



Solomon Islands Agricultural Science

Learner's Book
Year 7

PEARSON

Solomon Islands Agricultural Science Learner's Book

Year 7



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Solomon Islands Curriculum Development Division

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Parts of the book were adapted from Pearson Australia: *Agriculture for Melanesia 1*, Nagalingam Ethirveerasingam, Michael Kapari, Arnold Parapi & Ekpo Ossom; Pearson Australia: *Agriculture for Melanesia 2*, Ekpo Ossom & Michael Kapari; and various Curriculum Development Division Publications.

Funding support

The development and publication of this series was funded by the Solomon Islands Government, with assistance from the New Zealand Agency for International Development and the European Union.

Pearson Australia

(a division of Pearson Australia Group Pty Ltd)
20 Thackray Road, Port Melbourne, Victoria 3207
PO Box 460, Port Melbourne, Victoria 3207
www.pearson.com.au

Project Manager: Caroline Williams
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Production Controller: Claire Henry
Illustrators: Rob Mancini and Marty Schneider

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First published 2011 by Pearson Australia
2013 2012 2011
10 9 8 7 6 5 4 3 2 1

Solomon Islands Secondary Agricultural Science, Learner's Book, Year 7
978 1 4425 0060 0
Printed in Malaysia

Pearson Australia Group Pty Ltd ABN 40 004 245 943

Acknowledgements

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Introduction for learners

This book provides a course in agricultural science for Year 7, the first year of secondary school. This book consists of seven chapters and is based on an interactive approach to learning. This means that learners will be expected to learn things for themselves by doing activities and exercises, and not just by listening to the teacher or reading the book. These activities are an essential part of the book and you will not learn properly unless you do the activities. The 'my goals' list represents specific learning outcomes that learners are expected to achieve at the end of each sub-strand.

Each activity is marked with an icon to show you what kind of activity it is. The icons are as follows:



This indicates thinking for yourself or in groups. You are expected to use your own knowledge or experience, or think about what you read in the book, and answer questions for yourself.



This indicates doing a practical activity such as planting seedlings, collecting soil samples, or making observations about crops. You learn agriculture so that you can learn practical skills, which you can use when you leave school. These activities will help you to learn these practical skills.



This indicates an activity for you to write in your exercise book or elsewhere.



This indicates group work. You are expected to discuss something in groups and report back on what your group discussed. In this way you learn from each other.

Good luck in using the book.

Chapter 1

Introduction to agriculture

What is agriculture?

My goals

- explain how people get food
- explain the term “agriculture”
- outline the importance of agriculture
- describe agriculture as a primary industry

How do people get food?

People must have food to live, and most of the food people eat is produced on the land (see figure 1.01). The land supports the plants and the animals that feed on the plants. In addition to food, plants and animals also provide people with other useful things, like materials to use in building or weaving.



Figure 1.01: Crops growing at Burns Creek Organic Farm

There are two main ways of getting food from the land. One way is to gather plants that grow wild and to hunt for wild animals. This is called **hunting and gathering**. This is how the Indigenous peoples of Australia, and even some of our own ancestors, lived in the past. People did not grow plants and keep animals to use for their food. They lived by hunting, fishing, catching snakes and insects, and gathering wild nuts and fruits. This is shown in figure 1.04. To get food using such methods, you needed knowledge, skills, and also luck. In the Solomon Islands, people still carry out some hunting and gathering practices, for example, gathering shells from mangroves.



The other main way to get food from the land is called **agriculture**. Most people in Melanesia and Polynesia dig the land and use it to grow crops. This practice of growing crops is called agriculture. The word agriculture comes from two Latin words: *ager*, meaning field or land, and *cultura*, meaning cultivation. Agriculture therefore means field cultivation (see figure 1.02). The people in figure 1.03 are using agriculture to provide themselves with food. How is this different to the hunting and gathering shown in figure 1.04?



Figure 1.02: Cultivated soil

Today, the word agriculture is generally used to mean farming, or the production of plants and animals that are useful to people. Agriculture includes the following activities:

- digging the soil
- growing crops
- raising farm animals
- preparing plant and animal products.

An area where these activities are carried out is called a **farm** or garden. The people who carry out these activities are called **farmers**.



Figure 1.03: Young people working on a food crop farm



Figure 1.04: Hunting and gathering



Activity 1.01

- 1 Study the picture shown in figure 1.04 carefully. Discuss your answers to the following questions in pairs.
 - a What activities are the people carrying out?
 - b What basic tools are they using to carry out these activities?
 - c Why do you think these people are called hunters and gatherers?
 - d What is one advantage of getting food by hunting and gathering?
 - e What is one disadvantage of getting food by hunting and gathering?
 - f Is hunting and gathering still a useful method of getting food in the Solomon Islands?
- 2 List examples of hunting and gathering practices that people in your home or school area carry out.
- 3 Apart from hunting and gathering, what is another way of getting food from the land?



Activity 1.02

- 1 Write the sentences below in your exercise book. Fill in the blanks with the correct words.

The word _____?_____ comes from two Latin words: _____?_____ and _____?_____. Agriculture therefore means _____?_____.

- 2 Copy the table below into your exercise book. Match the following words with the correct definition.

Words	Definitions
Farm or garden	Cultivation
Farmer	Field
Ager	Place or area where agriculture takes place
Cultura	Person who does agriculture

- 3 List examples of agricultural activities you observe in your home or school area.

The importance of agriculture

Agriculture is a way of life for most people in the Solomon Islands. They depend on agriculture for many things, including those listed below.

- Food—most food comes from farms or gardens.
- Fiber to provide materials for building and weaving.
- Income from selling crops and animals. Income allows people to buy things they need.
- Employment for themselves or for other people to work on their farm.
- Medicine, which can be extracted from many crops people grow, to cure illnesses and treat wounds.
- Firewood and timber.

Furthermore, agriculture has a cultural importance in the Solomon Islands. Owning many pigs or a big plantation shows wealth. This can determine a person's social status, or importance, in their community.



Activity 1.03

Answer the following questions in your exercise book.

- 1 Why is agriculture a way of life for the people of the Solomon Islands?
- 2 List four benefits Solomon Islanders get from agriculture.
- 3 Name three things that you use, besides food, that come from agriculture.



Figure 1.05: Two farmers working on their farm

Agriculture as a primary industry

Agriculture is a **primary industry**. Primary industry refers to activities that directly involve natural resources, such as soil, water, plants, or animals. Some primary industries are fishing, forestry, mining, and quarrying. **Secondary industry** involves producing manufactured goods, such as toys or furniture. Compared to a country like Australia, where most people live in cities and work in secondary industries, a large portion of the population of the Solomon Islands works in primary industries.



Figure 1.06: Cultivating the land is a primary industry.

Activity 1.04



- 1 Why is agriculture a primary industry?
- 2 Study the photograph in figure 1.06 carefully and then answer the following questions in your exercise book.
 - a How can you tell this is an area of agriculture, or a farm?
 - b How is it different from a farm or garden in your home or school area?
 - c What types of jobs would you expect to find in such place?
 - d What crop is being grown in the area shown in the photograph?
 - e What products are gained from this crop?



Types of agriculture

My goals

- Explain how agriculture is developed in the Solomon Islands
- list the different types of agriculture
- describe subsistence agriculture
- describe semi-subsistence agriculture
- describe commercial agriculture

Development of agriculture

A long time ago, our ancestors began to settle in villages. They discovered that they were able to grow crops and raise animals. They used the crops and animals for food, for trade, and for social events. Over time, they developed different ways of growing crops and raising animals. The older ways of growing crops and raising animals are referred to as the traditional methods of farming.

Today, we still practise some traditional methods of farming. We have also adopted modern farming methods. These methods of farming, both traditional and modern, can be grouped into three types of agriculture: **subsistence agriculture**, **semi-subsistence agriculture**, and **commercial agriculture**. This is shown in figure 1.07.

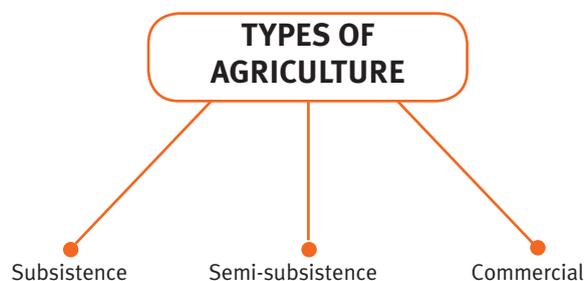


Figure 1.07: Types of agriculture

Activity 1.05



- 1 Copy the sentences below into your exercise book. Fill in the blanks with the correct words.

A long time ago, our _____ ?
 began to _____ ? in villages.
 They discovered that they were
 able to _____ ? crops and
 _____ ? animals.

- 2 Why did our ancestors grow crops or raise animals as they settled down?
- 3 List the three types of agriculture.
- 4 Find examples of traditional farming methods that are still practised in your area. Copy the table below into your exercise book. Use the table to record your findings. One example has been done for you.

Description of traditional farming method	Crop or animal it is used for
Scattering seeds in swampy areas in forests	To plant sago palm trees
Please do not write in this book	

Subsistence agriculture

As our ancestors began to group themselves in villages and settle permanently in one area, they made and used simple tools for agriculture. They used the tools to grow crops and raise animals to provide food for their family. Producing just enough food for yourself and your family is called subsistence agriculture.

Early people who lived in the Solomon Islands practised different methods of subsistence agriculture. In most areas, people used **shifting cultivation** or bush fallowing. This method of agriculture is when a farmer rests the soil by moving to a new place when the soil in the old place becomes exhausted. Figure 1.08 shows a site of shifting cultivation that has been allowed to lay **fallow**, or left uncultivated. The site is being cleared and prepared for growing food crops again.



In some places, people do not practise shifting cultivation but continue to use the same land to grow different crops (see figure 1.09). This is called **permanent cultivation**. Farmers continue to add organic matter such as waste plants or food to the soil, or do other things to support the land and keep the soil **fertile**. In addition to growing crops, some people may also raise farm animals like pigs or chickens on their land. These farm animals are often allowed to run freely to find their own food and are not looked after by people.

Some people do not think highly of subsistence agriculture, but it is important in many ways.

- Subsistence agriculture is part of the traditional way of life for people in the Solomon Islands.
- Subsistence agriculture helps people to meet their food needs and maintain their food security.
- Subsistence agriculture can be carried out without spending money.
- It is not very hard to learn how to carry out subsistence agriculture.
- Subsistence agriculture helps people learn traditional knowledge and skills.



Figure 1.08: Fallow land being cleared



Figure 1.09: A site of permanent cultivation

Activity 1.06



Work in small groups to answer the following questions. Write your responses in your exercise book. Report your findings to the rest of the class.

- 1 What is subsistence agriculture?
- 2 Why is subsistence agriculture important for families in the Solomon Islands? List at least four reasons.
- 3 Study the photograph in figure 1.09. Can you identify the food crop?
- 4 What is the advantage of using organic matter, or mulch, around the crops as shown in the photograph?

Semi-subsistence agriculture

Semi-subsistence agriculture refers to growing more crops or raising more animals than you and your family can use. The extra crops or animals are sold for income. Read the case study on page 7 to learn more about this type of agriculture.

Case study: Semi-subsistence farming in the highlands of Guadalcanal



Figure 1.10: Berry Filoa, semi-subsistence farmer

My name is Berry Filoa and I live in the highlands of Guadalcanal. Most people living in our area have traditionally been subsistence farmers. These farmers were self-sufficient in terms of meeting their family food needs. As time progressed, people realized that they have other needs and wants besides food. Many of these needs and wants cost money.

Most people in our area are not used to the idea of producing extra food crops to sell at the market. One of the reasons for this is that we do not have access roads where trucks can easily pick up our produce. People usually produced just enough food for their household.

Because I wanted to buy things, I thought of ways to get money. Despite the problems of transportation and access to markets, I decided

to grow more subsistence crops, like taro and yams, to sell in the market. I made arrangements with someone living at the coast to buy my produce at a reasonable price. They were responsible for selling the produce at the markets in town.

To solve the problem of transporting my produce, I had to build a bamboo raft. I used the raft to carry my produce for the day-and-a-half journey along the Moga River and down to the coastal village of Ghombua. Other people in my area saw what I was doing and began to produce extra food crops. They made similar arrangements with people living in the coastal villages. In this way, people in my area have been able to buy and acquire things we need and want.

Some years back, a trial planting of coffee was carried out in the highlands of Guadalcanal by the Ministry of Agriculture and Lands. People did not realize the potential of this crop. Then, after realizing the potential of agriculture in our area, people took over from where the ministry stopped and started to grow coffee and kava.

As a farmer, I wish to encourage potential farmers throughout the Solomon Islands to try semi-subsistence agriculture. Do not just stop if difficulties arise. You need to look at new ways to do something positive for yourself and your area. Do not wait for others to assist you with your project. You can start something small and later move into bigger agricultural activities.



Activity 1.07

Answer these questions in your exercise book.

- 1 Why were people in the highlands of Guadalcanal not used to the idea of producing extra food crops for sale at the market?
- 2 What do we call the type of agriculture where we produce extra crops to sell in the market?
- 3 How were farmers living in the highlands of Guadalcanal able to meet some of their needs and wants?
- 4 What message do you get from Berry Filoa’s experiences?
- 5 Identify sentences from the case study that match the features of semi-subsistence agriculture listed in the table. Copy the table and complete the activity in your exercise book.

Features of semi-subsistence agriculture	Sentences from the case study
Producing extra crops	
Growing crops to sell	Please do not write
Transporting crops	in this book
Identifying markets for crops	

Commercial agriculture

Commercial agriculture is different from other types of agriculture because crops and farm animals are not produced for personal consumption. Producing crops and animals solely for sale is called commercial agriculture. Farmers who are involved in commercial agriculture are called **commercial farmers**. Commercial farmers tend to specialize in growing one type of crop or raising one type of animal (see figures 1.11 and 1.12).

Crops grown in commercial agriculture are sometimes called **cash crops**. Examples of common cash crops grown in this country are cocoa, coffee, kava, oil palm, and coconut. Sometimes a commercial farmer may grow more than one type of cash crop on the same piece of land. This practice is shown in figure 1.13. Commercial agriculture involves more labour, money, equipment, time, skills, and knowledge about crops, farm animals, and farm management than is required for subsistence agriculture.



Figure 1.11: Cocoa is an example of a cash crop.



Figure 1.12: Commercial piggery production in the King George area



Figure 1.13: Growing multiple crops in one location in commercial agriculture



Activity 1.08

Copy the following questions into your exercise book or onto a separate sheet of paper. Write an answer to each question.

- 1 How is commercial agriculture different from subsistence and semi-subsistence agriculture?
- 2 Study figures 1.12 and 1.13.
 - a How can you tell that the pictures show commercial agricultural activities?
 - b What farm animal is shown in figure 1.12?
 - c What cash crops are shown in figure 1.13?
 - d Identify one reason a farmer would benefit from growing two cash crops together.
- 3 Look around your home or school area. Can you identify examples of commercial agricultural activities?
- 4 What commercial agricultural crops are suitable to grow in your home or school area?
- 5 What farm animals are suitable to raise in your home or school area?
- 6 What problems would you need to overcome to start a commercial agricultural activity in your home or school area?



School farms

My goals

- define and explain the term “school farm”
- state the benefits of a farm to a school
- describe problems affecting school farms
- suggest solutions to farming problems schools face

What is a school farm?

Any area of land within a school that is used mainly for producing crops and raising farm animals is called a **school farm** or school garden. Does your school have a farm or garden? If so, what grows there or what farm animals are raised there?

The purpose of a school farm may vary from one school to another. Having a school farm will assist the school in many ways. Some of the benefits of a school farm are listed below.

- A school farm provides a venue for learners to acquire skills and carry out practical activities during agricultural science lessons (see figure 1.14).
- A school farm is a source of food for the school kitchen.
- Extra crops or animals from the school farm can be sold to provide a source of income for the school.



Figure 1.14: Students working at a vegetable farm at the School of Natural Resources



Figure 1.15: Students at Muana Community High School working at the root crops farm

Activity 1.09



Complete the following activity in pairs. Write your answers on a separate sheet of paper.

- 1 What are the benefits of a school farm?
- 2 If your school has a farm, what crops are grown? What animals are raised?
- 3 Draw and label a map of the school and the area around the school. Make sure your map shows the following:
 - a the arrangement of school buildings
 - b any other school infrastructure
 - c the existing farm area of the school
 - d a suitable area within the school for farming.



Problems affecting school farms

Not all schools in the Solomon Islands are located in places that are suitable for farming. Some schools don't have enough space or land for a school farm. Others may have space for a farm but unsuitable soil. The soil may be too rocky, sandy, or swampy to support crop and farm animal production. If your school does not have a farm, look around and identify why.



Figure 1.17: Using sacks and bags filled with soil to grow crops



Figure 1.16: Students outside a community high school in Honiara

Some schools in Honiara (see figure 1.16) do not have a school farm because they do not have enough land around the school. This problem, however, should not prevent the school from doing something to produce crops or raise farm animals. Figure 1.17 shows one way that schools with limited space can grow crops: by using sacks or bags filled with a good soil mix. You will discover later other ways you can grow crops and raise farm animals.

Activity 1.10



- 1 Copy the sentences below into your exercise book. Fill in the blanks with the correct words.

Not all _____?_____ in the Solomon Islands are located in places that are _____?_____ for farming. Some schools don't have enough _____?_____ or land for a school farm. Others may have space for a farm but _____?_____ soil that is too _____?_____, _____?_____, or _____?_____.

- 2 How can a school with limited space or poor soil still have a school farm?
- 3 Identify other factors (beside lack of space) that could prevent a school from growing crops or raising farm animals. How would you deal with these problems?



Improving agricultural production

My goals

- state and explain ways agriculture is improved
- describe the contributions of science and technology in agriculture
- state and describe the use of improved agricultural practices
- describe the roles of the government in agricultural production

Ways agriculture is improved

The improvement of agricultural production in the Solomon Islands was associated with the arrival of people from other lands, such as traders and missionaries. They introduced new tools, new crop varieties, improved breeds of animals, and improved agricultural practices to the Solomon Islands.

During the time that the Solomon Islands were under British rule, a formal government system was organized and a plantation economy established. Most expatriate plantation owners and some village smallholders, or individual farmers, produced coconuts. Agricultural production in the Solomon Islands has continued to develop and improve from this period until now. In the next section, you will learn some of the factors that have contributed to improving agricultural production.

Contributions of science and technology

Many advances in science and technology can help farmers to increase the quantity, quality, and variety of their agricultural output. Some examples of these advances that benefit farmers include the following: farm machinery, tools and chemicals, improved animal breeds, improved crop varieties and information about weather and climate.

Activity 1.11



Complete the following activity in small groups. Discuss your findings with the rest of the class.

- 1 Identify ways that early traders, missionaries, and plantation owners contributed to improving agricultural production in your home or school area.
- 2 List other things that you think contributed to improving agricultural production in your home or school area.



Figure 1.18: A cocoa plantation



Figure 1.19: A coconut plantation



Science and technology will continue to develop more efficient tools, equipment, and methods to improve agricultural production.

Unfortunately, some of the advances in science and technology can have a bad effect on both

people and the environment. For example, using too many chemicals in agriculture can kill useful insects and soil organisms or pollute water sources (see figure 1.25).



Figure 1.20: Farm machinery



Figure 1.21: Improved farming equipment



Figure 1.22: Applying chemicals to crops



Figure 1.23: Improved animal breeds



Figure 1.24: Improved crop varieties



Figure 1.25: Negative effects of polluted water



Activity 1.12

Answer the following questions in your exercise book or on a separate sheet of paper.

- 1 What are the benefits for farmers of advances in science and technology?
- 2 List the advantages of using agricultural tools and equipment for agricultural production activities in your home or school area.
- 3 Identify two examples of the negative effects of science and technology on both people and the environment.

Using improved agricultural practices

Using new or different agricultural practices can improve agricultural production. Some of these practices are listed below.

- Mixed cropping.
- Rotating crops.
- Using compost and fertilizers.
- Using pest and disease control methods.
- Using terraces.
- Planting cover crops.



Figure 1.26: Compost on taro grown in a raised bed

One example of how using new or different agricultural practices can improve agricultural production is using **compost** to supplement soil on coral atolls. Compost is organic matter, like rotten leaves or animal waste. Atoll soils are poor, sandy, contain little plant food, and are too **alkaline** and salty for many crops. For crops to grow well on atoll soils, farmers in atolls use compost in their taro pits. These farmers cover the soil of their planting area with compost. They allow the compost to rot before they plant their taro crop in the soil. Composting also enables them to grow different crops than those grown traditionally, like taro, banana, and pandanus. By using compost, people living in atolls can produce more crops and different types of crops (see figure 1.26).

The larger volcanic islands have conditions suitable for growing many types of crops, as well as for raising different farm animals. People in these areas can use large areas of land to grow two cash crops together, such as coconut and cocoa. This is called **mixed cropping** and is common in the Russell Islands. Using suitable agricultural practices, like composting or mixed cropping, helps farmers maintain or improve crop production on their land.



Figure 1.27: Mixed cropping at Burns Creek Organic Farm





Activity 1.13

- 1 Write the sentence below in your exercise book. Fill in the blanks with the correct words.

Using _____? agricultural practices, like _____? or mixed _____?, helps farmers maintain or _____? crop production on their land.

- 2 List some of the different practices that can improve agricultural production.
- 3 What method is used by farmers in the atoll islands to improve their crop production?
- 4 What is the name of the agricultural practice in which a large area of land is used to grow two crops together, like coconut and cocoa?
- 5 What practices should farmers in the larger and higher islands of the Solomon Islands follow to maintain good crop production?

Roles of the government in agriculture

The government has a very important role in agricultural production and improvements in agricultural production. It performs these roles through various agencies:

- government ministries
- government departments
- institutions
- donors
- non-government organization partners.

The different roles of the government and its partners are listed in figure 1.28.

For example, the research role of the government is performed by the research department in the Ministry of Agriculture and Lands. The role of educating or training farmers is carried out by the Ministry of Education and Human Resource Development. The government may also provide incentives or direct assistance to farmers to improve the way they carry out agricultural production activities. Organized and efficient management of these roles by the government helps to improve and develop agricultural practices.

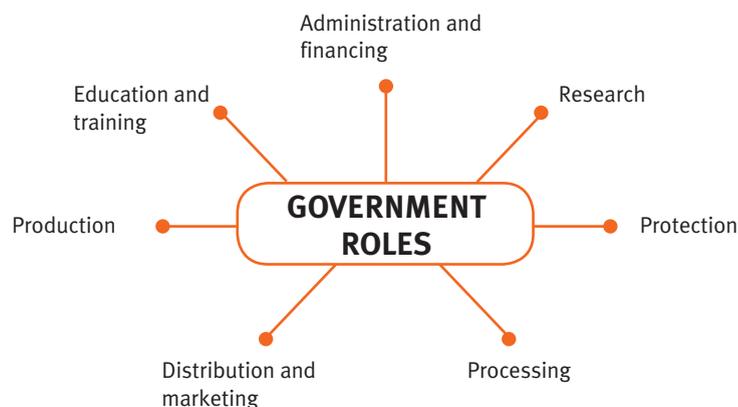


Figure 1.28: Roles of the government and other agencies in agriculture



Activity 1.14

- 1 Copy the following sentences into your exercise book or onto a separate sheet of paper. Fill in the blanks with the correct words.

The _____?_____ has a very important _____?_____ in agricultural production and improvements in agricultural production. It performs these _____?_____ through various agencies, which include:

- government _____?_____
 - _____?_____ departments
 - _____?
 - _____?
 - non-government organization partners.
- 2 List the various roles of government in agricultural production.
 - 3 Form small groups. Discuss what areas the government should focus on as a priority to improve agricultural production in your home or school area, or in the country as a whole.

