Agriculture: Outcomes and activities
God is Provider Year 6

Spiritual Awareness:
God expects mankind to work responsibly with the resources he has been given, using wisely the dominion he has been given. The provision of soil for the growing of crops is an expression of God's love and kindness towards us. Provision is on-going, as God provides rain, sun and seeds, the elements for His provision. He wants His children to trust in Him daily, and thank Him for the food He provides.

Values: Our response to 'God is Provider'
- **Thankfulness** to God for the things He provides
- Thankfulness to parents for the things they provide
- **Generosity**: Sharing with others the things that God has provided.
- **Trust** in God to take care of us.

Biblical references
Genesis 1:30; 2:5;3:23 - Man was instructed by God to cultivate the soil.
Psalm 104:14 - God provides grass for the cattle and vegetables for man.
Matthew 13:31 - The mustard seed. God provides when we have faith.
Matthew 26 - Do not worry.
Matthew 4:18 ; Mark 1:14; Luke 5:1; John 1:35 - The calling of the first disciples. They had to trust God to provide.
Exodus 15:22-27; Exodus 17 - God provided water for the Israelites when they trusted Him.
Job 36:26-31 - God is great. He is faithful in providing through the creation.
Psalm 119:86a - God's words can be trusted.
Psalm 56:3 - I put my trust in you.
Psalm 20:7 We trust in the power of the Lord our God.
Matthew 13:3 The Sower. God provides the seed.

Key Questions
How does God provide my food?
How can I thank God for my food?
What did God mean when He asked man to cultivate the soil?
What things in God's creation provide for the growing of seeds?
What must we do if we want seeds to grow into food plants?
What problems can there be in trying to grow good crops?
Where did weeds and pests come from?
Were they in God's original perfect creation?
How do animals help provide for our needs?
How do people provide for the needs of animals?
How does God want us to treat animals?
What is a shepherd?
How did the shepherd look after his sheep in Bible times?

Outcomes: Soil

- understand different soil types
- suggest ways of improving the soil
- understand problems deriving from poor soil management
- understand the responsibility mankind faces in soil conservation.

Outcomes: crop farming

- appreciate some of the processes involved in getting food from farm to table.
- appreciate the food value of food from the farm
- identify plant food sources of processed foods.
- differentiate between local and imported crops
- understand the importance of seasons in crop farming

Outcomes: Animal Husbandry

- show that God has provided animals to meet our needs
- understand the reason for animal husbandry
- appreciate needs of farm animals and to understand how they are cared for
- appreciate the diversity of farm animals

Activities: Soil

- Collect samples of soil from a variety of sources and place in jars. Include sand, clay, loam, broken down compost.
- Study soil samples using sight, smell and touch. Use a magnifying glass.
- Classify / list soil types and explain how they were formed.
- Explain the difference between topsoil and subsoil.
- Conduct experiment to show the different types of soil particles. Place soil and water in a jar and shake. Allow soil to settle, and watch heavier particles settling first and lighter particle settling last.
- Conduct experiment to show that soil contains air. Place soil in glass jar and slowly pour water over it. Observe rising air bubbles.
- Make soil from rocks by scraping soft sandstone, shale or limestone.
- Make inferences about the relationship between soil type and plant growth. Predict performance of plant growth in different soil types e.g. fertile garden compost, clay, sand.
- Measure plant growth and graph results.
- Grow a vegetable garden. Add compost to one section and note difference in performance.
- Examine organic and inorganic fertilizers.
- Discuss the practice of allowing land to be fallow.
- List some of the reasons for soil erosion.
- List ways of preventing soil erosion e.g. planting trees

Extension work: Earthworms

Activities: Crop farming

- Grow vegetables.
- Visit a crop farm.
- Visit a market or supermarket.
- Make a list of local and imported crops.
- Classify food crops into those grown in warm and cool climates.
- Make a flow chart showing the way the crop begins as a seed and becomes a food plant.
- Make a flow chart showing passage of food from producer to consumer.
- Make a calendar showing the activities in the farmers' year.
- Make a list of processed foods and their food crop source.
- Classify food plants.
- Prepare healthy meals from plant foods.
- Discuss the difference between organic and non-organic fruit and vegetables.
- Compare farming methods of organic and non-organic.
- Discuss the problem of pests.
- Discuss the potential problems of genetic modification.
- Compare today's farming methods with earlier times.
- Discuss transport and marketing of farm products.
- Discuss economic and marketing factors - imports and exports.
- Discuss ways in which overproduction in the first-world could benefit countries where there is food shortage.

Activities: Animal Husbandry

- Classify animals into categories of wild / domestic; pets / farm animals.
- Visit a farm.
- Make a list of products from farm animals.
- Describe how some animals help the farmer e.g. cattle / sheep dogs; horses.
- Investigate how farm animals care for their young.
- Discuss the needs of farm animals and the farmer's role in meeting these needs.
- Discuss the role of a vet.
- Make a yearly calendar showing changes if farm activities from season to season.
- Make a chart showing a day in the life of the farmer.
- Compare sheep farming today with Biblical times.
- Research the processes involved in animal products, from farm to consumer e.g. leather, wool, meat.
- Discuss the Christian response to issues such as cloning, hormone supplementation, battery hens and genetic modification.

Values education Year 6
God is Provider
Generosity
God expects us to share His provision with others.

Generosity is…

- sharing our things with others
- giving our time and talents to help others
- giving to people in need
- giving cheerfully
- not being selfish
- not being greedy
- giving without expecting to receive something in return

Activities

1. List three people who are generous with their time. Explain how each one is generous.
2. How can you be generous with your time and talents? Who could you help? What could you do?
3. Many people from other countries are suffering because of famine? Find out how these people can be supported financially through organizations.
4. Make something this week that you can share with others.
5. Write a list of ways that you could share material things with those in need. Example: Your brother has forgotten to buy Mum a birthday present. What could you do?

