DRINKS

Dry herb leaves for tea – mint, lemon sage, tea, rosella, medlar.

GINGER BEER

Bruise dried ginger roots and ferment with sugar and water.

COCONUT WATER

Coconut water is an excellent drink.

BEAN MILK FROM URD (BLACK GRAM) OR MUNG BEANS (GREEN GRAM).

Boil beans till soft, pound to a pulp and squeeze through a sieve. Keep cool and drink like milk.

6. CROP EXPERTS

Once you have decided what to grow, learners can gather more information about the particular crops. Becoming "crop experts" gives learners motivation and a sense of status. This lesson prepares them for independent research and a role as class consultants. N.B. Full presentations from student teams will need a second lesson.

LEARNING OBJECTIVES

Learners

- research the crops they have chosen to grow, and become "crop experts"
- learn to find information from several sources.

RESOURCES NEEDED

Each "crop team" will need the Crop Factsheet Questionnaire (**Guide A** or **B**) to take away. For younger learners, use a simplified version (**Guide A**). Make copies, or suggest that learners in teams copy out a few questions each.

PREPARATION

Choose one of the crops that the class plans to plant and complete the Factsheet Questionnaire for it (**Guide A** or **B**). (Both have examples of the questions answered for a sample crop, kale.) Make a note of where learners can find information about crops.

LESSON

1. **Lead-in** Learners recall the crops they want to plant. Write up the names. Explain that they are all to become experts on different crops so that the whole class can consult them.

2. **Crop facts** What do we need to know about these crops? Look at the Crop Factsheet Questionnaire (**Guide A** or **B**). Learners discuss and answer the questions for the crop you have prepared. Give answers where learners can't. Say where you got the information.

3. **Selection** Learners select the crops they want to study and form "crop teams".

4. **Sources** Learners discuss what they already know about their chosen crops, and where to get further information – for example, observing; asking at home, in markets/shops, in fields/gardens; speaking to teachers, friends, family, neighbours, local gardeners; reading seed packets / gardening books or the Food Factsheets in the School Garden Manual).

5. **Time frame** Discuss and decide how much time crop teams will need to complete their Factsheets, and fix a date for class reports.

Note: If this project is done well, learners will become a very useful "class memory". Make sure the class consults them and uses their knowledge, and do so yourself to set an example. But keep a check on what your "experts" say! Class presentations (by older learners) not only spread knowledge, but also allow you to check learners' facts and correct mistaken ideas.

FOLLOW-UP

1. **Presentations** (older learners) Teams present their findings. An alternative to oral accounts is poster presentations: each team pins up its completed factsheet in a different place. Half the team stays with their factsheet to answer questions while the others circulate, studying each others' factsheets and asking questions of other teams.

2. **Reference factsheets** Teams prepare final versions of their crop factsheets, corrected and clearly written, and put them in the Garden File. Use the factsheets as part of a promotional display when the crops are harvested.

3. **Advertising campaign** If learners are familiar with advertising, teams can run campaigns for their crops in the school.

LESSONS IN OTHER SUBJECTS

Project work Research strategies: finding sources.

CROP FACTSHEET QUESTIONNAIRE

(for younger learners)

QUESTIONS	ANSWERS
What food is this?	
Is it grown a lot in our area? Where?	
Is it good for us?	
Do people like it? Do they think it is a good food?	
How much does it cost to buy?	
How do we cook it and eat it?	
Is it easy to grow here?	
How do we plant it and where?	
How should we look after it?	
What else can we do with it?[1]	

[1] E.g. groundnut shells can be compressed for fuel; sunflower oil is good for lamps or as lubricant; pigeon pea stems make good fuel; bottle gourds make containers; bananas leaves are used for baskets and wrapping food; papaya leaves tenderise meat; pineapple fibre from young leaves makes fabric, coconut shells are used for bowls.

QUESTIONNAIRE A COMPLETED FOR KALE

(example for younger learners)

QUESTIONS	ANSWERS
What food is this?	*Kale*
Is it grown a lot in our area? Where?	*In the hills*
Is it good for us?	*Very good*
Do people like it? Do they think it is a good food?	*Yes but they do not think it is very special.*
How much does it cost to buy?	*3k per kilo*
How do we cook it and eat it?	*With fish and in soup*
Is it easy to grow here?	*Yes*
How do we plant it and where?	*Start it in a tray.*
How should we look after it?	*Weeding and watering*
What else can we do with it?	*Put it on the compost if not used.*

CROP FACTSHEET QUESTIONNAIRE

(for older learners)

INFORMATION NEEDED	QUESTIONS TO ASK	ANSWERS
The crop	What food is this? Is it grown a lot in our area? Where? What for? (sale? home eating?) Are there different varieties?	
Nutritional value	Is it good for us? What is its food value?	
Local status and attitude	Do people like it? Do they value it as a food? Are they right?	
Price	How much does it cost to buy? Is it expensive for families to buy?	
Dishes, snacks, combinations	How do we cook it? How do we eat it? What do we eat it with? What is the best way to eat it? How should it be prepared for full food value?	
Easy to grow	Is it easy to grow here?	
Time frame	How long does it take to grow? How long does it go on producing? When should we plant it and harvest it?	
Planting instructions	How do we plant it and where? Does it need thinning? Does it need transplanting? How much space does it need?	
Care and cultivation	How should we look after it? Does it need a lot of water or shade? Does it need staking or trellising?	
Pests & diseases	What attacks it? What can we do about it?	
Harvesting and storing	How do we harvest it? How do we store it?	
Preserving, processing, packaging	Can we preserve it? How? Does it need curing or processing? What packaging does it need?	
Other uses	What else can we do with it?	
Promotion	Does it need promoting? If so, how?	

QUESTIONNAIRE B COMPLETED FOR KALE

(example for older learners)

INFORMATION NEEDED	QUESTIONS TO ASK	ANSWERS
The crop	What food is this? Is it grown a lot in our area? Where? What for? (sale? home eating?) Are there different varieties?	*Kale* *It grows in the hills, in small fields.* *It is mostly grown as a cash crop.* *There are two main varieties here.*
Nutritional value	Is it good for us? What is its food value?	*It is very rich in vitamin A and vitamin C.*
Local status and attitude	Do people like it? Do they value it as a food? Are they right?	*They think it has a pleasant flavour, but they do not value it much.* *They should value it more.*
Price	How much does it cost to buy? Is it expensive for families to buy?	*It is quite cheap, about 3k a kilo, but it is cheaper to grow at home.*
Dishes, snacks, combinations	How do we cook it? How do we eat it? What do we eat it with? What is the best way to eat it? How should it be prepared for full food value?	*It is eaten as a relish with cassava or fish, cooked with tomato, onion and oil. It is good in soups and stews, with groundnut paste or fish or scrambled eggs, or boiled in coconut milk. Eat it with a little oil or fatty food to help the vitamin A.*
Easy to grow	Is it easy to grow here?	*It is quite easy to grow, but it has to be started in a nursery bed.*
Time frame	How long does it take to grow? How long does it go on producing? When should we plant it and harvest it?	*It takes 60-85 days (2 to 3 months).* *It goes on producing a long time.* *We should plant in May and June so we can eat it July to September.*
Planting instructions	How do we plant it and where? Does it need thinning? Does it need transplanting? How much space does it need?	*Sow seeds in trays or in a seedbed.* *Thin when they have 4 (real) leaves.* *Transplant when 10-15 cm high, 40 cms apart in rows 60-85 cm apart.*
Care and cultivation	How should we look after it? Does it need a lot of water or shade? Does it need staking or trellising?	*Weed regularly. Water well; give shade in the afternoon. Keep the soil firm so plants do not fall over.* *No staking.*
Pests & diseases	What attacks it? What can we do about it?	*Not much attacks kale.* *Protect the seedlings from slugs.*
Harvesting and storing	How do we harvest it? How do we store it?	*Pick young leaves from the top, and side shoots. Cut with a knife.* *Stand in cold water.* *Eat the same day – don't store.*
Preserving, processing, packaging	Can we preserve it? How? Does it need curing or processing? What packaging does it need?	*Dry the leaves in a solar drier.* *It does not need special processing.* *Keep leaves in airtight plastic bags.*
Other uses	What else can we do with it?	*Put it on the compost if not used.*
Promotion	Does it need promoting? If so, how?	*Tell people what a good food it is.* *Give a demonstration of solar drying.*

Adapted from Burgess et al. (1998)

For research and development:

1. Market research
2. Product proposals
3. Product information

For presenting proposals:

4. Profit budget
5. Business plan
6. Marketing and publicity

For record-keeping:

7. Book-keeping and records

ABOUT THESE LESSONS

These lessons are mainly suitable for older learners. They introduce them to the habit of "looking before you leap" - a very good business practice! In particular, learners are encouraged to investigate the market to see if their products will sell, do a few calculations to see whether the enterprise is worth the effort, and make their financial thinking clear to themselves and outsiders. The first five lessons form a close sequence, each depending on what goes before. Lessons 6 and 7 are desirable but not essential. If there is a Business Studies syllabus, discuss with Business Studies teachers how this project can be integrated into it.

To complement this series of lessons, you will need to decide what lessons are needed on essential horticulture from **Set F**, and on food or food processing from **Sets D** and **G**. The project should continue and finish with the OVERVIEW lessons from **Set H**, including Lesson 3 **Evaluation**.

1. MARKET RESEARCH

This introduction to market research needs a double lesson (break after Stage 2). If possible, invite local market gardeners to talk about their successes and to comment on learners' ideas.

LEARNING OBJECTIVES

Learners

- recognize the importance of market research
- brainstorm product ideas
- carry out simple market research.

RESOURCES NEEDED

- large sheets of paper, preferably shaped like pips
- large felt pens, crayons or sticks of charcoal
- the pictures from the story (next page) copied and enlarged

PREPARATION

As preparation, learners research these questions, one set per team:

- What foods in the home are bought? Can any of them be grown by us?
- Who grows food for sale? What? What is most profitable? How do they decide what to grow?
- What fruit and vegetables are on offer at local shops/ markets/stalls? What are the prices?
- Are there any fruit or vegetables people would like to have which are difficult to obtain?
- If there is a school meals service, where does it buy its food? Are there any products the service would be prepared to buy from the school garden?
- Apart from food, what other things do people grow to sell?

LESSON

1. **Lead-in** Explain the lesson aims: to start thinking about product ideas with profit in mind.

2. **Cautionary tale** Tell the sad tale of *Freddie, Mereby and the Tomatoes* (next page), showing the pictures as the tale is told and pausing for discussion at the starred* points. If possible, leave the pictures on display so that they can be used again in the re-telling (Follow-up 3). At the end, learners sum up what Freddie and Mereby should have done, and say what the story teaches us (*We need market research!*).

3. **The markets** The class report briefly on what they have discovered about cash crops. Ask them to check that they have considered all the possible outlets in **Guide A**.

4. **What could WE grow to sell?** Brainstorm possible products (eg. herbs, seedlings, raw food, preserved food, snacks, compost, firewood, baskets, brooms, flowers). Write specific ideas on separate large pip-shaped pieces of paper, and pin them up around the room. These are "product idea papers" or PIPs.

5. **Five questions** Learners choose one PIP as an example. Explain that to research the market we need to ask five important questions:

a) What will be special about our product?

b) Who will buy it and where?

c) Which markets are best?

d) What will customers pay?

e) When is the best time to sell?

Learners discuss these questions in relation to the selected PIP, using **Guide B** to guide the discussion. Write learners' ideas on the PIP.

6. **Preparation for research** Teams each choose another promising PIP, and undertake to research the five questions for it, following the hints in **Guide B**. Emphasize that these are still only provisional ideas: they may adopt other ideas if they wish.

FOLLOW-UP

1. **Market research** Teams carry out research, summarize their ideas on the PIP and prepare to present them.

2. **Survey** Learners extend their research with a market survey, choosing a representative sample of possible clients and asking them (e.g.) *Would you buy this product? What would you pay?*

3. **Happy ending** Learners re-tell the story of Freddy and Mereby so that the brother and sister do everything right and arrive at a happy ending. They can also take the story home and tell it to family and friends.

LESSONS IN OTHER SUBJECTS

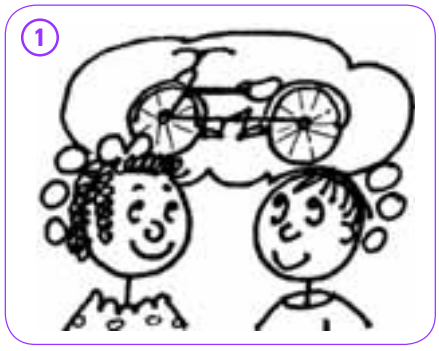
Economics Cash crops in the local economy

FREDDIE, MEREBY AND THE TOMATOES

Change details to suit your own context and circumstances. Pause at the stars* for discussion.

1

Mereby and Freddie are brother and sister. More than anything they want a bicycle, so they can ride to school and visit friends. They have saved 100 francs, but even a secondhand bicycle costs at least 1000 francs. They have been thinking about how to get the money to buy one.



They have a home garden where they grow food for the family. But how can they make money from it?* Freddie suggests that they sell tomatoes. "If we plant four times as many as usual," he says, "we will have about 20 kg. If we sell them for 5 francs a kilo, we will have 100 francs." Mereby is excited about the idea. Together they prepare a new garden bed for the tomatoes.

2

3

To be sure of having enough to sell, they buy seed for a small kind of tomato which is productive, delicious, nutritious and keeps well. The seed costs 10 francs. They also buy fertilizer for 10 francs. As they walk home they are worried.* They have already spent 20 francs. "But remember we'll be making100 francs!" says Freddie.

When they get home they sow all the tomato seed at once because they are in a hurry to make a profit. They are good gardeners and everything goes well, but it's quite a lot of work. Their friends play while they work. "Wait till they see our bicycle!" says Mereby.

4

5

In three months the plants are loaded with ripe tomatoes. They harvest the first crop, and next day they get up early to go to market. They carry the tomatoes in two big boxes, 3 kg in each. It's a hot day. "This would be easier if we had our bicycle!" says Mereby.

What do they see when they get to the market?* There are many people selling tomatoes, and they are selling them for only three francs, not five! Everyone has tomatoes, so they are very cheap.

6

7

Mereby and Freddie are dismayed. They sit down to sell their tomatoes. Then there are more problems.* The small tomatoes are hard to sell. "We like the big kind," customers say. Freddie argues with them. He says the small kind are delicious and nutritious, and keep twice as long. But the customers don't listen: they are not used to small tomatoes. Freddie and Mereby have to reduce the price to two francs.

And then there's a packaging problem. They have nothing to put the tomatoes in for the customers. Freddie goes to buy some paper bags. He has to buy 100 and they cost another 5 francs.

8

9

They go home very disappointed. They have sold all their tomatoes but how much money have they made?* They have only made 12 francs so far, and they have spent 25. The next day they try again. In the end they sell their whole crop: 15 kg for 2 francs a kilo. How much money have they made? And how much profit?*

Some weeks later there are not so many tomatoes in the market. Prices have gone up to 5 francs a kilo. But Freddie and Mereby's tomatoes are finished. They planted early and they harvested early.

10

11

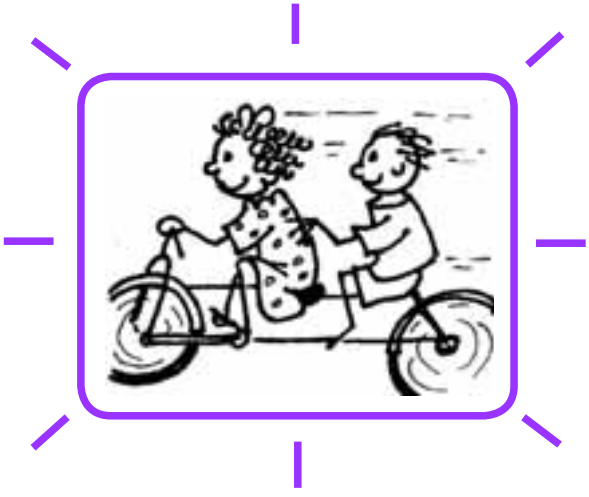
Here are Freddie and Mereby now. They can't understand what they did wrong. Can you help them? What should they have done differently?

Adapted from Heney, J. (2000), Aminta's story

WHAT SHOULD THEY HAVE DONE? WHAT COULD THEY HAVE DONE?

Some suggestions:

- They should have found out what people wanted – big tomatoes, which they are used to.
- They could have tried to promote the small tomatoes. They could have offered customers a taste, or put up some publicity material to catch people's attention.
- They needed to think about the costs beforehand, and allow for seed, fertilizer, packaging.
- They needed to find out the normal selling price at different times of the year. They could have planted later and got a higher price.
- They could have planted more tomatoes: it would have been the same amount of work (they could have borrowed a bicycle for transport).



RETELL THE STORY SO IT HAS A HAPPY ENDING.

MARKET OUTLETS

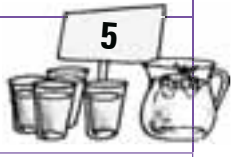
WHERE CAN YOU SELL SCHOOL GARDEN PRODUCE?

- at special school events
- in school snack stalls
- for school meals

- in shops
- in the market
- at the roadside

- at church socials
- to youth clubs
- to local restaurants
- to cafés and snack bars
- to people at home

DO YOUR MARKET RESEARCH!