Chapter summary

- Agriculture is the practice of farming. Growing crops on the land and raising animals are agricultural practices.
- Most people in the Solomon Islands get their food from agriculture. Agriculture also provides people with materials for building, with employment, and with income.
- There are three types of agriculture: subsistence agriculture, semi-subsistence agriculture, and commercial agriculture.
- A school farm is an area within a school where crops are grown or animals are raised. A school farm can provide food and a source of income. Schools that don't have suitable land for a farm or garden could start one using polythene bags filled with good soil.
- Science and technology have improved agricultural production through advances in farm machinery and equipment and through improved breeds of crops and animals. Different agricultural methods, such as using compost or mixed cropping, have also improved agricultural production.



Glossary

agriculture: field cultivation

alkaline: salty

cash crops: crops grown to be sold instead of to be used by the farmer

commercial agriculture: growing crops and raising animals for sale, not personal use

commercial farmers: people engaged in commercial agriculture

compost: organic matter

fallow: land that is not cultivated

farm: an area of land where agriculture is practised—crops are grown and animals are raised

farmers: people who practise agriculture

fertile: able to grow crops well

hunting and gathering: a method of getting food that involves gathering wild plants and hunting wild animals

mixed cropping: growing two cash crops together over a large area of land

permanent cultivation: to keep land cultivated and used agriculturally without any fallow periods

primary industry: directly using natural resources to produce something

school farm: a place at school where crops are grown or animals are raised

secondary industry: producing manufactured goods

semi-subsistence agriculture: growing more crops and raising more animals than you can use and selling the excess

shifting cultivation: cultivating land until it becomes exhausted, then moving to different land

subsistence agriculture: only growing enough crops and raising enough animals to provide for yourself

Chapter 2

Introduction to soil

What is soil?

My goals

- explain the term “soil” and how it is a valuable resource
- outline the importance, functions, and uses of soil

Soil as a valuable resource

The photograph in figure 2.01 shows a typical Solomon Islands farm or garden. What crops can you see in the photograph? All of the many varieties of plants have one thing in common: they all grow. What do we call the substance in which plants grow?

To be good farmers, it is important to learn about and understand **soil** because it is the place where plants grow. Even animals depend on soil because they eat plants that need soil to grow.



Figure 2.01: A typical Solomon Islands farm

The term “soil” may have different meanings to different people. To a miner, soil may cover precious metals. To a house builder, the soil is a place to put a foundation. To a farmer, the soil is the place where plants are grown and animals are raised (see figure 2.02). We can define soil like a farmer: soil is the natural material on the surface of the Earth that plants grow in. Soil is made up of tiny particles, or pieces, of rocks and dead or living plants and animals.



Activity 2.01

- Copy the table below into your exercise book. Use the questions in the table as a guide to help you investigate what two people from your home or school area think about soil.
- Use your own words to summarize the responses to your investigation. Present your findings to the class.

Questions	Person 1	Person 2
Is soil important to you?		
In what ways is soil important to you?		
Do you think soil is a valuable resource?		
What practices damage the soil in your area?		
Why do you think it is important to care for our soil?		



Figure 2.02: Crops growing in the soil

The importance, functions and uses of soil

There are many reasons that soil is important for plants, animals, and people. Most plants get their nutrients (food) and water from the soil (see figure 2.03). For many animals, plants are their main source of food. Most living things on land therefore depend on soil for their existence. Other functions and uses of soil include the following:

- Soil is a source of raw materials for building or growing things.
- Soil can be used to store heat.

- Soil acts as a filter, removing pollution from drinking water.
- Soil controls the flow of water through the landscape.
- Soil is a platform, or foundation, for structures like buildings and highways.
- Soil is a biological habitat for many organisms—many animals live in the soil or use the soil to make their home.

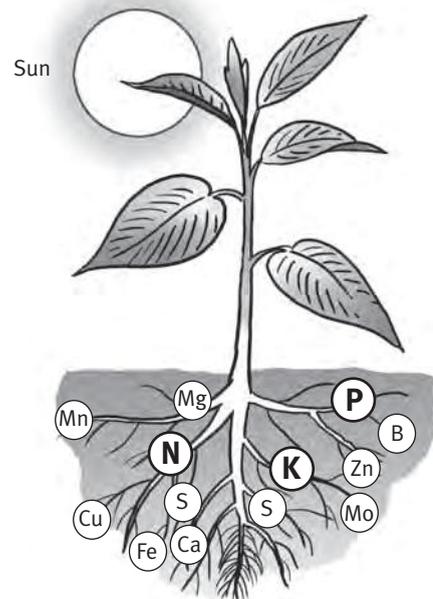


Figure 2.03: Soil provides plants with nutrients



Soil is more fragile than it appears, and can be easily damaged, washed away, or blown away. If we understand soil and manage it properly, we will avoid damaging it. Because soil is the basis of our environment, we must look after it. Remember, good crops will only grow well in good soil.

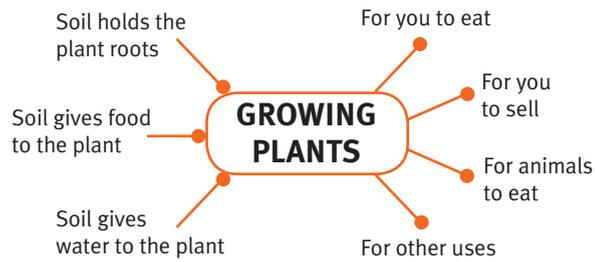


Figure 2.04: How soil is important for growing plants

Where does soil come from?

My goals

- explain how soil is formed
- explain the term “weathering”
- describe the different types of weathering

Soil formation

Many people think that the soil in their farms now is the same soil that their ancestors used (see figure 2.05). This is not true. Soil changes all the time. Sometimes the soil changes to make it better for growing crops. Sometimes the soil changes to make it worse for growing crops. To understand how soil changes, we must learn where it comes from and how it is formed.



Figure 2.05: A man working on the land

Activity 2.02

Copy the following questions into your exercise book. Then write down your answers to each question.

- 1 List three reasons why soil is important for growing plants.
- 2 Write down three other important uses of soil.
- 3 Why is it important to look after our soil?
- 4 Explain the meaning of the following sentence: Good crops will only grow well in good soil.

Soil is formed from **parent rocks**. Parent rocks are rocks that are underneath the soil. Five key factors affect the way soil is formed:

- climate
- living organisms
- topography, or slope, of the land
- parent material
- time.

These factors work together to break down large stones and rocks. The small pieces are called **soil particles** or rock particles.





Activity 2.03

- 1 Work in small groups. Each group will be given a small piece of chalk or sandy rock, a sheet of paper, and a stone.
- 2 Rub the chalk or sandy rock carefully with the piece of stone over the sheet of paper. Do this several times, as shown in figure 2.06. Observe what happens as you rub the chalk or sandy rock with the piece of stone.
- 3 Look at what falls on the paper. Feel it.
- 4 Describe this experiment in your exercise book or another sheet of paper.

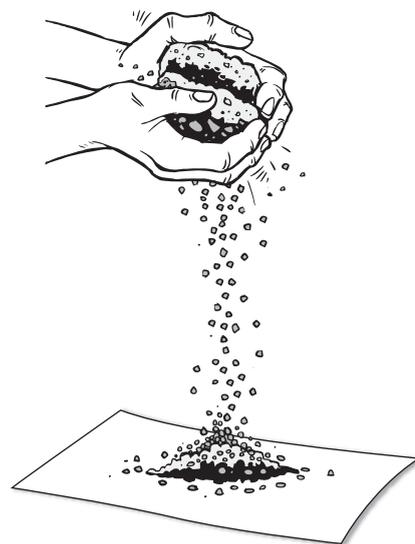


Figure 2.06: Rock breaking into particles

Weathering

As you've learnt, soil is formed when large rocks or stones break down into soil particles. The process by which large stones or rocks break down to form soil particles is called **weathering**. This process is shown in figure 2.07. Surface rocks break down into smaller pieces. The smaller pieces mix with

organic matter and other materials. Over time this creates a thin layer of soil.

There are three basic types of weathering: **physical weathering**, **chemical weathering**, and **biological weathering**. When rocks are broken down into smaller rocks that have the same general composition, it is called physical weathering (see figure 2.08).

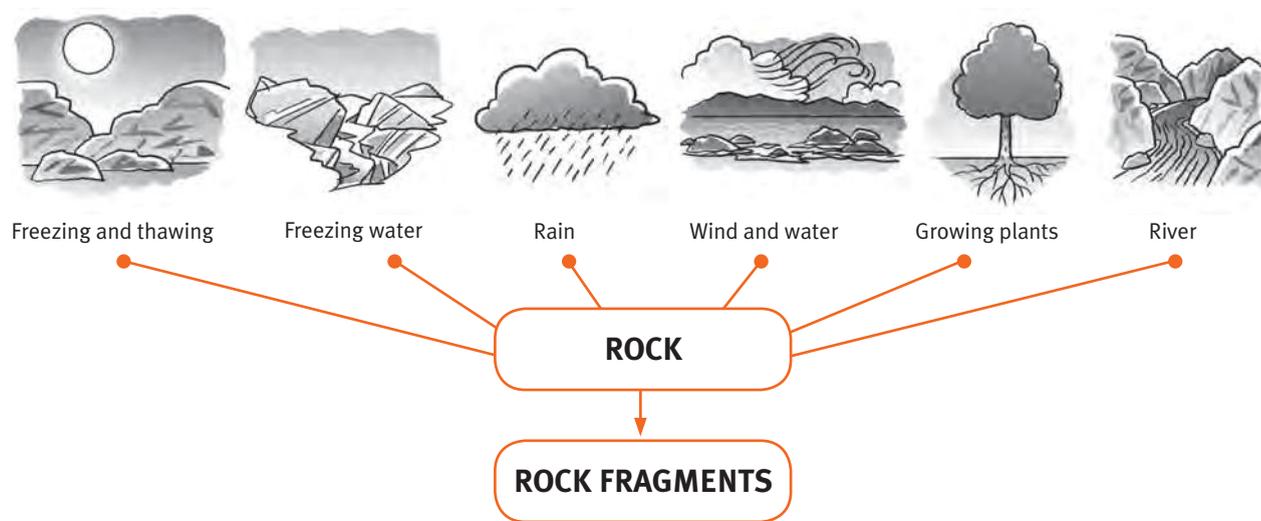


Figure 2.07: Weathering breaks down rocks to form soil.



Physical weathering is caused by the following factors:

- heat and cold—make the rocks expand (grow) and contract (shrink), causing rocks to crack
- ice—freezes in cracks in the rocks and forces them apart
- wind and rain—move rocks, causing them to bang against each other and break.

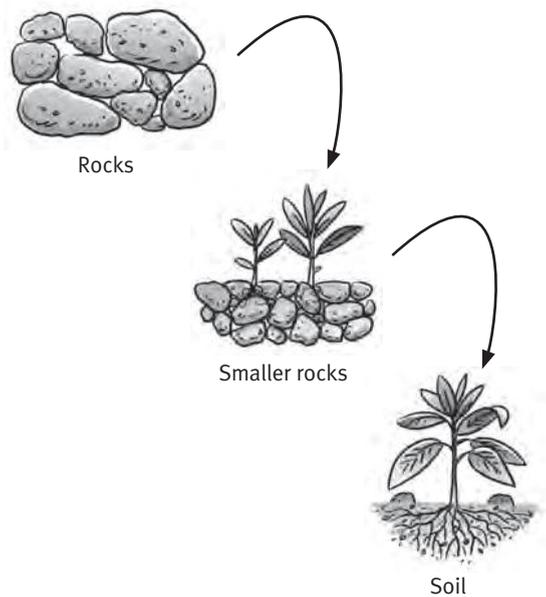


Figure 2.08: Physical weathering—rocks break down into smaller rocks and then into soil particles.

Chemical weathering is when the action of chemicals breaks bigger rocks into smaller rocks. These chemicals are usually found in water. Plant roots also contain chemicals that can cause chemical weathering. The smaller rocks formed through chemical weathering have a different chemical composition than the original, larger rock (see figure 2.09). This process is similar to what happens to your teeth if you do not clean them properly. Chemicals in your food make your teeth soft, or rotten, and they may break into pieces.

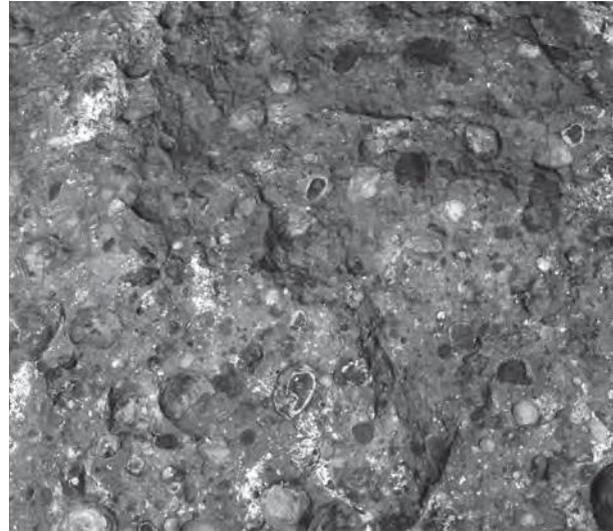


Figure 2.09: Chemical weathering

Biological weathering is when bigger rocks are broken into smaller rocks through the action of plants and animals (see figure 2.10). One example of biological weathering is a tree growing. As the tree grows, its roots expand, which causes the rock to break down.



Figure 2.10: Biological weathering



Activity 2.04

- Write the definitions of the words listed below in your exercise book or on a separate sheet of paper.
 - weathering
 - physical weathering
 - chemical weathering
 - biological weathering
- Copy the table below into your exercise book. Write the correct type of weathering (physical, chemical, or biological) next to each cause.

Cause of weathering	Type of weathering
Freezing and thawing of rocks	
Freezing water	
Rain falling on rocks	
Chemicals in water	Please do not write in this book
Wind and water	
Growing plants	
Flowing rivers	
Rainwater collected on limestone	
Chemicals in plant roots	



Activity 2.05

- Take a field trip around your home or school area. Look at any path, river, coast, track, or slope.
- Identify any signs that any of the three types of weathering have taken place at the site.
- Copy the table below into your exercise book or onto a separate sheet of paper. Use the table to record your observations of weathering at the site.

Site	Observations of weathering
	Please do not write in this book

What is in the soil?

My goals

- list the main components of soil
- describe soil particles
- describe air in soil
- describe water in soil
- describe organic matter in soil
- describe organisms in soil

Components of soil

Soil consists of four components: mineral matter, air, water, and organic matter (see figure 2.11).

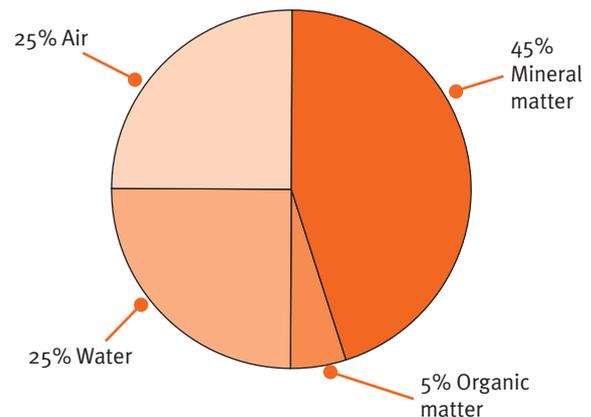


Figure 2.11: Typical amounts of different components in soil, by percentage

The amount of each of these components in soil varies with the type of soil and the climatic conditions of the soil. Although living organisms are not exactly part of the soil, they live in the soil and we could count them as a part of soil. In this section you will find out what soil is really made of.



Activity 2.06

- 1 Collect two different types of soil. Label the first type “Soil sample 1”. Label the second type “Soil sample 2”.
- 2 Spread two large handfuls of the first soil sample over a sheet of paper. Try to identify the content of the soil sample.
- 3 Separate and put into heaps all those things that look the same. List all the things you place in each heap in your exercise book. Use a table like the one below to record your findings.

Soil sample 1
Please do not write in this book

- 4 Spread two large handfuls of the second soil sample over a sheet of paper. Try to identify the content of this soil sample.



Figure 2.13: Separating soil contents

- 5 Separate and put into heaps all those things that look the same. List all the things you place in each heap in your exercise book. Use a table like the one below to record your findings.

Soil sample 2
Please do not write in this book

- 6 You may have written down things that people have thrown into the soil and that are rubbish, like glass, tin, and paper. Cross these off your list because they are not a part of the soil.



Figure 2.12: Collecting soil samples

Soil particles

The inorganic, or non-living, materials found in soil make up about half of the total mass of most types of soil. As you’ve learnt, these inorganic materials take the form of soil particles, which are formed from different rocks breaking down through weathering. Soil particles can be grouped into different types, depending on their size. These types include gravel, rough sand, fine sand, silt, and clay.

These five types of particles combine together to make three types of soil. If the soil feels very rough, it has a lot of sand and is therefore called a **sandy soil**. If the soil feels very smooth, it is called a **clay soil**. If the soil is a real mixture, it is called a **loam**.





Figure 2.14: Soil particles



Activity 2.07

- 1 Put about 6 cm of loose dry soil in a glass jar.
- 2 Fill the glass jar with water until it is about three-quarters full.
- 3 Put your hand over the top of the jar and shake the mixture of soil and water.
- 4 Put the glass jar in front of you and look carefully at what happens. In your exercise book, draw what you see.
- 5 Leave the glass jar for 24 hours or longer and then look again. Draw what you see in your exercise book.
- 6 You will notice a number of layers at the bottom of the glass jar. In each layer, there are different sizes of soil particles.

Activity 2.08



After you've completed the previous activity, answer the following questions. Use a separate sheet of paper or your exercise book to write down your answers.

- 1 Why are different sizes of soil particles in different layers?
- 2 Are the biggest particles at the bottom or top of the glass jar?
- 3 What was the reason for the change after leaving the glass jar for 24 hours or longer?

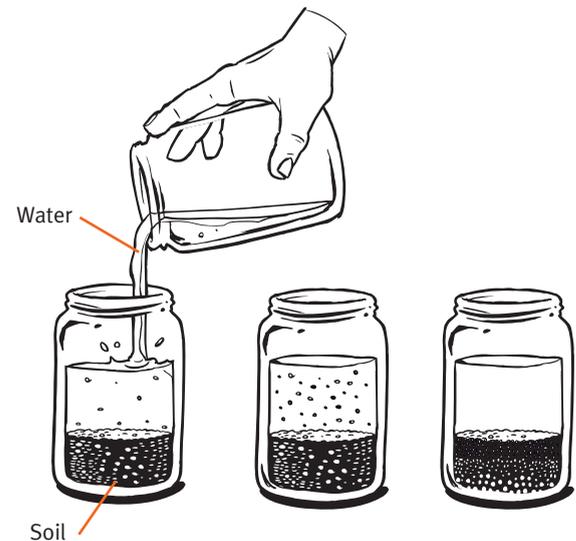


Figure 2.15: Layers of different sizes of soil particles



Air

Soil contains large, connected holes, or spaces, that are filled with air and water. The amount of air and water filling these spaces varies throughout the year and from one location to another.

The amount and composition of air in soil varies. To a large extent, the amount and composition of air in soil is determined by the amount of water in the soil and the activity of organisms in the soil. The next activity will help you find out about the presence of air in soil.



Activity 2.09

- 1 Collect two glass containers or jars.
- 2 Put 6 cm of dry, sandy soil in one container. Label it “A”.
- 3 Fill the other container with water. Label it “B”.
- 4 Quickly pour the water into the container of dry soil until it is nearly full. Do not let it overflow.
- 5 Look carefully at what happens when the water is poured into a container containing dry, sandy soil.
- 6 In your exercise book, write down what you see happening.
- 7 Can you explain what happened when you added the water?
- 8 What comes out and rises to the surface of the water?

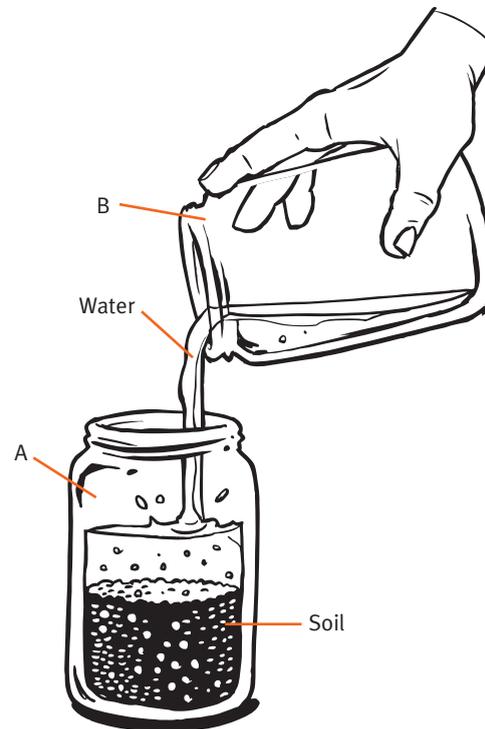


Figure 2.16: Investigating air in soil

Water

Water is an important part of soil. It can enter soil in a few different ways. The most common way that water enters soil is through precipitation, such as rain. Water also leaves the soil in different ways, including through evaporation and drainage.



Figure 2.17: Water surrounding plants



Many substances dissolve in water. Water can carry these dissolved substances from one part of the soil to another. Water makes chemical reactions in the soil possible. Water also supplies soil organisms with the water they need to live (see figure 2.17). These are all reasons why water is an important component of soil.



Activity 2.10

- 1 Collect a glass jar and a small piece of glass or a plastic cover. Fill the glass jar about halfway with dry soil.
- 2 Place the glass or plastic cover over the top of the glass jar. Put the container in the full sunlight.
- 3 After some time, check what is happening in the jar. Record your observations in your exercise book or on a separate sheet of paper.
- 4 Did the soil sample contain any water? How do you know?

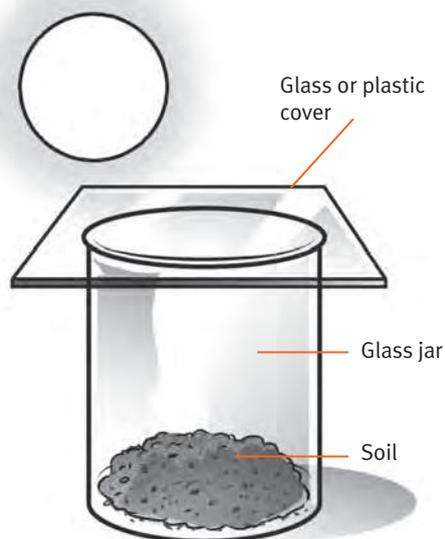


Figure 2.18: Does soil that seems dry contain any water?

Organic matter

All plants and animals, both living and dead, are **organic** matter. Organic means of, or from, living material. Plants decay when they die (see figure 2.19). Plants also attract animals. When the animals die, their bodies also decay. Decaying matter makes the soil thick and rich so that it can support many different plants. Organic matter is an important part of soil for many reasons. Some of these are listed below.

- Organic matter holds soil particles together.
- Organic matter stores and transmits air and water.
- Organic matter stores and supplies many plants and soil organisms with the nutrients they need.
- Organic matter prevents soil particles from joining together and becoming hard.
- Organic matter reduces the bad effects of chemicals and other polluting things on the environment.



Figure 2.19: Decaying grass

Activity 2.11



- 1 In your exercise book, define the term “organic matter”.
- 2 Write down three important functions of organic matter.