What does the Bible say about generosity?

Matthew 25:35-40 I was hungry and you gave me something to eat.
Mark 12:41-44 The widow's offering.
Psalm 112:5 Be generous and lend freely.
Proverbs 22:9 A generous man will himself be blessed.
Isaiah 58:6-11 The kind of fasting God has chosen is to share food with the hungry.

Art Year 6

God is Provider

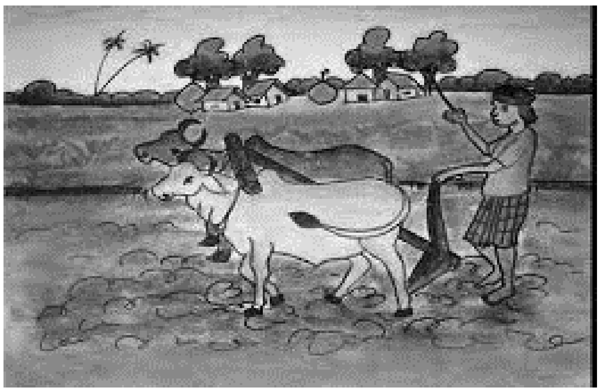
Agriculture

Biblical wall art and text: He makes grass grow for the cattle, and plants for people to cultivate, bringing forth food from the earth. Psalm 104:14

Drawing and painting

- Farming scenes showing fields of different hues or colours
- Farming scenes timeline, showing agriculture from earliest times to present
- Farming scenes in various countries around the world
- Still life drawing/paitning of fruits and vegetables

Printing: plant prints / fruit and vegetable prints



Thinking Skills Provider

Agricultural science 1 Create a new piece of farm machinery and explain what it does.	**Agricultural science 2** How many ways can you: **plant a seedling?**
Agricultural science 3 Find 10 different uses for: **a tractor.**	**Agricultural science 4** Explain how farms could be completely different in 50 years time.
Agricultural science 5 Consider 5 alternatives to this: **Food has to be packaged after it has been picked from the farm.**	**Agricultural science 6** You need to harvest wheat by combining: **a computer** **a cutting device** **a vehicle** Draw your invention and explain how it works.

Thinking Skills Provider

Agricultural science 7 **When food is not sold it needs to be given to the poor and needy.** List 5 advantages and 5 disadvantages of this statement.	**Agricultural science 8** **A farmer goes into his hen house one morning and finds that every single one of his hens has gone.** List 10 different explanations for this.
Agricultural science 9 The answer is **'God is Provider'.** Write 5 questions.	**Agricultural science 10** Work out 5 ways to help a nation that has less than we do.
Agricultural science 11 Name 5 things that **fertile soil** and **a cooking pot** have in common.	**Agricultural science 12** List 10 things that you would not find on a farm 100 years ago.

Practical Science Year 6
God is Provider
Soil

What Kind of Soil Do You have? Find Out with a Mud-shake!

1. Fill a clear container with straight sides about two-thirds full of water; then add enough soil to nearly fill the jar. You can also add a pinch of laundry detergent to help the soil components separate well. Shake the jar vigorously and then set it in a place where it won't be disturbed.
2. Observe the jar over the next couple of days as the particles settle into layers. The larger sand particles are heaviest and settle at the bottom, followed by a layer of silt, then topped by a layer of clay. The clay may stay suspended and cloud the water for several days, which is why the sample needs to sit undisturbed. Organic matter will float on or just below the water surface.

3. Measure the height of each layer, as well as the overall height of the soil (including all layers). Write a report on your findings. Which layer is the largest/smallest?

4. Repeat the experiment with soil from a different place. Compare the two.

https://www.gardeners.com/how-to/building-healthy-soil/5060.html

Practical Science: Plant crops
Potato shoot experiment

http://www.kidspot.com.au/kids-activities-and-games/Science-experiments+10/Potato-shoot-experiment+10983.htm?

What you need:

- a shooting potato (one that has little white shoots growing out of it)
- a shoe box
- scissors
- rocks

What to do:

Cut a small coin-size hole in the short end of the shoe box.

Put a handful of potting mix in the corner of the box opposite the hole you have made.

Lay the potato in the soil.

Put the rocks in the box with the potato to create 'obstacles'.

Put the lid on the box and put it somewhere where there is plenty of light.

After 4 weeks, open the box and you'll see that the potato shoot has made its way around and over the rocks to reach the hole where the sunlight is coming in.

Why?

Plants have cells that are sensitive to light and tell the plant which way to grow.

Plants will always grow toward the light.

The shoe box had a tiny hole of light and the potato shoot twisted until it reached the light.

Practical Science
Plant Seeds & Watch Them Grow

http://www.sciencekids.co.nz/experiments/seedgermination.html

Plant some seeds and follow the growth of the seedlings as they sprout from the soil while making sure to take proper care of them with just the right amount of light, heat and water. Have fun growing plants with this cool science project for children.

What you'll need:

- Fresh seeds of your choice such as pumpkins seeds, sunflower seeds, lima beans or pinto beans.
- Good quality soil (loose, aerated, lots of peat moss), if you don’t have any you can buy some potting soil at your local garden store.
- A container to hold the soil and your seeds.
- Water.
- Light and heat.

