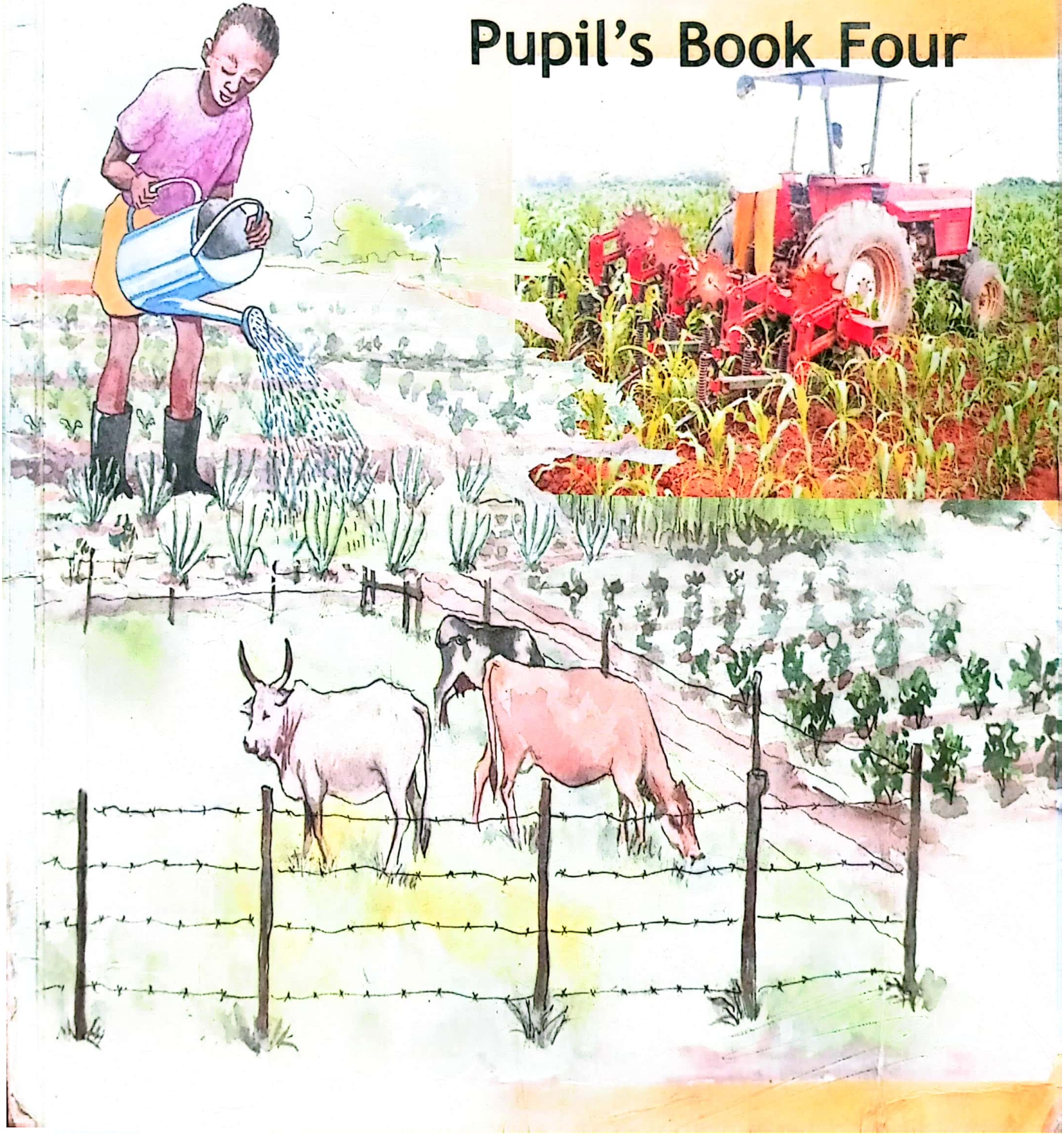
MK PRIMARY AGRICULTURE

Pupil's Book Four



Date.....