Activity 2.12

- 1 Dig up a full spade of soil.
- 2 Spread the soil out on pieces of newspaper or sack.
- 3 Look for anything in the soil that can be regarded as organic matter.
- 4 Try to identify the items you have collected. Write your findings in your exercise book.

Organisms

Besides air, water, and organic matter, soil also contains many varieties of living creatures. These creatures include bacteria, fungi, nematodes (roundworms), insects, and earthworms. Many of these organisms have very important functions for soil. For example, certain microbes, or very small organisms, can break down organic matter and chemicals such as toxins and pesticides. Other important functions soil organisms perform include improving the amount of air in soil, helping water to flow into soil, and helping with drainage. Some soil organisms are a very important part of soil. Other soil organisms are the enemies of the farmer because they stop good crop production.



Figure 2.20: A worm is an example of a soil organism.

Activity 2.13



In groups, discuss the following questions.

- 1 What important functions do soil organisms perform?
- 2 What different organisms can be found in the soil?
- 3 Are all soil organisms useful to farmers?

Activity 2.14



- 1 Choose a site near your school where you can dig up a spade full of soil.
- 2 Spread the soil out on pieces of newspaper or sack.
- 3 Look for any organisms in the soil. You will probably find that some soil organisms are alive and some are dead.
- 4 Try to identify the organisms you found in the soil. Write the names of the soil organisms in your exercise book or on a separate sheet of paper.



Figure 2.21: Use a rake and a shovel to care for soil.



What is a soil profile?

My goals

- define and explain the terms “soil profile” and “soil horizon”
- draw and label diagrams of soil profiles and soil horizons
- identify the soil profiles and the soil horizons of a given site

Soil profiles and soil horizons

A **soil profile** is a side view, or a vertical section, of soil that shows its individual layers (see figure 2.22). These layers are called **soil horizons**. An important feature of a soil is that it changes with depth. This means that as you dig deeper into soil, the soil changes. To learn about a soil, you should examine the soil horizons, from the surface to the parent material. When you do this, you will notice that the soil profile in different areas is different. The soil in different parts of the country has different physical features, such as colour, thickness or texture.

Generally a soil profile consists of the following horizons:

- horizon O
- horizon A
- horizon B
- horizon C
- horizon R.

Horizons are defined in most cases by obvious physical features such as colour, texture, structure, and thickness. Other soil properties that are not easily seen (such as chemical, mineral, or soil reactions) are also used by soil scientists to define different soil horizons. Soil horizons are used to classify and interpret the soil to find out its suitability for various uses.

Activity 2.15



- 1 Define the following terms in your exercise book.
 - a soil profile
 - b soil horizon
- 2 Copy the sentence below into your exercise book. Fill in the blanks with the correct words.

Generally a _____?_____ profile
_____?_____ of the following
horizons:

- _____?_____
- _____?_____
- _____?_____
- _____?_____
- horizon R.

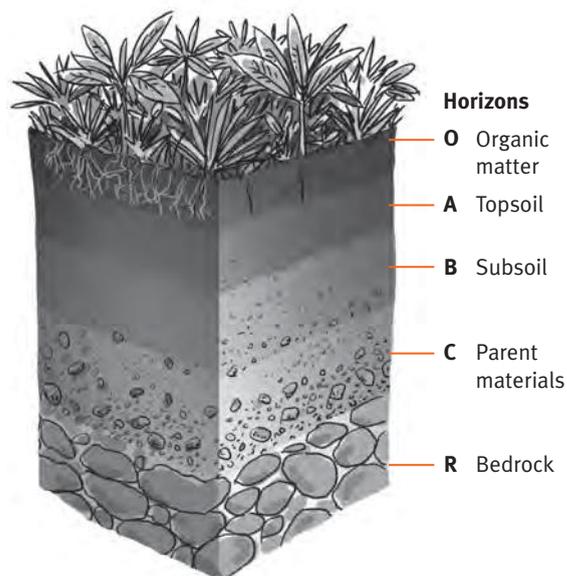


Figure 2.22: Soil profile showing different layers (horizons) of soil



Examining soil profiles and soil horizons

Not every soil horizon is present in every location and soil type. To examine soil horizons, you will need to dig a pit, or observe a riverbank or a road cutting to see the different layers of the soil.



Activity 2.16

- 1 Identify a site around the school area where you could dig a rectangular hole 1 metre wide x 1 metre deep x 2 metres long. If this is not possible, then try to find a cutting or cliff near a roadside, or the side of a rubbish dump, or a riverbank.
- 2 Observe the profile of the soil.
- 3 Draw a sketch of the soil profile in your exercise book. Label the soil profiles.

Chapter summary

- Soil is the natural material on the Earth's surface. It is made of tiny particles of rocks, air, water, and dead and living organisms (plants and animals).
- It is important to maintain soil because healthy soil produces healthy plants.
- Soil is made when rocks and minerals break down due to physical, chemical, and biological weathering.
- The soil profile is a side view of the soil that shows how the soil changes with depth. Soil horizons are the layers of soil that make up the soil profile.

Glossary

biological weathering: a larger rock breaks down into smaller pieces because of the actions of plants and animals

chemical weathering: a larger rock is broken into smaller pieces that have a different chemical composition by chemicals, such as from rain

clay soil: soil that feels smooth and contains a large amount of clay

loam: soil that feels smooth and rough and that contains a mixture of clay and sand

organic: of or from living material

parent rocks: rocks that are underneath the soil

physical weathering: a larger rock is broken into smaller pieces that are of the same general composition by the action of rain, wind and ice

sandy soil: soil that feels rough and contains a large amount of sand

soil: the natural material on the surface of the Earth in which plants grow

soil horizons: layers in soil

soil particles: small pieces of large stones and rocks

soil profile: a vertical section, or side view, of soil

weathering: the process in which large rocks or stones break down to form soil particles



Chapter 3

Introduction to food crops

Why grow food crops?

My goals

- describe the terms “farm” and “garden”
- explain the concept of growing food in the Solomon Islands
- describe the benefits of growing food crops

Growing food in the Solomon Islands

Most people in the Solomon Islands live in a village and grow food crops in their farms or gardens. A farm refers to a large area of land that is used for growing crops or raising farm animals. A garden refers to a smaller plot of land. Most people can grow food crops like vegetables, root crops, fruits, and grains at or near their homes (see figure 3.01).



Figure 3.01: Taro crops grown near a house in the Burns Creek area

For most families in the Solomon Islands, the work of growing food crops is shared. In some families, it is the women and children who do most of the work. Growing food crops should be seen as a shared responsibility. This means that all members of each household should take an active role in growing food crops. We cannot depend on others to feed us. We should regard growing food crops as a worthwhile occupation because our livelihood depends on it.



Activity 3.01

- 1 Work in small groups to define the terms listed below.
 - a farm
 - b garden
- 2 Look around your home or school area. Identify two farmers you can interview. Ask each farmer the following questions.
 - a What food crops do you grow on your farm or in your garden?
 - b Why have you chosen to grow these food crops?
- 3 Copy the table below into your exercise book. Complete the table as a group.
- 4 Identify two people in your home or school area who do not grow food crops. Ask each person the following questions.
 - a Why don't you grow food crops?
 - b What will happen if farmers stop growing food crops?
- 5 In your groups, discuss the following question: Who do you think should make sure that food supply for a household is always available?

Farmers	Types of food crops grown	Reasons for growing food crops
Please do not write in this book		

Benefits of growing food crops

Growing food crops requires hard work. For example, some farmers will have to travel long distances from their homes to grow food crops. The benefits a farmer gets from growing food crops will vary from one farmer to another. Some of the benefits farmers get from growing food crops are listed below.

- If a farmer grows a variety of food crops, they have access to a variety of food.
- Growing food crops improves the food security of a household.
- Growing food crops can provide a source of income (see figure 3.02).
- Growing food crops can be a source of employment.
- Growing food crops helps to supplement a person's diet.



Figure 3.02: Selling food crops at the market



Figure 3.03: Processed foods sold in shops

Many people living in urban centres do not have land where they can grow enough food for their household. Because they cannot grow their own food, they eat processed food like bread, rice, noodles, and tinned food that is sold in shops (see figure 3.03). These processed foods may taste nice but they do not always contain the nutrients that make the body healthy.



Activity 3.02

- 1 List three benefits farmers get from growing food crops.
- 2 Most farmers in the Solomon Islands grow more than one food crop on their farm. Why do you think it is important for farmers to continue this practice? List at least two reasons in your exercise book.
- 3 Do people in your home or school area think farming is important? Why?
- 4 How can you encourage people to grow more food crops?
- 5 Which food is usually more nutritious, or good, for the body—food produced from our farms or processed food bought from a shop?

Plant reproduction

My goals

- define and explain the term “plant reproduction”
- describe sexual reproduction
- describe asexual reproduction

What is plant reproduction?

In order to grow food crops successfully, and get all the benefits of growing food crops, we must understand how plants grow.

We learn in science that one important feature of living things is that they are able to reproduce themselves. The word “reproduce” means to make another. **Plant reproduction** refers to the process when a plant makes another plant. It is important to know about plant reproduction to grow food crops successfully. Plants can reproduce themselves in one of two main ways: through sexual reproduction or asexual (vegetative) reproduction.

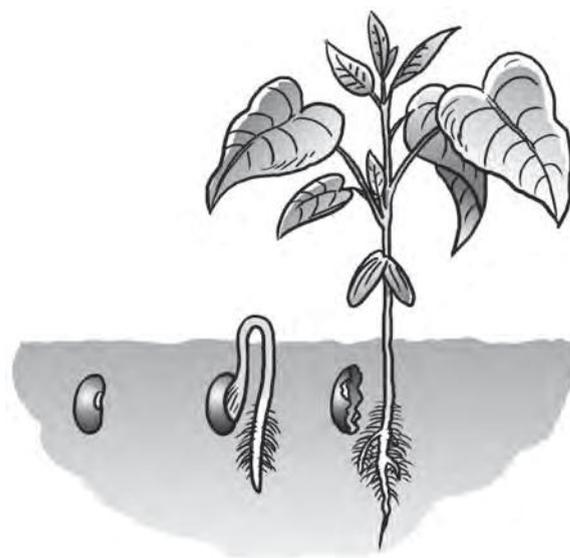


Figure 3.04: A bean plant grown from a seed that has germinated

Sexual reproduction

In sexual reproduction, plants grow flowers and fruit that will develop seeds. When the seeds mature, they **germinate**, or start to grow, and develop into new plants. For example, when sown, bean seeds germinate and grow into a new plant. This is shown in figure 3.04.

Many introduced crops are now being grown in the Solomon Islands. Most of these plants are grown from seeds. A **seed** is the part of a plant that will eventually grow into a new plant. Learning about seeds helps us to grow crops successfully.



Most seeds can be divided into two parts: the inner part and the outer part (see figure 3.05).

- **Outer parts**—The outer part of a seed consists of a skin or **testa**, the scar or **hilum**, and the **micropyle**. The testa protects the inner parts of the seed. The hilum is the place where the seed was attached to a part of the flower or fruit. The micropyle is an opening that allows the seed to be fertilized to start the new plant growing. These parts of the seed might be difficult to see with our naked eyes.
- **Inner parts**—The inner part of the seed consists of the **cotyledon(s)**, or seed leaves, and the **embryo**. In most seeds, the cotyledon forms the largest part of the seed. The cotyledon supplies the young plant with food when it starts to grow. The embryo is a young shoot that can eventually be germinated and grow into a new plant.

As you've learnt, the word "germinate" is used to describe the process by which a plant starts to grow from a seed. This process is shown in figure 3.04. You can buy seeds in a packet that have not germinated. If we leave them in the packet, will they ever start to grow? Seeds that have not germinated are said to be **dormant**.

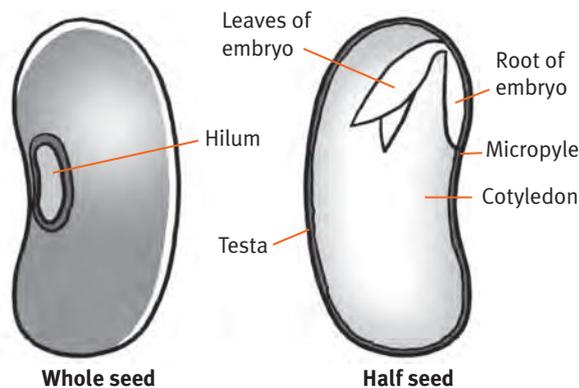


Figure 3.05: A whole bean seed and a half bean seed

Activity 3.03



- 1 Define the term "seed" in your exercise book or on a separate sheet of paper.
- 2 Your teacher will give you a seed. Look at it very carefully. Examine the inner and outer parts of the seed.
- 3 Identify the different parts of the seed. Your teacher will help you to learn their correct names.
- 4 Draw and label what you have seen in your exercise book or on a separate sheet of paper.

Asexual reproduction

Asexual or vegetative reproduction is when a new plant is grown from another part of the plant, not from seeds. For example, if we want to reproduce a banana plant, we use the sucker to grow a new banana plant (see figure 3.06). Most food crops native to the Solomon Islands do not reproduce from seeds but grow from other parts of the plant. This type of reproduction makes it possible for farmers to plant crops directly, without using seeds.



Figure 3.06: A banana sucker





Activity 3.04

Answer the following questions in your exercise book or on a separate sheet of paper.

- 1 Define the term “plant reproduction”.
- 2 List the two main ways plants reproduce. Briefly describe each method of reproduction.
- 3 Identify six different food crops you grow in your home or school area. Name the part of the plant that is used for planting.
- 4 Write down one benefit of asexual reproduction in plants.



Figure 3.07: Ginger

Types of food crops

My goals

- classify food crops
- identify examples of different food crops grown in the Solomon Islands

Classification of food crops

Food crops can be **classified**, or sorted, into groups. Generally food crops are classified into groups based on their characteristics. It is important to know about the different classifications of food crops so that you can grow them successfully.

Food crops grown on the farm or garden can be classified into two main groups. If the plant part that we eat grows above the ground, then the food crop is classified as an above-ground crop. If the plant part that we eat grows below the ground, then the food crop is classified as a below-ground crop. The two groups can be further divided, based on the part of the plant that we eat, like the leaves or stems. These divisions are shown in table 3.01.

Table 3.01: Classification of food crops

Classification of food crops	Plant part eaten	Example
Above-ground food crop	Fruit (eaten as fruit or nut)	Banana, cutnut, mango, ngali nut, pawpaw, pineapple, watermelon
	Fruit (eaten as vegetable)	Avocado, cucumber, pepper, pumpkin, tomato
	Flowers	Betel nut flower, hibiscus flower, pit pit (losi)
	Leaves	Ball cabbage, Chinese cabbage, fern, lettuce, saladeer, slippery cabbage
	Seeds and pods	Corn, cowpea, long bean, mungbean
	Stems	Sago palm, sugarcane
Below-ground food crop	Roots and tubers	Cassava, sweet potato, yam
	Underground stems	Carrot, English potato, garlic, onion, radish, shallot
	Rhizome and corm	Ginger, turmeric, taro



Examples of different food crops grown in Solomon Islands



Figure 3.08: Pawpaws



Figure 3.09: Corn



Figure 3.10: Bananas



Figure 3.11: Pumpkin



Figure 3.12: Cassava



Figure 3.13: Taro



Figure 3.14: Tomatoes



Figure 3.15: Slippery cabbage

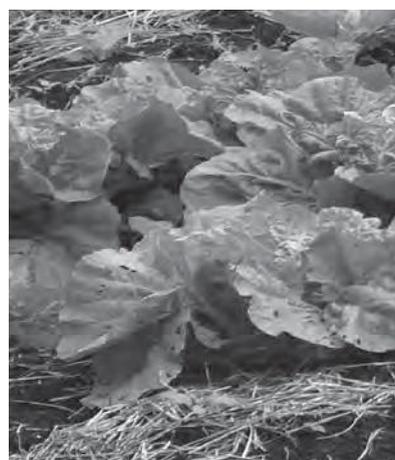


Figure 3.16: Saladeer



Activity 3.05

- 1 In your exercise book, list the two main groups of food crops.
- 2 Look around your home or school area and identify the different types of food crops that are being grown. Classify the food crops you identify into above-ground food crops or below-ground food crops. Copy the table below into your exercise book. List your findings in the table.

Examples of above-ground food crops	Examples of below-ground food crops
Please do not write in this book	



Activity 3.06

Work in pairs to complete this activity.

- 1 Collect different food crops grown around your home or school area. Identify the food crops you've collected.
- 2 What problems might have kept farmers from growing different types of food crops in your home or school area?

Preparing to grow food crops

My goals

- plan to grow food crops
- choose what food crops to grow
- describe different cropping methods
- choose a suitable site for growing food crops
- use the right tools to grow food crops
- clear and prepare a site
- select planting materials

Planning to grow food crops

Planning is important in any activity. For example, when you build a house, you must make many different decisions. You must decide where to put the house, how many rooms to build, and what materials to use. When you make decisions like that, you are planning.

Just like when you build a house, if you intend to grow food crops, you need to plan. Planning involves making an outline of what you intend

to do before you get started. Some of the things that must be considered when planning to grow food crops include the following:

- the availability of land
- the resources you would need
- the costs involved
- the cropping method to use
- the types of food crops to grow
- the location of a suitable site
- the availability of planting materials
- the tools and equipment needed
- the preparation of the land
- the food requirements, or needs, of your household
- the market demand for different food crops.

Any farming activity will certainly involve some costs. Farmers need to prepare a simple cost estimate to know how much money they need to spend to grow food crops successfully. Preparing a cost estimate is one of the most important parts of planning.



Figure 3.17: Availability of land for farming



Activity 3.07

- 1 Copy the sentence below into your exercise book. Fill in the blanks with the correct words.

Planning involves _____?
 an _____? _____ of what you
 intend to do _____? _____ you get
 _____?

- 2 List three things that need to be considered when planning to grow food crops.
- 3 In your own words, explain why you think the cost involved is one of the most important things to consider when planning to grow food crops.

Choosing what to grow

When you are planning your farm or garden, you must decide what types of food crops you are going to grow. You should also decide why you are growing food crops. To sell at the market? To feed your household? Your decision about which food crops to grow might be influenced by different factors:

- the food crops the people in your household enjoy eating
- the food crops that are sold in the market
- the food crops that are most often bought in the market
- the price of the food crops in the market.

The most important factor in deciding what food crop to grow is the suitability of the crop to the area. It is important for people to plant the food crops that grow best in their home or school area. A farmer cannot grow a successful food crop if the crop isn't suited to the area of the farm.



Figure 3.18: Different food crops

Activity 3.08



Complete the following activity in pairs or small groups. Report your findings to your classmates.

- 1 List the factors that may influence the decision about what food crops to grow.
- 2 What food crops do people eat the most in your home or school area?
- 3 What food crops do farmers sell the most in your home or school area?
- 4 What food crops do people buy the most at the market?

Cropping methods

Once you have decided what food crop to grow, you must decide what cropping method to use for your crop. There are different ways, or methods, to grow food crops. Some of the common methods that can be used to grow or cultivate food crops are given in table 3.02.

People living in urban centres or towns may not have enough space to grow food crops. However, they can still grow food crops using urban agriculture techniques. Some of these techniques are shown in figures 3.19 to 3.22.



Table 3.02: Cropping methods

Methods of cropping	Features of cropping systems
Shifting cultivation or bush fallowing	Farmers cultivate a piece of land for 2 to 4 years. When the soil is exhausted of plant food, as indicated by a low crop yield , the farmer leaves the area and moves on to farm a different piece of land. This allows the exhausted land to recover. The land should be allowed to recover for 10 to 20 years before it is used again.
Continuous cropping	Growing crops on a piece of land for many years without resting the land.
Monocropping	Growing the same crop on the same piece of land from year to year. Annual, or perennial, crops can be grown in monocropping.
Mixed cropping or multiple cropping	Growing more than one type of crop on a piece of land at the same time.
Crop rotation	Alternating growing different crops on the same land to maintain soil fertility and structures.
Intercropping	Growing two crops in the same area using definite spacing.
Home or sup sup garden	Growing food crops in a small area around your house.
Urban agriculture techniques	Growing food crops in a box or container around your house, especially in town or urban areas.



Figure 3.19: Planting on rooftops



Figure 3.20: Planting in containers



Figure 3.21: Planting in polythene bags



Figure 3.22: Planting in tyres



Activity 3.09

- 1 Copy the table below into your exercise book. Match the method of cropping with the correct features.
- 2 Identify at least two farmers in your home or school area. Find out what cropping methods they use in their farm or garden. Why do they use these cropping methods?
- 3 Briefly describe how people living in urban centres can grow food crops.

Methods of cropping	Features of cropping methods
Shifting cultivation or bush fallowing	Alternating growing different crops on the same land to maintain soil fertility and structures.
Continuous cropping	Growing food crops in a small area around your house.
Monocropping	Growing more than one type of crop on a piece of land at the same time.
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Crop rotation	Growing the same crop on the same piece of land from year to year. Annual, or perennial, crops can be grown in monocropping.
Intercropping	Growing food crops in a box or container around your house, especially in town or urban areas.
Home or sup sup garden	Growing two crops in the same area using definite spacing.
Urban agriculture techniques	Farmers cultivate a piece of land for 2 to 4 years. When the soil is exhausted of plant food, as indicated by a low crop yield, the farmer leaves the area and moves on to farm a different piece of land. This allows the exhausted land to recover. The land should be allowed to recover for 10 to 20 years before it is used again.

Choosing a site

When you are planning to grow food crops, it is important to choose a site that is suitable for the food crops you plan to grow. A suitable site would be an area that is quite flat, that is near a water source so that you can water your crops during dry weather, and that has a type of soil that is well drained and rich in organic matter.

The soil in your area might not be good for growing certain types of food crops. Using suitable agricultural practices, however, you can improve your soil and grow different food crops with more success.



Figure 3.23: A suitable site for growing food crops





Activity 3.10

Copy the following questions into your exercise book or onto a separate sheet of paper. Then answer the questions.

- 1 List the important factors that must be considered when choosing a site for growing food crops.
- 2 Why do you think a site is suitable or not suitable for growing food crops?
- 3 What might affect how suitable your area is for growing food crops?
- 4 If a site is not suitable, are there ways you can still grow food crops in the area?
- 5 Work in groups. With the help of your teacher, your group must choose a site where you can grow food crops. If a suitable site is not available, choose another way to grow crops. Refer back to the suggestions from earlier in the chapter for ideas. Decide what crop to grow. As you progress through this chapter, your group will clear the site, decide on a cropping method, prepare a nursery, grow crops in the nursery, transplant the crops to your site, and look after the crops.

Using the right tools

Once you have chosen a suitable site for your food crop, you need to start preparing your site. To prepare your site, you need to know the right tools to use. Some examples of common farm tools that can be used to prepare a site are shown in figure 3.24.



Activity 3.11

Complete the following activity in small groups. Report your answers to the rest of your class.

- 1 Give two reasons why it is important to have knowledge about tools.
- 2 Look at the school toolshed or ask a farmer around your home or school area if you can look at their tools. Identify all the farm tools you can find.
- 3 List the names of the tools and decide what activity you would use each tool to complete.
- 4 Name any improvised tools that could be used when growing food crops. Improvised tools are tools that are not bought from shops.



Figure 3.24: Can you name these farm tools?



Clearing and preparing a site

The word “**prepare**” means to get ready. Your farm or garden area must be prepared before you can plant the seed, seedlings, or cuttings. The most common method of clearing and preparing farm or garden sites in the Solomon Islands involves clearing the forest or bush. This is shown in figure 3.25.