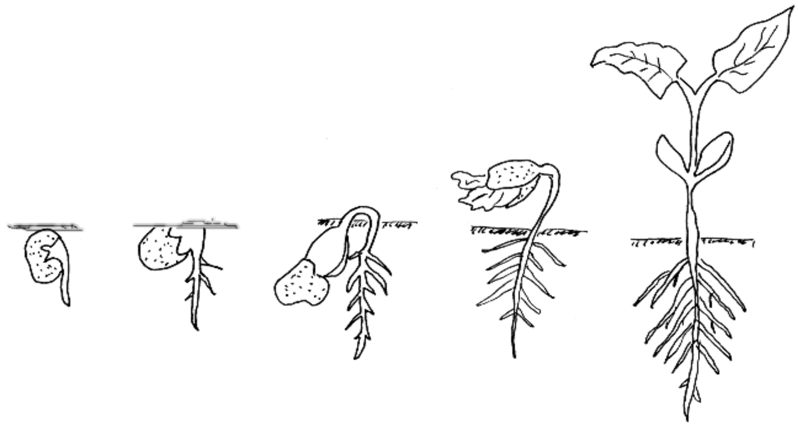
Instructions:

1. Fill the container with soil.
2. Plant the seeds inside the soil.
3. Place the container somewhere warm, sunlight is good but try to avoid too much direct sunlight, a window sill is a good spot.
4. Keep the soil moist by watering it every day (be careful not to use too much water).
5. Record your observations as the seeds germinate and seedlings begin to sprout from the seeds.

What's happening?
Hopefully after a week of looking after them, your seedlings will be on their way. Germination is the process of a plant emerging from a seed and beginning to grow. For seedlings to grow properly from a seed they need the right conditions. Water and oxygen are required for seeds to germinate. Many seeds germinate at a temperature just above normal room temperature but others respond better to warmer temperatures, cooler temperatures or even changes in temperature. While light can be an important trigger for germination, some seeds actually need darkness to germinate. Follow the instructions on the packet.

Continue to look after your seedlings and monitor their growth. For further experiments you could compare the growth rates of different types of seeds or the effect of different conditions on their growth.

Plant a bean seed



1. Draw the diagram and label it using the words in bold words below.
Stage 1: the skin splits and soaks up moisture. Then a little white **root** appears. The root points down and pushes down through the soil.

Stage 2: a white **shoot** pushes upwards into the air.

Stage 3: tiny **hairs** grow out from the root and these suck in water and food from the soil.

Stage 4: two thick leaves from the seed. These are called the **seed-leaves**. They give food to the plant.

Stage 5: The plant grows **true leaves** and can make its own food.

2. Copy and choose the correct word:

The root grows (up / down)

3. How does a seed take in moisture at first?
4. How does the seed take up moisture later on?
5. What do the see-leaves do?
6. What can the plant do once it grows true leaves?

Practical Science
Capillary action of plants

http://www.sciencekids.co.nz/experiments/escapingwater.html

What you'll need:

- A glass of water
- An empty glass
- Some paper towels

Instructions:

1. Twist a couple of pieces of paper towel together until it forms something that looks a little like a piece of rope, this will be the 'wick' that will absorb and transfer the water (a bit like the wick on a candle transferring the wax to the flame).
2. Place one end of the paper towels into the glass filled with water and the other into the empty glass.
3. Watch what happens (this experiment takes a little bit of patience).

What's happening?

Your paper towel rope (or wick) starts getting wet, after a few minutes you will notice that the empty glass is starting to fill with water, it keeps filling until there is an even amount of water in each glass, how does this happen?

This process is called 'capillary action', the water uses this process to move along the tiny gaps in the fibre of the paper towels. It occurs due to the adhesive force between the water and the paper towel being stronger than the cohesive forces inside the water itself. This process can also be seen in plants where moisture travels from the roots to the rest of the plant.

What is soil?

Student research activities

Soil is the loose upper layer of the Earth's surface where plants grow. Soil consists of a mix of organic material (decayed plants and animals) and broken bits of rocks and minerals.

How is soil formed?

Soil is formed over a long period of time by a number of factors. It can take up to 1000 years for just an inch of soil to form. Besides time, other factors that help soil to form include:
Living organisms - This includes organisms such as plants, fungi, animals, and bacteria.
Topography - This is the relief or slope of the surface of land where the soil is forming.
Climate - The overall climate and weather where the soil is forming. Parent material - The parent material is the minerals and rocks that are slowly disintegrating to form the soil.

Why is soil important?

At first you may think of soil as just dirt. Something you want to get rid of. However, soil plays a very important role in supporting life on Earth.

Plants - Many plants need soil to grow. Plants use soil not only for nutrients, but also as a way to anchor themselves into the ground using their roots.

Atmosphere - Soil impacts our atmosphere releasing gasses such as carbon dioxide into the air. Living organisms - Many animals, fungi, and bacteria rely on soil as a place to live.

Nutrient cycles - Soil plays an important role in cycling nutrients including the carbon and nitrogen cycles.

Water - The soil helps to filter and clean our water.

Properties of Soil

Soil is often described using several characteristics including texture, structure, density, temperature, color, consistency, and porosity. One of the most important properties of soil is the texture. Texture is a measure of whether the soil is more like sand, silt, or clay. The more like sand a soil is the less water it can hold. On the other hand, the more like clay a soil is, the more water it can hold.

Soil Horizons

Soil is made up of many layers. These layers are often called horizons. Depending on the type of soil there may be several layers. There are three main horizons (called A, B, and C) which are present in all soil.

Organic - The organic layer (also called the humus layer) is a thick layer of plant remains such as leaves and twigs.

Topsoil - Topsoil is considered the "A" horizon. It is a fairly thin layer (5 to 10 inches thick) composed of organic matter and minerals. This layer is the primary layer where plants and organisms live.