QUESTIONS	OUR MINT DRINK
What will be special about our product? What is its "added value" or selling point? Why should people want to buy ours instead of another one? For example: high quality? cheap? attractive? delicious? highly nutritious? organic? available out of season available when needed produced by the school convenient (e.g. delivered home)	**Answer:** It will be there when people are thirsty. It's cool and delicious. 
Who will buy it and where? Local people: local shops, markets, roadside stalls, bars and restaurants People at school: in snack stalls, through vendors, in class Families: through learners, or at school events The school meals service	**Answer:** People at school People at sports events People at the market 
Which markets are best? Why do we prefer these markets? Are they the most profitable? Are they easy to get to?	**Answer:** The school is easiest. 
What will customers pay? What is the normal price range for this product?	**Answer:** 5 per glass (less than in shops) 
When is the best time to sell? Are there seasonal price differences? Are there special times when this product will sell well? (e.g. in hot weather)	**Answer:** All year round, but especially when hot 

2. PRODUCT PROPOSALS

This lesson follows directly from the previous lesson, **Market research**. Again, if possible, involve "consultants" from the world of business and market gardening: real people and real experiences are the best educators.

LEARNING OBJECTIVES

Learners

- collect information about proposed products
- consult appropriate experts (e.g. horticulturists, home economics teachers, smallholders)
- present product proposals.

RESOURCES NEEDED

- a folder which will become the Project File
- learners' PIPS (product idea papers), completed for homework

PREPARATION

- Following Lesson 1 **Market research**, learners should have collected market information about product ideas: what can be sold, what the particular selling points will be, which markets they should aim at and why, when they should sell and what price they should ask.

- Write up the "personality keywords" from stage 3 before the lesson.

LESSON

1. **Lead-in** Teams report on their market research. They display and talk through their PIPs (product idea papers) and say how successful they think these ideas might be. Encourage objectivity and common sense: this is the time for keeping a level head.

2. **Selection** The class chooses the most promising idea and proposes a name for it.

3. **Roles and teams** Explain that, although everyone will do a bit of everything, we will also need specialist teams responsible for

a) production
b) accounts/ records
c) sales
d) publicity/advertising.

What kind of people does each team need? Some "personality keywords" for discussion are:

good contacts	creative	honest
loves gardening	hard worker	enthusiastic
good organiser	artistic	energetic
good with people	good writer	good head for figures

Learners can recommend each other, or volunteer for a particular team.

4. **Records** Hand over the folder to the "Accounts and Records" team. They should file project ideas, record team names and start a Project Log, a weekly account of events for the file.

5. **Product information** Further information is now needed about the selected crop. With the class, go through the Crop Factsheet in the **Guide**, answering the questions where possible and discussing what further information is needed about the crop to be grown. Class members/teams volunteer to find out specific information to complete the factsheet.

FOLLOW-UP

Product information Learners research product information for the following lesson. They should consult local farmers and gardeners, families, agricultural experts.

LESSONS IN OTHER SUBJECTS

Management Team-building

* The first time round it is easier to keep track if the whole class works on the same project idea. With older learners you may want to divide into teams, each with a different product. It is also a good idea for everyone to be involved in production, with "time off" for other activities.

CROP FACTSHEET

	GROUP/CLASS	NAME OF CROP .....
INFORMATION NEEDED	QUESTIONS TO ASK	INFORMATION
The crop	Is it grown a lot locally? Where? What for? (cash or food) Are there different varieties?	
Nutritional value	Is it good for us? What is its food value?	
Local status and attitude	Do people like it? Do they value it (e.g. as food, medicine)?	
Dishes, snacks, combinations	How do we cook it and eat it? What do we eat it with? What is the best way to cook it and eat it?	
Easy to grow	Is it easy to grow?	
Time frame	How long does it take to grow? Will the project fit into the school year? How long does it go on producing? When should we plant it and harvest it?	
Planting instructions	How do we plant it and where? Does it need thinning/transplanting? How much space does it need?	
Care and cultivation	How should we look after it? Does it need a lot of water or shade? Does it need staking or trellising?	
Pests and diseases	What attacks it? What can we do about it?	
Harvesting and storing	How much does it produce? How do we harvest the crop and store it?	
Preserving, processing, packaging	Will it need preserving or processing? How should this be done? What packaging/labelling will it need?	
Other uses	Are there any by-products we can sell[1]?	

[1]E.g. groundnut shells can be compressed for fuel; sunflower oil is good for lamps or as lubricant; pigeon pea stems make good fuel; bottle gourds can be turned into containers; bananas leaves are used for baskets and wrapping food; pawpaw leaves tenderise meat; pineapple fibre from young leaves makes fabric; coconut shells are used for bowls.

3. PRODUCT INFORMATION

This third lesson brings together the information needed for drawing up the business plan in the following lessons. Bring in an expert gardener or agricultural extensionist if you can find one!

LEARNING OBJECTIVES

Learners

- assemble essential information about the product and the inputs required
- recognize the range of roles in developing a product and what they involve.

RESOURCES NEEDED

- learners' homework research on crops
- blank copies of the Crop Factsheet, **Guide B** and **Guide C**
- flipchart paper for recording learners' decisions

PREPARATION

- Learners should have collected product information from local experts and should be ready to report on the crop, the inputs required and costs, referring to their crop factsheet.
- Display the ten questions in **Guide A** so they can be referred to in later lessons as well.

LESSON

1. **Lead-in** Explain that we are now moving towards creating a Business Plan. Ask learners to look at the ten questions in **Guide A**. Ask them which ones they have already discussed (1-3). Explain that we will cover questions 4, 5 and 6 in this lesson.

2. **Product information** Learners report on the product information they have found out. The Production Team completes a fair copy of the Crop Factsheet, which is put in the Project File.

3. **Scale of production** *What is the size of our project? How much land do we need? How much time can we give? How much do we hope to produce?* Encourage learners to produce rough figures (e.g. number of plants, number of square metres, number of kilos) so they have something to work with. They can change these estimates later. The Accounts and Records Team should record final decisions (as in **Guide B**).

4. **Inputs** *What will we need?* Together, draw up a list of all the inputs required for the project, where to obtain them and how much is needed. These should be recorded by the Accounts and Records Team (as in **Guide C**) as the discussion goes ahead. N.B. Some inputs may be begged, borrowed or free, and will not incur costs. But put them all down.

5. **Responsibility for inputs** Discuss and decide which teams, individuals or groups will be responsible for obtaining each input.

FOLLOW-UP

Action For homework, teams draw up a list of their responsibilities and a first list of things to do.

LESSONS IN OTHER SUBJECTS

Business Studies Business Plan

PRODUCT INFORMATION

THE QUESTIONS TO ASK OURSELVES

1. What are we going to produce?
2. How do we do it?
3. How and where will we sell our products?
4. How much do we plan to produce?

5. Where will we get our inputs?
6. What will our costs be?

7. What will our income be?
8. How much profit do we expect to make?
9. What are the risks and how can we avoid them?
10. What will we do with the profit?

GUIDE B

PRODUCTION ESTIMATES

HOW MUCH CAN WE PRODUCE?

How many plants? .....

How much land? .....

How many kilos per plant? .....

How much do we expect to produce?

TOTAL PRODUCTION ESTIMATE .....

GUIDE C

INPUTS REQUIRED

(e.g. tools, equipment, seeds, transport, packaging, labels, ingredients)

ITEM	WHERE DO WE GET IT?	HOW MUCH/MANY DO WE NEED?	HOW MUCH WILL IT COST?

4. PROFIT BUDGET[2]

We come to the vital activity of predicting profit. This is done by estimating production and expected income and subtracting costs. N.B. If a double lesson is needed, break after Activity 4.

LEARNING OBJECTIVES

Learners

- estimate the profitability of possible products.

RESOURCES NEEDED

- list of inputs, sources, prices from the previous lesson
- (optional) two cardboard "postboxes" for learners to post ideas for the next lesson
- the ten questions from Product Information (**Guide A** in the previous lesson)
- copies of the blank Cost Analysis form (**Guide B** in this lesson)

PREPARATION

Teams prepare lists of team responsibilities and a list of things to do.

LESSON

1. **Lead-in** Learners look again at the ten questions in Product Information (**Guide A** in the last lesson). Which have we discussed and answered? (1-6) We now come to the big money questions (7 and 8). Can our project make a good profit?

2. **Demonstration of cost analysis** Referring to **Guide A** in this lesson, show how to draw up a table of projected costs and income and calculate potential profit. Explain that we only deal here with inputs which cost money.

3. **Own cost analysis** Learners should have a list of project inputs from the previous lesson. They select only those which cost money. In groups, they do a cost analysis for their project using the form in **Guide B**, and present their results. When the whole class agrees on the figures, file the cost analysis. Say that we will look at this again later to see if our estimates were right.

4. **Team activities** Discuss teams' responsibilities (some possibilities are in **Guide C**), trying to even out the workload. Emphasize that teams will need to help each other out, and should consult each other frequently.

5. **Risks and profits** Remind learners that we have two of the ten questions left, dealing with risks and use of profit. Recall the story of Mereby and Freddie. For the following lesson learners should think about

a) what risks there may be

b) what to do with the profit they make (if any).

Set up two "postboxes" with slots in the top, labelled RISKS and HOW TO USE THE PROFITS. Invite learners to post ideas in the boxes before the next lesson.

FOLLOW-UP

Risks and profits Learners think of risks and of what to do with profits.

LESSONS IN OTHER SUBJECTS

Business Studies Cost analysis, fixed and variable costs

[2] N.B. To calculate economies of scale we need to recognize the difference between fixed costs (the same whatever you do) and variable costs (which change according to the scale of production). For simplicity we have left out this element, but if your students can handle it, ask them to calculate the profit margin with different production levels; they will soon see that higher output can mean a proportionally greater profit, when the fixed costs remain the same.

COST ANALYSIS OF TOMATO PROJECT

INCOME

PRODUCT	QUANTITY	SALE PRICE PER UNIT	TOTAL VALUE
Tomatoes	50kg	2 per kg	100
TOTAL			100

COSTS

ITEM	QUANTITY NEEDED	PRICE PER UNIT	TOTAL COST
Seeds	5 packets	2	10
Fertiliser	5 bags	5	25
Paper bags	100	10 per 100	10
Market licence	1	5	5
Transport	4 trips to market	3	12
Hire of tools			4
TOTAL			66

Adapted from Heney, J. (2000)

EXPECTED PROFIT

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COST ANALYSIS FORM

DO YOUR OWN COST ANALYSIS ON THIS FORM.

INCOME

PRODUCT	QUANTITY	SALE PRICE PER UNIT	TOTAL VALUE
TOTAL			

COSTS

ITEM	QUANTITY NEEDED	PRICE PER UNIT	TOTAL COST
TOTAL			

EXPECTED PROFIT

• • •

RESPONSIBILITIES OF PROJECT TEAMS

WHAT ARE YOU GOOD AT?

PRODUCTION

Aim

To produce a bumper crop, free of disease, and keep the soil rich

Responsibilities

Preparing beds
Planting
Caring for crops
Harvesting
Processing
Packaging
Liaising with other teams
Final report

SALES

Aim

To sell 90% of the product at the target price and have a lot of satisfied customers

Responsibilities:

Purchasing inputs
Contacting vendors
Storing and transporting
Customer relations
Selling
Liaising with other teams
Follow-up on customer satisfaction
Final report

ACCOUNTS AND RECORDS

Aim

To keep clear interesting records of the project and accurate transparent accounts

Responsibilities

Calculating profit margin
Keeping accounts
Handling petty cash
Illustrating project log with photos, drawings
Maintaining Project Log (work done, time taken, incidents and actions, figures)
Liaising with other teams
Final report

PUBLICITY AND MARKETING

Aim

To promote the product, enhance the school's reputation, and educate customers

Responsibilities

Researching the market
Dealing with visitors and sponsors
Deciding marketing strategy
Deciding prices
Designing packaging, posters etc.
Distributing publicity
Making presentations
Liaising with other teams
Final report

5. BUSINESS PLAN

This lesson brings together the learners' work so far in a form that could be presented to the public or to a funding agency. It also discusses what to do with the profits, an absorbing subject which raises practical, ethical and business questions. This can be given a separate lesson, or can be dealt with again when the project looks likely to make a profit.

LEARNING OBJECTIVES

Learners

- anticipate risks
- discuss how to use the profits
- draw up a business plan
- present a business plan.

RESOURCES NEEDED

- cost analysis of the project from the previous lesson
- the ten questions from **Product Information** (Lesson 3, **Guide A**) used in the previous lessons

PREPARATION

Learners should have submitted suggestions about potential risks and what to do with profits. Before the lesson, sort their suggestions into groups.

LESSON

1. **Lead-in** Refer back to the ten questions in **Product Information** (Lesson 3, **Guide A**). Say that in this lesson we will deal with the last two questions, and will then be ready to draw up a Business Plan.

2. **Risks** Each team describes the risks it has thought of and says how it plans to avoid them. Ideas for action should be noted by each team. For example:

Production: Water may be a real problem in June. Can we get it from the river?

Sales: The markets may not want to sell our product. We must find a willing stallholder at once.

Publicity: People may not want our product. We should do a survey to see if they are interested.

Accounts and records: Anyone might steal our money. We need a secure cash box.

3. **What to do with the profits?** Learners select a few good ideas and discuss them. At the end they sum up the points raised and record the ideas in the project file. Suggest discussing the ideas again later in the project: this gives learners time to reflect.

4. **Business Plan Proforma** Introduce learners to the Business Plan Proforma and example in **Guides A** and **B**. Discuss the purpose of such a document (to clarify, to summarise, to present when applying for credit). It is very important that it is realistic and well-researched.

5. **Own business plan** The class checks through the form, supplying information about their own projects verbally.

6. **Things to do** Teams outline their immediate action priorities, say who will be responsible for carrying them out, and indicate probable deadlines. The Records team keeps brief notes.

FOLLOW-UP

1. Drawing up a Business Plan In teams, learners write up their Business Plans based on the form in **Guide A**. They display them in class and select the most impressive for the project file.

2. Presenting Business Plans In teams, learners present their Business Plans to outside groups – other classes, the PTA, the Garden Group, the school staff, the school governors, potential sponsors etc. Rehearse presentations beforehand, showing how to divide up the talk into phases, distribute it between several presenters, use pictures and flip-charts, involve the audience etc.

LESSONS IN OTHER SUBJECTS

Maths Basic arithmetic

Language and communication Presentations

BUSINESS PLAN PROFORMA

Adapted from Heney, J. (2000)

Name of group ..... **Class** ..... **Name of project and product** .....

Project description .....

Period of project: from .... (month, year) to .... (month, year)

1. Estimate the profitability of the enterprise:

INCOME

PRODUCT	QUANTITY	SALE PRICE PER UNIT	TOTAL VALUE
TOTAL			

COSTS

ITEM	QUANTITY NEEDED	PRICE PER UNIT	TOTAL COST
TOTAL			

EXPECTED PROFIT

• • •

2. Where we will get our inputs.....

3. How and where we will sell our products .....

4. What we will do with our profit .....

5. What the main risks are and how we will reduce them.....

EXAMPLE OF BUSINESS PLAN

FRONT PAGE

Name of group: Class 5, Business Studies

Period of project: June to September

Name of project and product: Micro-enterprise: Mango Chews

Project description

We plan to collect mangoes from the three big trees in the school grounds, slice them and dry strips in a solar drier. They will be sold in 200g packets to schoolchildren and to families through their children.

SECOND PAGE

1. Estimate the profitability of the enterprise

INCOME

PRODUCT	QUANTITY	SALE PRICE PER UNIT	TOTAL VALUE
mango chews	250 packets of 200 g Fifty will be distributed as free samples, so there will be 200 packets for sale.	20	4000
TOTAL			4000

COSTS

ITEM	QUANTITY NEEDED	PRICE PER UNIT	TOTAL COST
black plastic sheet for solar drier	1	50	50
wood for solar drier: 2m battens, 8cm x 10cm	6	200	1200
large aluminium buckets or pans	3	300	900
cellophane for wrapping	6 packs	30	180
sugar	50 1kg packets	4	1000
potassium metabisulphite for preserving	200 grams	100 per kilo	20
sticky labels in packets of 100	4	50	100
rubber stamp promoting Mango Chews for product labels and school exercise books	1	4	4
TOTAL			3474

N.B Trees, stall and weighing machine will be lent by the school and knives will be borrowed from home.

EXPECTED PROFIT

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THIRD PAGE

2. Where we will get our inputs

- plastic sheet, cellophane and sugar from the market
- the chemist's shop for potassium metabisulphite
- donations (we have an offer for the wood)

3. How and where we will sell our products

They will be sold to learners and families: learners will take them home and the project team will sell them at school in break time. Products will be promoted by free samples, word of mouth and packaging. The selling points will be taste, nutritional value and long life.

4. What we will do with our profit

- 50% for the project team (half for a celebratory party)
- 30% for the School Fund, for outdoor tables for eating and studying
- 20% for reinvesting in garden enterprises

5. What the main risks are and how we will reduce them

Risk 1

The solar drier may not work well (we have not used one before).
Solution: get technical advice.

Risk 2

People may not see the value of the product.
Solution: good promotion, keeping people informed about the project, informing them of the nutritional value and giving out free samples. Our product label will have nutritional information.

Risk 3

We don't know how long the product will last: if it goes bad, people will be angry.
Solution: This will not be a selling point in the first year; we will save some of the product to see how long it lasts.