Figure 3.25: A cleared farm or garden site

The cleared area is burnt and the rubbish removed. You can remove weeds from the site, but remember that the remains of old crops, leaves, and stems should be mixed into the soil. This increases the amount of organic matter in the soil.

Selecting planting materials

Once you’ve prepared your site, you will be able to sow your **planting material**. Planting material refers to the part of the plant that will go into the soil and grow into the food crop. Seeds, cuttings, and suckers are all examples of planting materials.

Before you sow your planting material, you must select suitable planting material so that your food crops grow successfully. It is important to select planting material that meets the following guidelines.

- The planting material comes from plants that grow well in the specific soil and climatic condition of your site.
- The planting material is healthy.
- The planting material is resistant to pests and diseases.
- The planting material matures early.
- The planting material produces a high yield, or a large amount, of food crop.

Farmers should try to grow their own supply of planting materials. Because they will always have planting materials available, farmers who grow their own planting material can grow food crops continuously.



Figure 3.26: Healthy planting materials



Activity 3.12

- 1 Clear and prepare your site.
- 2 As you clear and prepare your site, think about the following things.
 - a Are you using the correct tools?
 - b Are you using the tools in the right way?
 - c What is the tool actually doing to the soil?
 - d How are you mixing the organic matter into the soil?
- 3 In your exercise book or on a separate sheet of paper, describe how people in your local area clear and prepare a farm or garden site for planting.





Activity 3.13

- 1 In your exercise book, list the different types of planting materials that can be used to grow food crops.
- 2 Collect examples of different food crop planting materials. Display them in class.
- 3 Discuss what makes planting materials healthy and how to select planting materials to use to grow food crops.
- 4 Decide what planting materials you will use for your crop.

Sowing seeds

My goals

- explain the term “direct sowing”
- start a seedling nursery
- prepare a soil mix for the nursery
- sow seeds in the nursery

Direct sowing

Now that you know how to select food crops and suitable growing sites, as well as the correct tools and ways to use them to prepare a site, you are ready to plant your food crops. Some food crops are sown, or planted, directly as **cuttings**.



Figure 3.27: Corn plants planted using direct sowing

This term refers to the part of the plant that will be planted to make a new plant.

Another way to plant food crops is to sow seeds. Some food crops, like beans, corn, and peanuts, have seeds that are sown straight into the planting bed where they will germinate and grow. This is called **direct sowing**. For example, the corn plants growing in the photograph in figure 3.27 are sown directly into the planting beds where they will grow. Direct sowing is best used for food crops that meet the following requirements:

- have big seeds
- germinate easily
- grow and establish easily
- would be difficult to transplant.

The plots, or planting beds, where food crops will grow must be prepared before the seeds are sown. The seeds should be planted in furrows, or holes. When the seeds are sown directly, the farmer should be sure the seeds are planted at the correct depth, and with enough space between the seeds. The farmer should also make sure that the seeds are sown with at least two seeds in each planting hole. The way a farmer sows food crops will depend on the type of food crop that is grown. A sucker would be used to sow a banana crop but a seed would be used to sow a bean crop.

Activity 3.14



Answer the following questions in your exercise book or on a separate sheet of paper.

- 1 Use your own words to explain what the term “direct sowing” means.
- 2 Why should a farmer use the direct sowing method for some food crops?
- 3 Why is it important to plant seeds at the correct depth and correctly spaced apart?
- 4 Why do you think it is advisable to plant two seeds in each planting hole?



Starting a seedling nursery

Not all types of food crops can be sown directly into the site where they will grow. Some food crops must be raised in a separate area as **seedlings**, then **transplanted** to the field or area where they will grow and develop. A place where we sow and raise seedlings is called a **nursery**. There are different types of nurseries (see figures 3.28 to 3.31).

When choosing a site for your seedling nursery, there are certain things you should look for:

- near a source of water
- a short distance from farm or garden site
- free of pests

- close to the house
- flat area
- well-drained soil.

Activity 3.15



- 1 Look carefully around your school area. What factors should you consider to help you select a good site for a seedling nursery? Your teacher will assist you with this activity.
- 2 Construct a simple seedling nursery using the materials available to you.



Figure 3.28: Polythene bag nursery



Figure 3.29: Open bed nursery

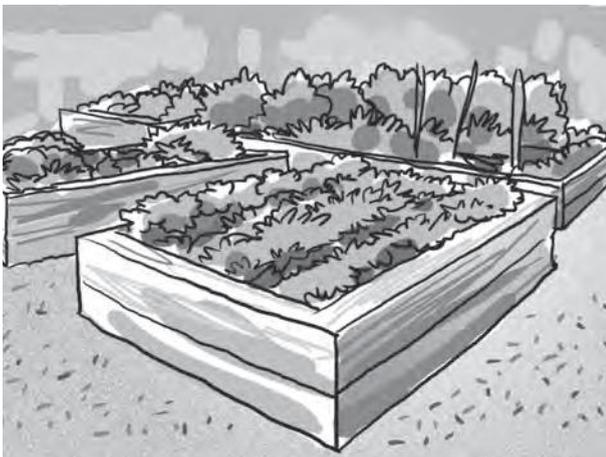


Figure 3.30: Raised bed nursery



Figure 3.31: Box nursery



Preparing a soil mix

Before we can sow seeds, we must prepare a good soil mix for the nursery. A good soil mix must contain plant food that will help the seedlings grow well. A mixture or combination of the following materials should make a good soil mix for your nursery.

- Loose, or **friable**, soil that is well drained.
- Organic matter, like rotting coconut husks or animal manure.
- Sandy soil.

Figure 3.32 shows a farmer at the Burns Creek Organic Farm preparing a soil mix for the plants in the nursery.

Some soils may contain pests or disease-causing organisms. Therefore, it is good to clean the soil of these pests or harmful organisms by heating it. This should be done before sowing the seeds. Heating the soil to kill harmful pests and organisms is called **soil sterilization**. One way to sterilize soil is shown in figure 3.33.



Figure 3.32: Preparing a good soil mix for a nursery



Figure 3.33: Sterilize soils for the nursery by placing wet soil in a drum and heating the drum.

Activity 3.16



Copy the sentences below into your exercise book. Fill in the blanks with the correct words.

Before we can sow seeds, we must _____ a _____ soil mix for the _____.
A good soil mix must _____ plant _____ that will help the seedlings _____ well.

Activity 3.17



- 1 Collect suitable materials for preparing your soil mix.
- 2 Prepare a good soil mix for your seedling nursery.



Sowing seeds in the nursery

If you sow seeds in seed boxes or an open bed nursery, then you must first make a small furrow, or drain, in the soil before you sow the seeds.

- If the soil mix is dry, add water to it before sowing the seeds.
- Make sure you spread the seeds evenly along the furrow in the seed boxes or open bed nursery.
- After sowing the seeds, use your fingers to brush the soil over the seeds. The soil should lightly cover the seeds.



Figure 3.34: A seedling nursery

When you sow seeds in a container, in polythene bags, or in seedling trays, make a deep hole in the soil to place the seed in. Do not sow the seeds too deep or too close together. You must keep the seed bed watered, but you must not put too much water in the seed bed. You will learn more about watering seedlings in the next section. To ensure success in food crop production, you must remember to choose seeds that meet the following requirements:

- are resistant to pests and diseases
- produce high yields
- are healthy and reliable
- are adapted to our climate and soil type.

Activity 3.18



- 1 Watch your teacher demonstrate how to sow seeds in seed boxes or in an open bed nursery.
- 2 Sow seeds in prepared seed boxes or open beds in the nursery.

Caring for the seedlings

My goals

- list important practices for caring for seedlings in the nursery
- water seedlings
- prick newly germinated seedlings
- remove weeds from the seedling nursery
- control pests and diseases in the seedling nursery
- harden seedlings

Seedling nursery care

Seeds that germinate in the nursery (see figure 3.35) must be looked after properly until they are ready to be transplanted in the field or area where they will grow. Some of the important tasks that must be done to care for seedlings include watering, pricking, weeding, controlling pests and diseases, and hardening.



Figure 3.35: Newly germinated seedlings





Activity 3.19

- 1 With a partner, discuss why farmers need to care for newly germinated seedlings.
- 2 Discuss with your partner what you must do to care for seedlings in the nursery.

Watering

Seedlings in the nursery need water. Water is important because it helps to dissolve nutrients and to carry nutrients to the plant. The right amount of water must be supplied to the seedlings when they need it. If a seedling gets too much water, it can develop diseases. If a seedling gets too little water, it will not get the nutrients it needs to grow strong and healthy. Figure 3.36 shows a simple way to water seedlings in the nursery, using a watering can. You can make a watering can from a tin or another container.



Figure 3.36: Watering seedlings with a watering can

Activity 3.20



- 1 Check your seedlings daily to see if they require water.
- 2 Apply water to your seedlings when they need it.

Pricking

Some seedlings need to be removed from the seed bed or separated from other seedlings. This is to avoid overcrowding and create space for each seedling so that they all can grow well. The removed seedlings can be discarded or replanted elsewhere. The process of separating and removing seedlings in the nursery is called **pricking**. Pricking is best done when the seedlings, and their roots, are still small. Figure 3.37 shows newly germinated seedlings that are ready for pricking.



Figure 3.37: Newly germinated seedlings ready for pricking

Activity 3.21



- 1 Observe the seeds you have sown to see if they have germinated.
- 2 Prick any seedlings that are overcrowded.



Weeding

Removing weeds from seedlings and the soil around seedlings is important. Weeding is especially important if your seedlings are growing in an open bed nursery. If weeds are not controlled and removed, they will compete with the seedlings for nutrients, water, and growing space. Figure 3.38 shows weeds being removed from the open bed nursery at the School of Natural Resources.



Figure 3.38: Removing weeds from an open bed nursery



Figure 3.39: Weeds can take over if not kept under control

Activity 3.22



- 1 Check your seedling nursery to see if weeding is required.
- 2 Carry out any weeding that is needed.

Controlling pests and diseases

Keeping a close watch over the seedlings is an important step in controlling pests and diseases in the nursery. Pests and diseases can come from different sources at different stages (see figure 3.40). Knowing where pests and diseases come from will help us to prevent or reduce the harmful effects of any attacks on the seedlings. It is important to keep a watchful eye on seedlings to observe any signs of pests and diseases damaging seedlings. If you observe pests and diseases harming seedlings, you must take appropriate measures to control them.



Figure 3.40: A caterpillar on a seedling leaf

Activity 3.23



- 1 Observe your seedlings to identify any signs of damage from pests or diseases.
- 2 Use appropriate measures to control pest and disease damage to the seedlings.



Hardening

The conditions in the nursery are very different to the conditions in the area where the plant will be transplanted. It is very important that seedlings go through the process of **hardening** before they are transplanted. Hardening prepares the young seedlings for the conditions in the field.

The way the hardening process is carried out will vary for different seedlings and different types of nurseries. For example, for seedlings from an open bed nursery, hardening is done by removing the shade cover from the nursery. For seedlings from a polythene bag or a box nursery, seedlings are taken into the sun (see figure 3.41). This preparation should be carried out a week prior to transplanting the seedlings. This time will allow the seedlings to get used to the outside conditions and reduce the shock of transplanting to the seedlings.



Figure 3.41: Eggplant seedlings raised in a polythene bag nursery being hardened in the sun



Activity 3.24

- 1 Observe your seedlings to see if they are ready for transplanting.
- 2 Harden the seedlings before transplanting.

Chapter summary

- Growing food crops is a shared responsibility. The benefits of growing food crops include having a variety of foods available and having a source of income.
- Plants can reproduce through sexual or asexual reproduction.
- Food crops can be classified as above-ground food, meaning that we eat the part of the plant that grows above the ground, or below-ground food, meaning that we eat the part of the plant that grows below the ground.
- The first steps in growing food crops are choosing what to grow and deciding what cropping methods to use. Once a farmer has a suitable site for growing food crops, they must use the right tools to prepare the site and select suitable planting material to plant.
- Food crops that are grown in a nursery must be watered, pricked, weeded, and have pests and diseases controlled. Seedlings grown in a nursery should be hardened before being transplanted.



Glossary

classified: sorted into groups

corm: a short, rounded underground stem

cotyledon: the largest part of the seed, found on the inner part of the seed, that supplies a growing plant with food

cuttings: the parts of a plant that are planted to make a new plant

direct sowing: planting seeds, cuttings, or suckers directly into the land where they will grow and develop

dormant: seeds that have not germinated

embryo: a part of the inner seed that can eventually develop into a new plant

friable: able to crumble easily

germinate: to begin to grow

hardening: to prepare a seedling for field conditions by removing shades, placing plants in the sun, or other such measures

hilum: the place on the outside of the seed where it was attached to the flower or fruit

micropyle: the opening on the outside of the seed that allows it to be fertilized

nursery: a place where seedlings are grown before they can be transplanted

planning: making an outline of what you intend to do before you actually get started

plant reproduction: making another plant

planting material: the part of the plant that will go into the soil and grow into the food crop

prepare: to get something ready

pricking: separating and removing seedlings in the nursery so that each plant grows well

rhizome: an underground stem

seed: the part of the plant that will grow into a new plant

seedlings: young plants

soil sterilization: heating soil to kill harmful pests and organisms

testa: the outer part of a seed that protects the inner parts

transplanted: to move a plant from one location to another

yield: the amount of a crop that grows successfully



Chapter 4

Growing vegetables

Why grow vegetables?

My goals

- define and explain the term “vegetables”
- classify vegetables
- identify examples of different vegetables

What are vegetables?

You’ve already learnt about the first steps for growing food crops. These first steps are the importance of planning and how to manage a nursery. Now you are ready to learn about growing vegetables in the field.

Vegetables are a common type of food crop grown in the Solomon Islands. Vegetables are the edible parts of plants such as cabbages, peppers, beans, tomatoes, and shallots (see figure 4.01). The term “vegetables” only relates to cooking; it is not a botanical or scientific term.



Figure 4.01: Tomatoes on the vine

Everybody knows what vegetables are. You often hear people say, “Eat more vegetables, they are good for you”. What does this mean? Vegetables are good for our health because they contain vitamins that we need to protect us from getting sick. Vegetables are also rich in minerals that our bodies need to function well, like iron and calcium.

It is good for our health to eat food grown in our own farm or garden. This is why we must try to grow more vegetables for ourselves. People living in towns also need to be supplied with fresh vegetables. Farmers are able to get extra income if they meet the demand for vegetables of people living in towns.



Activity 4.01

Copy the questions below into your exercise book. Then complete the activity.

- 1 Define the term “vegetables”.
- 2 Are you eating enough vegetables? Copy the table below into your exercise book. Use the table to keep a record of the vegetables that you eat during a week.
- 3 What does the information in the table tell you about how many vegetables you eat in a day?
- 4 Do you think you need to increase the amount of vegetables you eat in a day? Why?
- 5 Why do you think people need to grow more vegetables in their local area?

Day	Vegetables eaten
Sunday	
Monday	
Tuesday	
Wednesday	
Thursday	
Friday	
Saturday	

Classifying vegetables

We can classify vegetables into six general categories:

- bulbous vegetables
- cucurbit vegetables
- fruit vegetables
- leafy vegetables
- legume vegetables
- root vegetables.

More information about classifying vegetables can be found in table 4.01. Many local and introduced vegetables are grown in villages in the Solomon Islands. However, people do not often think of the local plants as vegetables. Figures 4.02 to 4.09 show examples of some introduced and local vegetable crops that grow in the Solomon Islands.

Table 4.01: Types and examples of vegetables

Types of vegetables	Examples of vegetables
Bulbous vegetables	Garlic, onion, leek, shallot
Cucurbit vegetables	Cucumber, pumpkin, squash
Fruit vegetables	Pepper, eggplant, okra, tomato
Leafy vegetables	Ball cabbage, Chinese cabbage, kangkong, slippery cabbage, watercress
Legume vegetables	Long bean, winged bean, snake bean
Root vegetables	Carrot, radish, taro, yam



Examples of different vegetables



Figure 4.02: Onion



Figure 4.03: Pumpkin



Figure 4.04: Eggplant



Figure 4.05: Tomato



Figure 4.06: Local leafy vegetable



Figure 4.07: Local leafy vegetable



Figure 4.08: Long beans



Figure 4.09: Carrots



Activity 4.02

Work in groups to complete the activity. Present your findings to the class.

- 1 What are the six ways to classify vegetables?
- 2 Is it easy or hard to grow vegetable crops in your home or school area? Why?
- 3 Copy the table below into your exercise book or onto a separate sheet of paper. Use the table to write down examples of local and introduced vegetables you grow in your home or school area.
- 4 Why do you think it is important to promote our own local vegetables?

Local or traditional vegetables	Introduced vegetables
Please do not write in this book	



Preparing a vegetable farm

My goals

- prepare planting beds
- use correct planting space
- transplant seedlings

Preparing planting beds

After a farmer has completed planning and has sowed seedlings, the next step is to prepare the field, plot, or bed where the seedlings will be transplanted and the plants will grow. You must consider how to prepare the soil for growing vegetables, how much space each plant needs, and how to transplant vegetables successfully.

When farmers cultivate the soil, they are breaking it up so that when seeds, seedlings, suckers, or cuttings are planted, it will be easy for the plant to grow. It will also increase the size and number of air spaces in the soil. An area or site farmers prepare for planting is called the **planting bed**. Figure 4.10 shows one way that a farmer can prepare a planting bed for growing vegetables.

There are different types of planting beds:

- raised plots
- flat plots
- ridges
- sunken plots
- mounds.

Figures 4.11 and 4.12 show different types of planting beds. The type of planting bed a farmer prepares for growing vegetables will depend on the type of soil of the land and the vegetables to be grown.

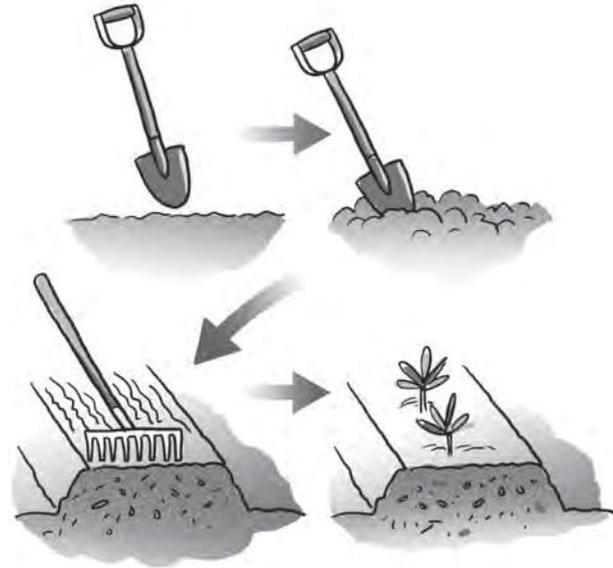


Figure 4.10: Preparing a planting bed



Figure 4.11: Raised plots



Figure 4.12: Sunken plot or bed





Activity 4.03

Work with a partner to complete the following activity.

- 1 Why is it important to break up the soil before planting seeds, seedlings, suckers, or cuttings?
- 2 Identify the different types of planting beds. Draw a picture of each type of planting bed in your exercise book.
- 3 Which types of planting beds are commonly used in your home or school area for planting vegetables?



Activity 4.04

Prepare planting beds for your vegetable seeds, seedlings, suckers, or cuttings.

Planting space

The planting space a vegetable crop needs varies from one crop to another. It is important to space vegetable crops apart correctly when you plant them. This will avoid plants competing for nutrients, sunlight, water, and space to grow. Vegetables planted too close together will not grow well. The correct spacing for planting some common vegetables is shown in table 4.02.

One way to work out the correct planting space a vegetable crop needs is to calculate the space the fully grown vegetables need. You can do this by carefully digging out a plant and all the soil around the plant. Carefully wash the soil off the roots. Then measure the length of the roots and the leaves. The spread of the roots of the plant will be similar to the spread of the leaves of the plant. This is shown in figure 4.13.

You will need to leave enough space for the plant to grow fully, without pushing into other plants. You will also need to be sure that you don't plant the vegetables too far apart. When we plant vegetable crops too far apart, we waste space that could be used to grow crops.

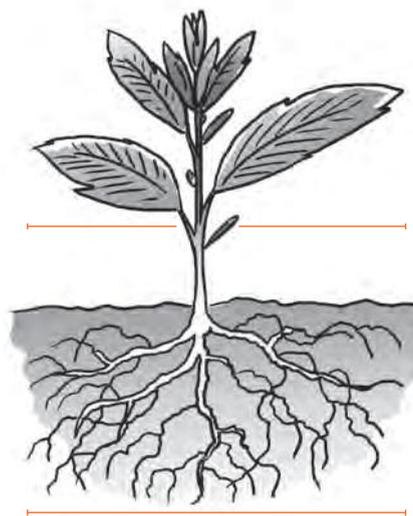


Figure 4.13: Calculating the size of a fully grown vegetable

Table 4.02: Spacing for common vegetable crops

Crop	Distance between plants	Distance between rows	Plant depth
Chinese cabbage	25–30 cm	45–60 cm	1–2 cm
Cucumber	30 cm	120–140 cm	2–3 cm
Eggplant	45 cm	90 cm	1–2 cm
Head cabbage	30–40 cm	45–60 cm	1–2 cm
Lettuce	10–15 cm	30–45 cm	1–2 cm
Pepper	45–60 cm	60–90 cm	1–2 cm
Pole bean	10–15 cm	90–120 cm	3–4 cm
Tomato	40–50 cm	100 cm	4 cm



Activity 4.05

- 1 Why is it important to plant vegetable crops using the correct amount of spacing? Discuss your answer with your classmates.
- 2 Look around the school farm or a farm near the school to observe vegetable crops. Carefully observe the planting space of the vegetable crops.
- 3 If possible, measure the distance between the plants.
- 4 If possible, measure the distance between the rows of plants.

Transplanting seedlings

As you've learnt, seedlings that are growing in a nursery must be moved to the farm or garden to allow them to grow and develop fully. This is called transplanting. The exact time to transplant vegetable seedlings varies with different vegetable crops. However, the factors that will determine how and when we transplant seedlings include the following:

- the height of the seedlings
- the time of day
- the size of the seedling leaves
- the prepared seed or planting beds.

There is a correct process for transplanting seedlings farmers should follow.

Transplanting process

- 1 Transplanting should be carried out only when seedlings have grown to the correct size. Cloudy days with no wind are the best days for transplanting. The best times for transplanting are late in the afternoon or evening.

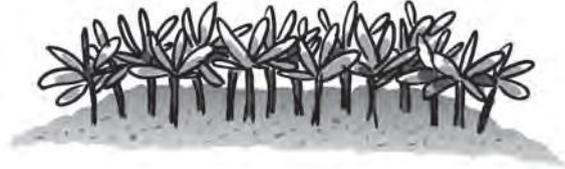


Figure 4.14: Seedlings in the nursery that are ready to be transplanted

- 2 Water seedlings 1 to 2 hours before taking them out of the nursery.



Figure 4.15: Water seedlings in the nursery before you transplant them.

- 3 Loosen the soil around the seedlings.



Figure 4.16: Loosen the soil around the seedlings.



- 4 Remove the seedlings. Leave the damp soil around the roots of the seedlings. If the seedlings have been grown in containers, carefully turn the container upside down and hold the plant by the roots in the palm of your hand to remove it.