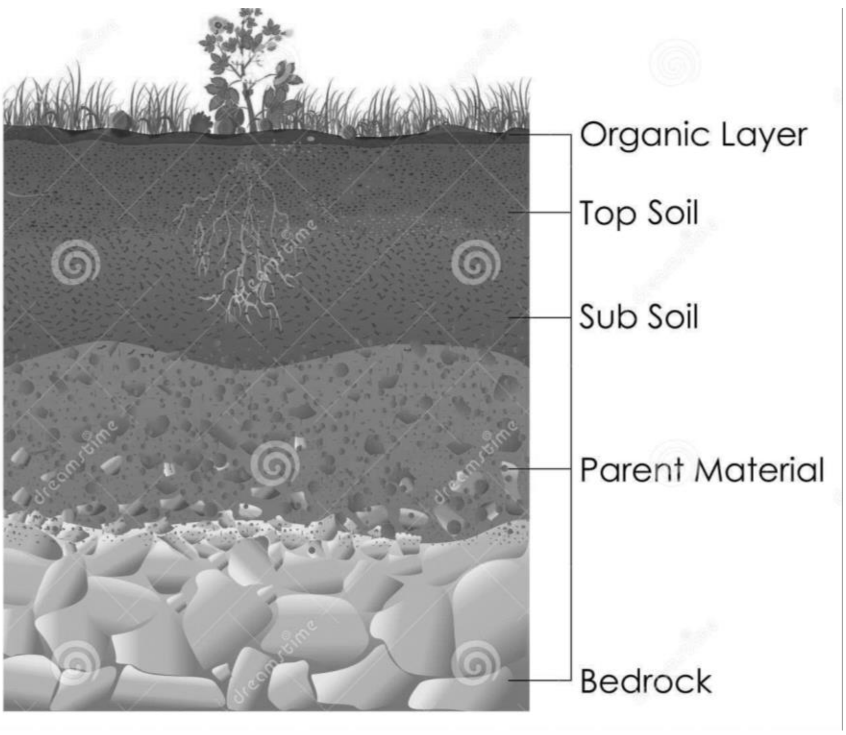
Subsoil - Subsoil is considered the "B" horizon. This layer is made primarily of clay, iron, and organic matter which accumulated through a process called illuviation.

Parent material - The parent material layer is considered the "C" horizon. This layer is called the parent material because the upper layers developed from this layer. It is made up mostly of large rocks.

Bedrock - The bottom layer is several feet below the surface. The bedrock is made up of a large solid mass of rock.

Interesting Facts about Soil

The process by which minerals move down through soil is called leaching. In a teaspoon of good soil there will typically be several hundred million bacteria. The average acre of good cropland will be home to over 1 million earthworms. Soil is mostly made of the following elements: oxygen, silicon, aluminum, iron, and carbon. It is possible to over-farm soil and remove so much of its nutrients and organic matter that plants will no longer be able to grow in it.



Soil Quiz

1. What is soil made of?

a. Rocks

b. Decayed plants

c. Minerals

d. Decayed animals

e. All of the above

2. What important soil measurement determines how much water it can hold?

a. Temperature

b. Texture

c. Color

d. Consistency

e. All of the above

3. What is another name for the layers of soil?

a. Levels

b. Stories

c. Horizons

d. Blocks

e. Mantles

4. What is the solid mass of rock below soil called?

a. Organic

b. Topsoil

c. Subsoil

d. Parent material

e. Bedrock

5. What layer is considered the 'B' layer of soil?

a. Organic

b. Topsoil

c. Subsoil

d. Parent material

e. Bedrock

6. What layer is the primary layer of soil where plants and animals live?

a. Organic

b. Topsoil

c. Subsoil

d. Parent material

e. Bedrock

7. What layer is also called the humus layer and is made up of plant remains like leaves and twigs?

a. Organic

b. Topsoil

c. Subsoil

d. Parent material

e. Bedrock

8. What layer is called the 'C' horizon and is made up mostly of rocks?

a. Organic

b. Topsoil

c. Subsoil

d. Parent material

e. Bedrock

9. How does soil help in supporting life on Earth?

a. It filters the water

b. It helps recycle nutrients like carbon and nitrogen

c. Many plants grow in the soil

d. Soil is home to living organisms such as bacteria

e. All of the above

Soil classification

Although scientists use many methods to classify soil, gardeners usually describe soil using words like "sandy," "clay," and "loam." These terms describe a soil's texture. Knowing your soil's texture will help you predict how it will behave under different conditions. It's the first step toward creating the best conditions for the plants you're growing.

About Soil Texture

A soil's texture is determined by the mineral particle sizes it contains. Sand, silt, and clay — the mineral particles in soil — are derived from rock broken down over thousands of years by climatic and environmental conditions (rain, glaciers, wind, rivers, animals, etc.).

The largest, coarsest mineral particles are ***sand***. These particles are 2.00 to 0.05 mm in diameter and feel gritty when rubbed between your fingers.

Silt particles are 0.05 to 0.002 mm and feel similar to flour when dry.

Clay particles are extremely fine — smaller than 0.002 mm. They feel sticky in your fingers when wet and clump to the point that you can't see an individual particle without a microscope.

The proportion of these three mineral particle sizes determines the soil texture.

Soil Texture and Plant Growth

The ratio of particle sizes affects the amount of pore space — the space between the mineral particles — and therefore the amount of air and water a soil can hold. It also affects other characteristics. The smaller the soil particles, for example, the more they bind together when wet. Thus, clay soils can be sticky and difficult to work. They drain poorly and have less pore space for air, so roots may suffer from a lack of oxygen. However, clay soils are often rich in plant nutrients. In contrast, sandy soils can drain water too quickly for healthy plant growth and tend to be low in nutrients, but they are easier to work. Adding organic material can offset many of the problems associated with either extreme.