6. MARKETING AND PUBLICITY

There's always scope for sales talk! Promoting a product is also educational for the promoters themselves. Do this lesson while the crops are growing.

LEARNING OBJECTIVES

Learners

- are aware of the value of marketing and promotion in their own context
- adopt a coherent marketing programme, including a follow-up evaluation
- study, select and implement marketing strategies.

RESOURCES NEEDED

- a flipchart if possible
- a display copy of the Marketing Cycle (**Guide A**)

PREPARATION

If possible, hand over stages 2 and 3 of this lesson to the publicity team. This is their opportunity to gather ideas for their marketing plan. Alternatively, ask all learners to look at **Guide B** before the lesson and to think of suitable marketing strategies for their product.

LESSON

1. **Lead-in** Present the Marketing Cycle (**Guide A**) and ask the class to recall their decisions after their early market research.

2. **The marketing process** Ask learners to explain all the stages of the Marketing Cycle, then to focus on Stage 2 – the marketing plan.

3. **Karara School** Present, or ask learners to present, Karara School's marketing strategy (**Guide B**).

4. **Our marketing strategies** Say our strategies will be different, but should also be cheap and effective. Brainstorm ideas. Take each area of **Guide B** in order, but don't expect ideas to respect the order! The publicity team make a note of ideas, preferably on a flipchart (so that the class can see them and also so that they can be used again). Learners select the best ideas.

5. **Will it make a difference?** Is marketing worth it? Is it a waste of time? (In areas where there is little spending money there is also little room for persuasion, so expect some hard realism in discussing this question.) How can we find out afterwards if our marketing efforts were worth it? Encourage learners to think of a follow-up survey (**Guide A**, Stage 4).

FOLLOW-UP

Marketing The publicity team prepares and presents a marketing plan with ideas from the lesson.

Labels Learners collect labels from similar products, paste them into a collage and write a paragraph describing and evaluating their publicity strategies.

Marketing strategies Learners make a book of the marketing strategies they see around them, including social marketing (e.g. public health notices). Each entry describes or pictures the strategy and discusses if it is effective. The criteria are whether it is attention-catching, convincing and honest.

Publicising the project If the project is successful it is worth publicising for itself, not just for sales. Make sure the lesson **Showing and telling** (Lesson H2) is part of your programme.

LESSONS IN OTHER SUBJECTS

Business Studies Marketing, advertising

THE MARKETING CYCLE

1 RESEARCH THE MARKET

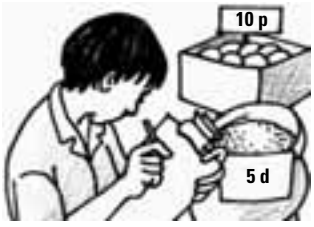
Will they buy it?

Study the market
Do surveys
Look at prices

Select outlets

Study the product
Establish selling points
(e.g. quality, convenience)

Decide target market
(e.g. the public, school,families)



2 CREATE A MARKETING PLAN

How can we persuade them?

Decide overall approach and marketing strategies
(e.g. name, logo, advertising, packaging, promotions)

3 CARRY OUT THE MARKETING CAMPAIGN

What do we have to do?

distribute posters
brief salespeople
make packages etc.

4 EVALUATE EFFECTIVENESS

Was it worth it?

Do a follow-up survey:
"Why did you buy our product?"

KARARA SCHOOL'S MARKETING STRATEGIES

WHAT WE DO AT KARARA SCHOOL

"We sell tomato bedding plants, ready to plant. We deliver them to the door and also sell them on a market stall on Saturdays. They are a hardy and prolific variety, with a great flavour, and a really healthy food."

1 Decide overall marketing approach (e.g. knocking on doors, poster campaign, word of mouth, appeal to support the school, pretty packaging, special services, special offers)

"Our main strategy is talking. We talk to school learners and families and they talk to others. We also give out a flier about tomatoes."

2 Get a product name, a logo and a slogan. They should reflect your main selling points.

"Our product name is Top Taste Tomatoes (TTT). Our logo is a tomato shape on packaging, fliers and banners. It's easy to make and it shows buyers what they are going to get."

3 Design packaging and labelling. Products to be kept must have airtight pest-proof packaging. Food labels should give contents, weight and price. They can also give information about food value etc.

"Our packaging looks good and costs nothing. Our labels give the date and the care instructions."

4 Create advertising and promotions – e.g. banners, posters, fliers, displays, gimmicks, special offers.

"Everyone in the school takes home a tomato flier. The customer writes their name and address on the back and the children bring it back to the sales team. After making the delivery we file the flier."

5 Brief project personnel and sales-people on marketing strategy and points to emphasize.

"We brief our sales team, and they brief everyone else in the school. They teach them how to grow tomatoes so they can do it at home."

7. BOOK-KEEPING AND RECORDS

Even if there is very little cash-flow, learners should be trained to keep the accounts. It is an excellent exercise, useful in normal life as well as in business, and makes a good impression on families, visitors and officials.

LEARNING OBJECTIVES

Learners

- keep track of daily income and expenditure in a cash book
- recognize the need for transparency in accounting, and act on it.

RESOURCES NEEDED

- a new cash book - write CASH BOOK in large letters on the front
- a display copy of **Guide A**

PREPARATION

- Learners find out from market traders how they keep track of their daily income and expenses.
- Make a large copy of **Guide A** for display.

LESSON

1. **Lead-in Cash book** Show the cash book and discuss what it is for (to record income and expenditure). Learners discuss reasons, e.g.

a) We must be able to show where the money went, and how much we received (accountability and transparency).

b) We always need to know where we stand financially.

c) When you are trying to make a profit, you can't rely on memory.

2. **How do we do it?** Show **Guide A** (Elizabeth's Cash Book). Point out that it uses symbols instead of words. First let learners try to work out what it all means and try to explain it. Explain it again yourself while learners follow the pictures:

a) On 1 September Elizabeth starts with 8,000 cash in hand (the 1000 means cash).

In the morning she buys:

- 2 baskets of tomatoes at 2,000 each
- 1 bag of onions at 2,500
- 1 basket of okra at 1,200

During the day she sells:

- tomatoes for 1,000
- onions for 600
- okra for 400

b) She also takes 600 for herself to buy food for the household.

c) At the end of the day she has 1,700 left. So next day she will start with 1,700 cash in hand.

d) On the plus side she has 10,000, but she has spent or taken out 8,300. To check that she hasn't made a mistake, she adds the difference to the minus side so that the two sides match.

3. **Simon's accounts** Tell the story in **Guide B**, or let learners read it in small groups. As they hear/read the story, learners make the entries in Simon's cash book for the week. Check with the Key.

4. **Organizing accounts** Discuss and decide

a) who is to keep the accounts for the project

b) who will control petty cash (if any)

c) where the cashbook will be kept

d) who should see the accounts, how often, and how.

FOLLOW-UP

1. **Cash-flow scenarios** Learners invent other cash-flow stories for their classmates to record in cash books.

2. **Monthly summary** The accounts team present and explain a monthly cash flow summary to show where the money has gone, what has come in, and what the balance is.

LESSONS IN OTHER SUBJECTS

Maths Arithmetic

ELIZABETH'S CASH BOOK

Elizabeth sells tomatoes, onions and okra in the market.

This is one day's page from her cash-book. (N.B. The boxed 1000s mean notes)

CASHBOOK SEPTEMBER

	⊕	¢		⊖	¢
1-9-93	1000 *	8000	1-9-93	2 x 1000	4000
1-9-93		1000	1-9-93	1 x 2500	2500
1-9-93		600	1-9-93	1 x 1200	1200
1-9-93		400	1-9-93		600
		10,000			8300
			1-9-93	1000 10,000 - 8300	1700
					10,000

Adapted from Heney, J. (2000)

* This means cash

SIMON & CO.

Simon and Co. bottle and sell plum tomatoes. They scald the tomatoes, peel them, pack them into bottles and boil them to sterilise them. The bottles are expensive but they are on sale-and-return: when people bring them back they get a refund, then the bottles are cleaned and used again. Simon and Co. buy the bottles at 5k and charge 6k for them, to allow for the cost of cleaning.

Simon and his team start this week with 520k in hand, but they have run out of bottles. On Monday (23 May) they buy 20 new bottles. The same day children bring back 25 bottles and are given refunds. Simon also pays 20k for fuel for boiling bottles, and 4k for some new labels. The next day they sell 32 bottles of tomatoes at 15k each (the price includes the deposit on the bottle).

Fill in Simon's cash book for the week!

SIMON & CO: INCOME AND OUTGOINGS

DATE	INCOME	AMOUNT	DATE	OUTGOINGS	AMOUNT

KEY TO SIMON & CO

DATE	INCOME	AMOUNT	DATE	OUTGOINGS	AMOUNT
23.05	Cash in hand	520	23.05	20 bottles @ 5k	100
24.05	Sales: 32 @ 15k	480	23.05	25 refunds @ 6k	150
			23.05	fuel	20
			23.05	labels	4
Total		1000	**Total**		274
				1,000 - 274	726
					1000

To prepare for gardening tasks:

1. **Sowing seeds**
2. **Planting and transplanting**
3. **Mulching: the soil blanket**
4. **Watering (1)**
5. **Watering (2)**
6. **Weeding**
7. **Keeping the garden healthy**
8. **Plant doctors**
9. **Harvesting**

ABOUT THESE LESSONS

The lessons in **Set F** deal directly with gardening activities and help to set up routines such as regular watering, weeding and daily patrols of the state of the garden. These lessons will need to be integrated into your particular gardening project and distributed through the gardening season.

There is no need to buy fertilisers, but you will need good supplies of compost (enriched with animal manure if possible), mulch and sufficient water. Adequate pesticides can also be homemade (see **Homemade sprays** in *Setting up and running a school garden*).

1. SOWING SEEDS

This lesson is about sowing seeds directly in the garden and therefore deals with big seeds (e.g. beans, pumpkin). Do it when the beds are prepared and you are ready to plant. The whole lesson is best done in the garden.

LEARNING OBJECTIVES

Learners

- get local advice on planting seeds
- sow seeds correctly directly in the garden
- care for seeds and seedlings correctly.

RESOURCES NEEDED

- the seeds to be planted
- seed packets (if any)
- pegs and string
- ruler, tape measure or sticks for measuring
- a little compost

PREPARATION

To prepare for the lesson, older learners find out the height and width of the fully grown plants and measure them. They should try to get advice on sowing: how far apart, how deep.

LESSON

1. **Lead-in** Learners recall Lesson A2 **What plants like** (rich soil, space, no competition, warmth, moisture, light) and explain why the prepared garden beds are good places to plant. Show the seeds to be planted. Point out that they are big and strong so we can plant them directly outdoors.

2. **Dangers** But they are still babies! Learners suggest what dangers they face (e.g. falling on/under stones, washed away, waterlogged, eaten by birds/slugs, overgrown, scorched by sun).

3. **Measuring and deciding** (for older learners)

a) Ask *How deep? How far apart?*

b) Learners demonstrate how big the plants will grow. Planting must allow for this final size. Discuss and decide spacing for seeds.

c) Learners measure or estimate the seeds' diameter and multiply by three. This gives a rough planting depth.

d) Learners read seed packet instructions (if any) and compare with local practice (see **Guide A**). Discuss which advice to follow (generally, respect expert local advice based on local conditions).

4. **Planning the work** Discuss the following questions on the garden site. Learners demonstrate their answers practically. Older learners can refer to **Guide B**.

- What do we do first? (Rake the soil, make it fine.)
- Do we want rows? circles? patterns? How will we mark them out? (pegs, string etc.)
- How do we measure between seeds and between rows? (e.g. with measuring sticks)
- How do we make the holes? (with a stick)
- What do we do next? (Put in a little compost.)
- And then? (Drop the seeds in.)
- And then? (Cover and press in the seeds, water GENTLY.)
- How will we protect the plants? Learners recall the risks and suggest solutions (e.g. thorns to keep off chickens, branches for shade and rain protection, gentle watering).

5. **Planting** Divide the class into groups, each with seeds to plant, pegs/string etc.

FOLLOW-UP

1. **Drama: The Seven Seeds** Act out the story of seven seeds which between them experienced all possible dangers and threats.

2. **Seed race** Teams have a race for first shoots, first true leaves, first plant to reach 5 cm. etc.

3. **Germination rate** Older learners count the seeds planted and calculate the germination rate.

4. **Growth rates** Older learners sow different varieties of seed, or apply different conditions (e.g. with mulch/compost/weeding/water or without) and track the different growth rates.

LESSONS IN OTHER SUBJECTS

Maths Averages, measurements, growth graphs

PLANTING INSTRUCTIONS AND LOCAL KNOWLEDGE

Seed packets give general planting instructions. They should be adapted to local conditions.

BROAD BEANS

Crops in	71 days
Height	80 cms
Description	This is the fastest maturing variety of broad bean and very high yielding: up to 34 pods per plant!
Sowing instructions	Sow the seed any time, 5 cm deep and 23 cm apart in double rows 23 cm.

Growing instructions

When they flower, take off the top shoots to induce earlier and bigger crops. Surprise your friends and neighbours!

Adapted from Thompson and Morgan (2004)

CAN YOU FIND THE ANSWERS?

When should we plant?

How deep?

How far apart?

SOWING SEEDS

1

Make a good bed with fine soil.

2

Space out the rows.

3

Sow three seeds deep.
Add a little compost.

4

Cover the seeds and press down.

5

Water gently and keep damp.

2. PLANTING AND TRANSPLANTING

Small seeds are generally started in a seedbed and then transplanted or thinned out. Introduce the process when you are ready to sow the seeds. Younger learners should do only Steps 1 and 2.

LEARNING OBJECTIVES

Learners

- understand the overall process of planting and transplanting
- (older learners) get information and advice from seed packets and local people
- (older learners) plan the process and carry it out.

RESOURCES NEEDED

- big seeds, small seeds
- blanket/sheet/fronds to make a sun canopy
- paper symbols for sun, rain, wind
- (for older learners) seed packets
- copies of **Guide A** questions

PREPARATION

- Before the lesson, learners find out all they can about sowing and growing the planned crops. Older learners can use the questions in **Guide A** to guide their research.
- For older learners, copy the **Guide A** questions on the board or on a flipchart before the lesson.

LESSON

1. **Lead-in** Show some big seeds (e.g. melon, bean), then some very fine seeds. Ask which ones need more care and protection (the small ones). Explain that we have to treat them like babies!

2. **Walkthrough** Explain that we will go through the whole process, so that they will know what to do. Eight learners represent seeds; others represent sun, rain, wind (give them paper symbols). The rest are gardeners. The "seedbed" is around the teacher's desk and the "open garden" is the learners' desks. Walk and talk through the mime below. N.B. This demonstration can have a dramatic or a scientific flavour, depending on the tastes of class and teacher.

Mime

a) We sow the small seeds in a nursery bed (the "seeds" sit down in a row in the "seedbed" while "sun", "rain" and "wind" take up positions nearby). We keep them warm and shady (two gardeners hold a canopy over them) and protect them from sun, rain and wind (gardeners form a hedge). We water regularly (two gardeners "water the soil").

b) The seedlings come up. ("Seeds" stand up together.) But they are too close! *What do we do?*

- We thin them out! (Half the "seeds" go back to desks. "Gardeners" mulch and water those left.)

c) Now the seedlings have room to grow. ("Seeds" stretch and expand.) But they are still very tender. They need to get used to sun, rain and wind. *What do we do?*

- We harden them off! (Learners lift the canopy and expose "seeds" a little to sun, rain and wind, then repeat the process, lifting the canopy longer each time).

d) Now they are strong and ready for anything. ("Seeds" stand up tall.) *What do we do?*

- We transplant them! (Gardeners take "seeds" away and "plant" them back in their desks.)

3. **What do our seeds need?** (older learners) Groups present to the class what they have found out about the specific seeds to be grown, referring to the questions in **Guide A**, which should be on display. They should consult and refer to seed packets if they have them.

FOLLOW-UP

1. **Garden work** Move on to sowing, growing and transplanting in the garden (see **Guide C**).

2. **Growing schedule** Older learners prepare a growing schedule for the selected crops (**Guide B**).

3. **Experiment** Learners leave one line of seedlings unthinned and observe the difference from the other rows.

LESSONS IN OTHER SUBJECTS

Drama Growing up

Environment Natural selection

PLANTING AND TRANSPLANTING

STAGE	QUESTIONS	ANSWERS
Sowing	When do we sow the seed? How do we sow the seed? How deep? How far apart should the rows be?	
Growing **Thinning** **Hardening off**	How long do they take to germinate? Do we thin out the seedlings? When? When should we harden them off?	
Transplanting	When do we transplant them? How far apart?	
Growing plants	How do we look after the plants?	
Harvesting	How long until they are fully grown? How/when do we harvest the crop?	
Storing	How do we store the crop?	

GROWING SCHEDULE FOR TOMATOES

INSTRUCTIONS	MONTH 1	MONTH 2	MONTH 3	DETAILS
Sow	x			1.5 mm deep
Germination	xxx			Takes 6-14 days
Transplant to pots OR thin out	xxx			When large enough 2 cm apart
Harden off		xx		When 20 cm tall
Plant out in garden **Provide support** **Remove side shoots**		xxx xx xx	 xxx	45 cm apart, rows 75 cm apart Fertile well-drained soil Support with bamboo. Tie up branches.
Harvest			xxxxxxx	In about 80 days
Water well	xxxxxxxxxxx	xxxxxxxxxxx	xxxxxxx	

Instructions for "Gardener's Delight", Thompson & Morgan (2004)

THE STAGES

SOWING

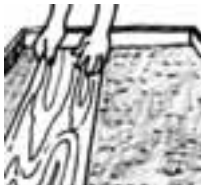
1. Make a seed bed with fine rich soil.