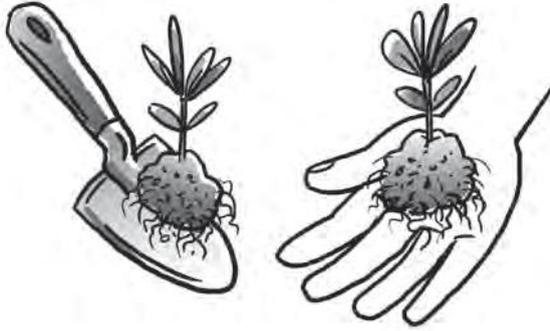


Figure 4.17: Remove the seedlings from the nursery.

- 5 Dig holes in the planting beds where each seedling will be planted. Ensure the hole is large enough for the root system to grow and develop fully. Water each hole before transplanting the seedling.



Figure 4.18: Dig a hole in the planting bed for each seedling.

- 6 Plant the seedlings in the holes. Pack the soil around the roots of the seedlings.



Figure 4.19: Plant each seedling in the planting bed in the farm or garden.

- 7 Water the planted seedlings.



Figure 4.20: Water the planted seedlings.

- 8 Protect the seedlings from the sun.

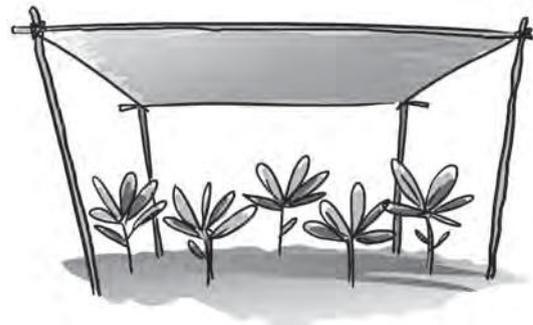


Figure 4.21: Protect the newly planted seedlings from the sun.



Activity 4.06

Write your answers to the following questions in your exercise book or on a separate sheet of paper.

- 1 Define the term “transplanting”.
- 2 Write down the factors that determine when and how a farmer should transplant seedlings into the field.

- Watering the plants.
- Providing mulch to the plants.
- Weeding the plants.
- Thinning out the plants.
- Staking and trellising the plants.
- Pruning the plants.
- Applying fertilizer to the plants.
- Controlling pests and diseases affecting the plants.

If a farmer completes these steps, the vegetable crops will grow healthier and produce a higher yield, or more vegetables.



Activity 4.07

- 1 Look at the seedlings in the nursery. Are they ready for transplanting?
- 2 Transplant any crops that are ready to be moved into the farm or garden. Follow the procedure outlined in this section to transplant the seedlings.

Watering

Like all plants, vegetable crops need water to grow. To grow well, some vegetable crops need more water than others. Remember, farmers cannot control the amount of water vegetable crops get when it rains. If there is not enough rain, farmers can provide plants with extra water. When there is not enough water available to the plant, or not enough water in the soil, the plant will start to bend over and the leaves will hang down. This is called **wilting**.

There are several possible sources of water for your vegetable crops:

- wells
- tanks
- streams
- creeks
- rivers.

Figures 4.22 to 4.25 show some ways that vegetable crops can receive water. Some of the methods used to supply water to plants are quite expensive and unsuitable to our situation.

It is best to water plants in the morning and late in the afternoon, when the sun is not too hot. On a hot day, water and moisture is lost from the surface of the soil. This process is called **evaporation**.

Caring for vegetable crops

My goals

- identify steps to care for vegetables
- water vegetable crops
- provide mulch to vegetable crops
- control weeds in vegetable crops
- thin vegetable crops
- stake and trellis vegetable crops
- prune vegetable crops
- apply fertilizers to vegetable crops
- control pests in vegetable crops
- control diseases in vegetable crops

Steps to care for vegetables

There are many steps involved in caring for vegetable crops.





Figure 4.22: Hose



Figure 4.23: Sprinkler



Figure 4.24: Watering can

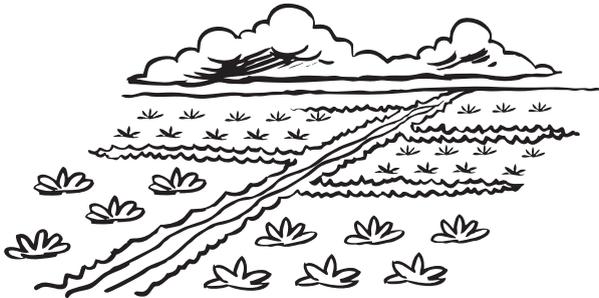


Figure 4.25: Flood irrigation



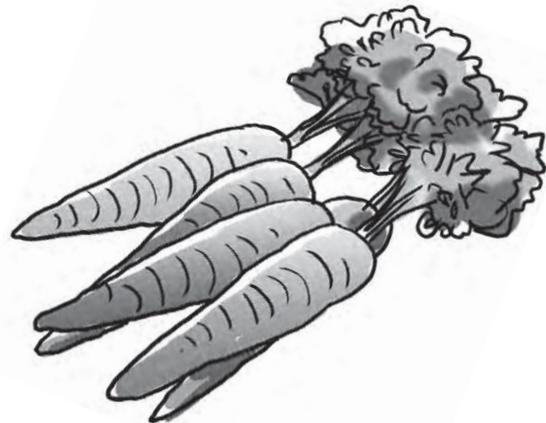
Figure 4.26: Watering crops

Activity 4.08



Answer the following questions in your exercise book or on a separate sheet of paper.

- 1 List some possible sources of water for your vegetable crops.
- 2 What are some of the methods used to supply water to crops?
- 3 Which methods for supplying water to plants are the most suitable for your home or school farm or garden?
- 4 Construct a simple watering can using a tin or any empty container.
- 5 Water your vegetable crops.





Mulching

As you've learnt, soil is very important for growing crops successfully. You've also learnt that soil is more fragile than it looks. When the surface of the soil becomes hot because of the sun, water evaporates and is lost. During the rainy season, the soil surface may be washed away by water. These problems can affect how vegetable crops grow. It is important to cover and protect the surface of the soil. This is called **mulching** (see figure 4.27). Figures 4.28 and 4.29 show examples of materials that farmers can use for mulching.



Figure 4.27: Dried grasses used as mulch to protect the soil around a plant



Figure 4.28: Dried leaves and rotting sticks



Figure 4.29: Rotting coconut husks

Activity 4.09



- 1 Identify and collect examples of different materials you can use for mulching.
- 2 Go to your vegetable plot. Place the mulch materials on the planting beds around your plants.

Weeding

When you prepared your farm or garden site for planting, you probably found many different plants already growing there. These are plants that grow naturally in the Solomon Islands.

After you planted your vegetable crops, you will have noticed that many of these plants started to grow again. Unwanted plants growing in a farm or garden are called **weeds**.

Any weeds allowed to grow in a farm or garden will take up all the nutrients, light, and water necessary for vegetable crops to grow. Weeds also can bring diseases and pests to the garden. This is why weeds must be controlled. We can use a number of methods to get rid of weeds (see figures 4.30 to 4.33).



1



Figure 4.30: Pull the weeds out of the soil.

2



Figure 4.31: Cut the weeds out of the soil.

3



Figure 4.32: Burn the weeds.

4



Figure 4.33: Spray the weeds with a chemical.



Activity 4.10

- 1 Define the term “weed” in your exercise book or on a separate sheet of paper.
- 2 In your exercise book, write down two reasons why weeds need to be controlled in vegetable plots.



Activity 4.11

- 1 Identify and collect examples of common weeds you could find in your vegetable farm. Your teacher will help you.
- 2 Weed your vegetable farm or garden using a suitable weed control method.

Thinning out

When you sowed your seeds, you should have put more than one seed in each hole. In some places, all the seeds will have germinated. Where this has happened, it is a good idea to remove the extra seedlings. This will leave one strong plant in each hole. By removing extra seedlings, the remaining seedlings will have more space, and can grow healthier and more successfully. The process of removing extra seedlings from a plant bed is called **thinning out**. Thinning out should be done as early as possible, when the roots of the plant are still small. This will help the remaining plants grow strong. If extra seedlings are left in the planting beds, they will crowd the remaining plants.



This makes all the crops in the plot long, soft, and weak. Figures 4.34 and 4.35 shows plant beds before and after the plants have been thinned out.

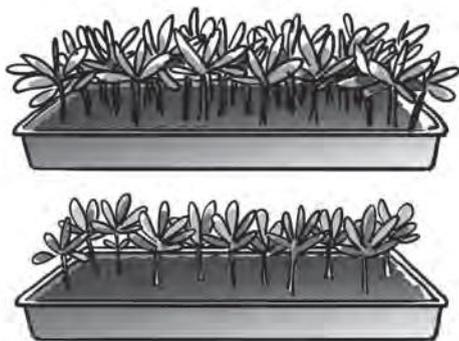


Figure 4.34: Thinning out—before and after

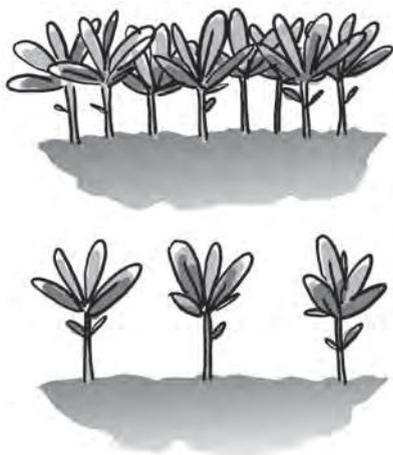


Figure 4.35: Thinning out—before and after

Activity 4.13



- 1 Observe the crops you have planted to see if they require thinning out.
- 2 Thin out any crops where extra plants need to be removed.

Staking and trellising

Some plants have weak stems that must be supported as the plant grows. One way of supporting a plant with a weak stem is called **staking**. Staking is when you put a pole or a stick into the soil near the plant. Then you tie the plant to the pole (see figure 4.36).



Figure 4.36: A farmer staking young tomato plants in his sup sup garden

Other vegetables, like beans, cucumbers, and pumpkins, are climbers. These plants must be supported or grown along erect structures so they can grow tall and successfully produce fruit. Any structure built to support a vine or climbing plant is called a **trellis**. Figures 4.37 and 4.38 show two different trellises.



Activity 4.12

In pairs or small groups, discuss the following questions.

- 1 Define the term “thinning out”.
- 2 Why is thinning out necessary?
- 3 Briefly describe when thinning out should take place.



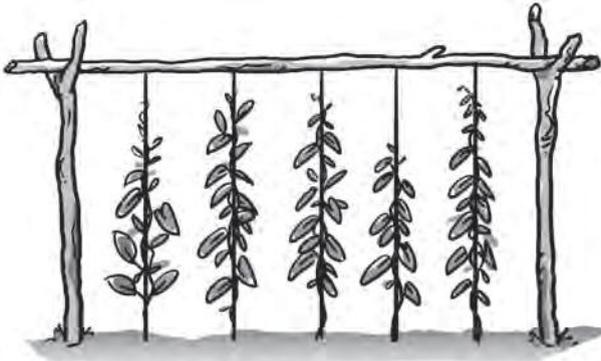


Figure 4.37: String trellis

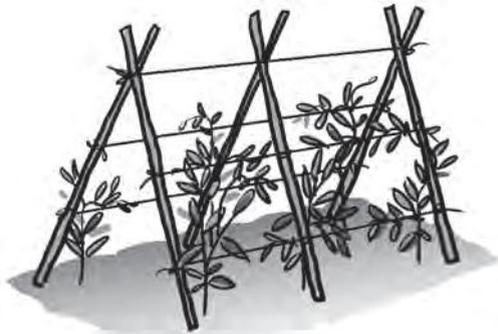


Figure 4.38: Tent-style trellis

Activity 4.15



- 1 Look around your vegetable plot. Identify plants that need support to grow.
- 2 Build a trellis or provide staking to any plants you've identified that need support.
- 3 When do you think is the best time to stake your plants? Why?



Figure 4.39: A student at the School of Natural Resources pruning tomato plants



Activity 4.14

- 1 Copy the sentences below into your exercise book. Fill in the blanks with the correct words.

Some plants have _____?
 stems that must be _____?
 as the plant grows. This is called
 _____?. Any _____?
 built to support a _____?
 or climbing plant is called a
 _____.

- 2 Define the following terms in your exercise book.
 - a staking
 - b trellis

Pruning

Some vegetables, such as tomatoes and eggplants, produce many shoots and branches. Not all of these shoots or branches bear fruit. Those shoots that do not bear fruit are called **excess shoots**. Excess shoots use up food that is needed for the plant to flower and fruit. These branches or shoots should be pruned, so that only shoots that are flowering and producing fruit are left on the plant. Removing plant parts to improve or control plant growth and fruit size is called **pruning** (see figure 4.39).

Besides improving or controlling plant growth, another reason for pruning is to help the plant support the weight of the fruit. When a branch bears too much fruit, it might get heavy and break. Another reason for pruning is to remove



any part of the plant that is infected by disease. Finally, pruning helps to keep the plant healthy and to maintain its life span.

Pruning should be carried out using a sharp, clean pruning knife, secateurs, or a pruning saw (see figures 4.40 and 4.41). Some vegetable crops that require regular pruning are tomatoes, peppers, and eggplants.



Figure 4.40: Secateurs



Figure 4.41: Pruning saw

Activity 4.16

- 1 Explain to a classmate or your teacher what the term “pruning” means.
- 2 What are three reasons that pruning is necessary for plants to grow healthy?

Activity 4.17



- 1 Go with your teacher to your school farm or a nearby farm or garden. Identify vegetable crops that need pruning.
- 2 Watch carefully as your teacher shows you how to prune a vegetable crop.
- 3 Use a sharp, clean instrument to prune your vegetable crops.
- 4 Why do you think it is important to use a clean and sharp instrument for pruning?

Applying fertilizer

Plants need plant food, or **nutrients**, in the soil in order to grow. There are different types of nutrients in the soil. Plants get these nutrients through their roots. If a plant grows well, that shows that there are nutrients in the soil.

When there are not enough nutrients in the soil, plants will not grow well. If plants are lacking nutrients, a farmer can add materials to the soil to help the plants get the nutrients that they need. These materials are called **fertilizers**. There are two main types of fertilizers that farmers can use:

- Organic fertilizers are made of materials that originally came from plants and animals. Figure 4.42 shows organic material that can be used as a fertilizer.
- Inorganic fertilizers are made by people. Figure 4.43 shows an inorganic fertilizer.

There are important guidelines to follow about fertilizers, no matter what kind of fertilizers you use. Fertilizer should be applied to plants at the correct time, in the correct place, and in the correct amount. Figure 4.44 shows how to apply inorganic fertilizer to plants.





Figure 4.42: Dried grasses and coconut leaves



Figure 4.43: NPK fertilizer



Figure 4.44: The correct method of applying inorganic fertilizer to plants

Activity 4.18



- 1 Copy the sentence below into your exercise book. Fill in the blanks with the correct words.

Plants need plant _____?, or _____?, in the _____? in order to _____?.

- 2 Briefly describe the two main types of fertilizers in your exercise book.
- 3 What factors do we need to consider when applying fertilizers to plants? List these in your exercise book.

Activity 4.19



- 1 Your teacher will help you determine how much fertilizer you would need for your vegetable crops.
- 2 Watch your teacher demonstrate how to correctly apply inorganic and organic fertilizers to vegetable plants.





Controlling pests

As vegetable crops grow, they are likely to be eaten or damaged by **pests**. Pests are living things that eat or damage plants or plant parts. Vegetable pests can be insects, birds, snails, or animals. Figures 4.45 to 4.48 show examples of some common vegetable pests. Remember, pests will spoil your crops if you do not keep them away. Keeping pests away from your crops is called **pest control**.

We can control pests using the following methods:

- chemical methods
- biological methods
- mechanical methods
- manual methods
- plant-derived pesticides (PDP).

These pest control methods are explained further in table 4.03.

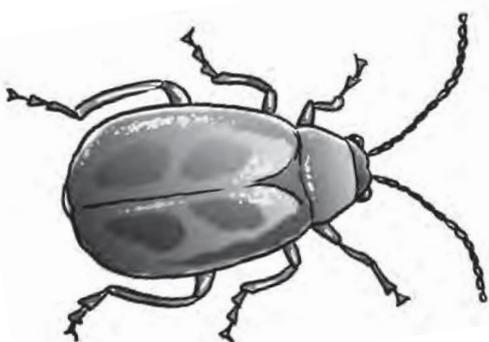


Figure 4.45: Bean leaf beetle

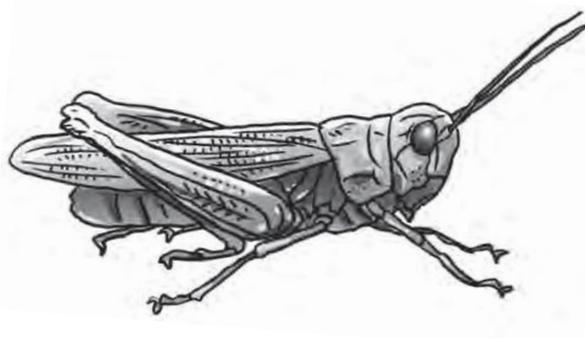


Figure 4.46: Grasshopper

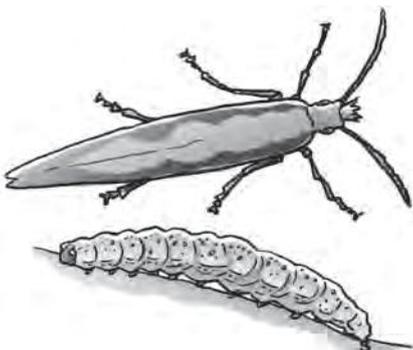


Figure 4.47: Diamondback moth



Figure 4.48: Thrips

Table 4.03: Pest control methods

Method of control	Description	Examples
Chemical control	Using chemicals to control pests.	Pesticides
Biological control	Using other plants and animals to control pests.	Use plants to repel pests, use other animals to kill pests
Mechanical control	Using traps or other mechanical devices to control pests.	Traps, nets
Cultural (manual) control	Removing pests manually.	Pick the pests off by hand
PDP	Using a collection of materials derived from plants or other sources to control pests.	Chillies, wood ash, detergents



Activity 4.20

- 1 In your exercise book, define the following terms.
 - a pest
 - b pest control
- 2 List the different methods of pest control. Briefly describe them in your exercise book or on a separate sheet of paper.
- 3 Visit your vegetable plot. Identify any damage to your crops from pests.
- 4 Carry out pest control using the appropriate methods.



Figure 4.49: Blossom-end rot in a tomato plant

Controlling diseases

Beside pests, there are other organisms (some so small that we cannot see them with our eyes) that cause diseases in vegetable crops. These organisms are called **pathogens**. Examples of pathogens include bacteria, fungi, viruses, and nematodes. These pathogens can cause vegetable crops to rot, wilt, or die.

Other pathogens cause vegetable crops to show unusual growth patterns or to grow slowly. Sometimes, it is not easy to determine which pathogen causes a disease in a plant. Figure 4.49 shows a common vegetable disease.

There are different ways to control diseases in plants, including the following:

- using chemical methods
- using cultural, or manual, methods
- selecting good-quality, disease-free planting materials and seeds
- following good hygiene and quarantine practices
- planting in greenhouses
- using good farming practices.

Table 4.04 explains these methods further.

Table 4.04: Disease control methods

Method of control	Description	Examples
Chemical control	Using chemicals to control diseases.	Fungicides, herbicides
Cultural (manual) control	Manually removing vegetable crops that are diseased.	Picking diseased plants by hand
Disease-free planting materials	Selecting planting materials like suckers, cuttings, or seeds from disease-free sources.	Banana suckers gathered from areas where there are no nematodes
Hygiene and quarantine practices	Using quarantine procedures.	Not entering farms where there are diseases, not entering your farm if you have been at a farm where there are diseases
Planting in greenhouses	Planting in greenhouses to avoid plant contact with disease-carrying insects or animals.	Using a greenhouse, growing crops in buildings
Farming practices	Using farming practices to control diseases.	Crop rotation



Activity 4.21

- 1 Copy the sentences below into your exercise book. Fill in the blanks with the correct words.

Besides pests, there are other _____?_____ (some so small that we cannot see them with our eyes) that _____?_____ diseases in _____?_____ crops. These organisms are called _____?_____.

- 2 List two examples of pathogens in your exercise book.
- 3 Visit your vegetable plot. Identify vegetable crops that show signs of disease.

Harvesting, preparing, and selling your vegetables

My goals

- identify features that indicate vegetables are ready for harvest
- harvest vegetables correctly
- prepare vegetables correctly for sale

Harvesting vegetables

Vegetable crops can be grown in small gardens, for example in the backyard, or in large farms for the household to eat or sell. Everybody involved with growing vegetable crops always looks forward to harvesting time.

Every vegetable crop has a different harvesting time. It is important that farmers know the best time to harvest their vegetable crops so their plants are healthy and fully developed. Remember, harvesting time for many vegetable crops may depend on different factors.

These factors include the following:

- plant colour
- plant size
- the number of young leaves on the plant
- the maturity stage of fruit, cobs, and pods on the plant
- the maturity stage of the stalks and roots of the plant.

The method used to harvest vegetables is different for different vegetable crops. Do you think the corncob shown in figure 4.50 is ready for harvesting? Why? The corn is ready for harvest when the silks are dry and brown, the kernels at the tip are full, and the cob is firm.

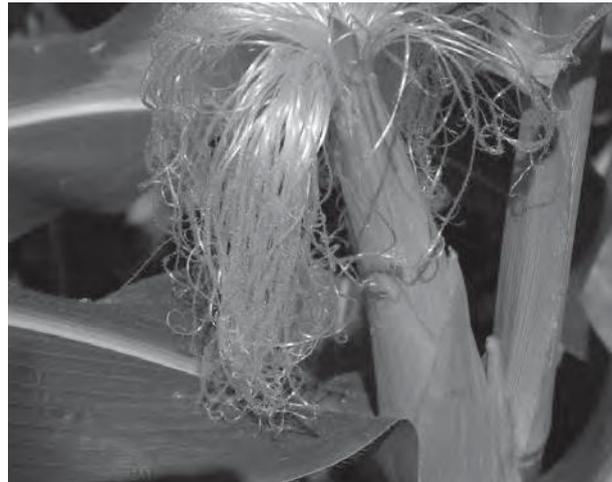


Figure 4.50: Corncob



Figure 4.51: Carrots



Activity 4.22

Work in pairs or small groups to complete the following activity.

- 1 Copy the sentences below into your exercise book. Fill in the blanks with the correct words.

Every vegetable crop has a different
_____ ? _____ ?

It is important that _____ ?
know the _____ ? _____ time to
_____ ? _____ their vegetable crops.

- 2 What factors determine the correct time to harvest vegetable crops?
- 3 Go to the school farm or any farm near your home or school area. Identify five vegetable crops. What features indicate the vegetable crops are ready, not ready, or too late for harvesting? Copy the table below onto a separate sheet of paper. Record your findings in the table.
- 4 Present your findings to the class.

Name of crop	Why is it not ready for harvesting?	Why is it ready for harvesting?	Why is it too late for harvesting?
Please do not write in this book			

Preparing and selling vegetables

If a farmer plans to sell vegetable crops, it is important that the crops are correctly prepared to be sold. Read the case study on page 70 to learn more about selling vegetable crops.



Figure 4.52: Fruit and vegetable market stall

Activity 4.23

Work in groups to complete the following activity. Present your findings to your classmates.

- 1 In the case study on page 70, what was the main reason Lanir succeeded in producing and selling vegetable crops?
- 2 What should a farmer do to achieve customer satisfaction and maintain vegetable quality?
- 3 Visit any market outlets near your home or school area. Observe how farmers sell their produce.
- 4 What can you say about the quality and display of vegetable crops sold by farmers?