While there's no such thing as a perfect soil, different plants grow best in different types of soil. Most common garden plants prefer loam — soils with a balance of different-sized mineral particles (approximately 40% sand, 40% silt, and 20% clay) with ample organic matter and pore space. However, some plants grow better in sandy soils, while others are well-adapted to clay soils.

What are the benefits of seaweed?

Seaweed contains at least sixty micronutrients, including iron, copper, zinc, boron, and manganese. Seaweed also contains a high concentration of natural growth hormones which allow it to grow rapidly in its natural environment. When applied to plants, these growth hormones stimulate root growth, reduce transplant shock, promote more rapid fruit set, increase frost resistance and improve storage life. Research has also revealed that seaweed contains antitoxins that help plants fend off bacteria, viruses and pests.

Vegetable growing

Things to consider before you start

1. Can I sell it?

2. Can I grow it?

Before working out whether or not to grow a crop, you need to have a very firm idea of where the crop is going to be sold. There is no point in growing the finest looking and tasting crop if it sits in the garden because it can't be sold at the price needed to recover costs.

In addition to these key questions there are other considerations such as water and labour. Water for irrigation will be essential for vegetable production even in areas of high rainfall.

Selecting the site

Site selection includes issues such as soil type and topography. Steep slopes are not suited to vegetable production and some soils will be unsuitable.

Your site may or may not come with water. The availability of water for irrigation is essential and vegetable production should not be contemplated without it.

What should I grow?

Grow something you can sell.

Market demand should be a very significant influence on what you plant and how much. There is no point in getting a perfect crop if you have nowhere to sell it.

Climatic conditions are a major determinant of what can be grown and at what times of year.

Production considerations

Labour may well be a determining factor in what you can grow or the amount that you grow.

Do you want to be able to manage on your own, or are you prepared to hire staff?

Is there labour available in your local area?

Marketing your product

Selling direct to the consumer such as a roadside stall or farmers market has the lowest costs and lowest number of constraints. Another option is selling to restaurants and other food services.

Growing the crop

Fertilizers

Some fertilizer may need to be spread and applied pre-planting depending on the results of the soil test. Most crops will require some side-dressing after planting throughout their growing season. There is a range of fertilizers available, both chemical and organic.

Planting

The choice of flat or raised beds depends on soil type, the crop, its production requirements, and the topography of your site. Typically, heavier soil types will require raised beds to ensure that there is good drainage around the roots of the crop. Crops such as lettuce which are very susceptible to water logging may require raised beds on lighter soils.

Pests and disease

All vegetable crops will have some potential pest and disease problems. It is essential to monitor crops for pests and diseases as well as the incidence of beneficial insects.

Pest control that considers the whole biological system is called "Integrated Pest Management" or IPM.

Chemical control

Some organisms have been shown to be resistant to certain chemicals or chemical groups. It is important to minimize the development of resistance. Chemical labels give information on how to minimize resistance. This may include rotating chemical groups or limiting the number of sprays per crop.

Irrigation

Water supply

The availability of water for irrigation is essential for vegetable production and its supply and quality will determine the area and crops that can be grown. Supply must be reliable and typical water sources include rivers or streams, ground water, and farm dams.

Climate

Climate and climatic variability are critical factors in vegetable production and is largely beyond your control, unless you plan to establish protected cropping such as glasshouse or shade-house production. Climate will determine what crops can be grown and at what time of the year. Some crops will be frost sensitive; others will have a heat requirement or a minimum soil temperature for germination of seed.

Weather

It is also important to remember that weather conditions are variable and that there are also extreme events which can affect the growing conditions and crop quality.

Weather will also have an impact on disease and insect levels. Leaf wetness increases the likelihood of some fungal diseases and this is not only due to irrigation and rain but also humidity and dew. Other conditions which can influence pest and disease incidence include temperature and wind.

Harvesting

Harvest labour can be a significant consideration when deciding to grow vegetables. You may need a consistent supply of labour or many hands all at once or something in between.

Will your crop be harvested by machinery or harvested by hand?

Project

Imagine that you are going to start a vegetable garden.

Write a report on your garden. Include:

- How you will get started
- The site you will choose
- What you will grow and why you would choose these vegetables
- What you will need
- Some of the problems you might encounter
- How you will harvest your products
- Whether you will employ labour
- How you will sell your products.

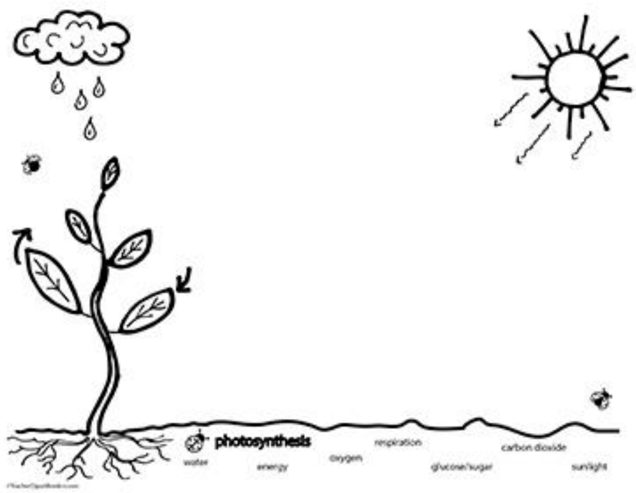
How plants make food

All living things need energy to live, and energy comes from food. But, have you ever seen plants munching on food? No. Plants get their energy in a different way. They use *photosynthesis*. Here's how it works:

Plants take water from the soil through their roots. The water goes to the leaves. The leaves take carbon dioxide (a gas) from the air into the plant. The carbon dioxide mixes with the water. The green part of the plant, called chlorophyll, traps the energy from the sun. Energy from the sun helps the plant make food in the leaves. The food is a sugar called glucose. The glucose is plant food. It gives the plants energy to grow.