No lumps, sticks or stones

2. Weed well.

Get the roots out

3. Flatten it neatly.



Use a board.

4. Protect seeds.

Make shade. Keep away pests.

5. Mix seeds with fine soil or sand.

Keep the packets.

6. Draw lines.

A few cm deep, about 15 cm apart

7. Sprinkle seeds.

Label the rows.

8. Cover lightly.

Press down gently.

9. Water well.

Don't flood!

10. Mulch.

Keep cool and damp. Stop competition!

GROWING, HARDENING OFF AND THINNING

1. Water twice a day.

Morning and evening

2. Keep mulching.

Mulch keeps plants cool and damp and stops the competition.

3. When they have true leaves, thin them out.

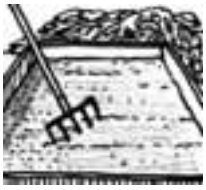
About 5 cm apart

4. 6-8 weeks after germination, harden them off gradually.

Give them more sun and weather every day.

TRANSPLANTING AND PLANTING OUT

1. Prepare good raised beds.



Lots of compost and topsoil

2. Transplant when it's cool.

A cloudy day, morning, evening

3. Mark lines and holes.

Read instructions on seed packets.

4. Dig holes.

Put in a little compost.

5. Choose strong healthy seedlings.

Healthy plants make good food.

6. Scoop up plants.

Take some soil with the roots.

7. Transplant them.

Handle roots delicately.

8. Fill with soil.

Press down lightly.

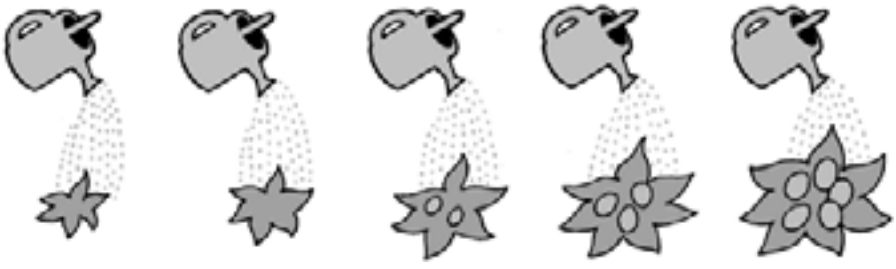
9. Water right away.

Water ground, not plants.

10. Mulch around plants.

Keep water in. Keep away weeds.

11. Water regularly for good growth.



If plants get too dry they will wilt and not grow.

3. MULCHING: THE SOIL BLANKET

Mulching is mentioned in many lessons, for example those dealing with soil, organic gardening, weeding, watering and planting. This lesson brings it all together. Do it in the garden whenever you are ready to mulch. Younger learners should only do steps 1 to 5.

LEARNING OBJECTIVES

Learners

- recognize the value of mulching
- know how to mulch and when.

RESOURCES NEEDED

- wilting plants in dry soil overgrown with weeds
- some kind of good mulch (e.g. leaves, dry grass – without seeds)
- some dry grass with seeds
- water and watering can
- large labels and string for "problem cards"
- big felt pen

PREPARATION

Either find some dry cracked soil in the garden and some wilting plants surrounded by weeds
Or take a few wilting plants into the classroom (together with soil and weeds).

LESSON

1. **Lead-in** Learners recall **What plants like** (Lesson A2).

2. **Problems** Present some plants which are wilting in dry soil, diseased or overgrown with weeds. (For younger learners give the plants local names: *Poor Sammy and Betty!*). What are their problems? (weeds / no water / poor soil). Learners write these problems large on separate "problem cards", and tie them onto the plants as labels.

3. **Ideas** How can we help these plants? Ask for suggestions. Warmly approve proposals for watering, taking out weeds, adding compost, picking off bugs. Explain that there is another way to help: MULCHING, or making a "soil blanket". Mulching is Magic!

4. **Mulching**

a) Show learners some "good mulch" (if possible, light-coloured straw).

b) Pick out "bad mulch" with weed seeds in it. Learners sort the good from the bad and make a special trip to put the bad mulch on the compost heap.

c) Start putting the good mulch around a few of the plants.

d) Learners continue until it is about 6 cm thick. Encourage them to feel protective!

e) Learners water the plants.

5. **Why mulch?** Learners look at the "problem cards" one by one. How does mulching help with each problem? Encourage learners to work out the answers (see **Guide**: Why Mulch?).

6. **Explaining** (for older learners) Two learners volunteer to give a "mulching demonstration" to the class on another suffering plant, with commentary. They should explain the problem, then show the materials and the method, and finally give the reasons. The class help and correct the speakers. If time allows, learners can all practise mulching demonstrations in groups.

7. **Planning** (for older learners) Discuss and decide what needs mulching in the garden, who will do it and when. Also plan for collecting and storing mulching materials.

FOLLOW-UP

1. **Demonstrations** Learners do "Mulching Magic" demonstrations for families/friends at home.

2. **Control experiment** (for older learners) Take two adjoining plant areas with the same plants and similar exposure. Heavily mulch one area. Use litre/gallon jugs for watering so that you can track how much water is being used. Check soil moisture daily with fingers to demonstrate how mulch helps to retain moisture. Do a weed count on both patches. *Adapted from Guy et al. (1996)*

3. **Song** Any marching song goes well with the words *Mulch, mulch, mulch, mulch*! Or find a tune that fits these words: *Mulch cools the earth! Mulch stops weeds! Mulch feeds the plants! Mulch saves our water!* Sing it as you go to work.

LESSONS IN OTHER SUBJECTS

Science Evaporation, condensation

MULCHING: WHAT AND WHY?

Is your soil poor? Do you have a hot climate? Do you have very little water?
THEN YOU NEED TO MULCH!

WHAT TO DO

Mulch covers the ground round plants so other plants can't grow.

Make it thick - about 6 cm.

You can use:

leaves

straw

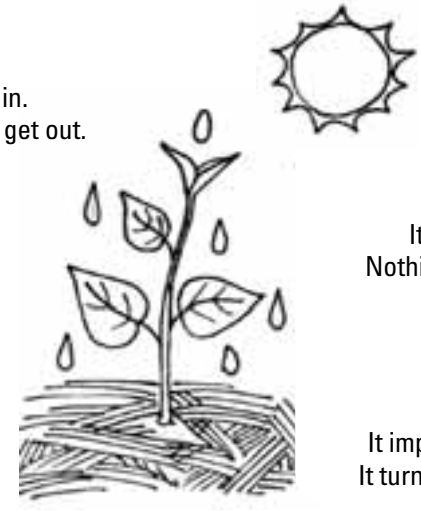
dry grass

BUT NOT GRASS WITH SEEDS!

Light-coloured mulch reflects away light and heat.

WHY MULCH?

It keeps moisture in.
Water gets in but can't get out.



It prevents weeds.
Nothing grows in the dark.

It keeps soil cool and soft.
Diseases don't like cool soil.

It improves the soil.
It turns into compost.

4. WATERING (1)

Watering (1) and (2) should be consecutive lessons, about a week apart. Both should be done mainly in the garden, once crops have been planted.

LEARNING OBJECTIVES

Learners

- appreciate plants' water needs.

RESOURCES NEEDED

(for older learners) Five questions written large on separate cards/strips:

- Where is there water/moisture in the garden?
- Where is the water in plants?
- Where do plants get water from?
- How does the water get into the plant?
- How much of a plant is water?

LESSON

1. **Lead-in** Learners recall **What plants like** (Lesson A2). Pick up the need for water. Ask:

a) Can plants have too much water? (when, for example?)

b) Can they have too little? (when, for example?).

c) Are plants the same as people? (see **Guide A**).

2. **Plants and water** Ask and discuss the five MAIN questions. (For older learners, pin up the question cards one by one for discussion.) Get some ideas.

3. **Send learners to the garden** to hunt for answers. Explain that they are looking for *dampness/moisture*, not for *drops* or *streams*. Suggest they look in leaves, stems, fruits and roots, and in the soil.

4. **Feedback on garden investigation** Ask the questions again one by one. Learners say where they found moisture in the garden (mostly in the soil) and in plants (all through the plant). *Where does the moisture come from?* (the soil) *How does it get into the plant?* (sucked up through roots – N.B. not through the leaves!). Older learners can write the answers on the cards.

Pause on the last question: *How much of a plant is water?* and ask for guesses (half? quarter?).

- For younger learners, tell them it is almost all of the plant (90%). A plant is just a bag of water.

- For older learners, don't give an answer. Ask them to record their guesses (e.g. *Six of us think a plant is 25% water…*) and say we will do an experiment to find out.

5. **Shrinking Grass experiment** (for older learners) Set up the Shrinking Grass experiment (**Guide B**), to be finished in the following lesson.

FOLLOW-UP

1. **Drama** A chorus of learner "plants" complain about dry feet, wet feet, hot feet, floods, hard soil, weeds etc. Learner "gardeners" rush to answer their complaints one by one.

2. **Experiment write-up** Older learners begin to write up the Shrinking Grass experiment under the headings Purpose and Method.

LESSONS IN OTHER SUBJECTS

Biology Plant physiology

HOW MUCH WATER DO PLANTS NEED?

PLANTS ARE LIKE PEOPLE

THEY CAN HAVE

TOO LITTLE WATER.

=

OR THEY CAN HAVE

TOO MUCH WATER

=

OR THEY CAN HAVE

JUST THE RIGHT AMOUNT.

=

THE SHRINKING GRASS EXPERIMENT

TO FIND OUT HOW MUCH OF A PLANT IS WATER

You will need: - some freshly cut green grass or weeds
- a lightweight container (e.g. box, plastic bottle), transparent if possible
- weighing scales if possible.

A Setting up the experiment

1. Weigh the container (or pass it round to feel the weight).
2. Fill it completely with freshly cut green grass or weeds. Everybody can help to pack it in.
3. Weigh the container again and work out the exact weight of the grass. If there are no scales, feel the weight by hand, and find another object weighing about the same.
4. Take out the green stuff, spread it on a piece of newspaper and put it in a safe warm dry place.
5. Leave it for a week to dry out and lose its water.

B Looking at the results

1. After a week put the dry grass back into the same container and weigh it again. The grass will have shrunk and lost weight because it has lost water.
2. Compare the dry weight with last week's wet weight. Estimate or calculate what percentage of the weight and volume remain. The lost weight is all water.

C **Conclusions** (keep these for the end of the experiment)

Plants are about 90% water. Like people, if they don't drink they die.
This is why watering is so important.

5. WATERING (2)

This lesson introduces good watering practices and finalises the Shrinking Grass Experiment.

LEARNING OBJECTIVES

Learners

- know when and how to water plants.

RESOURCES NEEDED

- a part of the garden that needs watering
- watering cans/buckets/hosepipe
- sticks for measuring the depth of moist soil, with marks at 3 cm and 25 cm
- mulching material
- Golden Rules for Good Watering on display (see **Guide A**)

PREPARATION

- Before the class, learners ask local gardeners how they water their crops, when and how much.
- Write the Golden Rules for Good Watering (**Guide A**) in large letters, each on a separate card or paper strip (N.B. only the rules, not the comments).

LESSON

1. **Lead-in** Learners recall last lesson's question *How much of a plant is water?* Emphasize the importance of water for plants. Look at the results of the Shrinking Grass experiment from the previous lesson: this will bring out the same message.

2. **Feedback on local investigations** Ask learners what they found out about how local gardeners water plants. Did they find the methods shown in **Guide B**? What advice did they get?

3. **Seven Golden Rules** Learners hold up the Seven Golden Rules for Good Watering one by one and read them out. For each, they say why it is important. At the end turn the rules face down and ask the class to remember them all. As they call them out, stick them up again.

4. **Watering demonstration** Go round the garden with the whole class. Feel the earth and demonstrate measuring the need for water with the measuring stick. Wherever water is needed, the class suggests the best way to do it, recalling appropriate Golden Rules. Learners take turns to do each watering task.

5. **Summing up** Ask learners to hold up each Golden Rule again. The class picks out the rules they used in their demonstration session.

FOLLOW-UP

1. **Experiment write-up** Older learners finish writing up the Shrinking Grass experiment under the headings Results and Conclusion. They can repeat the experiment at home for their families.
2. **Establishing good practice** Accompany the class on their next two watering sessions, so they can show they know what to do. When a new crop is planted, discuss the watering approach.
3. **Moisture measures** Learners make themselves "moisture measures" for homework and show their families how they use them.
4. **Golden Rules** Display the Golden Rules in the classroom or in waterproof form in the garden.
5. **Watering experiment** Divide a row of plants into three. Learners overwater one part, don't water another part, and treat the third part just right. They label each part with waterproof plastic flags (e.g. TOO MUCH, TOO LITTLE, JUST RIGHT), then measure and record the growth and health of the three parts over two weeks.

LESSONS IN OTHER SUBJECTS

Science Experimental method

SEVEN GOLDEN RULES FOR GOOD WATERING

1 MEASURE MOISTURE EACH DAY

The top 25 cm of soil should be damp. If the top 3 cm is dry, it's time to water. Make a stick to measure.

2 WATER IN THE EVENING OR MORNING

Don't let the water evaporate in the heat of the day.

3 WATER SOIL, NOT PLANTS

Water on leaves can hurt the plant and may not reach the roots. Water between plants and around them.

4 BE GENTLE

In particular, water seeds and seedlings frequently and gently.

5 DON'T OVERWATER OR FLOOD

Plants can drown, just like people. If they need a lot of water, give it in stages.

6 DEEP ROOTS DON'T NEED MORE WATER

Let them dry out between waterings to encourage roots to grow.

7 MULCH MULCH MULCH!

Mulching keeps the water in.

WAYS OF WATERING PLANTS

1	2	3	4	5
Flood the bed	Drip irrigation	Water by hand	Make water traps	Individual watering
				
Make sunken beds in dry places to keep water in.	Use a drip hose or soaker hose.	Use a watering can or a plastic bottle.	Keep the water round the plant.	Use tins and plastic bags.

MAKE EVERY DROP COUNT

GET THE WATER TO THE ROOTS

6. WEEDING

The spirit of battle is the best approach to weeds. But learners need to know how to prevent them as well as how to get rid of them, and also that not all weeds are harmful to crops. Do this lesson in the garden, once crops are growing. You may need a double lesson.

LEARNING OBJECTIVES

Learners

- recognize common local weeds and their characteristics
- find out how local gardeners deal with them
- know how to control weeds easily, cheaply and ecologically.

RESOURCES NEEDED

Numbered slips of paper with one question on each:

1. How many different kinds of weed can you find in the garden? Do you know their names?
2. Which is the commonest weed? Do you know its name?
3. Where are the weeds growing? Are there any near the crops?
4. Where are the weeds growing thickest? Why?
5. Which is the biggest weed? How big is it? Where is it?
6. Which weed has the deepest root?
7. Are any of our crops in danger from weeds? Which?
8. Where are there no weeds? Why not?
9. Are there any insects on or around any of the weeds? Are any of the weeds sick?
10. Do any of the weeds have flowers or seeds? How do they spread themselves/propagate?

PREPARATION

Learners find out about important local weeds and how gardeners deal with them.

LESSON

1. **Lead-in** Ask the class *What is a weed?* (It is just a plant in the wrong place!).

2. **Weed hunt** Each group takes one of the prepared questions, reads it aloud to the whole class, then goes into the garden to find the answer. Give a time limit. Tell groups to bring back weed samples to illustrate their answers.

3. **Feedback** Groups report back and display their samples. With older learners, discuss the survival strategies of the sample weeds (e.g. thousands of seeds, deep roots, fast life cycle, extra height to catch the sun).

4. **Friend or enemy?** Are all weeds bad for crops? Can they be good? Referring to what learners have found, lead them to recognize the dangers and benefits of weeds (see **Guide A**).

5. **Weed strategy** (older learners) Discuss strategies for dealing with weeds (**Guide B**).

6. **Routine** (older learners) Agree on a weeding routine and discuss how to keep weeding interesting (see **Guide D**).

FOLLOW-UP

1. **Weed policy** Older learners create a weed policy (**Guide C**) and explain it to visitors and families.

2. **Drama** Act out the battle between weeds and gardeners, showing both sides' strategies.

3. **Favour a weed** Teams each choose a weed, cultivate it, illustrate its growth, study its survival strategy and make a presentation on it.

4. **Weed book** Press weeds (see Lesson B1 **Ecological audit**) and create a Weed Book, giving name, date and information for each specimen.

5. **Experiment** Leave one patch of plants unweeded. Measure the plants and count the insects each day, comparing with weeded plants.

6. **Name a weed** Give a prize for the best invented name for a common local weed, accompanied by a drawing and description (see **Guide D**).

LESSONS IN OTHER SUBJECTS

Science Natural selection: survival strategies

WEEDS: FRIENDS OR ENEMIES?

SOME WEEDS ARE GOODFOR THE GARDEN

They attract good insects.

Bees and butterflies are friends.
They pollinate flowers.

They make the soil rich.

Legumes give nitrogen to the soil.