MK
PRIMARY AGRICULTURE
PUPIL'S BOOK 4

Authors:

KENNETH K.G. KINTU

AMOLO OMODING

MUWANGA LWANGA

ARINANYE MOSES

MK PUBLISHERS

Setting a new trend in school book publishing

MK Publishers (U) Ltd
P.O. Box 12385 Kampala
Telephone : 271615
Fax : 041-271615
Kampala-Uganda

Publication Date 2002

ISBN : 9970 - 04 - 024 - 5

Typeset and Design:
Kigumba Betty

Illustrations:
Ssenyondwa .D.

Special Acknowledgements
Kyambadde Daniel
Kironde Majwega Ronald
Ndugga Ronald
Kasegu Michael
Mulumba Robert
Rebecca Namatovu
Bunjo Edward
Sserwanga Sam

Printed & bound in India

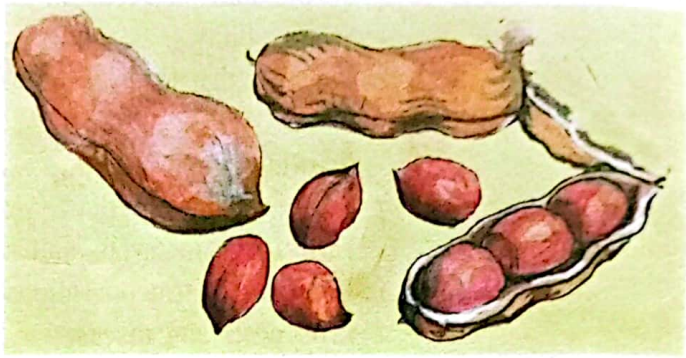
TABLE OF CONTENTS

GERMINATION OF SEEDS IN A GARDEN

Seeds and their uses

In the previous class, we learnt that many crops grow from seeds. Examples of such crops are maize, rice, beans, groundnuts, coffee, cabbages and tomatoes.

Bean Seeds



Groundnut Seeds

Name other crops that grow from seeds.

Apart from growing into new crops, seeds have many other uses.

With the help of your teacher, name other uses of seeds.

It is important to keep seeds in good conditions so that they do not get spoilt. Such seeds grow into seedlings when planted.

Activity 1

- Collect different types of seeds. These may be got from the garden, market or food store.
- Keep them in different containers. Keep them in a cool and dry place. This prevents them from getting spoilt.

Name the different types of seeds that you have collected.

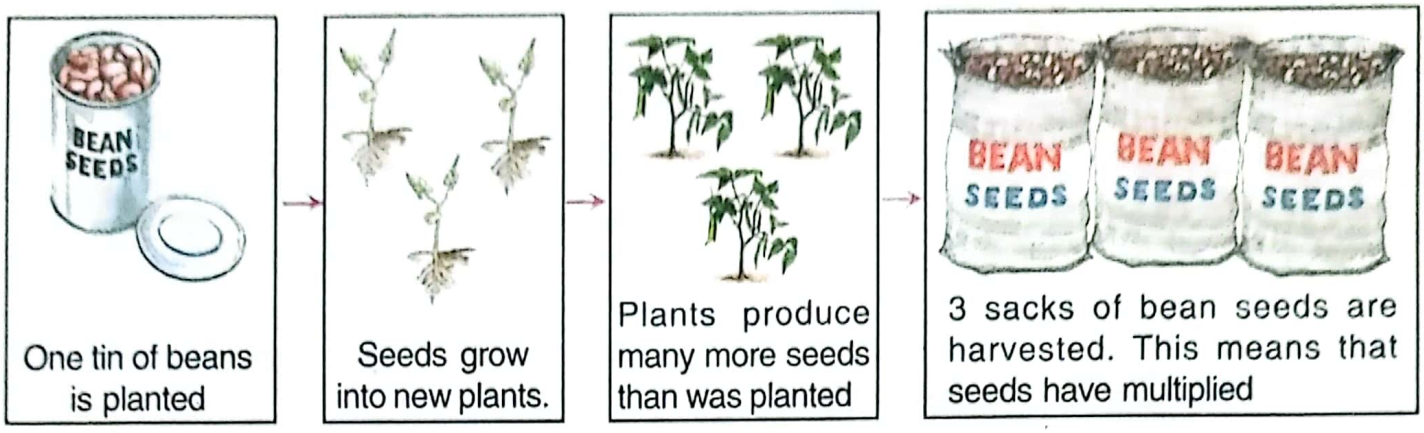
How do farmers in your area keep the types of seeds that you collected safely?