When plants take carbon dioxide from the air, they release oxygen (the main gas in the air). Animals and humans use this oxygen to breathe and grow. We breathe out carbon dioxide, which the plants use. Too much carbon dioxide in the air would not be good for us, but that's OK because the plants need it and use it. That keeps the air fresh.

1. What are four things a plant needs to make its food?
2. How do plants help us to breathe and grow?
3. How do plants help to keep the air fresh?



Seeds

Nearly all the plants around us started as seeds. Seeds are different shapes and sizes, but they are alike in two ways.

- A seed always contains the young plant, called the *embryo.* It is inside the seed.
- The seed contains food for the young plant to live on, before it can make its own food.

Draw some seeds you know to show their different shapes. Try to draw them the right size too. Here are some examples: pea, apple, pumpkin, tomato, bean, orange, watermelon, lettuce.

Copy:
Seeds are alike on two ways:

a) The seed contains the ____________________ ___________________ . This is called the em _ _ _ _.

b) The seed contains a supply of ____________________.

Why does the embryo need food from the seed?
Draw this seed and label the embryo.

Seeds have a hard coat

If you look at a seed closely and feel it, you will notice that it is hard and dry. The hard coat protects the young plant inside from hard. On the outside of the seed, you will see a little scar. This is where it was attached to the stalk while it was growing on the parent plant. On the hard coat you will also find a little hole. It is here that the water gets into the send when it is planted.

Why did God give seeds a hard coat?
Ephesians 6 says "Put on the whole armour of God so that you may stand against the arrows that the devil fires at you."
What is a hard coat that we can put on to protect us from fiery darts of evil?

Copy:
The little scar on the outside of the seed is where it was ____________________ to the stalk when it was growing on the ____________ plant.
Draw some peas growing in a pod. Show the little stalks attaching the peas to the pod.

Copy:
The little hole on the hard coat of the seed is where the ___________________ gets into the seed.

Seed germination
When a seed starts to grow into a plant, we say that it has germinated. Before it can do this it must have three things: water, warmth and oxygen. Yes a seed needs oxygen just as we need it. The oxygen comes from the air in between the soil particles. The water comes from the moisture in the soil, and of course the warmth comes from the sun.

1. We say that a seed has germinated when …….

2. Add "ion" and "ing" to make words:

germinat _ _ _

germinat _ _ _

3. Before a seed can _________ it needs three things:
a)

b)

c)

4. A seed gets oxygen from the ___________________. Draw the soil showing small particles with air between them.

5. How does a seed get the moisture it needs for germinating?

6. How does a seed get the warmth it needs for germinating?

God is a Provider
We can see how God has planned for new plants to grow from seeds. God provides everything the seed needs, even before it can make food for itself.

God looks after his creation. He says, "Look at the flowers. Aren't they dressed in beautiful colours? I look after them. Look at the birds. They don't make their own food but I look after them. And I look after you, so don't worry about anything!" (Matthew 6:25 – 31)

How does God use the following to provide for you? (Write one sentence for each.)
a) parents

b) plants

c) animals

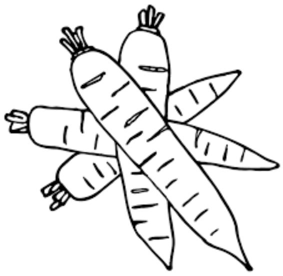
d) the sun

e) the earth

f) the sky

Plants we eat: Roots, stems and seeds

Carrots are roots. Because root vegetables grow underground, they absorb a great amount of nutrients from the soil.



Some vegetables that grow underground are swollen parts of underground stems called tubers. Examples of these are potato, taro, yams and taro.

Onions and garlic grow underground too but are actually bulbs.

Sugar cane is an example of a stem foods growing above the ground.

Draw and label some roots and stems that we eat. Draw them growing underground or above ground.

There are many seeds that we eat. Seeds are found inside the fruit. For example, wheat, rice, corn, beans, peas and even coconuts are seeds. Nuts are also seeds from fruits.

Draw and label some seeds that we eat.

Plants we eat: leaves, flowers and fruits

Some of the leafy vegetables are cabbage, spinach, lettuce, coriander. The green leaves have many nutrients.

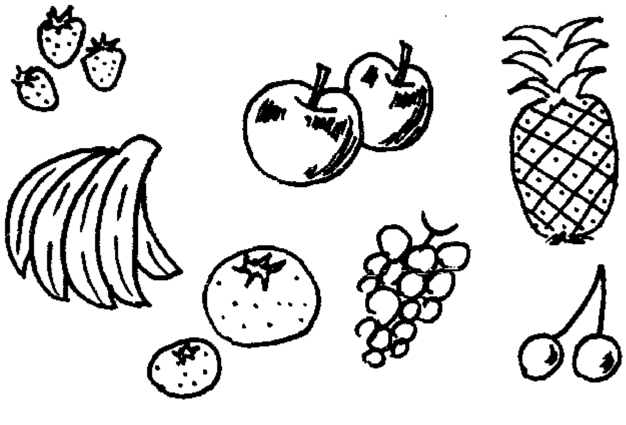
Broccoli and cauliflower are examples of the flower of the plant.