SOME WEEDS ARE BAD FOR THE CROP

Some pests like to live on tough weeds.

They are too close for comfort!
They can move from weeds into crops.

Weeds can starve crops.

They take the light, water
and food for themselves.

WEED CONTROL

PREVENT WEEDS

Fill up the space.

Lay mulch 6 cm deep.
No weed seeds!

Cover the ground.

Plant quick-growing vine plants.

Create shade.

Grow crops in layers.

REMOVE WEEDS

Dig or pull weeds when ground is damp.

Catch them small!
Don't let them go to seed.

Don't use weedkiller.

It can kill good insects.
It can kill good plants.
It poisons the soil.
It can kill YOU.

Use weeds for compost.

Use weeds for mulch -
but not if full of seeds!

OUR WEED POLICY

PREVENT WEEDS

Grow healthy plants

Cover the ground

Mulch well

DESTROY WEEDS

Pull out weeds

Use a hoe

No weedkiller

USE WEEDS

Leave a few friendly weeds

Have a weed patch

Use weeds for compost or mulch

WEED WINNERS

WE ENJOY WEEDING!

We celebrate daily victories over weeds.

We keep a weed diary.

We study weeds. We have a Weed Book.

We have competitions for the most weeds pulled,
the biggest leaves, the fastest weeder etc.

We have a weeding party every month, with refreshments.

WE ARE WEED WINNERS!

WEEDY NAMES

Weeds have interesting names.
Some names for weeds in Uganda are:

COUCH GRASS

SODOM APPLE

GOAT WEED

TICK BERRY

GALINSOGA

What names do your weeds have?

Invent a good name for a weed you know!

7. KEEPING THE GARDEN HEALTHY

Young gardeners need to realize that heavy indiscriminate spraying with pesticides is not a good answer to the dangers of pests. Instead they should emphasize prevention more than cure, giving priority to the health of the plants and the whole environment. This lesson revises many previous lessons. Younger learners should do only the first two stages, and should do the lesson in the garden so that they remember easily.

LEARNING OBJECTIVES

Learners

- practise healthy gardening as a basis for integrated pest management
- know how to encourage beneficial insects.

RESOURCES NEEDED

None

PREPARATION

Learners ask local gardeners how they keep plants healthy.

LESSON

1. **Lead-in** Ask the learners which is better -

- to get sick and then recover, or not to get sick at all?
- to fight monsters and kill them, or not to have any monsters?
- to be weak and looked after, or to be strong and not to need looking after?

(Let's hope they prefer the second option in all cases!)

2. **Prevention and protection** Draw conclusions about plants: the best way to prevent them getting sick or struggling to survive is to make them strong and healthy. How do we do this?

a) How do we make beds for healthy plants? Learners recall Lessons A2 **What plants like** and C6 **Garden beds**.

b) How do we look after plants to keep them healthy? Learners recall the messages of Lessons B4 **Compost**, F3 **Mulching**, F6 **Weeding**, F4 and 5 **Watering**.

c) What do we need to protect plants? Learners recall Lesson B3 **Insects and others**.

Brainstorm ideas. Prompt learners if necessary – e.g. *What about watering? Tell me about good insects! Why mulch?* Older learners can write up key words.

3. **The whole picture** Learners look at **Guide A** and find ideas they have mentioned. They pick out anything new and discuss if and how it can be done in the school garden.

4. **First patrol** Together look at the "patrolling checklist" in **Guide B**. Take the class into the garden and ask them to do a "garden patrol" in small groups using the questions on the checklist. Ask them what they see and point out things they haven't noticed.

5. **Routine patrols** Establish that we need a regular garden patrol twice a week to keep an eye on things. Learners recap what they will be looking for and organize the patrol. They may, for example, choose a friend, patrol in pairs before school and report to the class each morning before lessons begin. You may like to have a baton or badge (e.g. the moisture measure from Lesson F5 **Watering 2**) which is handed on from one week's duty group to the next.

FOLLOW-UP

Garden log Learners design a report form based on the checklist, and keep a garden log. It should include action taken and results observed.

LESSONS IN OTHER SUBJECTS

Environment Ecology

A HEALTHY GARDEN

Integrated Pest Management (IPM) is the most effective route to healthy plants. It aims to prevent pests and diseases as much as to cure them. It uses many ways of producing healthy plants and a healthy environment.

1. HOW DO WE LOOK AFTER OUR PLANTS?

Grow plants where it suits them.

Some plants need sunlight.
Some like shade.

Make the soil rich:
add mulch and compost.

Feed your crops and they will feed you!

Provide shelter and protection.

Use hedges against predators.
Use trees to break the wind.

Water regularly …

… but not too much!

Give plants space.

Reduce competition by weeding,
mulching, training up.

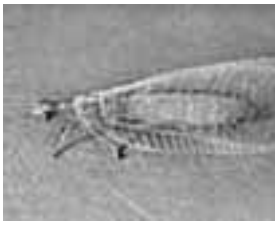
Know the dangers for each plant.

What might attack your plants?

2. WHO DO WE WANT TO LIVE HERE?

MAKE THE GARDEN A GOOD HOME FOR GARDEN FRIENDS!

Have plants of all kinds and sizes, and flowers all the year.



Bring in lacewings and ladybugs.

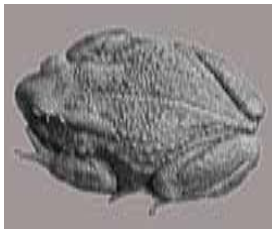
Leave some bugs for the beneficial insects to eat.

A few caterpillars or aphids for breakfast!

Have plants which attract the good guys ...

... and which keep the bad guys away.

Be friends with the Pest Police, e.g. frogs, lizards, ladybirds.



Invite ducks and hens in to make a meal.

PESTICIDES KILL YOUR FRIENDS AS WELL AS YOUR ENEMIES!!

3. WHAT DO WE GROW AND WHERE?

Plant local varieties.

They are often stronger.

Use clean up-to-date seeds.

It's safest to buy them.

Grow several crops together.

It confuses pests.

Rotate crops.

It cheats diseases and pests and saves the soil.

4. HOW CAN WE KEEP THE GARDEN CLEAN AND TIDY?

Burn diseased plants and take away plant rubbish ...

... to protect other plants.

Keep down weeds.

Pests live there.

Keep the compost heap away from the vegetable patch.

That way diseases can't spread.

PATROLLING CHECKLIST

1. Growth	Have the plants grown? How tall are they? What stage are they at? Are there any fruit or seeds?
2. Health	Are they looking well? Are there signs of pests or diseases? Are any plants wilting or stunted? Are there fallen leaves, eaten leaves, yellow leaves, fungus?
3. Pests	What insects/worms/animals are around? What signs are there? What are they doing? Is anything being attacked by pests? (Take a sample)
4. Soil/water	Is the soil dry? Which plants or beds need water? Is anything too wet?
5. Mulching	Is everything well mulched? Where do we need more mulch?
6. Protection	How good is our protection against predators (fences, hedges, walls, scarecrows)?
7. Wind and sun	Are any plants getting too much wind, sun or shade?
8. Space	Are any plants overcrowded? Do any plants need thinning/transplanting?
9. Weeds	Are there a lot of weeds near the plants?
10. Support	Do any plants need training up, tying up, spreading out?
11. Hygiene	What needs tidying up, burning, cutting back, cutting down?
12. Compost/ mulch	How good are our supplies of compost and mulch?

8. PLANT DOCTORS

Gardeners generally learn how to deal with plant problems gradually, over a long period. This lesson is only an introduction. Do it in the garden, where learners can see problems first hand and decide on treatment. Younger learners should do only steps 1 to 3. Older learners should keep records and monitor effects so they can see what really works. This will make them resistant to both old wives' tales and hard-sell modern chemicals.

LEARNING OBJECTIVES

Learners

- make a rough diagnosis of a plant problem
- choose a suitable remedial action and carry it out
- monitor the effects.

RESOURCES NEEDED

- some homemade pesticide (see **Homemade Sprays** in Horticultural Notes in *Setting up and running a school garden*).
- a small knapsack spray or hand-held spray
- if possible, an expert gardener to go with you on your garden tour

PREPARATION

- Before the lesson, learners find a plant problem in the garden and mark it so they can find it again. Older learners copy out the Case Notes form (**Guide B**) and complete parts 1 and 2.
- Take a look round the garden before the lesson and identify a few typical plant problems.

LESSON

1. **Lead-in** Learners recap what we need to do to have a healthy garden from the previous lesson **Keeping the garden healthy**. But what if plants get sick? We need to become "plant doctors".

2. **Garden tour** Take a walk round the garden, with an expert gardener if possible. Learners describe and display the "sick plants" they have studied and give each case a "case name" (e.g. *Droopy Daisy, Lacy Leaves*).

3. **First diagnosis** Younger learners decide if the plant needs more (or less) water, better soil, less competition, more (or less) shade, and take appropriate action. Older learners decide if the problem is likely to be a pest, a disease, or a problem of diet, and what makes them think so.

4. **What's the problem?** Older learners check **Guide A** to find the problem and its probable cause (pest, disease, or diet). Help them to see that some symptoms (e.g. wilting) may mean several different things: the only way to find out is by experimenting. If it is a pest, they should play detective and look for the culprit in all the obvious places (they are very good at this!).

5. **What's the solution?** Learners check **Guide A** to see how to handle the problem. Help them to pick up the basic messages (Disease: *Destroy*. Diet: *Feed*. Pest: *Pick, spray, trap, bring in the Pest Police*).

6. **Treatment** Individuals or teams adopt each case by name, and undertake to carry out immediate treatment. Learners keep Case Notes as they continue treatment/observation.

FOLLOW-UP

1. **Case studies** Learners maintain the Case Notes for their chosen plants and report on progress. These notes can be kept in the Garden File or collected into a Garden Doctor's Casebook.

2. **Plant surgeries** Do more garden tours (or "plant surgeries") from time to time, and invite local garden experts along as guest doctors.

3. **Plant sprays** Learners learn to make plant sprays, and show home gardeners outside the school.

4. **Interviews** Learners interview local gardeners about how they handle specific plant problems, and report in class.

LESSONS IN OTHER SUBJECTS

Science Empirical method

WHAT'S WRONG WITH MY PLANT?

1 DISEASE: IS MY PLANT SICK?

Are the leaves covered in powder?
Is the plant wilting or drying up?
Are there black patches with yellow edges?
Are there spots?
Are the leaves rolled up?
Are there red and yellow marks on the leaves?
Are there strange patterns on the leaves?

DESTROY IT! AND START AGAIN

- Use clean seeds.
- Plant it in a different place.
- Let the bed dry out before re-planting.

2 DIET: IS IT GETTING THE WRONG FOOD?

Does it have yellow leaf veins?
Is it too small?
Are the leaves pale?
Do other plants around look the same?
Perhaps it needs nitrogen.
Do the edges of the leaves look burnt?
Are there brown patches on the leaves?
Perhaps it needs potassium.
Are the stems or leaves purple?
Perhaps it needs phosphorus.

FEED IT!

For all problems, give compost and mulch and rotate crops.

For nitrogen, dig in legumes (green manure).

For potassium, give wood ash or wood bark.

For phosphorus, add chicken manure or animal bones to your compost.

3 DEPREDATION: HAS IT GOT PESTS?

Are there insects on the plant?
Are the leaves or stems sticky?
Is there sooty mould on the leaves?
Are the leaves or fruit pale, brown or speckled?
Perhaps it has sucking insects.
Do the leaves have holes or jagged edges?
Is the plant wilting or falling over?
Perhaps it has chewing insects.

GET RID OF THEM!

PICK OFF	by hand.
WIPE OFF	whitefly, scale or mealybug by hand.
TRAP	whitefly with "sticky traps". Smear yellow cardboard with petroleum jelly.
TRAP	slugs under citrus or potato skins or in a slug trap (e.g. a half-buried can of beer or milk). Spread ash or sawdust around plants.
SPRAY	with natural pesticides, or dust with wood ash or flour. Spray under the leaves too!
PEST POLICE	Encourage ducks and hens, frogs and lizards, ladybugs and lacewing.

CASE NAME

DRAWING

PLANT DOCTOR'S CASE NOTES

DATE		NOTES
	1 Description of plant & location (e.g. soil, position, space, light/shade, weeds)	
	2 Description of problem (check leaves, under leaves, stems, buds)	
	3 Possible diagnosis	
	4 Action taken	
	5 Results	
	6 Further action taken	
	7 Results	

CASE NAME *Holey Cabbage*

DRAWING

PLANT DOCTOR'S CASE NOTES – example

DATE		NOTES
7 July	1 Description of plant & location (e.g. soil, position, space, light/shade, weeds)	*Most cabbages near the wall. No weeds.*
	2 Description of problem (check leaves, under leaves, stems, buds)	*Leaves have irregular holes. Only on cabbages. A few white butterflies around.*
	3 Possible diagnosis	*Chewing insect*
8 July	4 Action taken	*Found caterpillars, picked them off, fed them to the chickens.*
11 July	5 Results	*Chickens happy. No new holes in cabbage leaves*
14 July	6 Further action taken	*Checked 3 days later; found two small caterpillars and removed them.*
20 July	7 Results	*A week later – no new holes*

With thanks to Chris Landon-Lane

9. HARVESTING

Harvesting is best learnt at harvest time by hands-on demonstration and practice with the real thing. Consult Food Factsheets, seed packets and local experts for advice on harvesting and storing particular crops. This lesson simply emphasizes principles and reinforces attitudes.

LEARNING OBJECTIVES

Learners

- know which food crops decay rapidly
- appreciate the need for careful harvesting, rapid transport and good packaging, and act accordingly
- know what to do with plant debris.

RESOURCES NEEDED

- if possible, a rotten fruit/vegetable and a dried-out one
- to act out the dialogue:
  - a) a big basket
  - b) something to represent tomatoes (e.g. real tomatoes, crumpled balls of paper, red stones)
  - c) something to represent tomato plants (legs of desks, twigs, real tomato plants)

PREPARATION

Train two confident learners beforehand to play the parts in the dialogue.

LESSON

1. **Lead-in** Present a rotten fruit/vegetable and a dried-out one. Discuss if we can eat these or sell them.

2. **Rotting and drying out** Discuss the following questions briefly at whatever level the learners can manage. Older learners can work in independent groups and report back.

a) **Why do foods dry out?** (e.g. too much sun, exposure, wind; thin skins).

b) **Why do they rot?** (rotting caused by bacteria/fungi in the air, enzymes in the food)

c) **When do they rot?** (e.g. when they are overripe, cut, bruised, wet or warm)

d) **Which foods rot quickly?** sunflower seeds? bananas? tomatoes? sweet potatoes? spinach? Why? (Older learners can work out that "rapid rotters" are usually ripe, soft and full of water.)

3. **Dialogue** Present the picture of Mr Rotten Tomato (next page), who hasn't a clue about keeping foods fresh. Act out the situation twice with two different learners: the first time the teacher plays the interviewer, the second time Mr Rotten Tomato. OR all learners read the dialogue aloud in pairs: at the end choose a good pair to act it out.

4. **Advice** Run through the dialogue again, pausing at the stars so that the class can advise Mr Rotten Tomato on what he is doing wrong, and why, and what he should do instead. Give hints if necessary, or add points which learners miss.

5. **Check** Older learners check the advice in the **Guide** to see if it matches the advice they gave.

FOLLOW-UP

Drama Turn the dialogue into a little play. Present it to other classes when they are about to harvest, so they can discuss how it applies to their own crops.

LESSONS IN OTHER SUBJECTS

Science Decomposition

MR ROTTEN TOMATO PREPARES FOR MARKET

* Asterisks mark places where the dialogue can be paused for learners to explain what is wrong.

Interviewer	Hullo, Mr Rotten Tomato, what are you doing?
Mr RT	*I'm harvesting my tomatoes to take to the market.*
Interviewer	And it's so hot, too.
Mr RT	*Yes, I work hard, even in the sun.**
Interviewer	So tell me what you are doing.
Mr RT	*First I pick up all the ripe tomatoes on the ground.**
Interviewer	Also those ones with cuts and bruises? And the squashy ones? And the spotty ones?
Mr RT	*All of them.**
Interviewer	And then?
Mr RT	*Then I throw them in that basket over there.**
Interviewer	That big basket over there in the sun?
Mr RT	*That's right. Then I pick the very ripe ones on the plants, the ones which are almost soft. And I throw them in the basket too.**
Interviewer	And then?
Mr RT	*Then I take them to the market. Tomorrow. Or the next day. Or the next day.**
Interviewer	In the basket, just like that?
Mr RT	*Just like that.**
Interviewer	And where do you keep them in the meantime?
Mr RT	*Right here, in the basket in the sun. So they get nice and ripe.**
Interviewer	And do you get a good price?
Mr RT	*No, terrible. No-one wants to buy my tomatoes. Life is hard. But what can you do?**

FRESH AND UNDAMAGED

All crops mature on the plant.
Some can ripen off the plant.

Find out the best way
to harvest each crop.

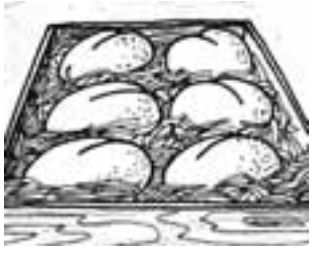
Harvest in the cool of the day.

Be gentle! They are fragile!

Use up damaged foods quickly
before they rot.

Only store perfect foods.