Case study: A vegetable farmer sells his crops



Figure 4.53: Lanir Bosa

My name is Lanir Bosa and I come from the Guadalcanal plains area. I completed Year 9 in 1996. I did not manage to continue my education to Year 10 and 11 levels. I tried to find formal employment in town but I was without success. I know I have the potential to continue my education but I did not make use of the opportunity to learn while I was in school. I had to find ways to make a living and support myself.

I thought very hard and tried to find ways to earn a decent living at home. Finally, I decided to make use of my land, which was lying idle, to grow and sell vegetable crops. I have never regretted my decision to venture into vegetable crop production. Now I can support my family and meet whatever needs they have.

I learnt from experience that growing and caring for your vegetable crops is one thing. Harvesting, preparing, storing, and selling your vegetable crops is another thing. The key factor that helps me to succeed and continue with the business of producing and selling vegetable crops is customer satisfaction. I always ensure that the vegetable crops I produce and harvest at my farm are fresh and that customers are satisfied with my vegetables. To achieve customer satisfaction and maintain quality, I always ensure that my vegetable crops meet the following guidelines.

- Vegetables are washed, dried, and stored properly prior to going to the market.
- Vegetables are trimmed to remove plant parts that are old, diseased, or full of holes.
- Vegetables are graded and grouped according to size, shape, colour, and quality.
- Leafy or stem vegetables are placed in bunches so they look neat and tidy.
- Soft vegetables are placed in strong baskets or containers to avoid bruising or damage.
- Take care with vegetable crops to avoid damaging them during transport.
- Display vegetables at the market in an orderly manner.
- Display vegetables so that the prices are easy to see.

To be successful, you must ensure that the quality of your vegetable crops is maintained during and after harvest. It is also important that vegetable crops are harvested at the right time using correct methods.

Chapter summary

- Vegetables can be classified as bulbous, cucurbit, fruit, leafy, legume, or root vegetables.
- A farmer must prepare a planting bed and determine the planting space needed for each vegetable crop. Any seedlings must be transplanted to the planting bed using the correct process.
- Vegetable crops must be watered, provided with mulch, weeded, and thinned out. Stakes and trellises are needed for any heavy or climbing plants.
- Vegetable crops also need to be pruned, given fertilizer, and to have pests and diseases controlled.
- Colour and size are two factors that indicate when a vegetable crop is ready for harvest.
- Farmers must maintain the quality of their vegetable crops during and after harvest so that the crops are not damaged and can be sold at the market.

Glossary

evaporation: when water is lost from soil on a hot day

excess shoots: parts of a plant that do not bear fruit

fertilizers: materials added to soil to give plants nutrients that help them to grow

mulching: covering and protecting the surface of the soil

nutrients: plant food in the soil

pathogens: organisms that cause diseases

pest control: keeping pests away from crops

pests: living things that eat or damage plants

planting bed: an area of land prepared for planting seeds, seedlings, or cuttings

pruning: removing unwanted plant parts to improve or control plant growth or fruit size

staking: tying a plant to a pole to support a weak stem

thinning out: removing extra seedlings from a plant bed

trellis: a structure built to support a vine or climbing plant

weeds: unwanted plants growing in a farm or garden

wilting: when a plant does not receive enough water and the leaves begin to droop

Chapter 5

Introduction to plantation crops

Plantation agriculture in the Solomon Islands

My goals

- define and explain the term “plantation”
- describe the development of plantation agriculture in the Solomon Islands
- outline the benefits of plantation agriculture
- explain the term “smallholding”
- describe the features of smallholders in plantation agriculture

What is a plantation?

A **plantation** is a large area of land that is owned privately (by an individual, a church, or a private company) or owned by the government. People who work at the plantation usually also live there. Cocoa, coconuts, oil palms, and forestry trees are often grown on large plantations (see figures 5.01 and 5.02).



Figure 5.01: Teak plantation at Kolombangara Island



Figure 5.02: Cocoa plantation at Tenaru

In English, the word “plantation” is usually used to describe a very large commercial farm where the same crops are grown year after year. In Solomon Islands Pijin, the word “plantation” is also used to describe a small area of tree crops, like coconuts (see figure 5.03).



Figure 5.03: A small area of coconut trees at West Guadalcanal

Development of plantation agriculture

Plantation agriculture was first introduced in the Solomon Islands by traders, missionaries, and big companies. One of the main goals of early plantation agriculture was to produce raw materials to use to feed various industries in foreign countries. They grew crops on many hectares of land and put in large amounts of money, labour, and management skills into the plantation. There were plantations owned by traders, missionaries, and big companies established throughout the Solomon Islands. Figure 5.04 shows an example of a plantation that was owned previously by a large company. Most of these plantations have now been returned to the original landowners.



Figure 5.04: Lungga plantation



Activity 5.01

- 1 Copy the sentence below into your exercise book. Fill in the blanks with the correct words.

A plantation is a _____?_____ area of land that is owned _____?_____ or owned by the _____?_____.

- 2 Identify different plantations around your local area. Answer the following questions in your exercise book.
 - a Who owns these plantations?
 - b What types of commercial crops are grown on these plantations?
 - c Is the plantation still being used productively?



Activity 5.02

- 1 Copy the sentence below into your exercise book. Fill in the blanks with the correct words.

One of the main goals of early plantation _____?_____ was to produce raw _____?_____ to use to feed various _____?_____ in foreign countries.

- 2 What groups first introduced plantation agriculture to the Solomon Islands? Why?



Benefits of plantation agriculture

Plantation agriculture is an example of commercial agriculture. The purpose of plantation agriculture is to sell the products or crops grown in the plantation for a profit.

Figure 5.05 shows bags of dried cocoa beans and copra that have been unloaded from a ship from the provinces at the wharf at Point Cruz, ready to be exported. Most of the products obtained from plantation agriculture are exported to foreign buyers. The benefits for the Solomon Islands from plantation agriculture include the following:

- a source of income and employment for rural people
- a means of earning foreign currency
- an additional source of tax revenue for the government.



Figure 5.05: Bags of dried cocoa and copra that have been unloaded from a ship

Smallholdings

A **smallholding** is a small plantation. Farmers grow crops on the land to use in their household and to sell for a profit. Read the case study on page 75 to learn more about smallholdings in the Solomon Islands.



Activity 5.03

Work in groups to complete this activity.

- 1 In your group, decide on the correct words to complete the sentences below.

Plantation agriculture is an example of _____? _____ agriculture. The purpose of plantation agriculture is to _____? _____ the products or _____? _____ grown in the _____? _____ for a profit.

- 2 What are three benefits of plantation agriculture?
- 3 Study the photograph in figure 5.05. How does selling copra and cocoa benefit farmers and the country?

Activity 5.04



After reading the case study on page 75, answer the following questions in pairs or small groups. Present your findings to the rest of the class.

- 1 What are some of the disadvantages of working in a big plantation?
- 2 What does the term “smallholder” mean?
- 3 What are the benefits of producing commercial crops on a small scale?
- 4 Is there a small-scale plantation in your home or school area?
- 5 What benefits do you or your school get from this smallholder plantation?



Case study: Smallholder



Figure 5.06: Minomino

My name is Minomino and I worked at a plantation owned by a large company for nearly 30 years. I was 17 years old when my uncle first took me to the Russell Islands in the early 1960s. I had not attained any formal education, apart from completing Year 2 at a mission school. My decision to begin work at Yandina plantation was exciting for me because I would be earning money for the first time.

Working in the plantation was exciting. After I had been working for a while I found out that it was hard work, that there were risks, and that you had people above you who were your bosses. Sometimes, when you did not follow orders or meet work targets, like

cutting a certain number of dry nuts, you were disciplined. Throughout my working career at the plantation, I was fortunate to work in different sections like cattle, cocoa, copra, and coconut research.

While working, I tried to learn and gain experience in different types of work. This helped me a lot later in life when I decided to start my own coconut and cocoa plantation. Though the coconut and cocoa plantation I planted at home was small, I was satisfied because I could manage to look after the small plantation. I was also happy that whatever income I earned belonged to me.

After I started my own plantation, I realized that producing commercial crops on a smaller scale is important for Solomon Islanders. One benefit of smallholder plantation agriculture is that it does not harm the natural environment as much as other types of agriculture.

Smallholder farmers only cut down a small area of forest in an area that is easy to get to, like along a river.

At first, people in my village did not realize the importance of smallholder plantation agriculture. My efforts to establish my own small plantation have encouraged people in my community to start their own smallholder plantations to grow commercial crops like coconut and cocoa.



Crops grown in the plantation

My goals

- explain the term “plantation crop”
- classify plantation crops
- identify examples of different plantation crops

Classifying plantation crops

The term “**plantation crop**” is used to describe perennial, or permanent, crops that are grown in plantations. As you’ve learnt earlier, sometimes these crops are called cash crops because people grow them to sell for money. Plantation crops can be divided into six main groups:

- fruits and nuts
- oil plants
- beverage plants
- stimulant plants
- spice plants
- vegetation—forest trees and ornamental plants.

Table 5.01 provides further information about each of these groups of plantation crops. Figures 5.07 to 5.15 show examples of different plantation crops.

Table 5.01: Plantation crops

Category	Description	Examples
Fruits and nuts	Plants that produce fruit and nuts that people eat.	Citrus fruits, small fruits, tree fruits, nuts
Oil plants	Plants that can produce oil for people to use.	Coconut palm, oil palm
Beverage plants	Plants that can produce flavoured drinks.	Cocoa, coffee, tea
Stimulant plants	Plants with juice that people chew or drink to make them happy or relaxed.	Betel nut, kava
Spice plants	Plants that can be used to add flavour to food.	Cardamom, chilli, ginger, turmeric, vanilla
Vegetation (forest trees and ornamental plants)	Plants that can be used to produce timbers or to decorate the landscape.	Eucalyptus, mahogany, orchid, teak

Activity 5.05



- 1 Copy the sentence below into your exercise book. Fill in the blank with the correct words.

The term “plantation crop” is used to describe _____?_____, or _____?_____, crops that are grown in _____?_____.

- 2 What are the six main groups of plantation crops? Briefly describe each group in your exercise book.
- 3 Identify examples of plantation crops that are grown around your local area.

Activity 5.06



- 1 Observe the different types of plantation crops that are grown around your home or school area.
- 2 Collect examples of plantation crops and display these examples in your class.

Examples of different plantation crops



Figure 5.07: Breadfruit



Figure 5.08: Coconuts



Figure 5.09: Betel nut



Figure 5.10: Kava



Figure 5.11: Oil palms



Figure 5.12: Cocoa



Figure 5.13: Mangos



Figure 5.14: Eucalyptus



Figure 5.15: Sago palm



Preparing to grow plantation crops

My goals

- plan to grow plantation crops
- choose a plantation crop to grow
- choose a suitable site to grow plantation crops
- prepare a site
- select good planting materials
- use different planting layouts to grow plantation crops

Planning to grow plantation crops

You have discovered earlier that planning is an important activity. If a farmer wants to grow plantation crops successfully, they have to plan. Planning is necessary because it helps the farmer complete important tasks.

- The farmer makes meaningful aims or goals.
- The farmer identifies the tasks that must be completed to achieve these aims or goals.
- The farmer decides the right tools and methods to use to carry out the tasks.
- The farmer decides the wisest ways to use time and resources.
- The farmer outlines a work program.



Figure 5.16: Open bed cocoa nursery

For farmers to make the right plan to grow plantation crops successfully, they must have knowledge about the crops that they want to grow. There are different things a farmer must consider when planning to grow a plantation crop. Some of these factors are listed below.

- Select a nursery site.
- Decide on a suitable type of nursery.
- Select good planting materials.
- Select a suitable farm or garden site.
- Decide on a suitable plantation layout.
- Decide on a suitable method of farming.
- Prepare the site correctly.
- Use the correct tools and equipment.

Activity 5.07



Work in groups to complete the following activity. Use your exercise book or a separate sheet of paper to write out your answers.

- 1 Copy the sentence below into your exercise book. Fill in the blanks with the correct words.

Planning is _____?_____ because it helps the farmer complete _____?_____ tasks.

- 2 What important tasks does planning help a farmer complete?
- 3 A farmer is planning to start a cocoa plantation. Identify at least five different things that the farmer must consider when making a plan for the plantation.
- 4 Are there any possibilities for people in your home or school area to increase their plantation crop production? Why?



Choosing a plantation crop to grow

Many farmers choose to grow a plantation crop because they think they can earn more money by growing that crop. But, if the selected crop cannot grow well on the farmer's site, it will be useless to the farmer. If the farmer has a site to use to grow plantation crops, they should find out information about the site, including the soil type, the amount of rainfall, and the amount of sunlight the area gets. For example, there are many different soil types in the Solomon Islands. Not all plantation crops will grow well in one area (see figure 5.17). That is why it is important for farmers to find out what plantation crops will grow well in different sites.



Figure 5.17: Sago palm growing in swampy area



Activity 5.08

- 1 Copy the sentence below into your exercise book. Fill in the blanks with the correct words.

If the farmer has a _____ ?
to use to grow plantation crops, they
should find out _____ ?
about the site, including the soil
_____ ? , the amount of rainfall,
and the amount of _____ ? the
area gets.

- 2 Why do you think many farmers choose to grow plantation crops? Write your answer in your exercise book or on a separate sheet of paper.

Choosing a suitable site

Different plantation crops have different needs to grow well. Some of the requirements to consider when growing plantation crops include the following:

- type of soil
- amount of rainfall
- amount of sunlight
- temperature
- planting space
- crop nutrient needs.

Farmers must know the needs of the plantation crop they are planting when they choose a site to grow their plantation crops (see figure 5.18).



Figure 5.18: Choosing a suitable site to grow a plantation crop



Activity 5.09

- 1 Copy the sentence below into your exercise book. Fill in the blanks with the correct words.

Different plantation crops have different _____? _____ to grow _____?

- 2 Identify the factors a farmer must consider when selecting a suitable site to grow plantation crops.
- 3 Inspect the area around your home or school. Are there any areas that are suitable for growing plantation crops? Why?

Preparing a site

Once the farmer has chosen a crop and a site for their plantation, they must clear and prepare the land (see figure 5.19). Clearing and preparing land usually involves cutting down forest or bushes and clearing the debris by burning. However, farmers should be encouraged not to burn dead vegetation but to use the organic matter in their plantation, as mulch for example.



Figure 5.19: Clearing and preparing a site for plantation agriculture



Activity 5.10

- 1 What are the main activities involved in clearing and preparing a site for plantation agriculture?
- 2 Your teacher will allocate you an area of land. Clear and prepare the site for growing plantation crops. Decide what type of crop to grow. If possible, choose a fruit or nut crop as you will be learning about these in the next chapter.

Selecting good planting materials

Most plantation crops are **perennial**. Perennial crops are plants that grow for more than a year. It is best to plant only strong, healthy seedlings in the field because the individual trees will be kept for many years.

To have a strong and healthy seedling, the farmer must start with good seeds or planting materials (see figure 5.20). When the seedlings are growing in the nursery, the farmer must identify and remove the weak and unhealthy seedlings (see figure 5.21).

All crops, like all other living things, have differences in character. For example, one variety of coconut may bear fruit earlier than another variety of coconut. Although it bears fruit earlier, this variety of coconut may produce more nuts per bunch than one that bears fruit later. The farmer must select planting materials from plants that have the qualities that the farmer requires. Some of these qualities are listed below:

- produce a high yield
- mature early
- are healthy
- are resistant to pests and diseases
- germinate early
- are adapted to the local environment.





Figure 5.20: Strong and healthy seedlings



Figure 5.21: Weak seedlings



Activity 5.11

- 1 Copy the sentence below into your exercise book. Fill in the blanks with the correct words.

To have a _____?_____ and healthy seedling, the farmer must _____?_____ with good seeds or _____?_____ materials.

- 2 Work in pairs. In your exercise book, list four characteristics that you would look for when selecting a plant to use to obtain planting materials.
- 3 With your partner, list at least four plantation crops, and whether these crops can be grown from seeds, cuttings, or both. Copy the table below into your exercise book and record your answers in the table.

Crops	How crop is grown
Please do not write in this book	

- 4 Choose planting materials to plant in the land you have been given.

Planting layout

The way crops are arranged during planting is called a **layout**. There are a number of layout systems that farmers can use when planting plantation crops. There are five commonly used layouts:

- the square layout
- the rectangular layout
- the triangular layout
- the single row layout (see figure 5.22)
- the double row layout (see figure 5.23).

The choice of layout and spacing is different for different crops, soil types, and management practices, such as pruning and harvesting methods.



Figure 5.22: Coconuts grown in a single row layout



Figure 5.23: Pineapples grown in a double row layout

Seedling nurseries

My goals

- choose a suitable nursery site
- prepare a good soil mix for a nursery
- care for the seedlings
- harden seedlings

Choosing a nursery site

As you have learnt, a nursery is an important part of growing healthy plants. The nursery is where seedlings and cuttings are raised and strong healthy plants are selected for planting in the field (see figure 5.24).

It is important to choose a site for the nursery carefully. There are four main things to consider when choosing a nursery site:

- availability of water (near a water source such as a well or stream)
- near to the plantation site
- flat area or area with level ground
- flood-free area.

Figures 5.25 to 5.27 show examples of different nurseries for plantation crops.



Activity 5.12

- 1 In your exercise book, write the definition of the term “layout”.
- 2 List the different crop layouts in your exercise book.



Activity 5.13

- 1 Observe carefully as your teacher demonstrates how to use different layouts.
- 2 Practise arranging different plantation crops in different layouts.



Figure 5.24: Oil palm nursery at Guadalcanal Plains Palm Oil Ltd (GPPOL)



Figure 5.25: Newly established nursery at the Taiwan Technical Mission





Figure 5.26: Fruit tree nursery at the Taiwan Technical Mission



Figure 5.27: Ornamental seedling nursery at the School of Natural Resources



Activity 5.14

- 1 What four things should a farmer consider when choosing a site for a nursery?
- 2 Look around your local area. Identify a good site for a plantation crop nursery.
- 3 Construct a seedling nursery using the materials available.

Preparing a soil mix

It is necessary to prepare a good soil mix if we want our seedlings to grow healthy in the nursery (see figure 5.28). A loamy soil, or sandy soil mixed with clay, should make a good soil mix. Other soil types can be used, provided they contain good organic matter and are well drained. Polythene bags are widely used to raise plantation crop seedlings and should be filled with the prepared soil mix (see figure 5.29). The size of polythene bags used for the nursery will depend on the type of seedling.



Figure 5.28: Soil mix

Activity 5.15



- 1 Copy the sentence below into your exercise book. Fill in the blanks with the correct words.

It is _____?_____ to prepare a good _____?_____ mix if we want our _____?_____ to grow healthy in the _____?_____.

- 2 Write a brief description of the features of a good soil mix in your exercise book.
- 3 Prepare a good soil mix.
- 4 Sow seeds and cuttings. Your teacher will assist you.



Figure 5.29: Filled polythene bags, ready for sowing

Caring for the seedlings

Proper care should be given to the seedlings in the nursery. A seedling in a nursery needs the following:

- water
- shade
- space
- fertilizer and nutrients
- weed control
- pest and disease control.

Taking care of the seedlings helps them to grow strong and healthy. Only strong and healthy seedlings will produce good crops and be profitable to farmers.



Figure 5.30: Shade and space for seedlings in a nursery

Activity 5.16



- 1 What basic needs do seedlings in a nursery have? List them in your exercise book or on a separate sheet of paper.
- 2 Observe your seedling nursery. Check that the seedlings are being cared for properly.

Hardening seedlings

We've learnt that healthy and strong seedlings should be properly prepared, or hardened, prior to transplanting in the plantation. Any weak, slow-growing, diseased, deformed, or abnormal seedlings should be removed from the nursery. These plants should not be transplanted. It is also a good idea to expose the seedlings to the natural environment, like the sun and the wind, gradually, before transplanting takes place (see figure 5.31).



Figure 5.31: Hardening seedlings

Activity 5.17



- 1 Inspect the seedlings in your nursery.
- 2 Select healthy seedlings for transplanting.
- 3 Prepare and harden seedlings prior to transplanting.



Chapter summary

- A plantation is a large area of land where certain crops are grown to be sold for a profit. Smallholders are people who have a small plantation.
- The crops grown on a plantation are often called cash crops and include cocoa, coconuts, and oil palms.
- The first steps for starting a plantation are choosing a crop, choosing a site, and preparing the site.
- Once a site is prepared, good planting materials must be selected and a plant layout determined.
- Many plantation crops are grown from seedlings. Seedlings must be properly cared for and hardened in the seedling nursery before they are transplanted.

Glossary

layout: the way crops are arranged during planting

perennial: plants that grow for more than a year

plantation: a large area of land that is owned by the government or privately owned

plantation crop: a perennial, or permanent, crop grown in a plantation

smallholding: a small plantation

Chapter 6

Growing fruits and nuts

What are fruits and nuts?

My goals

- explain how fruits and nuts are formed
- justify the need to grow fruits and nuts
- classify fruit and nut crops

Formation of fruits and nuts

Fruits and nuts are both plant parts that people can eat. Fruit is usually formed after the **ovule**, or unfertilized seed, is fertilized by the pollen. The wall of the ovary then starts to swell to form the outside skin and the inside flesh of the fruit. It is this flesh that we like to eat. The diagram in figure 6.01 illustrates how this happens in a tomato plant.

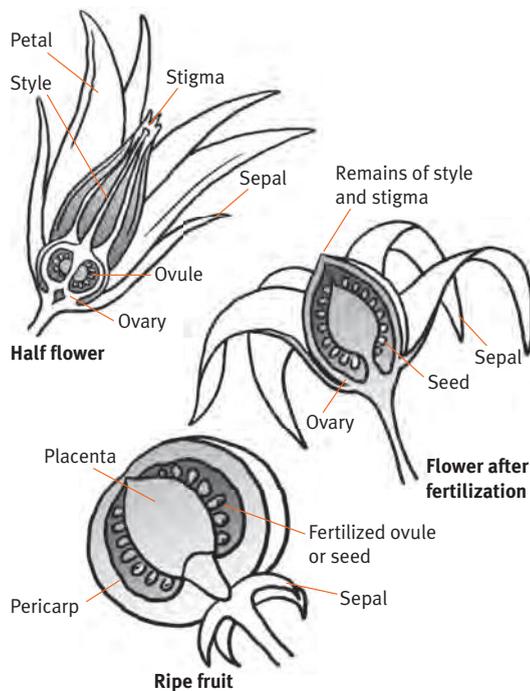


Figure 6.01: Fruit formation in a tomato plant

In science, the term “fruit” refers to a swollen ovary that contains one or more seeds (see figure 6.02). The same process that forms fruit also forms nuts. When nuts form, the wall of the ovary becomes hard and dry, and it is the seed itself that we eat (see figure 6.03).

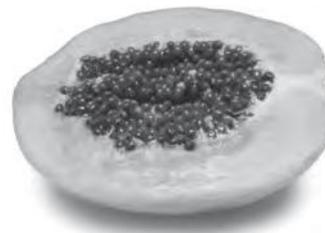


Figure 6.02: Pawpaw



Figure 6.03: Cutnut



Activity 6.01

Complete this activity by writing your answers in your exercise book or on a separate sheet of paper.

- 1 Define the following terms.
 - a fruit
 - b nut
- 2 How is fruit formed? Briefly describe the process.
- 3 How is fruit formation different to nut formation?



Activity 6.02

- 1 Your teacher will give you a flower. Look at it carefully.
- 2 Identify as many parts of the flower as you can.
- 3 Use your exercise book or a separate sheet of paper to draw the flower. Label the different parts of the flower.
- 4 Study the photographs in figures 6.02 and 6.03 carefully.
 - a How many seeds are there in the pawpaw?
 - b How many seeds are there in the cutnut?