Seed Propagation

Seeds can not be kept safely for many years. If kept for too long seeds may get damaged and will not be able to germinate.

When seeds are planted, they germinate and grow into new plants. These plants

produce new seeds. Planting of seeds is done to have more and more seeds. This process is known as seed propagation.

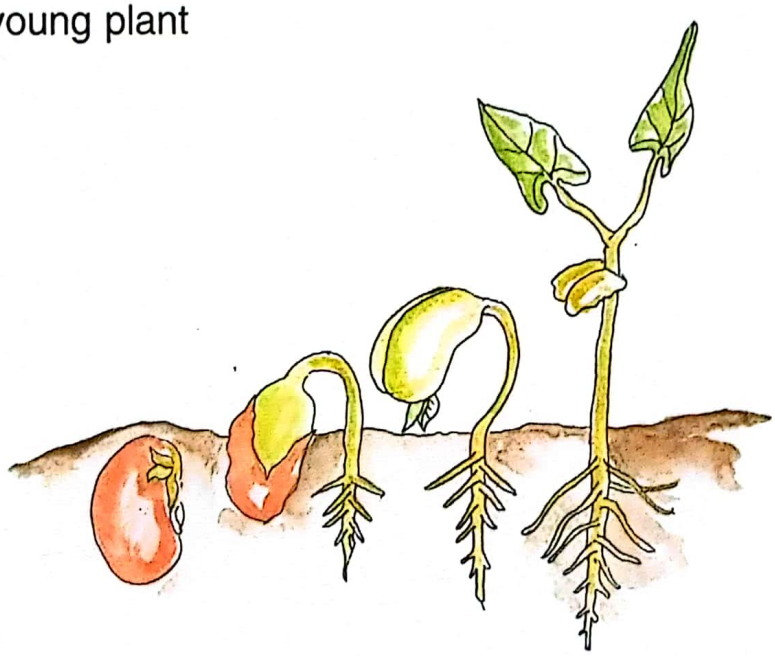


When seeds are planted they grow into crops and yield more seeds

Germination

Germination is the growing of a seed into a seedling.

A seedling is a young plant



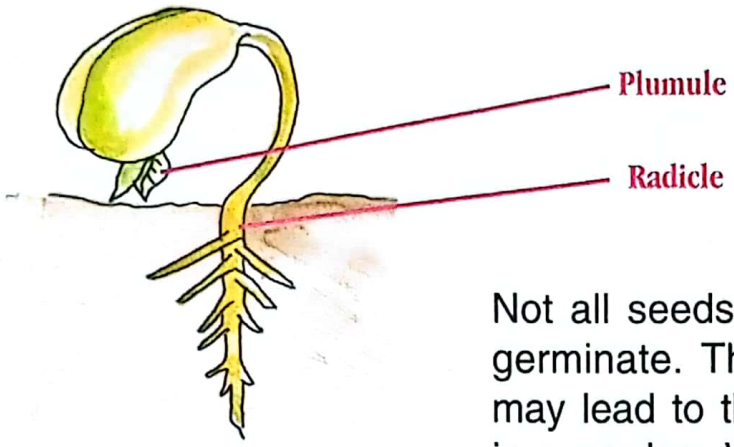
Stages of a germinating bean seed

Activity 2

- Get bean seeds.
- Get a tin of a reasonable size.
- Make holes at the bottom and fill it with loam soil.
- Plant five good seeds in the tin.
- Water the tin daily.
- Observe and draw changes in the planted seeds.