Draw and label some vegetables that are actually leaves or flowers.

There are many fruits that God has provided for us to eat. Did you know that tomatoes and pumpkin are technically fruits? We call them vegetables because they are not sweet like mangoes and pineapples.

There are many sweet fruits: pineapple, mango, papaya, bananas, guava, bread fruit, apples, pears, oranges, lemons, berries and many more.

Draw and label some fruits that we eat.



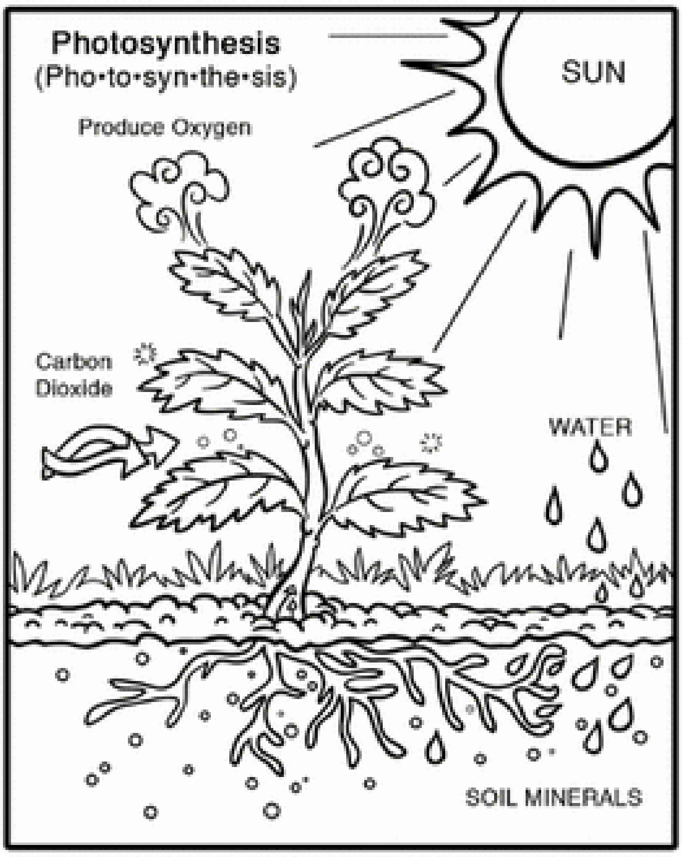
Photosynthesis

“Photo” means “light” and “synthesis” means “to make”; so, photosynthesis is the way plants make food for themselves using light.

The food is made in the green parts of the plant, like the leaves. The green part of the plant contains a green substance called “chlorophyll “which makes food for the plant when the sun shines on it.

The leaves have little pores (openings) which take in a gas called carbon dioxide from the air. The roots take up water from the ground. The chlorophyll changes the water and carbon dioxide into food the plant needs. This food is a kind of sugar called glucose. The whole process of making food is called photosynthesis. While this is happening, the leaves give off a gas called oxygen.

Isn’t God amazing! The oxygen part of the air we breathe is what we need to stay alive. When we breathe in, our bodies use oxygen in the air, and then we breathe out the waste gas called carbon dioxide. Carbon dioxide is not good for us, but perfect for plants. Plants use it to make fresh air for us!



Rewrite the following, filling in the missing words. Choose from the words at the bottom of the page.

Leaves help to make ________________ for the plant.

They contain a green substance called chlorophyll.

The leaves take in a gas called ________________ ___________________.

The roots take in _________________ and other substances from the ground.

The ____________________ changes the water and carbon dioxide into the food that the plant needs. The food is a kind of sugar called _______________________.

This whole process of making food is called ___________________________.

While this is happening the leaves give off a gas called ___________________.

Missing words: (jumbled order)

Oxygen, carbon dioxide, photosynthesis, water, food, chlorophyll, glucose

Make an equation for photosynthesis:

____________ + ____________ with sunlight → ___________ + ____________

Animal Farming 1

Dairy Farming

Very early in the morning the cows are driven to the milking shed. Cleanliness is essential in the handling of milk. The farm workers scrub their hands before they begin and the cow's udders are washed. All equipment has to be sterilized.

Cows were once milked by hand, but now electric milking machines are used. Electrically operated suction caps are fitted to the teats of the cow. As these expand and contract they extract the milk from the udders. The milk flows along a tube into the can. In the tube there is a section made of glass through which the farmer can watch the flow of milk and see when the cow has been milked dry. These machines are thoroughly cleaned and sterilized after each milking.

When all the cows have been milked, they are herded back to the pasture where they eat grass and chew their cud all day. In the evening they are taken to the shed to be milked again.

While the milk is still warm it is strained and put through a cooler, ready to be picked up by a refrigerated milk truck that takes the milk to be processed.

As soon as the milk arrives at the processing plant it is pasteurized, which means it is heard to a temperature of 75 degrees Celsius in 15 seconds, and immediately cooled down to freezing point within 25 seconds. This ensures that the milk is free of bacteria. By-products of milk are butter, cream and yoghurt.

1. Describe the dairy farmer's job.
2. What happens to the milk after it leaves the farm?

Animal Farming 2

Meat production

In the beginning God created wild animals and domestic animals. Domestic animals can be farmed and are very useful to us. In earlier times animals were hunted for food, and in some cultures, this is still done.

For those of us who buy meat at the shops, there are different kinds of meat available:
Beef, from cattle
Veal, from calves
Lamb
Pork from pigs
Venison from deer

Farmers who raise animals for meat start by buying female animals which give birth to young. The farmer cares for the herd, ensuring that the animals always have plenty of feed and water, until such a time when the animals are old enough to be sold for meat.