The need to grow fruit and nut crops

Many people do not think of fruits and nuts as agricultural crops. However, fruits and nuts are agricultural crops and people should be encouraged to plant more of these crops in their area. Every year, between October and January, the markets of the Solomon Islands fill with people selling fruits. At other times of the year, it is difficult to find fruits. It makes good sense for farmers to mix fruit and nut crops into their usual agricultural activities. This way, there will be more fruits and nuts for everyone to eat and sell (see figure 6.04).

Most rural farmers in the Solomon Islands are familiar with the traditional practice of growing mixed crops. If people are going to have a variety of food supplies, then farmers have to organize their farms or gardens so that they grow all types of food crops, including fruits and nuts. One way of encouraging farmers to do this is through a special cropping method called **multi-storey cropping** or multiple cropping (see figure 6.05). Multi-storey cropping is when a farmer grows different crops together in a specific area.



Figure 6.04: A variety of fruits

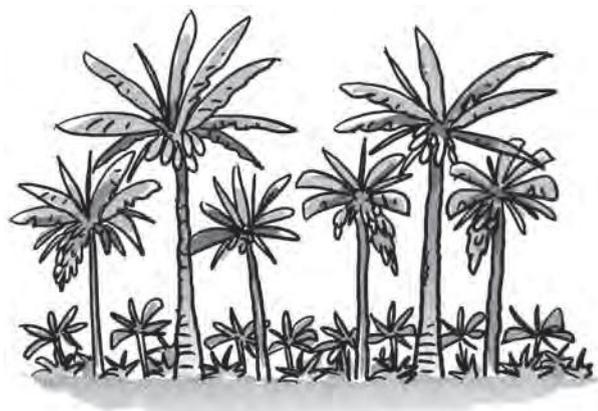


Figure 6.05: Multi-storey cropping

Classifying fruits and nuts

The simplest way to classify fruit and nut crops is to group them into categories. There are four categories of fruit and nut crops:

- tree fruits
- citrus fruits
- small fruits
- nuts.

Table 6.01 outlines some examples of fruit and nut crops in each of the categories. Figure 6.06 shows a common local nut known in the Solomon Islands as the ngali nut. What other local fruits and nuts can you find in your home or school area?

Table 6.01: Examples of fruits and nuts

Category of fruit and nut crops	Examples
Tree fruits	Avocado, breadfruit, carambola, guava, soursop, rambutan, rose apple
Citrus fruits	Lemon, pomelo, sweet orange, tangerine
Small fruits	Banana, grape, pawpaw, passionfruit, watermelon
Nuts	Alite nut, cutnut, ngali nut



Figure 6.06: Ngali nut

Activity 6.03

- 1 How often do you eat fruits and nuts in a week? Copy the table into your exercise book. Record your findings in the table.

Days	Fruits and nuts eaten
Sunday	
Monday	
Tuesday	
Wednesday	
Thursday	
Friday	
Saturday	

- 2 Discuss the following questions with a classmate.
 - a What problems may prevent you from eating many fruits and nuts?
 - b Why are fruits and nuts important for Solomon Islanders to eat?
 - c Identify the ways that fruit and nut crops are grown in your home or school area.



Activity 6.04

Complete the following activity in pairs or small groups.

- 1 What are the four categories of fruit and nut crops?
- 2 Identify fruit and nut crops growing in your home or school area. You will probably find that some of these crops are planted and looked after by people, while others grow naturally.
- 3 Copy the table below into your exercise book. Identify fruits and nuts in your local area, then write a tick in the correct column to show whether they are planted and looked after by people or grow naturally.

Fruits/nuts	Planted and looked after by people	Grow naturally
Please do not write in this book		

Preparing to start a fruit and nut farm

My goals

- use correct planting spaces
- transplant fruit and nut seedlings, cuttings, and suckers

Planting spaces

You've learnt that planning is an important part of successful agriculture. You must also plan to grow fruit and nut crops successfully.

Fruit and nut crops have different spacing requirements. How much space a fruit and nut crop needs is influenced by the following factors:

- type of land or terrain
- fruit and nut crop species



Figure 6.07: Pawpaw trees planted in raised beds

- climate
- soil
- irrigation method
- cropping method (see figure 6.07).

In addition to these factors, a farmer will want to plant as many fruit and nut crops in a given area as possible without affecting the yield, quality, and management practices of the crops. Table 6.02 outlines the planting spaces needed for some common fruit and nut crops planted in a square layout.

Table 6.02: Planting space for common fruit and nut crops in a square layout

Fruit and nut crop	Distance between plants	Distance between rows
Banana	2–3 m	2.5–3 m
Breadfruit	10–13 m	10–13 m
Carambola	5–7 m	5–7 m
Citrus (orange)	6–10 m	6–10 m
Guava	7 m	7 m
Mango	6–12 m	6–12 m
Passionfruit	3–7 m	2–3 m
Pawpaw	2–3 m	2–3 m
Pineapple	30 cm x 60 cm	1 m
Soursop	5 m	5 m



Activity 6.05

- 1 In your exercise book, list the factors that influence fruit and nut crop spacing requirements.
- 2 Mark out the planting space needed for a specific fruit or nut crop. Use any of the layouts described earlier.

Transplanting

The seedlings, cuttings, or suckers that are prepared and hardened should be transplanted in the field. Before planting, the polythene bags should be removed carefully, without disturbing the soil or the plant (see figure 6.08).



Figure 6.08: Removing a polythene bag

The planting holes should be big and deep enough to hold the seedlings, cuttings, or suckers. It is good practice to add organic matter to the planting holes. For seedlings that are grafted or budded, the graft union or place where the two join should be at least 15 cm above the ground surface (see figures 6.09 and 6.10).

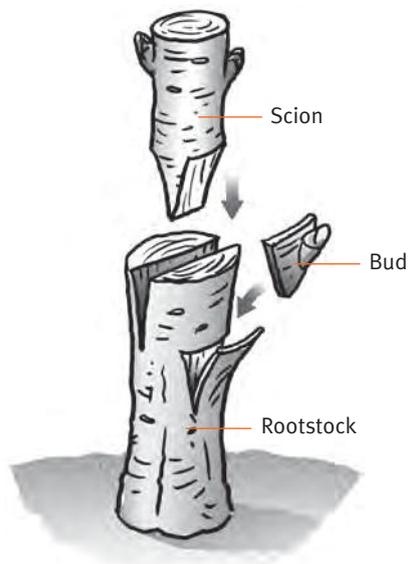


Figure 6.09: Grafting



Figure 6.10: Grafted seedling



Activity 6.06

Discuss the following questions in pairs, small groups, or as a class.

- 1 What factor will determine the size and depth of the planting holes?
- 2 Why do you think it is important to add organic matter to planting holes?



Activity 6.07

- 1 Prepare seedlings, cuttings, or other planting materials for transplanting. These should come from the nursery you made for the activities in the last chapter.
- 2 Prepare planting holes.
- 3 Plant the seedlings, cuttings, or planting materials in the field.

Caring for fruit and nut crops

My goals

- identify caring practices in fruit and nut crops
- control weeds in fruit and nut crops
- carry out desuckering in fruit and nut crops
- carry out pruning in fruit and nut crops
- apply fertilizers to fruit and nut crops
- carry out debelling and bunch propping in fruit and nut crops
- control pests and diseases in fruit and nut crops

Caring practices for fruits and nuts

There are many activities a farmer must do to look after fruit and nut crops. Some fruit and nut crops require specific cultivation practices to grow successfully.

Weeding

The photograph in figure 6.11 shows tall grass that is competing with fruit trees. This grass should be removed so that the trees can grow well and be healthy. Weeds can encourage pest infestation and, in some areas, weeds can be a fire risk.



Figure 6.11: Weeds competing with fruit trees for space and nutrients

Activity 6.08



- 1 What does the photograph in figure 6.11 tell you about the farmer who is growing the crop?
- 2 What suggestions would you give to the farmer about how to control weeds on the farm?
- 3 Observe your fruit and nut crops to look for weeds. Carry out any weeding that is necessary.



Desuckering

Some fruit and nut crops produce suckers. As you've learnt, a **sucker** is a part of the plant that can be used as planting material to grow a new plant. These suckers should be removed if the plant is to produce a large amount of fruit. The process of removing suckers from a growing plant is called **desuckering**. For example, when growing bananas, only four suckers should be allowed to grow at any one time. After harvesting, the next suckers are allowed to grow (see figure 6.12).



Figure 6.12: A banana sucker

Pineapples, like bananas, develop suckers. In pineapples, the suckers are not removed until after the first harvest. Once the first fruit has been harvested, all the suckers should be removed. This will leave one strong, healthy sucker that grows from the base of the plant. This sucker will then develop and produce the next fruit (see figure 6.13).

There are several tools that can be used for desuckering:

- spade
- mattock
- bush knife
- digging stick
- hoe.



Figure 6.13: Pineapple suckers

Activity 6.09



- 1 In your exercise book, define the term “desuckering”.
- 2 Why should a farmer desucker fruit and nut crops?
- 3 How many suckers should be allowed to grow around a plant at any one time?

Activity 6.10



- 1 Look around your home or school area. Identify crops that require desuckering.
- 2 Desucker the fruit and nut crops where appropriate.

Pruning

You've learnt earlier that removing any unwanted parts of a plant is called pruning. You might want to prune a plant because it has a disease. Another reason to prune a plant is because it has shoots that will not produce good fruit. You may want to prune excess shoots to keep them from competing with the rest of the plant for nutrients. Pruning also helps to give a good shape to the plant (see figures 6.14 and 6.15). Pruning should be done carefully to avoid damaging the plant. The correct tools to use for pruning are secateurs, a pruning knife, and a pruning saw.



Figure 6.14: Pruning gives a plant a good shape.



Figure 6.15: A pruned mango orchard

Activity 6.11



- 1 Work with a partner. Discuss the following questions.
 - a Define the term “pruning”.
 - b What are the reasons why a farmer would carry out pruning?
 - c List the correct tools to use for pruning.
- 2 Use the correct tools to prune your fruit and nut crops.

Applying fertilizer

Most fruit and nut crops can grow and produce fruits and nuts in a wide range of soil types in the Solomon Islands, provided that the soil is well drained and contains organic matter. Like all plants, fruit and nut crops will benefit from using organic and inorganic fertilizers, particularly if the soil is poor (see figure 6.16). Any fertilizer applied to fruit and nut crops should help the plant grow and produce fruit.



Figure 6.16: Organic fertilizer around a fruit tree



Activity 6.12

- 1 Copy the sentence below into your exercise book. Fill in the blanks with the correct words.

Any fertilizer applied to _____? _____ and nut crops should help the plant _____? _____ and _____? _____ fruit.

- 2 Identify the types of soil in which most fruit and nut crops grow well in the Solomon Islands.



Figure 6.17: Propping in a banana tree



Activity 6.13

- 1 Collect any organic materials around your home or school area.
- 2 Apply these organic materials to your fruit and nut crops.

Debelling and bunch propping

Debelling is when the male flower is removed from a plant. The male flower is usually removed by hand, 8 to 12 days after the bunch emerges. This will help to reduce fruit scarring and cigar-end rot disease. Debelling is commonly carried out in banana plants.

Sometimes banana fruit gets damaged when bunches of bananas fall from the plant, or if the whole plant falls over. One way to reduce this problem is to support the plant with one or two poles or sticks. This is called **propping** (see figure 6.17). Propping is also carried out in other fruit trees that have heavy branches. This prevents the fruiting branches from breaking.

Activity 6.14



- 1 Define the following terms in your exercise book.
 - a debelling
 - b propping
- 2 In your exercise book, write down at least one reason why debelling is carried out in fruit and nut crops.
- 3 In your exercise book, write down at least one reason why propping is carried out in fruit and nut crops.
- 4 Carry out debelling and propping in your fruit and nut crops.

Controlling pests and diseases

Fruit and nut crops are affected by a wide range of pests and diseases, which makes it difficult to control these problems. The best way to prevent pests and diseases is to grow the plant from materials that are free from pests and diseases. Figures 6.18 to 6.23 show examples of some common pests of fruit and nut crops. Figures 6.24 to 6.26 show examples of common diseases of fruit and nut crops.





Figure 6.18: Scale insect

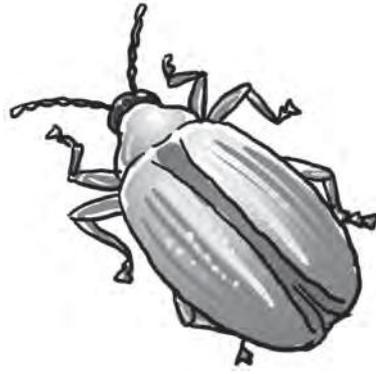


Figure 6.19: Leaf-miner



Figure 6.20: Fruit fly

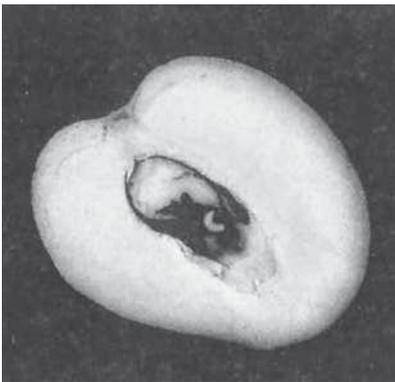


Figure 6.21: Seed weevil



Figure 6.22: Cicada



Figure 6.23: Fruit fly larvae damage to a pawpaw



Figure 6.24: Anthracnose on ripe mangos



Figure 6.25: Stem canker in a pawpaw plant



Figure 6.26: Anthracnose in avocado



Activity 6.15

- Copy the sentence below into your exercise book. Fill in the blanks with the correct words.

The best way to prevent
 _____?_____ and _____?
 is to grow the plant from
 _____?
 _____? that are free from
 _____?
 _____? and diseases.

- Observe your fruit and nut crops. Identify any signs of pest and disease damage on the fruit and nut crops.
- Collect any damaged fruit and nut crops that you identify. Display them in class.

Harvesting and selling fruits and nuts

My goals

- harvest fruits and nuts with correct timing and methods
- identify signs that indicate fruits and nuts are ready for harvest
- preserve fruits and nuts
- sell fruit and nut crops

Correct timing and method to harvest

Fruits and nuts should be harvested when they are ready. However, sometimes harvesting is not organized. If this happens, fruits and nuts are picked too early (see figure 6.27) or too late. More and more fruit and nut crops are being harvested and transported to towns and local markets to be sold. When this happens, the correct timing and method for harvesting, and the correct preparation for selling the crops at the market, is important.

Harvesting should be done with care in order to maintain the quality of the fruit and nut

products. Harvesting is simple when fruit and nut crops can be reached by hand. As the fruit and nut plants become taller, sometimes a harvesting aid, such as a pole or a ladder, must be used.



Figure 6.27: Bananas



Figure 6.28: Harvesting fruit using a long stick as an aid

Activity 6.16



Work in small groups to complete the following activity. Report your findings to the rest of your class.

- Look at the photograph in figure 6.27. Can you tell if this fruit is ready for harvest?
- Study the photograph in figure 6.28.
 - What fruit is being harvested?
 - Is the method used to harvest the fruit suitable? Why?



Signs a fruit or nut is ready for harvest

In most cases, the most obvious sign that a fruit or nut crop is ready for harvest is a change in colour. Taste and softness can also show that a fruit or nut crop is ready for harvest. If fruit is to be transported or kept for a period of time before it is eaten, the fruit should be harvested just before it is ripe. Most fruit will continue to ripen after harvesting.



Figure 6.29: Fruit being sold at the market



Activity 6.17

- 1 How do you know that a fruit or nut crop is ready for harvest? Write your answer in your exercise book or on a separate sheet of paper.
- 2 Look around your home or school area. Identify fruit and nut crops that are bearing fruit.
- 3 Observe any signs that the fruit and nut crops are unripe, ripe, or overripe. You must look particularly at the colour, softness, shape, and taste of the fruits and nuts.
- 4 Copy the table below into your exercise book. Record your findings in the table.

Name of crop	Unripe for harvest	Ripe for harvest	Overripe for harvest
	Please do not write in this book		



Activity 6.18

- 1 Select one fruit tree that is bearing fruit. Find two pieces of fruit from the same plant, of approximately the same size and age, that are not quite ripe.
- 2 Remove one of the pieces of fruit from the tree. Put it in a safe place.
- 3 Put a mark on the other piece of fruit, which is left on the tree.
- 4 Check the harvested fruit and the fruit on the tree each day.
- 5 Compare the speed at which the pieces of fruit ripen. Keep a record of your observations in your exercise book or on a separate sheet of paper.

Activity 6.19

Answer the following questions in your exercise book or on a separate sheet of paper.

- 1 What are the advantages of letting fruit ripen naturally?
- 2 What are the advantages of forcing fruit to ripen?
- 3 What are the disadvantages of letting fruit ripen naturally?
- 4 What are the disadvantages of forcing fruit to ripen?





Preserving fruits and nuts

Fruits and nuts are usually eaten when they are ripe and fresh. However, there are ways that people in the Solomon Islands can process and preserve fruits and nuts. It is very important for people to preserve fruits and nuts, using

traditional knowledge and processes. Preserved foods can be eaten during times of drought, cyclone, earthquake, or other disaster or emergency. Read the case study below to learn more about preserving fruit.

Case study: Nambo

Breadfruit is grown almost everywhere in the Solomon Islands and is liked by most people. Many people particularly like dried breadfruit, or **nambo**. Nambo is made in the Temotu province by processing and preserving mature breadfruit. It is sold in retail shops and markets in the Solomon Islands. This means that nambo is valuable as a source of income and for nutrition. Nambo can be kept for a very long time if it goes through the drying process properly. The people of the Temotu province use hot air or fire to dry the breadfruit. The fire should not produce too much smoke. To avoid producing too much smoke, special firewood is

used. There are eight different steps to produce nambo (see figure 6.30).

- 1 Harvest mature breadfruit.
- 2 Roast the mature breadfruit.
- 3 Cool the roasted breadfruit.
- 4 Remove the skin of the breadfruit.
- 5 Cut the breadfruit into small pieces.
- 6 Spread the breadfruit over a special netting.
- 7 Dry the breadfruit over a fire for 12 to 24 hours.
- 8 Pack the breadfruit into dry leaves in coconut baskets.

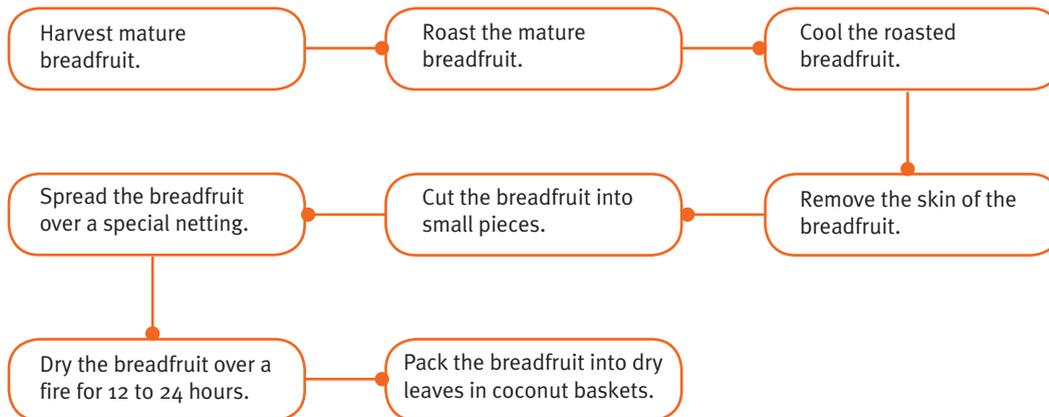


Figure 6.30: The process of drying breadfruit to produce nambo



Activity 6.20

- 1 Identify fruit and nut crops that can be processed and preserved. Write a list of these crops in your exercise book or on a separate sheet of paper.
- 2 Choose one fruit or nut crop. Process and preserve this crop into a product.
- 3 In your exercise book, briefly describe the process and methods involved to preserve this fruit or nut.
- 4 Present your product to the class.

Selling fruit and nut crops

The ability to sell fruit and nut crops depends on the quality and quantity, or supply, of the product. The quality of fruit and nut crops depends on the time the crops were harvested and the way they were prepared for the market. The quality of fruit and nut crops is indicated by the following factors:

- colour
- size
- shape
- taste.

It is important that farmers are aware of these qualities when they are harvesting and preparing fruit and nut crops for the market.

The quantity of fruit and nut crops available depends on the season. Scientists have discovered ways to force or promote flowering and fruiting in some fruit trees. By using these methods, farmers can produce crops during the off-season and get better prices at the market for their product (see figure 6.31). The demand for some of these fruit and nut crops is very high, not only in the Solomon Islands, but also overseas. Many of our fruit and nut crops will

not grow in cooler climates, so there could be a chance for Solomon Islanders to export these crops to other countries.



Figure 6.31: Off-season fruiting in pineapple crops

Activity 6.21



- 1 Find out the price of five fruits and nuts at a market outlet near your home or school area. Copy the table below into your exercise book. Record your findings in the table.

Fruits and nuts	Selling price
Please do not write in this book	

- 2 Find out how much a farmer earns, on average, from selling fruits and nuts. You can ask any farmer near your home or school area.



Chapter summary

- Fruits and nuts are formed when a seed is fertilized by pollen. The ovary swells to form fruit or becomes hard and dry to form nuts.
- Fruit and nut crops need the correct amount of space and to be transplanted properly for each plant to grow strong and healthy.
- Care for fruit and nut crops by providing them with water and nutrients like fertilizers, and by keeping them weeded, desuckered, pruned, and free from pests and diseases.
- Debelling is when the male fruit is removed from a plant. Bunch propping is when a branch of a plant is supported so that it does not break. These practices help farmers grow strong, healthy crops.
- A change in colour is the clearest sign that a fruit or nut is ready for harvest.
- Harvested fruits and nuts can be eaten fresh, preserved, or sold at the market.

Glossary

debelling: removing the male flower from a plant

desuckering: removing suckers from a growing plant

multi-storey cropping: growing different crops together in a specific area

nambo: mature breadfruit that has been processed and preserved

ovule: unfertilized seed

propping: supporting a plant with sticks or poles

sucker: a part of a plant that can be used as planting material to grow a new plant



Chapter 7

Introduction to farm animals

Why raise farm animals?

My goals

- define and explain the term “farm animal”
- outline the benefits of raising farm animals
- classify farm animals

What are farm animals?

Birds, animals, reptiles, insects, and marine animals (fish, prawns, clams, eels, etc.) that are raised on a farm are called **farm animals**. Farm animals in the Solomon Islands are either native animals or animals introduced into the country from other places. The practice of raising farm animals began thousands of years ago with people who were once hunters and gatherers. Gradually, as they began to settle, they started to tame and raise animals. This practice of raising animals provided them with a more secure source of food than their occasional hunting of wild animals.



Figure 7.01: Chicken eggs

Many Solomon Islanders keep and raise some farm animals. Some farmers may raise farm animals to be sold at the market. There are other reasons farmers may raise farm animals:

- family consumption
- social obligation
- bride price
- feasts
- other special occasions, like a birthday or Christmas party.

Farm animals provide many important products that are useful to people (see figures 7.01 and 7.02). Therefore, it is important that farmers have a basic understanding of farm animals and the skills to raise them successfully.



Activity 7.01

Work in pairs or small groups to complete the following activity.

- 1 Copy the sentences below into your exercise book. Fill in the blanks with the correct words.