What takes place in a seed during germination?

During the process of germination, the seed absorbs water and swells. This makes the testa soft. The young root (radicle) grows and comes out of the testa first. Later on the young shoot (plumule) also comes out.



Not all seeds that are planted are able to germinate. There are some factors which may lead to the poor germination of seeds in a garden. We shall be able to find them out in activities 3, 4, 5, 6 and 7 below.

Activity 3:

- Get half a kilogram of groundnuts, beans and soya seeds.
- Select the seeds as mentioned below.
- For each type of seed select:
  1. good quality seeds.
  2. bad quality seeds.
- Group them into:
  1. good groundnut seeds.
  2. bad groundnut seeds.
  3. good bean seeds.
  4. bad bean seeds.
  5. good soya seeds.
  6. bad soya seeds.
- Plant each group of seeds above in its own plot.
- Water the plots daily.
- Observe the plots daily for ten days.
- Ten days after planting count and record the number of seeds that have germinated in each plot.

Copy the table below and fill in your observations.

Table 1:

Group of seeds	Number of seeds that germinated	Number of seeds that did not germinate
Good groundnut seeds		
Bad groundnut seeds		
Good bean seeds		
Bad bean seeds		
Good soya seeds		
Bad soya seeds		

When seeds are planted, some germinate but others may not germinate. Seeds germinate well if they are good and healthy.

You may have found out in the above table that some bad seeds did not germinate. Other bad seeds germinated, but how do their seedlings look like?

As farmers, we should therefore, plant only good and healthy seeds. We have to separate good and healthy seeds from bad seeds. This practice is called seed selection.

What causes some seeds not to germinate when planted?

This is caused by a number of factors.

Can you mention some of them?

In the activities below, we shall find out what these factors are:

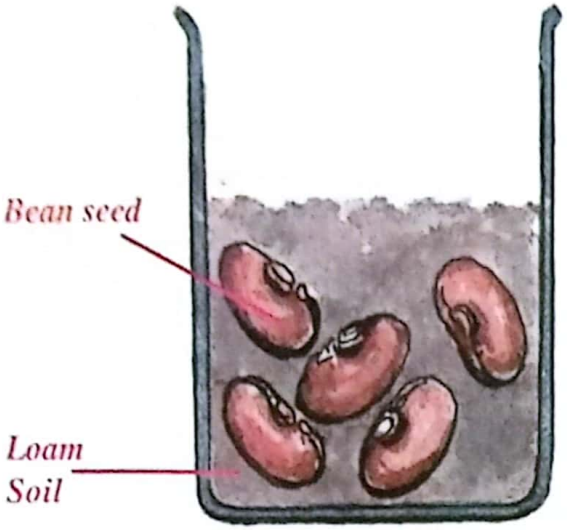
Activity 4

- Get two tins.
- Fill both tins with dry loam soil.
- Label one tin B and another C.
- Make holes in the bottom of each tin.
- In each tin plant five selected good bean seeds.
- Add water to tin C but do not add water to tin B.
- Observe daily for ten days.
- Record your observations.

What did you observe during the ten days?

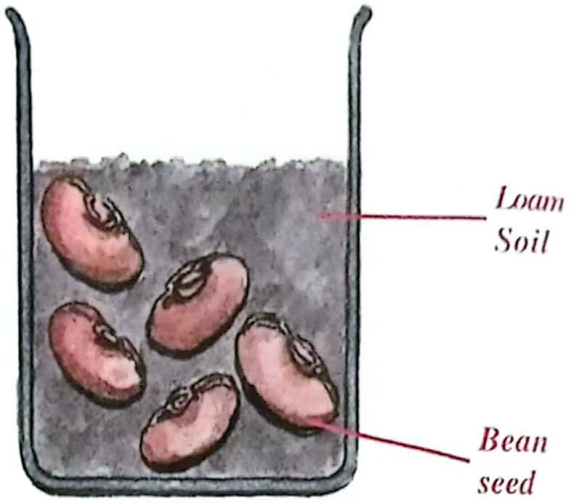
What can you tell us about what you observed?