Pack fruit to transport it …

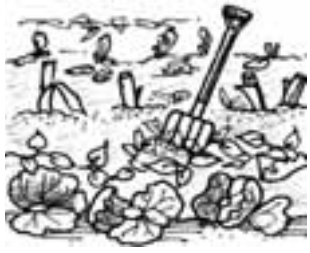


… so it won't get hurt.

Do not store in the sun.

This will ruin your crop.

Leave the old plants in the soil.



They are good compost.

In preparation for preparing food:

1. Keeping food
2. Food hygiene

Preparing food:

3. Preparing food
4. Cooking in the garden
5. Conserving and preserving

ABOUT THESE LESSONS

Food hygiene practices are based on an understanding of the dangers of "invisible dirt" (i.e. bacteria). This set of lessons focuses on ways of eating raw food and ways of conserving food value, and on cooking and eating as social activities and the culmination of gardening work.

1. KEEPING FOOD

THE ROT RACE

This lesson introduces the general principles of food decay and food conservation. It can be done as a preliminary to Lesson G5 **Conserving and preserving**, or as a pair with Lesson F9 **Harvesting**. The experiment needs to be followed up over the course of a week.

LEARNING OBJECTIVES

Learners

- share knowledge of how to keep foods fresh
- recognize the causes of food decay and observe the process of decay.

RESOURCES NEEDED

- a few fresh garden foods (e.g. carrot, celery, salad, fruit), gathered by learners if possible
- small pieces of paper about 10 cm x 20 cm
- running water to wash foods

PREPARATION

- Learners ask their families *How do we keep food fresh? What happens to fresh foods if we leave them?* Tell them to come to class with some true stories about particular foods.
- Ask them to come with hands washed (with soap and running water).
- Prepare your own story about some food which went bad. Include members of your family in the story, and some dialogue.

LESSON

1. **Lead-in** Check that learners have washed hands. Wash foods in front of learners. Cut each food in two and put half aside. Divide the rest into small pieces, giving everyone a piece to eat. Say this is the best way to eat foods: freshly gathered, washed in clean water, eaten the same day. Savour the food and urge learners to do so.

2. **Keeping food fresh** What if we want to eat the rest the next day? How do we keep food fresh? Learners report on what families do. Older learners check the **Guide** to match ideas.

3. **Reasons** What happens if we leave fresh food? Tell your own story about a piece of food which went bad. Collect learners' own stories and ask follow-up questions (e.g. *So why did it go bad? What did your mother say?*).

4. **Rot Race** The leftover pieces of food will take part in a "Rot Race" to see which ones keep best. Groups adopt pieces of food and decide where to leave each one (e.g. outside in the shade, in a tree, on a shelf). For each piece they take a small piece of paper. On one half they write the name of the food and a prediction about what will happen – e.g. *dried up, eaten, mouldy*. On the other half they put the food and a small stone to hold down the paper.

Learners monitor their foods every day for a week, observing closely and reporting what happens. At the end of the week they describe them. This is good for vocabulary extension: possible new words are *dehydrated, dried up, withered, wrinkled, limp, shrunk, wilted, mouldy, rotten, smelly, liquefied, soft and squashy; inedible, uneatable.*

FOLLOW-UP

1. **Tell the family** Learners tell families what happened to their foods.

2. **Horror stories** Older learners write up their own horror stories of food which went bad, saying why, giving a full description (smell, touch, sight), and describing people's reactions.

LESSONS IN OTHER SUBJECTS

Language Descriptive vocabulary

Biology Decay

KEEPING FOOD FRESH

MICE

RATS

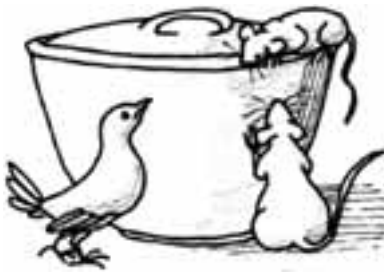
BIRDS

INSECTS

They eat our food.
They carry our food away.
They make it dirty.

SO....

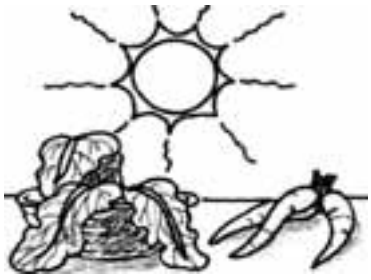
Keep food in containers.
Keep animals away.



DRY AIR

THE SUN

THE HEAT



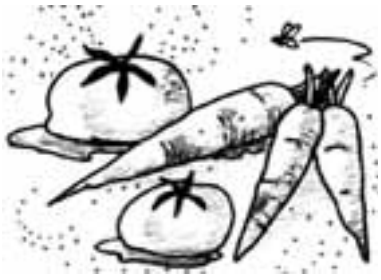
They take out the water.
They dry up the food.

SO....

Keep food cool.
Keep it out of the sun.

BACTERIA

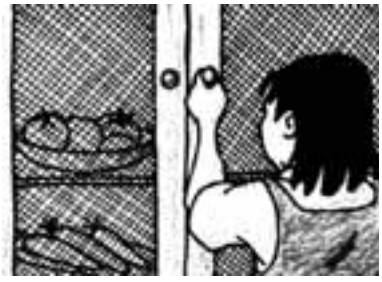
FUNGI IN THE AIR



They make food mouldy.
They make food rot.
They like it warm, wet and light.

SO....

Don't keep damaged food.
Keep food cool and dry.
Keep it in the dark.



2. FOOD HYGIENE

This first lesson on food preparation focuses on food hygiene. It is best given in a kitchen, using real utensils. Learners have to learn two things. One is to understand why hygiene is necessary; the other is to practise hygiene routines. Both take some time to learn: this lesson only introduces them. N.B. If learners have not yet learnt about bacteria, talk about *dangerous dirt, dirt you can't see* or *invisible dirt*.

LEARNING OBJECTIVES

Learners
- recognize the danger of "invisible dirt" (bacteria and moulds) and how to avoid it
- become familiar with hygiene routines in preparing food.

RESOURCES NEEDED
- two glasses of water, one clear, one muddy
- some simple pieces of food to prepare and the necessary equipment (it is simplest if the food can be eaten raw)

If it is not possible to use a real kitchen, bring (or ask learners to bring) knives and spoons, soap, a basin and cloths for cleaning and covering food.

PREPARATION

Learners ask at home what needs to be clean when preparing food, and why.

LESSON

1. **Lead-in** Show the class a glass of muddy water and ask if it is clean or dirty. Show the clear water and ask the same question. Ask learners to think well. Help them to see that we know the muddy water is dirty, but we *don't know* that the clear water is clean. It could contain dangerous bacteria (invisible dirt) which can make us sick. Mime drinking the dirty water (*Is this dangerous?*) and let learners stop you. Do the same with the clear water.

2. **Where are they?** Bacteria like water. Emphasize that they also need food. They love to be wet and warm. Cooked food, damp food, sunlight, warm water and warm bodies are all good places for them. Look around the kitchen (or at **Guide A**) and ask learners to guess where invisible bacteria might be lurking.

3. **Routines** How do we beat bacteria and defeat the dirt? The slogan is "clean, cold, covered". Tell the class we will prepare some simple food they know well (e.g. grated carrot) so they can learn some of the Ten Steps to Safe Food (see **Guide B**). If you are not in a kitchen, indicate a pretend tap, sink, work surface and cooker. Demonstrate the routine below. Pause before each step to ask learners what comes next.

FOOD PREPARATION ROUTINE

a) Check there is clean water and cleaning equipment (soap, scrubber, jug).
b) Check there are no insects around.
c) Wash hands with soap and running water, including nails.
d) Set up all the equipment you need and check that surfaces, utensils, containers are clean.
e) Wash foods in clean water.
f) Prepare foods (rubbish from plant foods goes to the compost).
g) Cover cooked food and put in a cool place.
h) Clear up and wash up.

4. **Guide** Pupils look at **Guide B**, find the steps that have been demonstrated and any new ones. They discuss why each one is important.

5. **Practice** Everyone washes hands. Groups prepare to demonstrate preparing another food in the same way.

FOLLOW-UP

1. **Home demonstration** Learners ask to prepare a food at home and demonstrate to their families the ten steps to food safety.
2. **Bacteria hunt** Learners go on a bacteria hunt round the school grounds, looking for rubbish, old food, bad smells etc. Give a point for each likely "black spot".

LESSONS IN OTHER SUBJECTS

Science Bacteria

WHERE ARE THE BACTERIA?

There are bacteria ...

- in dirty water
- on the feet of flies and other insects
- on dirty hands and under nails
- on work surfaces, on dirty equipment, in old food
- on the surface of fresh food
- drifting through the air onto cooked food

Can you find them in this kitchen?

CLEAN, COLD, COVERED:

TEN STEPS TO SAFE FOOD

1. Use clean water and cleaning equipment.
2. Keep away flies and insects.
3. Clean hands thoroughly (including nails) before preparing food – use soap and clean running water.
4. Separate raw and cooked food.
5. Check that everything is clean - work surfaces and utensils (pots, pans, knives etc.).
6. Cook food thoroughly, especially meat, poultry, eggs and seafood.
7. Wash fresh food in clean water.
8. Cover or wrap cooked leftover food.
9. Do not leave cooked food at room temperature for more than 2 hours; reheat leftover food.
10. Clean everything after preparing food.

3. PREPARING FOOD

This lesson is about getting full food value from your homegrown foods. It stresses raw foods, light cooking and conserving cooking water. Do it (in a kitchen if possible) when planning how to prepare garden foods. Younger learners do only the first three stages.

LEARNING OBJECTIVES

Learners
- describe local methods of cooking and food preparation
- appreciate the value of raw foods
- understand how to cook to conserve food value (older learners)
- try out new cooking methods (older learners).

RESOURCES NEEDED

For all: pieces of cooked food and (edible) raw food

For older learners:
- a few raw vegetables for cooking
- a cooking fire, or something to represent one (e.g. a cardboard box with holes in sides and top)
- a cooking pot with lid
- a frying pan or wok
- some small rocks for steaming
- water
- a grid for grilling food

PREPARATION

Learners find out how some fruits and vegetables are cooked, which ones are eaten raw and how they are prepared. N.B. If younger learners do not understand *vitamins*, use the word *food*.

LESSON

1. **Lead-in** Check that learners have washed hands (with soap and running water). Show some foods and ask which are raw and which are cooked. Learners sample the foods and discuss the difference in taste between raw and cooked foods (e.g. raw foods are crunchier).

2. **Raw foods** Learners report on foods which are often eaten raw and how they are prepared and eaten (grated, juiced etc.). Older learners extend **Guide A** with local examples. Ask which raw vegetables they like, and show warm approval of all preferences. Explain that raw foods are usually very good for us. Cooked vegetables too should be crunchy, not overcooked.

3. **Local cooking methods** Ask learners what they can cook (show approval of experienced cooks). Ask one or two class "experts" to describe how they themselves prepare particular vegetables (e.g. onions, pumpkin). Recall the ten steps to safe food from F2 **Food hygiene**.

4. **Getting full food value** (for older learners) Discuss how much water is best for cooking vegetables. Explain that we must keep the food in the vegetables. How do we do this?

a) Demonstrate *boiling*. Put vegetables in water in a pot and boil them (in reality or in mime). *What happens to the food/vitamins in the vegetables?* (Some come out in the water.) Demonstrate throwing the water away. *What happens?* (We lose the food/vitamins in the water.) *How can we save the food/vitamins?* (Use less water; make a sauce with the water.)

b) Demonstrate or mime *steaming* (as in **Guide B**). *Is this better than boiling?* (Yes, because the food/vitamins stay in the vegetables.)

c) Demonstrate any one-pot local dish (e.g. rice with vegetables). *Is this a good way to cook?* (Yes, because nothing escapes – we eat all the food.)

d) Demonstrate *grilling* vegetables on a grid. *Is this good?* (Yes, because nothing escapes.)

e) Finally, demonstrate *stir-frying*. *Is this a good way to cook?* (Yes, because it's light cooking, and many of the vitamins stay in the food.)

Get learners to draw conclusions about the effects of different cooking methods.

FOLLOW-UP

1. **Carrot colour** If time permits, do the "Cooking Carrots" experiment shown in **Guide C**.

2. **Home trials** Learners try out steaming, grilling or stir frying at home and report back.

3. **Our raw food** Learners make an illustrated table of raw local foods as in **Guide A**.

LESSONS IN OTHER SUBJECTS

Nutrition/Home Economics Nutrients in foods

HOW DO WE EAT RAW FRUIT AND VEGETABLES?

WHOLE
For example,salad, celery, tomatoes, nuts, young peas

WHOLE, WITH DRESSING
For example, pawpaws, avocadoes, grapefruit

PEELED
For example, bananas, oranges, grapefruit, passion fruit

WASH THEM ALL WITH CLEAN WATER!

CUT UP
For example, sweet peppers, cucumber, melon, celery

GRATED
For example, carrot, apple, cabbage

JUICED
For example, grapefruit, passion fruit, tomato, carrot

WHAT FOODS DO YOU EAT RAW?
HOW DO YOU EAT THEM?

HOW DO WE COOK OUR FOOD?

Don't kill nutrients with overcooking.

Don't throw nutrients out with the water.

KEEP THE NUTRIENTS IN !

STEAMING

More nutrients stay in the food.

"CONSERVATIVE" COOKING

Use very little water. Keep the water for soups.

ONE-POT COOKING

Make dishes which include the cooking water.

STIR FRYING

Cut food very small and cook very quickly in a small amount of hot fat.

BAKING AND GRILLING

Cook thin slices over the fire or in the oven.

COOKING CARROTS

PURPOSE: to determine what cooking method preserves the most vitamins

MATERIALS: carrots, stove, steamer, two pots, clear glasses or glass bottles

PROCEDURE:

1

Slice up the carrots.
Divide them into three heaps.

2

Boil one third of the carrots.
Steam one third of them.
Keep one third raw.

3

When they are cooked, pour the water from the boiled carrots into a clear glass or bottle, and the water from the steamed carrots into another.

RESULTS:

The orange colour of the water is the vitamins that have come out of the carrots.

The more orange the water, the more vitamins have come out of the carrots.

Which water is darker?

Which cooking method has taken more vitamins out of the carrots?

Which carrots now contain more vitamins – the boiled ones or the steamed ones?

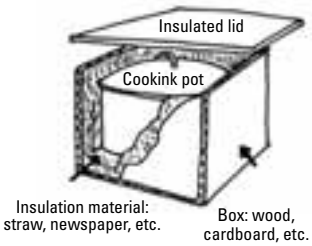
What about the raw ones?

Which cooking method preserves more vitamins?

Adapted from Kiefer and Kemple (1998)

N.B. This experiment can also be done with spinach or squash.

4. COOKING IN THE GARDEN



Cooking in the garden is a social occasion which gives high focus to garden products and can demonstrate environmentally friendly cooking methods. This lesson promotes the haybox, which uses minimum fuel and is easy to make. Other homemade outdoor fuel-saving cookers are solar ovens and cob ovens.

LEARNING OBJECTIVES

Learners
- know the main local cooking fuels; older learners know and compare costs
- can use one fuel-saving cooking method; older learners can explain how it works.

RESOURCES NEEDED

- a cooker of some sort (small fire or stove)
- a pot with a lid
- water
- some food which needs long cooking (e.g. rice, sweetcorn, beans) and which will produce an edible dish
- materials for a haybox (see **Guide B**)

PREPARATION

- Prepare a haybox with learners' help.
- To prepare for the class, younger learners find out what kind of cooker is used at home and what fuel is used. Older learners also find out where their fuel comes from and what it costs - in money or in time (e.g. for gathering firewood).

LESSON

1. **Lead-in** Learners describe their home cookers. Use **Guide A** for identification and comparison if necessary. Older learners discuss the costs of the various fuels (wood, gas, oil, electricity), write up the information and decide which fuels are very expensive.

2. **Demonstration** *How can we use less fuel?* Together, look at what happens when we cook food.

a) Light the cooker, put water and food in the pot and put it on the heat.

b) Learners gather round and hold their hands to the pot. *Can we feel the heat?* (Yes) *So where is the heat going?* (Out of the pot) *We are losing heat and wasting fuel! We are heating our hands instead of our food. How can we keep the heat in the pot?* Gather learners' ideas.

c) Present the haybox or "wonderbasket". It saves fuel because it cooks without a fire. Take the pot from the fire, put it in the haybox and close it. Learners hold their hands on the haybox. *Can we feel the heat?* (No) *Where is the heat?* (In the pot, cooking the food)

4. **Insulation** Older learners discuss what is happening. *How does the haybox keep the heat in?* (By wrapping the pot) This is called insulation. The food goes on cooking slowly, with no fire.

5. **Opening the pot** Fix a time to open the pot several hours later. Put up a big notice saying THE WONDERBOX WILL BE OPENED AT ...(time). When the moment comes, build up suspense before opening up. *Will the food be raw and cold? Will it be cooked, ready to eat, still hot?* Learners open the pot and report on what they find. Then share out the food.

FOLLOW-UP

1. **Home reports** Learners tell their families about the haybox.

2. **Poster and talks** Older learners make a poster of cooking methods and fuel costs and give talks about cooking methods to other classes using the poster.

3. **Demonstration** Learners give a haybox demonstration for families and school visitors.

4. **Further projects** Build a solar cooker or a cob oven for outside cooking in the school yard.