Birds, _____?, reptiles,
_____, and marine animals
that are raised on a _____?
are called farm animals. Farm animals
in the Solomon Islands are either
_____? animals or animals
_____? into the country from
other places.

- 2 What are three reasons to raise farm animals in the Solomon Islands?
- 3 Go to a shop. Identify any products or items that come from farm animals.

Benefits of raising farm animals

Read the case study on page 103 to learn about some benefits of raising farm animals.



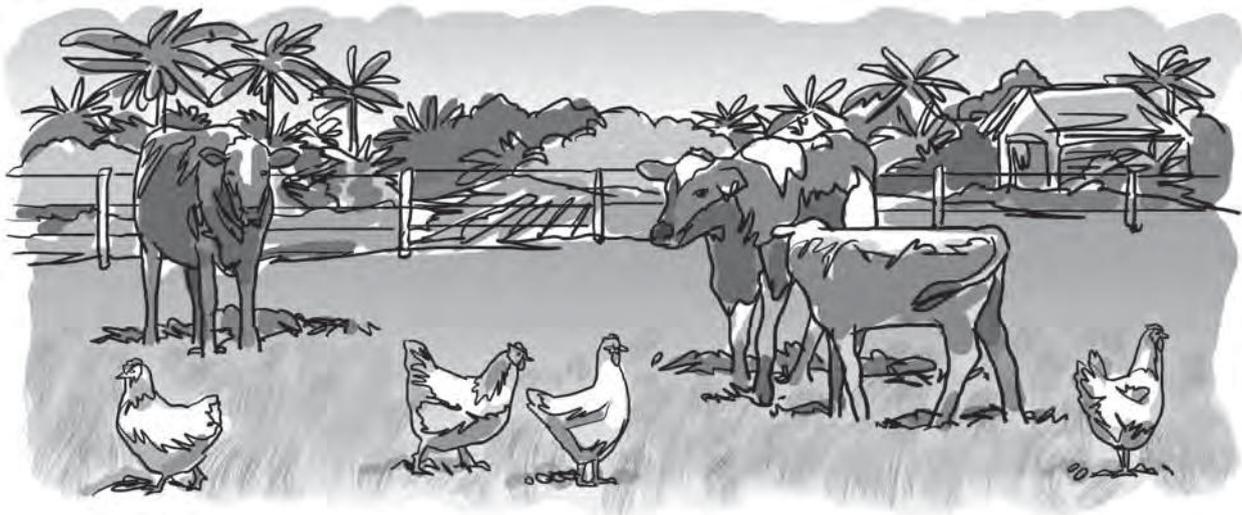
Figure 7.02: Dairy products

Activity 7.02



Complete the following activity after reading the case study on page 103. Write the answers to the questions in your exercise book or on a separate sheet of paper.

- 1 What makes this farmer successful?
- 2 Identify four benefits of raising farm animals.
- 3 Suggest ways to meet the demand for animal products in this country.



Case study: A broiler farmer



Figure 7.03: John Minus

My name is John Minus and I live with my parents at the outskirts of East Honiara. I am not formally employed. Since I left school in 2001, I have had to depend on my parents for support. I knew that my parents were struggling to support our family. I felt very sorry for them because I had not contributed anything to meet the needs of the household. I thought very hard about what I should do to help my parents. Finally, I decided to venture into chicken meat production.

Initially, I did not have any money to start the project. With the encouragement of some neighbours, I sought assistance from the Member of Parliament for East Honiara. With the help of a local farmer who had previously kept chickens, I developed a project plan. In the plan, I showed clearly how I would implement the project, what all the costs of the

project were, what income I expected to get from the project, how I would pay back the loan, and how I would have enough money left after paying back the loan to repeat the project. I got the loan and used the money to purchase building materials, equipment, animal food, and an initial stock of 100 day-old chicks.

It has been almost 5 years since I ventured into chicken meat production. My current production unit can accommodate between 500 and 800 chickens. I have market outlets throughout Honiara where I am well established. I employ three full-time workers to help me manage and operate the production unit. I also allow high school students in Honiara to carry out their practical learning at my chicken production unit.

I have learnt from experience that raising farm animals can bring many benefits. Some of these benefits are listed below:

- a source of income
- a source of employment
- a source of food and animal products
- a higher standard of living
- an increased status in the community
- a venue for student learning.

Now I am self-employed and I can help my parents and extended family members meet their needs. Raising farm animals is hard work, but with dedication and patience, you can reap the benefits of raising farm animals.



Classifying farm animals

There are different types of farm animals that farmers can raise. Some of these farm animals are **native** (meaning originated in the Solomon Islands) and others are **introduced** (meaning originated in a foreign country). Farm animals can be classified in different ways. The most common way to classify farm animals is to group them into the following categories:

- birds
- animals
- reptiles
- insects
- marine animals.

Figures 7.04 to 7.06 show examples of native and introduced insects and animals.

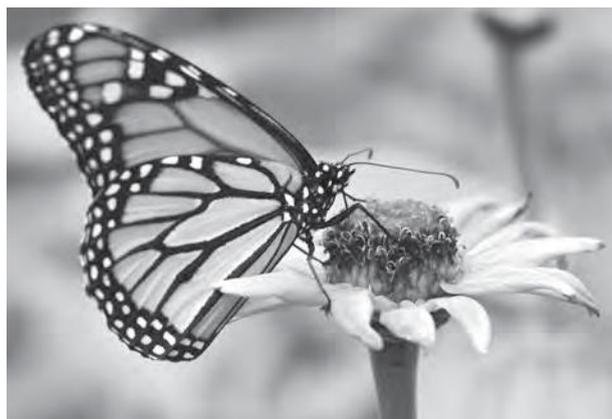


Figure 7.04: Butterfly



Figure 7.05: Cattle



Figure 7.06: Village chickens

In the Solomon Islands, people raise both native and introduced farm animals. However, people need to know more about the characteristics of both native and introduced farm animals to be able to raise them successfully. Table 7.01 outlines some common characteristics of native and introduced farm animals.

Table 7.01: Common characteristics of native and introduced farm animals

Characteristic	Native breeds	Introduced breeds
Growth rate	Very slow	Fast
Number of offspring (litter) or eggs	Low	High
Mothering ability	Excellent	Some are not good
Management effort required	Less	Very high
Management skill required	Less	Very high
Suitability and adaptability	Well suited and adapted	Some are not suited
Susceptibility to pests and diseases	Sometimes but not very serious	Easily attacked



Activity 7.03

- 1 Copy the table below into your exercise book. Write down examples of farm animals for each category.
- 2 Draw a new table with two columns in your exercise book.
- 3 In one column, list the farm animals that are native to the Solomon Islands.
- 4 In the other column, list the farm animals that are introduced.

Birds (poultry)	Animals (livestock)	Reptiles	Insects	Marine animals
		Please do not write in this book		

Preparing to raise farm animals

My goals

- plan how to raise farm animals
- select farm animals to raise
- choose a suitable site to raise farm animals
- use different management methods to raise farm animals

Plannig to raise farm animals

Proper planning and preparation must be done to raise farm animals successfully. A farmer will need to consider four important questions, and have clear answers to each question, before deciding to raise farm animals.

1 What farm animals should I raise?

Farmers will have to decide what types of farm animals to raise on their farm. They may also decide what types of animal products they want to produce. When selecting farm animals, farmers will also need to consider the characteristics of the animal, and where it can be obtained.

2 Where should I raise farm animals?

Farmers will need to select a suitable site to use to raise farm animals. A suitable site

for raising farm animals will depend on a number of things.

Some of these factors include the following:

- water availability
- road access
- security
- smell
- climate.

Farmers must consider these factors when deciding on a site to raise farm animals.

3 How should I raise the farm animals?

Farmers will have to decide on what system of farming to use to raise farm animals.

To make this decision, farmers will need to consider the materials they would need to raise farm animals using that method.

Farmers will also need to consider other things, including the following:

- animal care and handling
- feed availability
- money needed to start
- transport
- labour
- management skills
- sources of materials
- security.



4 Who will use the farm animals?

Farmers will need to consider the use of the farm animals when they are deciding to raise them. There are several factors to consider, including the following:

- market demand
- outlets for farm animal products
- security
- family and community obligations
- transport
- storage
- quality of animal products.

Selecting farm animals to raise

Farm animals will produce many products we can use. Thus, farmers should select a good stock to raise that will provide them with quality products like meat, eggs, and milk. It is important that farmers consider certain things when they select farm animals:

- the products a farmer wants to obtain, such as milk, meat, or eggs
- the type of farm animal breed, such as native, introduced, or cross
- suitability to local environment
- the health of farm animals
- the production characteristics of farm animals, such as the number of eggs or offspring they produce.



Activity 7.04

Work in groups to complete this activity. Present your findings to your classmates.

- 1 What four important questions should farmers answer before they start to raise farm animals? Write these questions in your exercise book.
- 2 Identify farmers around your home or school area who raise farm animals. Find out what planning and preparations they make before they start to raise farm animals. Your teacher will help you to carry out this investigation.



Figure 7.07: Introduced rooster breed



Figure 7.08: Local rooster breed



Farmers must also consider the market conditions in their local area when selecting farm animals to raise and deciding whether to raise animals for meat, for products (like eggs), or for live sale. For example, if there is a demand for farm animal products, the price paid for the products will be high. If there is less demand for farm animal products, the price will be low. The price of farm animal products at the market should help farmers decide what farm animals to raise. For example, if the price of chickens is high at the Honiara market, farmers should raise more chickens.



Activity 7.05

Complete the following activity by writing the answers in your exercise book.

- 1 Identify farmers around your home or school area who raise farm animals. Find out how they selected which farm animals to raise.
- 2 Study the photographs in figures 7.07 and 7.08. Which of these two chicken breeds is more suitable to raise in your village? Why?



Activity 7.06

Work in groups to complete the following activity. Report your findings to the rest of the class.

- 1 Interview farmers and conduct research at markets to determine what the demand is for farm animals and their products in your home or school area.
- 2 What types of farm animals and products are sold in your home or school area?
- 3 Who produces and supplies the market with farm animals and their products?

Choosing a site

Once you decide what farm animals to raise, you must determine where to house the farm animals. There are many important things that a farmer must consider when selecting a site for raising farm animals:

- size of the area
- source of water
- access to roads
- drainage
- direction of prevailing wind
- location of site (not too close to the farmer's house).



Figure 7.09: Backyard chicken house



Figure 7.10: Raising pigs in a backyard



Activity 7.07

- 1 Inspect the area around your home or school. Identify a suitable site for raising farm animals.
- 2 The photographs in figures 7.09 and 7.10 show examples of farm animals being raised in backyards in urban centres. Is it appropriate to raise farm animals in these areas?

Methods of raising farm animals

There are many ways farm animals can be raised. There are three main methods that can be used to raise farm animals:

- free-range or extensive method
- semi-intensive method
- intensive method.

Table 7.02 outlines the main features of each method.

Table 7.02: Methods of raising farm animals

Method	Description
Free-range	Animals run freely in search for their own food and shelter. This method is commonly used in villages.
Semi-intensive	Animals are provided with shelter and feed. Animals are allowed to go outside, in the open, with some restrictions.
Intensive	Animals are raised in a restricted area and are not allowed to run freely outside. Feed and water are provided to the animals.

The method a farmer chooses to use to raise farm animals will depend on a number of factors, including the following:

- availability of land
- availability of money
- type of farm animal
- purpose of raising farm animal
- knowledge and skill of farmer
- management ability of farmer
- suitability of method.



Figure 7.11: Free-range method



Figure 7.12: Semi-intensive method



Figure 7.13: Intensive method





Activity 7.08

- 1 Take a field trip around your home or school area. Observe how farmers raise farm animals.
- 2 List the methods of raising farm animals you observe in your exercise book.
- 3 Study table 7.02. In your exercise book, write one advantage of raising farm animals for each of the three methods.
- 4 Look again at table 7.02. In your exercise book, write one disadvantage of raising farm animals for each of the three methods.

What is animal nutrition?

My goals

- explain the term “animal food”
- describe the importance of animal nutrition

What is animal food?

After you have begun to raise farm animals, the most important aspect of caring for the animals is nutrition. Animals need food to grow strong and healthy, and to provide people with good-quality products (see figure 7.14).



Figure 7.14: Cattle feeding

Food that is processed and fed to animals or that the animals eat raw is called **animal feed**. When an animal consumes food, it is digested and changed into chemicals that the animal needs for energy, and for the repair and growth of cell tissue. These chemicals are called nutrients. In order to care for farm animals properly, and to help them produce good-quality products, the farmer must know what types of food to feed the farm animal, the amount of nutrients in the animal feed, the way animals’ bodies use nutrients, and the different ways animals obtain their food.

Activity 7.09



- 1 Copy the sentence below into your exercise book. Fill in the blanks with the correct words.

Food that is processed and _____?_____ to animals or that the animals eat _____?_____ is called _____?_____.

- 2 Define the term “nutrient”. Write your answer in your exercise book.
- 3 Copy the table below into your exercise book. Complete the table by listing the foods each animal eats.

Farm animal	Foods they eat
Village chicken	
Chicken raised for commercial meat production	
Goat	
Cow	

Please do not write in this book



Importance of animal nutrition

Feeding animals food that is full of nutrients helps them to grow healthy and strong. Good nutrition helps animals with the following activities:

- fighting diseases
- producing good-quality meat
- producing a large amount of products that are good quality, like milk and eggs
- producing healthy offspring.

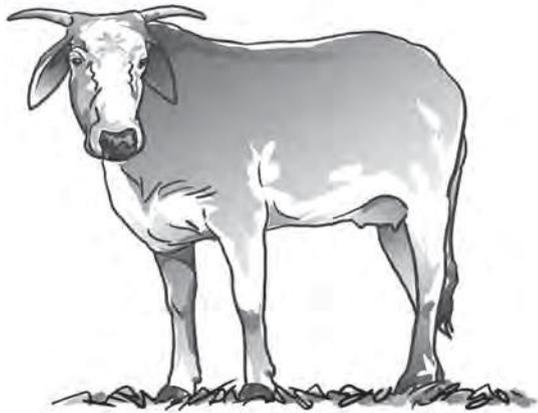


Figure 7.15: Healthy animal

If animals are eating unhealthy food that doesn't provide them with nutrients, they are said to be **malnourished**. Malnourished animals usually have the following problems:

- are slow growing
- are weak
- produce low-quality meat
- produce fewer and lower quality products, like milk and eggs
- produce unhealthy and weak offspring
- get sick easily.

It is important for farmers to provide farm animals with a continuous supply of good food.



Figure 7.16: Malnourished animal

Remember, not all the food that an animal eats gives the animal all the nutrients it requires to grow strong and healthy. When animals do not receive enough of certain nutrients, they get sick. This is another reason that farmers need to provide animals with a diet that is balanced. A **balanced diet** means that an animal is fed all the nutrients it needs to stay healthy and produce good-quality products.

Activity 7.10



Complete the following activity with a partner or in a small group.

- 1 Copy the sentence below into your exercise book or onto a separate sheet of paper. Fill in the blanks with the correct words.

Feeding animals food that is full of _____?_____ helps them to grow _____?_____ and _____?_____.

- 2 Discuss what it means for an animal to be malnourished.
- 3 Why is it important for farm animals to eat good food? List at least three reasons.
- 4 Study the picture in figures 7.15 and 7.16. What can you say about the condition of each of these animals?

Components of animal food

My goals

- describe the different nutrients and their functions
- classify and store animal feed
- feed farm animals

Nutrients and their functions

Animal food, just like food for people, should contain six different nutrients. These nutrients are shown in figure 7.17. It is important that animals eat food containing each of these different nutrients because each nutrient has specific work to do to keep an animal healthy.

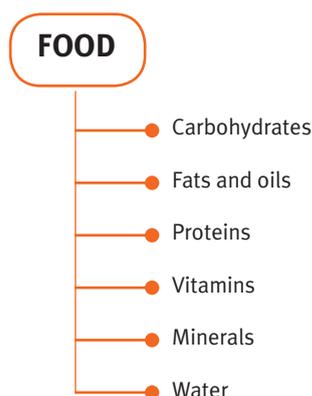


Figure 7.17: Components of food

It is only when the food is digested that the nutrients are absorbed into the animal's bloodstream. This means that farm animals can only use the nutrients when the food is completely digested, or broken down. Any part of the food that the animal does not use, or absorb into their bloodstream, is waste.

Table 7.03 outlines the functions of the different nutrients contained in food and the various sources from which these nutrients can be obtained.

Activity 7.11



Answer the following questions in your exercise book or on a separate sheet of paper.

- 1 What are the main components of food?
- 2 What happens to nutrients when food is completely broken down in the body?
- 3 How does the animal use these nutrients?

Table 7.03: Nutrients

Nutrients	Functions	Sources
Carbohydrates	Carbohydrates provide energy that can be used for doing work, or for body maintenance, growth, and reproduction.	Cereal grains (corn, rice, wheat), roots and tubers, grasses, hay, silage
Fats and oils	Fats provide animals with an additional source of energy and some essential vitamins.	Coconuts, oil palms, peanuts, milk
Proteins	Proteins are required for the growth of new body parts, the repair of damaged body parts, and for the development of hormones, enzymes, and antibodies.	Legume plants, meat and fish, eggs, milk. There is also some protein in foods such as silage, grasses, and hay, and in cereals, roots, and tubers.
Vitamins	Vitamins help to protect animals against illnesses and infections.	Green leafy vegetables, sunlight, fish, fruits
Minerals	Minerals perform different functions in an animal's body, including regulating body functions and building body tissues like bones or blood.	Legumes, green vegetables, cereal grains, fishmeal, salt, meat and bone meal, protein feeds
Water	Water keeps an animal's body cool. It is also a major component of blood and cell fluid. Water transports waste and helps to dissolve minerals.	Water in feeds, rainwater, water collected in tanks or containers, rivers, streams



Activity 7.12

- 1 Your teacher will split your class into six groups. Each group will be assigned a type of nutrient.
- 2 Prepare a presentation for your class. Your presentation should explain what the nutrient does for an animal and what animals can eat to obtain this nutrient.
- 3 Present your findings to your classmates.



Activity 7.13

- 1 Observe a farmer who raises animals around your home or school area. Find out what feed types the farmer feeds the animals during a 5-day period.
 - a What can you say about the types of feed given to the animals?
 - b Is the diet balanced? Why?
 - c What problems might the farmer face in feeding the animals?
 - d Copy the table below into your exercise book. Record your findings in the table.

Day	Types of feed given to farm animals
Monday	
Tuesday	
Wednesday	
Thursday	
Friday	

- 2 What can you say about the farmer's feeding program? Is it suitable or does it need improvement?

Classifying and storing animal feed

Animal feed can either be grown and prepared locally or bought from the shops. Figures 7.18 to 7.21 show examples of common animal feeds used in the Solomon Islands and in other countries.

Animal feed should be stored properly to maintain its quality, including its freshness and taste. We must also keep pests such as rats and insects away from the feed. Pests might eat or spoil the feed. These reasons are why storing feed properly is very important (see figure 7.22).



Figure 7.18: Layer feed



Figure 7.19: Pastures



Figure 7.20: Dried grass (hay) used to feed animals



Figure 7.21: Roots and tubers, like the sweet potato

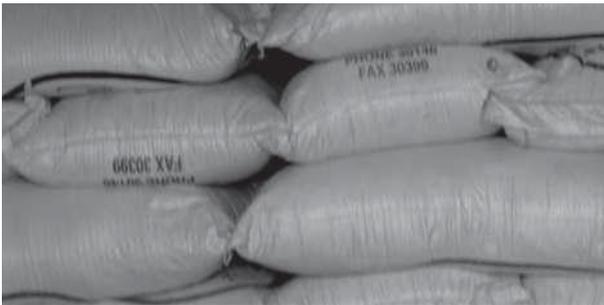


Figure 7.22: Stored animal feed

- 2 Identify any farmers around your home or school area who raise animals. Observe how they store their animal feed.
- 3 Do the farmers store their feed properly or not? Why?
- 4 Why is storing animal feed properly important?

Feeding animals

Feeding farm animals the right type and amount of food is very important for them to grow healthy and to produce good-quality products. If an animal eats a diet that is balanced, they will be able to obtain the nutrients they need for their growth and development.

There are different ways of feeding farm animals. The method a farmer uses to feed farm animals depends on different factors:

- the method of raising animals
- the types of animals kept
- the feeding equipment available (see figures 7.23 and 7.24).

Some farm animals are raised outdoors. This allows them to graze and forage to supplement the other foods that are given to them to eat. Another way of feeding animals is by keeping them in confinement, or in buildings. When feeding animals in confinement, it is best to keep animals of the same age together. This allows the animals to have frequent access to feed and to be able to eat a sufficient amount of feed. It is also important to provide many feed containers in different parts of the building. This is so that all animals have access to feed at the same time.



Activity 7.14

- 1 Where can you get feed for your animals? Make a list in your exercise book.
- 2 Collect examples of animal feeds that are available in your home or school area.
- 3 Display the different animal feeds you've collected in your class.



Activity 7.15

Work in groups to complete this activity.

- 1 Copy the sentence below into your exercise book. Fill in the blanks with the correct words.

Animal _____? _____ should be _____? _____ properly to maintain its _____? _____, including its freshness and taste.



Figure 7.23: Animals raised in confinement and fed indoors



Figure 7.24: Chickens searching for their own food outdoors



Activity 7.16

- 1 What factors affect the method a farmer uses to feed farm animals? Discuss your answer with a classmate.
- 2 Identify a farm around your home or school area where farm animals are raised. For a 5-day period, feed the farm animals.
- 3 Copy the table below into your exercise book. Record each feeding in the table.
- 4 Your teacher will help you to complete this activity.

Day	Time of feeding	Type of feed	Amount of feed given	Method of feeding
Monday				
Tuesday				
Wednesday				
Thursday				
Friday				

Please do not write in this book

Chapter summary

- Birds, marine animals, insects, reptiles, and animals are different kinds of farm animals. The benefits of raising farm animals include having a source of income, food, and animal products.
- To raise farm animals, you must decide what type of farm animal to raise, where to raise the animals, what method to use to raise the animals, and what the animals will be used for.
- Animals need to eat a balanced diet so that they can fight off diseases and produce high-quality products.
- Animals must eat six different nutrients to stay healthy: carbohydrates, fats and oils, proteins, vitamins, minerals, and water.
- There are many different kinds of feed available for animals. The feed must be stored properly to maintain its quality.

Glossary

animal feed: food that is processed and fed to animals or that the animals eat raw

balanced diet: an animal is fed all the nutrients it needs

farm animals: birds, animals, reptiles, insects, and marine animals that are raised on a farm

introduced: originated from a foreign country

malnourished: an animal that hasn't been provided with food containing nutrients

native: originated from the Solomon Islands

Solomon Islands Agricultural Science

Learner's Book Year 7

Agriculture is an important sector in the economy of Solomon Islands. It is the major employer and source of livelihood in rural areas where approximately 80 percent of the population is involved mainly in subsistence agriculture.

The *Solomon Islands Secondary Agricultural Science for Years 7 to 9* series helps learners achieve the learning outcomes of the Agricultural Science syllabus which was developed during the Solomon Islands Curriculum Reform since 2005. It is anticipated that this book will enable learners to develop basic skills in general agriculture, crop and animal production in relation to making a living.

Education and training in agriculture will continue to be a principal area of concern in the development of human resources in Solomon Islands. The inclusion of Agricultural Science in the secondary school curriculum is important because it provides learners with the opportunity and venue to acquire knowledge and relevant skills in the basic aspects of agricultural production which will be essential when they exit the education system. It also facilitates entry to specialised tertiary level agricultural education and training such as the School of Natural Resources.