Tin B



Dry loam soil with bean seeds

Tin C



Moist loam soil with bean seeds

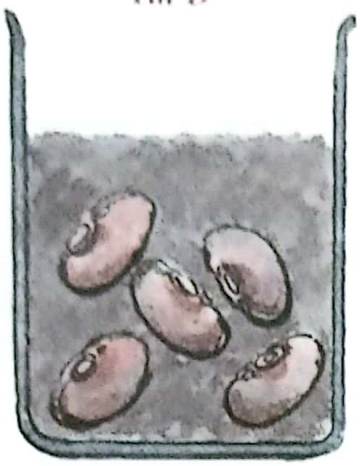
Activity 5

- Get two tins.
- Label them D and E.
- Get them half filled with dry loam soil.
- Plant five bean seeds in each tin.
- Provide just enough water in tin D.
- Add water to the soil in tin E until no more water can be absorbed by the soil. At this stage the water is covering the soil. See illustration of tin D and E.
- Observe both tins daily for ten days as you record your observations.

What did you find out?

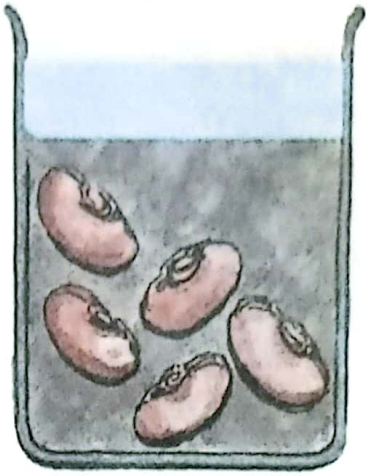
You may have observed that seeds which had enough water germinated well. You may have also observed that seeds to which too much water was added did not germinate. Yes, seeds need water to germinate but too much water is not good for the germination of seeds. Too much water may cause seeds to die and rot. Water also keeps out air from the soil yet seeds need air for germination. Some seeds germinate in excess water but die later on.

Tin D



Moist soil with bean seeds

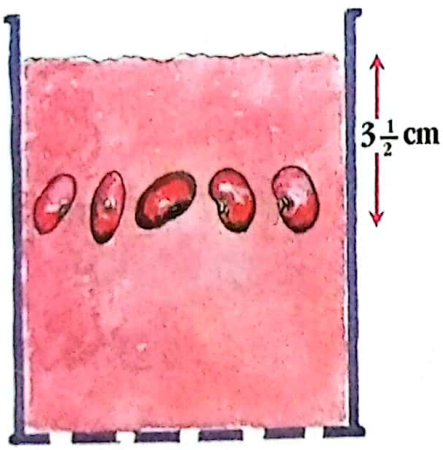
Tin E



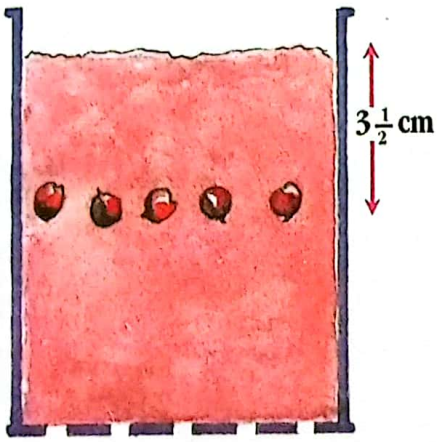
Bean seeds in soil with too much water

Activity:6

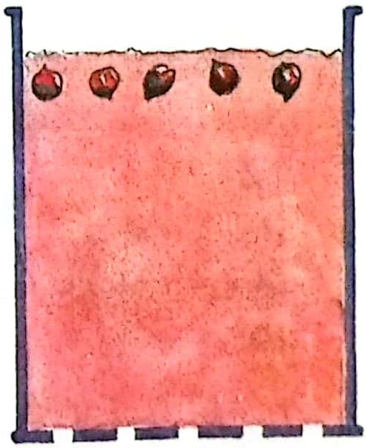
- Get three tins of the same size.
- Make holes in the bottom of each tin.
- Get two types of seeds: beans and sorghum.
- Fill all the tins with the same amount of soil.
- Label the tins F, G, and H.
- Plant five bean seeds in tin F at a depth of $3\frac{1}{2}$ cm.
- Plant five sorghum seeds in tin G at a depth of $3\frac{1}{2}$ cm
- Plant another five sorghum seeds near the surface in tin H
- Water all tins F, G and H on the advice of the teacher.
- Make observations after ten days.