LESSONS IN OTHER SUBJECTS

Science Heat insulation, fuel efficiency, radiant heat

CONVENTIONAL COOKING METHODS

OPEN FIRE

Not very economical or efficient: a lot of heat is lost

OPEN FIRE WITH COOKING STAND

More efficient but still uses a lot of fuel

GAS CYLINDER

Quite efficient, but expensive

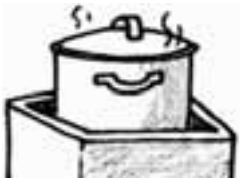
GAS/ELECTRIC COOKER

Efficient but expensive

THE HAYBOX: A FUEL-SAVING COOKER

The haybox or "wonderbasket" is an insulated bag or box. You heat up the food in a pot, put the pot in the box and leave it to cook in its own heat. It saves a lot of cooking fuel and keeps the food hot for when you want to eat it. Hayboxes are good for anything that needs long cooking, e.g. soups, relishes, stews, rice, beans, vegetables and cereals.

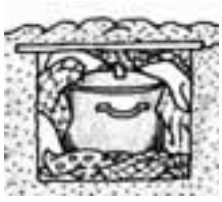
DIFFERENT KINDS OF HAYBOX



a box

a basket

a bag or sack



a hole in the ground

DIFFERENT KINDS OF INSULATION

Use things which create many little pockets of air, for example:

wood shavings

newspaper

feathers

rice husks

HOW TO USE THE HAYBOX

1 Put all the ingredients in the pot.

A black pot is best, with two handles at the top.

2 Heat pot to boiling.

You use less than half the fuel!

3 Put the pot in the haybox.

Lining the box with foil reflects the heat inwards.

4 Cover with an insulated lid.

The important thing is to keep the heat in.

5 Leave for several hours: it cooks by itself.

If you start it in the morning it will be ready to eat, and still hot, by lunchtime.

5. CONSERVING AND PRESERVING

Preserving food may be essential to maintaining a good diet through the year. Preserving processes can be practised in the school setting, repeated at home, and promoted by taking samples home, inviting visitors to try them, or selling the products in the community.

LEARNING OBJECTIVES

Learners
- understand the principles of food conservation (protection against pests, bacteria and fungi)
- can give examples of local food conservation practices
- participate in preserving foods, and can explain the process.

RESOURCES NEEDED

Samples of preserved/processed foods from several of these categories:
- dried foods (e.g. peas/beans, grains/seeds, dried fruit, dried fish, green leaves, tea, coffee)
- foods which keep well on their own (e.g. onions, sweet potatoes, pumpkin)
- foods preserved with sugar (e.g. jam, fruit leather)
- oil (e.g. palm oil, sunflower oil)
- pickled foods (preserved in salt or vinegar)
- bottled or canned foods (e.g. tomatoes, juice)
- flour (e.g. maize, wheat, cassava, banana)
- smoked foods (e.g. fish, meat)
- frozen food (with its packet)
- any other (e.g. cured foods like ham)

PREPARATION

Learners prepare for the lesson by finding out
- what foods are stored at home
- how they are stored/preserved
- why they don't go bad.

Learners bring samples of stored food to the class, especially home-grown or home-preserved ones.

LESSON

1. **Lead-in** Describe a recent meal. Ask learners which ingredients they think were fresh and which were stored. Ask *What foods do we preserve?* Collect samples and spread them around.

2. **Conserving food** Learners recall the two main risks for stored food: getting eaten and going bad. Ask the questions

- What eats our food? How do we stop them?
- How do foods go bad? Why? How do we stop it?

Give older learners the questions in a table, as below and allow groups 5 minutes to brainstorm. Groups feed back and write up answers.

Getting eaten

a) What eats our food? (e.g. flies, birds, weevils, insects, ants, rats and mice)

b) How do we stop them? (e.g. with containers, neem tree leaves, rat baffles, mouse traps)

Going bad

c) How do foods go bad? (e.g. black bananas, mouldy oranges, fuzzy tomatoes)

d) Why? (Bacteria/fungi cause decay - tiny invisible living things which love damp, light and warmth.)

e) How do we stop it? (Kill bacteria or stop them – e.g. drying, boiling, cooking, keeping cool (see **Guide A**).)

3. **How do we preserve foods?** Look again at the samples and collect information about methods of preserving or conserving, containers etc. For older learners, give each group a few samples, let them discuss how each food is conserved and why it works, then report back.

FOLLOW-UP

1. **Posters** Learners make a poster in four columns. Each draws or describes one item (e.g. one pest, one way to stop it, one mouldy food, one way of conserving food) on a card or paper and sticks it on the poster. Train learners to explain the poster to visitors or other classes.

2. **Home preserves** Groups research a local home preserving process, learn how to do it and report on it. Collect the reports into a booklet.

3. **School project** Do a small food preservation project in school with garden produce (see **Guide B** for ideas).

LESSONS IN OTHER SUBJECTS

Science Bacteria

HOW WE PRESERVE FOOD

KILL BACTERIA AND FUNGI. STOP THEM GROWING.

Use good containers

Keep out the air

Always put a label on, with the date

Keep dry

Bacteria need water: a little toasted white rice keeps foods dry.

Keep cool

Most bacteria don't like the cold and dark.

Add preservatives

Sugar and salt can stop food going bad.

Boil and cook

Boiling kills bacteria, but it also destroys some vitamins.

Dry and cure

Don't dry in direct sunlight.

Freeze and can

Freezing kills some bacteria and stops others.

Pickle

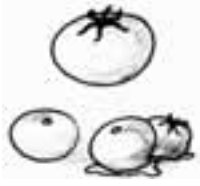
Salt and vinegar kill bacteria.

Make flour

Keep flour airtight and dry.

GENERAL RULES FOR PROCESSING FOODS

Harvest in the cool of the evening.



Choose ripe, undamaged items.

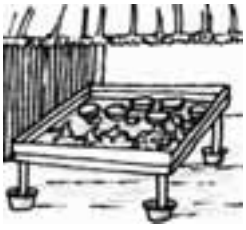
Cut out bad bits.

Sterilize equipment.

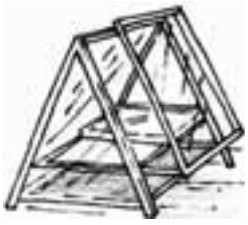
TEN SIMPLE FOOD-PRESERVING PROJECTS

HANG UP strings of onions, garlic, chillies, herbs, bunches of cherry tomatoes, in a cool shady airy place.

CURE SWEET POTATOES, YAMS, PUMPKINS by leaving them in a warm shady airy place for a week after harvesting. The skin will thicken and they will keep better. Then store in a dark cool dry place.



DRY FRUIT AND VEGETABLES in an airy open-sided shed. Put slices of food on a rack/mat/tray well off the ground with its legs in water to prevent climbing insects. Turn every day until dry (vegetables) or leathery (fruit). Thin foods (e.g. green leaves) can be dried whole. Dry legumes and oilseeds on the plant. Store in a cool dry protected place.



SOLAR DRYING is faster and preserves nutrients better. A solar drier is basically a box or frame with a plastic cover and is not difficult to construct. Fruit/vegetable strips and slices take about three days, green leaves about two days. Store dried food in airtight containers and label.

FLOUR can be made from (for example) pumpkin, banana, sweet potato, breadfruit and cowpeas as well as from cereals. Use in cakes, biscuits, pancakes and complementary feeding. Dry the food, then pound, sieve and store in an airtight container. For banana flour, pick bananas when three-quarters ripe. Heat them, peel and slice them, then dry the slices. Pound into flour, then sieve, store and label.

FRUIT LEATHERS are made by cooking fruit, pulping it, then drying it. For pumpkin leather, wash, peel, cut up and cook the pumpkin, purée, strain, add honey and spices, spread on an oiled tray and dry in a solar drier. Cut the leather into squares, wrap in cellophane and label.

PICKLED CUCUMBER Wash 3 kilos of firm, fresh, medium-size cucumbers and put in a deep bowl. Mix salt and water enough to cover the cucumbers. Let stand for two days. Drain, rinse and slice. Put 10 cups of sugar, 10 cups of white vinegar and some pickling spice in a pot and bring slowly to the boil to dissolve the sugar. Add sliced cucumbers to the hot syrup for a few seconds, then pack into clean hot jars. Fill jars with hot vinegar-sugar solution, seal and label.

Cooks Com (2004)

[1]Pickling spice has a lot of different spices, e.g. cinnamon, mustard seed, bay leaves, allspice, dill, cloves, ginger, peppercorns, coriander, juniper,mace, cardamom, chilli. Use whatever you have.

KANJI PICKLED CARROT DRINK This is popular in India. Wash a kilo of carrots and grate them into a jar/bottle. Add 7 litres of clean water, 200g salt and some hot spices (e.g. chilli, mustard seed). Close tightly, leaving a tiny hole for gases to escape. Ferment for 7-10 days. Strain. Consume within 3-4 days.

Battcock and Azam-Ali (1998)

BOTTLED TOMATOES Use plum tomatoes, ripe but hard. Wash well and remove bad bits. Dip in boiling water for 30 seconds, cool in water, then peel. Fill jars with tomatoes. Add a small spoon of lemon juice/vinegar to each. Seal while hot. Cover jars with water in a deep pan, with straw to stop rattling. Boil for 30 minutes (small jars) or 50 minutes (big jars). Let cool and label.

FAO Rural Processing & Preserving (1985)

GUAVA JUICE Choose firm ripe guavas. Wash, cut off the ends and slice. Cover with water in a large pot. Boil until very soft (15-20 minutes). Pour into a bag of rough cloth and let the juice drip through. Drink it right away. To bottle it, sterilize bottles and lids, boil the juice again, pour into hot bottles, seal and label.

For planning the work:

1. **Project plan**

For publicity:

2. **Showing and telling**

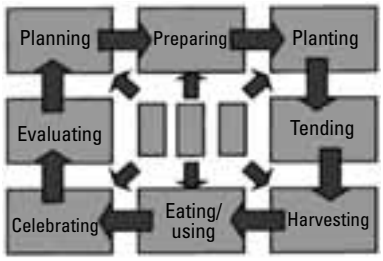
For wrapping up the year's work:

3. **Evaluation**
4. **Celebrations**

ABOUT THESE LESSONS

These four lessons are important for raising awareness – among learners, families, the school and the public. Lesson 1 **Project plan** sums up garden project plans and gives a framework for organizing the work. It should be done after planting has begun, but near the beginning of the growing season. Lesson 2 **Showing and telling** should be done in good time to get learners involved in some useful publicity before the end of the school year. Lesson 3 **Evaluation** should come near the end of the project, in time to make outline plans for next year. Lesson 4 **Celebrations** comes just before the celebration itself so that learners can help to plan the final social event of the gardening year.

1. PROJECT PLAN



This lesson should be done once the main decisions have been taken and garden work has started. It gathers the information and ideas which have been discussed and helps learners to summarise them. This recalls aims, clears up misunderstandings, lays a basis for later evaluation and prepares learners for presenting the project to the outside world.

LEARNING OBJECTIVES

Learners

- make their objectives and expectations explicit
- (older learners) create a summary of the project plan which can be presented to the outside world.

RESOURCES NEEDED

Large flipchart sheets for questionnaires

PREPARATION

- Find someone who is prepared to receive, read and respond to the summary produced in this lesson (e.g. the head teacher, the teaching staff, the School Board, the PTA, a school adviser, well-known garden visitors, a sponsor - someone who genuinely wants to know!)
- Copy **Guide A** (for younger learners) or **Guide B1** (for older learners) on a large sheet of paper and pin it up.

LESSON

1. **Lead-in** Explain that someone outside the school wants to know about the garden project (say who it is) and has asked for a summary (on one page). This lesson is to prepare the summary.

2. **Questionnaire** (for younger learners) Discuss the questions in **Guide A**, agree on the answers and write them in.

3. **Questionnaire** (for older learners)

a) Divide the class into groups; give one part of the questionnaire (**Guide B1**) to each group and allow 15 minutes for discussion and drafting. Each group appoints a secretary to record ideas. Indicate important points to be covered (see **Guide B2**). Circulate to listen and help.

b) Groups feed back to the whole class. Encourage learners to listen to each others' ideas and suggest improvements and additions (but suggest that they keep it short!). Make your own contribution. At the end of each section the secretary reads aloud the draft for the whole class's approval.

4. **After the lesson**, deliver the project summary to its intended audience and ask for a reply. This can be a written reply, or (better) a visit to the class and the garden to comment and ask questions, or (best of all) both visiting and writing.

FOLLOW-UP

1. **Final drafts** Group secretaries produce a final draft (dated) of the project summary, and make copies for the Garden File and for the person who asked for the report.

2. **Visual project summaries** Learners use the information in the project summary to create an explanatory flow-diagram for presentations (as in **Guide C**), a publicity poster (as in **Guide D**), or a crop calendar / work plan (as in **Guide E**).

3. **Practising presentations** Find other willing audiences and train learners to present the project in pairs, using one of the visual devices in **Guides C**, **D** and **E**.

LESSONS IN OTHER SUBJECTS

Language/Writing Summary, drafting collective reports, presentations

PROJECT SUMMARY QUESTIONNAIRE

(for younger learners)

	QUESTION	ANSWER
Project	What is our project? What is its name?	
Aims	What do we want to grow? What will we do with the things we grow? What do we want to learn?	
Activities	How much will we plant, and where? What work will we do in the garden? Who will help?	
Inputs	What will we need? (seeds, tools, water etc.)	
Monitoring	What will we need to check every week?	
Information	Who will we tell about it?	
Celebration	When will we celebrate, and how?	

PROJECT SUMMARY QUESTIONNAIRE

(for older learners)

	QUESTION	ANSWER
Project	What is our project? What is its name?	
Aims	What are our general aims?	
Objectives/targets	What exactly do we want to produce? What exactly do we want to learn?	
Activities	What will we plant, how much and where? What will we need to do in the garden? How will we organize it? Who will help, and how? Apart from growing plants, what else will we do? How will we maintain and improve the garden?	
Inputs	How much time will be required? What inputs will we need? (seeds, tools etc.) Where will we get them?	
Time frame	What is the schedule of activities?	
Monitoring	What do we need to keep track of? What kind of records will we keep?	
Information	Who will we keep informed? And how?	
Publicity	How will we publicise garden activities and create positive attitudes to our project?	
Evaluation	How will we evaluate our project? And when?	
Celebration	When will we celebrate, and how?	

PROJECT SUMMARY QUESTIONNAIRE - CHECKLIST OF POINTS

	QUESTION	ANSWER
Project	What is our project? What is its name?	
Aims	What are our general aims?	E.g. better eating, better health; learning gardening; improving the school environment; making money
Objectives/ targets	What exactly do we want to produce?	E.g. a certain amount of a particular crop; some aspect of garden infrastructure (paths, hedges); a number of flowering plants; x square metres of herbs for sale
	What exactly do we want to learn?	How to grow particular plants; particular garden activities (e.g. pruning, potting, making compost); how to sell vegetables successfully; how to manage a project; which insects are beneficial)
Activities	What will we plant, how much and where?	E.g. the number of plants, number of square metres, garden plan showing locations
	What will we need to do in the garden?	Outline of activities (e.g. sowing seeds, transplanting, watering, weeding, harvesting; making compost)
	How will we organize it?	E.g. time per week, teams or groups
	Who will help, and how?	E.g. parents, visitors, sponsors, teachers
	What else will we do?	E.g. cooking, preserving, packaging, studying insects
	How will we maintain and improve the garden?	E.g. enriching the soil, putting up fences, making a bird bath, creating amenities, garden art

(continued)

	QUESTION	ANSWER
Inputs	How much time is needed?	Estimate of hours per week per person
	What inputs will we need?	E.g. seeds, tools, water, buckets, seed trays, packages, pots, fuel for cooking, knapsack spray
	Where will they come from?	E.g. bought, borrowed, found, lent
Time frame	What is the schedule of activities?	Outline of what will happen each week/month, including planting, harvest, processing, garden events, sales, evaluation, celebration
Monitoring	What do we need to keep track of?	E.g. money, plant growth, weather, production, pests, work done, time spent, control experiments, visitors
	What kind of records will we keep?	E.g. garden diary/log, accounts, photos, drawings/plans/maps/diagrams, booklets, garden file, letters
Information	Who will we keep informed? And how?	E.g. the school, the PTA, parents, sponsors, the local community, the local newspaper
Publicity	How will we publicise garden activities and create positive attitudes to our project?	E.g. letters, talks and presentations, articles, Open Days, stalls and sales, take-home products, free gifts, talking to families
Evaluation	How will we evaluate our project? And when?	E.g. by looking back at our objectives and aims, halfway through the project and at the end
Celebration	When will we celebrate, and how?	Up to you - but there should be a celebration!