The animals are loaded on to trucks and taken to the abattoir. Here every precaution is taken to ensure that the meat is handled hygienically. The meat is graded and sent to the butcher's shops or supermarkets. Butchers know how to cut the meat into various "cuts" such as chops, steaks and roasts.

1. Describe the job of a beef or sheep farmer who raises animals for their meat.
2. What is the job of the butcher?

Animal Farming 3

Egg and poultry production

Poultry is the word used to describe the meat from:

a) Roosters, hens and chickens (also called fowls)

b) Drakes, ducks and ducklings

c) Turkey cocks, turkey hens and chicks

A poultry farmer keeps poultry for either eggs or meat.

Fowls are kept in fowl runs. They should have ample space to walk around and scratch for food such as insects and greens. Hens that have space to do this are called “free range” and are much healthier and happier than hens that are confined to farm sheds or cages.
Hens are raised in cages are given only pellets to eat and never see the light of day. Many animal activists are against this type of farming.

With both types of farming, nests are lined with straw, and the hens are fed pellets or wheat. A farmer that raises hens in a natural setting will have a rooster, and only one. If there is more than one, the roosters will fight. When a hen becomes “broody” she will want to sit on her eggs and be left in peace, waiting for her chicks to hatch.

Some chicks are hatched using incubators. The small chicks are put into a shed and have to be cared for by the farmer as they have no mother hen to look after them.

1. What is a “free range” hen?
2. What are the advantages of “free range”?
3. Why do you think some farmers choose to raise hens in cages?

Animal Farming 4

Wool production

Sheep are raised for many purposes. The most important reason farmers raise sheep is for their wool. This thick fibre coat is shaved off, or shorn, every year. It is used to make clothing, blankets, and other materials. Sheep can stay warm even on cold winter days thanks to their warm wool coat!

Sheering sheep is similar to cutting hair. Sheering is usually done in Spring. If sheep are not shorn they can suffer from over-heating in the hot summer months.

The fleece is sent to the woollen mills for processing. It is tangled and matted. In order to spin the wool into yarn, the fibres need to be running parallel to each other. This is done by carding, which is similar to combing. It is done by special machines. Once the wool is carded, it can be spun into yarn by twisting the fibres together.

Female sheep are called ewes, and males are called rams. Rams more often have horns, although there are some rams that are without horns, and there are some females that have horns!

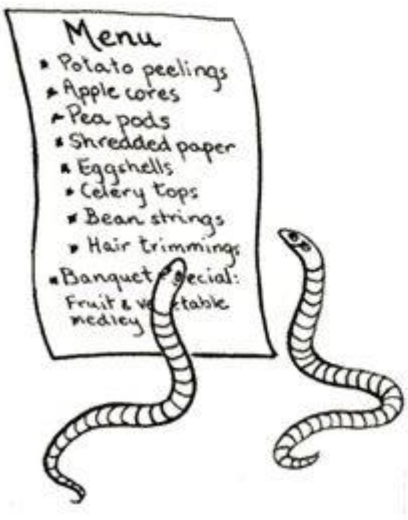
A sheep farmer has to make sure the sheep have plenty of grass to eat and water to drink. They also should provide shelter from the hot sun, by planting trees in the paddocks.

1. When would a sheep farmer have to employ extra labour?
2. Why is sheering necessary?
3. How is the fleece processed to make woollen yarn?
4. What are the advantages of woollen clothing?

Next page; Extension work: Earthworms

Earthworms

How earthworms help us



Worms that live in the ground are some of our most useful helpers. You know how important it is to loosen-up the soil before planting? Earthworms help us by loosening up the soil for us.

First the earthworm burrows down into the soil, and then he eats large quantities of it. He eats pieces of decaying leaves and plant material that are useful to him as food. The soil and decaying matter pass through the earthworm, and comes out as fine crumbly material called ‘castings’.

When an earthworm burrows into the earth making little tunnels, the earth walls don’t cave in. This is because the earthworm has special glands that give off a special cement. As he chews his way through the soil the cement sticks to the walls of his tunnel. An earthworm can dig and gobble two and a half metres in four days! The tunnels important to plants because air can get into the roots, gases can escape from the soil and rainwater can drain away.

1. What very important job does the earthworm do for us?
2. How does an earthworm loosen up the soil?
3. Draw and name some of the decaying (dying) matter in the soil that would be good food for an earthworm. Think of a compost heap.
4. How does the soil look when it comes out of the earthworm?

How an earthworm moves

An earthworm can be reddish brown or grey. The job of the red earthworm is to bring good soil to the top of the ground. The job of the grey earthworm is to release his soil underground.

Let’s look at the earthworm. He is a moist slippery tube, without legs, feet, eyes, ears, feelers or wings. He can sense vibrations in the earth. At night when he comes out looking for food, he will quickly disappear into his burrow again at the feeling of an approaching footstep.

The wetness of his skin moistens the earth around him and makes it easier to work through. He also has rows of tiny bristles covering the length of his entire body. He can draw in or project these bristles whenever he wants to. When they are out, he can grip the soil firmly, and when they are in, he can slide forward easily.

His body is made up of hundreds of rings, which he stretches and then contracts (drawn in) as a means of moving around. If you watch an earthworm move along you will see him stretching himself out long and thin, then drawing himself up short and fat.

1. What amazing thing can an earthworm do even though he has no eyes, ears, feelers or wings?
2. How does an earthworm's wet skin help him in his job?
3. What can an earthworm do when his bristles are out?
4. What do the rings help the earthworm to do?
5. Draw an earthworm with his rings stretched out.
6. Draw an earthworm with his rings contracted (drawn in).