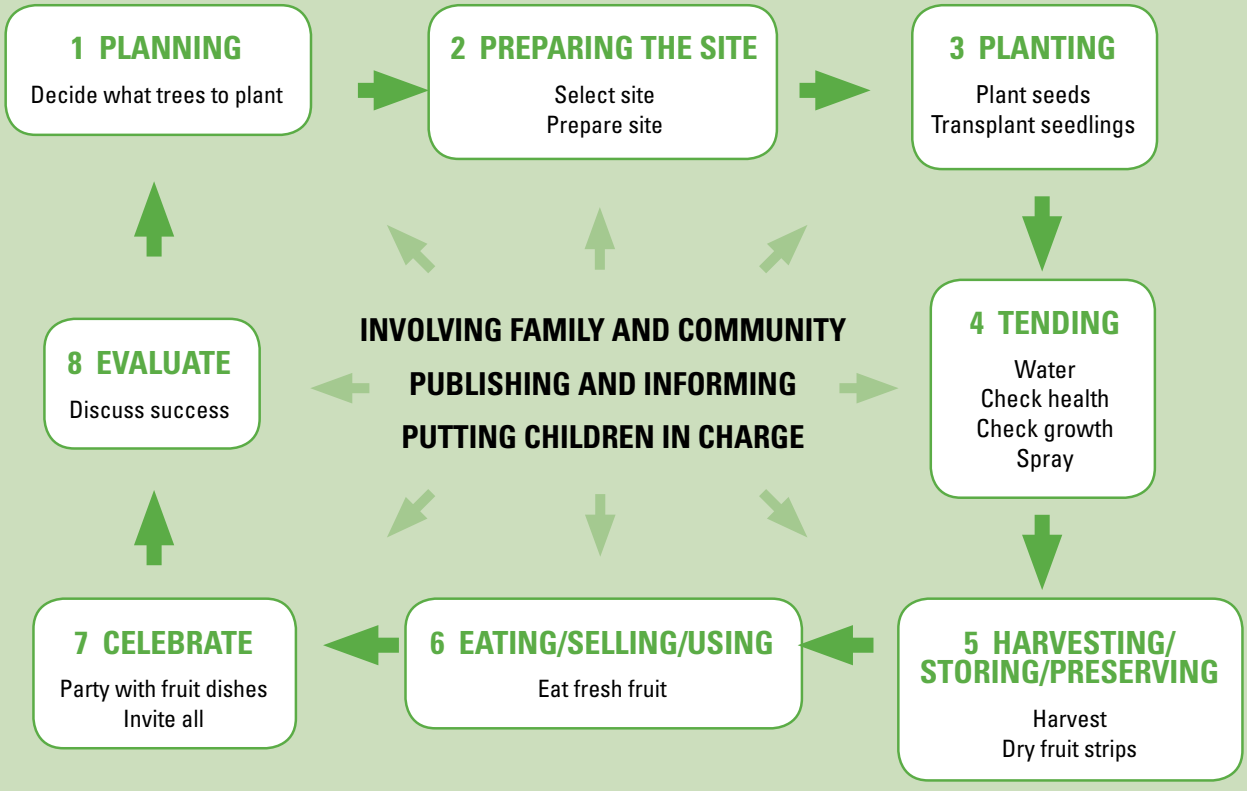
FLOW DIAGRAM

A flow-diagram shows the project activities at a glance. Here the objectives come first. The main stages are in the boxes of the diagram. Inside the diagram are ongoing activities (e.g. informing) and some of the important conditions (e.g. involving family and community).

PLANTING FRUIT TREES: THE PROJECT AT A GLANCE

General objectives

- To grow ten papaya trees to provide fruit for the school
- To get advice and information from local growers
- To learn how to grow papaya and harvest the fruit
- To learn how to make nutritious dishes and snacks with papaya
- To learn how to dry papaya strips
- To learn the nutritional value of papaya and some other fruits
- To learn a little about the papaya export market



ILLUSTRATED POSTERS

This poster is about the "**Four C's**" garden project. It shows some of the project's objectives and makes the project easy for learners to explain to outsiders.

C C C C

GARDEN PROJECT **"FOUR Cs"**

CARROTS, CABBAGES, COWPEAS AND COMPOST

WHAT WE ARE DOING IN THE GARDEN THIS YEAR

This is an appeal for help for the "**Four C's**" garden project. It explains the objectives and activities and links them to the specific help required.

CAN YOU HELP US?

Cowpeas help us to grow.

We are growing cowpeas.
We'll dig some into the soil.
We'll eat some.
We'll dry some.

CAN YOU HELP US
TO DIG IN THE COWPEAS?

CAN YOU HELP US
TO COOK THE CARROTS?

Carrots and cabbages keep us healthy.

We are growing cabbage
and carrots to improve our diet.
We will eat them at school.

Compost is good for the soil.

We are making compost.
We will put it around the vegetables.

CAN YOU HELP US
TO TURN THE COMPOST?

CAN YOU HELP US
TO PLANT THE HEDGE?

Hedges protect the garden.

We are growing hedges to keep out the goats.
The hedges will take two years to grow.

CROP CALENDAR

A calendar makes it possible to see the whole project at a glance, to look back at what you have done and to plan for the future. Spread the calendar across a whole wall, giving plenty of space to each month. You will then be able to add items under each month – e.g. visits and events, cooking and processing activities, sales, lessons, work schedules, garden diary, pictures, photos, displays.

Activity	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8	Month 9
Compost 1	Start heap	Turn	Turn	Use	Use			Start new compost heaps	
Compost 2		Start heap	Turn	Turn	Use	Use			
Compost 3			Start heap	Turn	Turn	Use	Use		
Carrots			Sow seed	Sow seed Thin out	Thin out	Harvest	Harvest	Harvest	Harvest
Cabbage	Sow seed	Transplant Sow seed	Transplant Sow seed	Transplant	Harvest	Harvest	Harvest		
Cowpeas					Sow seed	Sow seed		Harvest	Harvest and dry
Yucca fence	Plant cuttings	Check fence	Check fence						
Help needed	Finding cuttings	Turning compost	Turning compost	Turning compost	Turning compost				Digging in cowpea plants

2. SHOWING AND TELLING

Telling people about the garden and showing them what you are doing ties the school closer to the community, inspires people to help, brings in contributions and helps learners learn by talking. The information that is communicated is not nearly as important as the enthusiasm and interest aroused. Involving learners in this "garden publicity" makes them aware of what they are doing, proud of it and able to express it.

LEARNING OBJECTIVES

Learners

- think who to tell, why, and what, and decide how to do it.

RESOURCES NEEDED

- paper cut-outs representing people OR stick figures drawn on the board

PREPARATION

It is discouraging to send messages and get no reply! Prepare the ground for this activity by finding out which individuals or groups in the school and community will respond positively to hearing from school learners. This will help you to guide learners' choice of who to tell.

LESSON

1. **Lead-in** Recap garden plans, activities and events, e.g. *What has happened so far?* (We've made a plan; we've sown seed; we're about to transplant; we made compost but not enough; we got scratches from the thorny bushes; I tore my shirt etc.). Ask: *Who did you tell about these things? Who did you show?*

2. **Audience**

a) Ask: *Who else would we like to tell or show? Why?* Expect younger learners to suggest family, neighbours, school personalities etc. Older learners may see wider possibilities (see **Guide**). Add your own suggestions. Allow all reasons, even trivial ones.

b) As suggestions are made, learners label the paper cut-out figures and stick them up (they may also add specific information – e.g. long legs, name of shop, address).

3. **Selection** The class picks out a few figures as examples (make sure that they are people who will respond positively to being approached).

4. **The message** *What shall we tell them about? What shall we show them?* Older learners may focus on specific needs (e.g. for help, sponsorship, customers). Younger learners may simply want to show and tell.

5. **How?** Older learners browse the **Guide** and discuss different approaches. For younger learners pick out two or three possibilities and ask which they would prefer.

6. **Planning** Learners plan their "show and tell" campaign. Keep it small.

FOLLOW-UP

Campaign Carry out the campaign. The teacher should help by making personal contact with the recipients and ensuring that learners get some kind of feedback.

LESSONS IN OTHER SUBJECTS

Business Studies Marketing

Communication Audience awareness

SHOWING AND TELLING: WHO, WHY, WHAT, HOW?

Who shall we tell?

The general public
Other schools
Parents and families
The local newspaper
Local organizations (church/mosque? youth groups?)
The whole school / other classes / other teachers
Garden helpers and friends
The local radio

Why?

Because they are interested
To spread our fame
To use their knowledge and skill
To get help
To find markets
To show them what we are doing

What shall we tell them / show them?

Our garden
Our products
Our project plan
Our problems
Accounts/figures/data
Funny things that have happened
Achievements (what we've done)
Our activities (what we're doing) and events

How?

Guided garden tours and visits
Letters, circulars, newsletters
Labels and packaging
Picture and photo display
Talks/presentations
Samples/free gifts

Fund thermometer
Book of garden stories
Articles in local newspapers
Exhibitions, displays, panoramas
Pictures, photos, drawings
Showing and telling at home
Play or dramatization

Posters, notices, fliers
Interview on radio/TV
Personal greeting cards
Garden documents (e.g. file, homemade books, maps)
Special events – e.g. Open Day, party, show, food tasting, Bring and Buy, auction

For special people

Tell them what you are going to do

Tell them that you are doing it

Tell them that you have done it.

Then invite them to the party!

3. EVALUATION

The first question to ask in an evaluation is *What happened?* Then the standard evaluation question is *Did we do what we set out to do?* This leads to better planning for the future. But a year's gardening may have all sorts of outcomes and cannot be evaluated only in this way. Other important questions are *What did we learn? Did we enjoy it? Were other people interested?* and (most revealing) *What shall we do next time?*

LEARNING OBJECTIVES

Learners
- recall the year's gardening and its ups and downs
- reflect on the year's gardening horticulturally, educationally and as a general experience
- acknowledge others' help
- make plans for the coming year
- congratulate themselves.

RESOURCES NEEDED

- aims and objectives from the project summary (Lesson H1 **Project plan**)
- project records (e.g.diary/log/file/photos/drawings/correspondence/accounts)
- three rosettes in different colours or sizes marked Excellent, Good, Not bad, with the class name and the year (see **Guide A**)
- three cardboard badges labelled *Great Gardener* (see **Guide A**)

PREPARATION

Learners assemble and display all documents and records of the gardening year.

LESSON

1. **Lead-in: Do you remember?** Go round the garden with the class, using each part to recall what happened and who did what during the season – triumphs, disasters, hard work, mistakes. Move on to the display of records and do the same. N.B. Do not be judgmental – it is for the learners to evaluate their own achievement.

2. **How did we do?** Discuss and summarise:
- What did we manage to do?
- What did we not manage?
- What went well? What went wrong?
- What did we learn?
- Did we have a good time?
- What will we do next year?

Older learners can make notes.

Learners doing market gardening projects can follow the questions in **Guide B**.

3. **Meeting the objectives** (older learners) Call on a student to read out the objectives and targets from the Project Plan. The class says how far they achieved these objectives, why or why not.

4. **Who helped?** Learners acknowledge help received from helpers, sponsors, local gardeners etc. and discuss how to thank them.

5. **Time for awards**

a) Show the three rosettes. Ask which one we should award ourselves: Excellent, Very Good, or Not Bad? The class choose the rosette they think is appropriate and hang it up.

b) Show the three "Great Gardener" badges. The class chooses the year's three top gardeners and award the badges.

6. **The congratulation circle** The class stand up and form a circle, facing inwards. They then turn sideways so they are one behind the other. They all raise their right hands and pat each other on the back - for a job well done!

FOLLOW-UP

1. **Write-up** Older learners (groups or individuals) write up the class discussion in four parts:

a) Our aims and objectives

b) What we achieved

c) What we learned

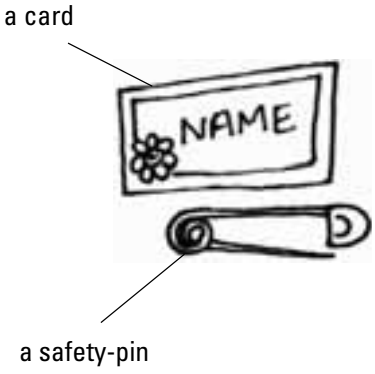
d) Plans for next year

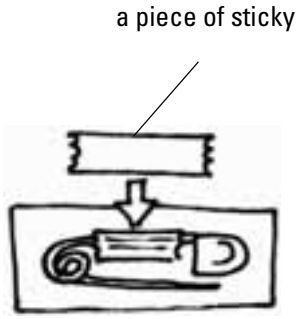
2. **Evaluation by others** Use the display of garden documents and learners' own evaluation to involve other interested parties in the garden evaluation.

3. **Thank-you's** The class sends thank-you letters, notes or cards to garden helpers, sponsors etc.

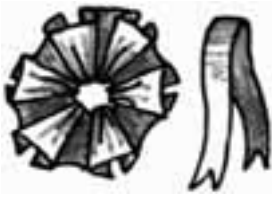
MAKING BADGES AND ROSETTES

BADGES





ROSETTES



Make a rosette of paper or cloth.

1

Fix the centre with cardboard circles.

2

Attach a safety-pin.

3

BUSINESS PLAN EVALUATION

At the end of a market gardening project, the evaluation should pick up the projections in the Business Plan. Learners write up the evaluation report and include it in the Project File.

4. CELEBRATIONS

Celebrate the harvest, the end of a market garden venture, a new garden feature or a successful year's work in the garden. Whatever the achievement, there should be a celebration and learners should have a hand in planning and organizing it.

LEARNING OBJECTIVES

Learners

- are aware of the need for a celebration and who should be involved
- help to plan and organize the event.

RESOURCES NEEDED

If possible, make one photocopy of **Guides A** and **B** and cut them up into separate items.

PREPARATION

Arrange a time when garden produce is available. Decide what aspects of the event to organize yourself and what contribution learners can make. Learners should be involved in social contacts, explaining, demonstrating and performing, producing documents and decorations, planning and organizing, and hospitality. The older they are, the more they can undertake. However, teachers will need to supervise learners' activities.

LESSON

1. **Lead-in** Announce the celebration and give the details already decided (e.g. date, place, time, general nature of the event).

2. **Planning discussion** The class discuss:

a) **The event** What shall we call it? Refer to **Guide A**.

b) **Participants** Who will be there? (make a list) How will we invite them?

c) **Programme** What will the programme be? How will we start/finish? Who will be involved in each part? Some ideas for the programme are given in **Guide B**: circulate the ideas and pictures for learners to discuss in groups.

d) **Refreshments** What will there be to eat and drink? How will it be served?

e) **Gifts** Can we provide a garden gift for everyone, e.g. a flower, a fruit, a recipe?

f) **Decorations and displays** What will we do for decorations/displays? What materials will we need? Who will be responsible for each task? (Make a list) Some ideas for decorations are given in **Guide B**.

g) **Jobs to do** What do we need to do? Can our guests contribute? Who will ask them?

FOLLOW-UP

Organizing Learners organize their part in the event.

SOME KINDS OF CELEBRATION

A FOOD FAIR OR OPEN DAY

A HARVEST FESTIVAL

A PARTY OR SPECIAL MEAL

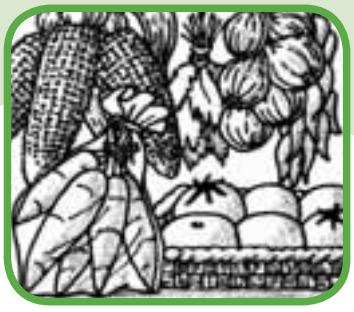
A GUIDED TOUR OR PRESENTATION

WAYS TO CELEBRATE

Make a photocopy of this Guide, cut up the items and circulate them in class for group discussion.

COMPETITIONS

FLAGS



DECORATIONS

GIFT-WRAPPED PRODUCE

DEMONSTRATIONS

GUIDED TOUR
AND EXPLANATIONS

DISPLAYS/EXHIBITIONS

PERFORMANCES

POSTERS

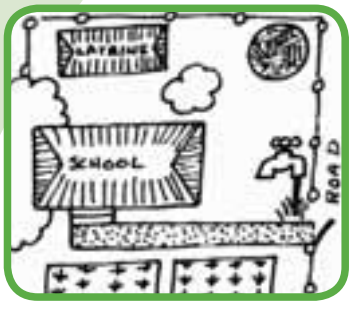
SPECIAL DISHES AND TASTING SESSIONS

PRESENTATIONS

STORY-TELLING

REFRESHMENTS

MAPS AND SIGNS



SONGS AND DANCES

PRIZE-GIVING

GUIDES: TOPIC INDEX

SETTING UP AND RUNNING A SCHOOL GARDEN

Teaching Toolkit

SOME OF TODAY'S BIGGEST CRISIS POINTS are nutrition, the environment, livelihoods and education. In all these areas, school gardens are making a proven contribution to children's wellbeing, understanding and life prospects. FAO's manual *Setting up and running a school garden* helps schools, governments and NGOs to establish gardens and to make them successful. This Toolkit is a companion to the Manual.

School gardens can help to provide healthy school meals and generate income for school funds, but they are primarily a platform for learning: learning how to grow food for a healthy diet, improve the soil, protect the environment, market food for profit, enjoy garden food and, not least, advocate it to others.

There is strong evidence that classroom lessons and practical learning in the garden reinforce each other, indeed that often one does not work without the other. New garden projects and programmes are therefore making sure that the classroom curriculum finds room for garden-related learning about agriculture, the environment and nutrition. This Teaching Toolkit is FAO's contribution.

For more information on this publication, please contact:

Ellen Muehlhoff
Senior Nutrition Officer
Nutrition Education and Consumer Awareness Group
Nutrition and Consumer Protection Division
Food and Agriculture Organization of the United Nations
Viale delle Terme di Caracalla, 00153 Rome, Italy
email: Ellen.Muehlhoff@fao.org
Fax: (+39) 06 57054593
www.fao.org/ag/humannutrition/nutritioneducation/en

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