Tin F



Tin G



Tin H

Which seeds germinated?

Which seeds did not germinate?

Why do you think this was so?

The size of the seed determines the depth of planting . Small seeds like millet and sorghum should be planted near the soil surface. Bigger seeds like groundnuts and beans should be planted deeper than millet seeds. It is important to plant seeds at their correct depth.

Seeds use stored food in their cotyledons for germination. Seeds planted very deep will use up all the stored food before the plumule comes out of the ground. Such seeds do not grow into seedlings.

It is a good practice to plant small seeds not deeper than *5mm.* This is possible by scattering seeds on the soil surface. After scattering, the seeds are covered with little soil. This is called broadcasting method of planting.

Farmers planting seeds by broadcasting method. The woman is covering the seeds lightly with soil using a rake.

Copy and match the type of seeds listed below with the correct depth of planting

Seeds	Depth of planting
Millet seeds	
Mango seeds	Near the surface
Bean seeds	
Groundnut seeds	Deeper in the soil
Sorghum seeds	
Avocado seeds	

Activity 7

- Get about $\frac{1}{2}$ kg of bean seeds.
- Spread them on a clean floor or table.
- Select the good, large and well filled seeds. These should have no signs of damage. Now you have good, healthy seeds. The remaining seeds are damaged. The damage could have been caused by diseases or pests.
- Plant 20 good seeds on a small plot in the school garden.
- Plant 20 bad seeds on a plot next to the first one.
- Water the two plots on the advice of your teacher.
- Observe the plots after seven days.

How many seeds germinated in the first plot?

How many seeds germinated in the second plot?

Why was there a difference in the number of seedlings in the two plots?

A tin containing good seeds and damaged seeds.

Selection of good seeds from bad seeds

What is a crop pest?

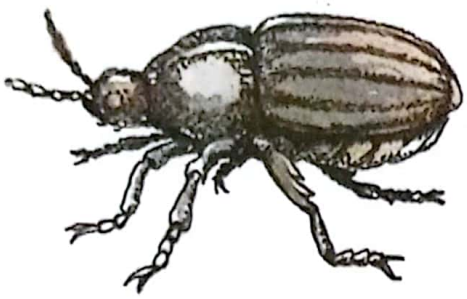
A pest is a living thing that destroys our crops.

Pests like weevils, lay their larvae into the seeds.

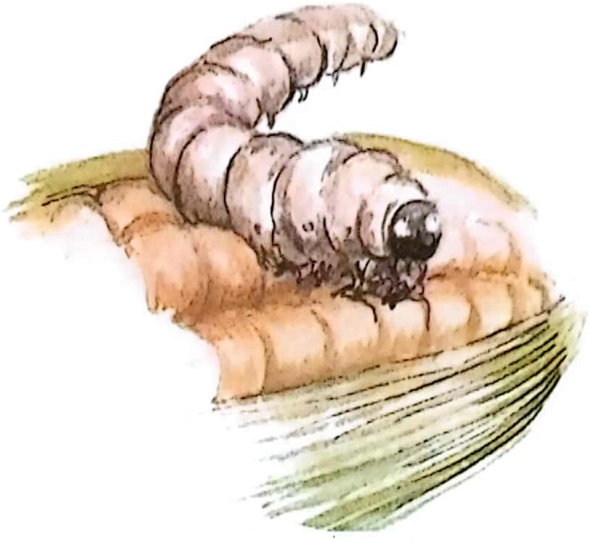
While inside, the larvae feed on the seeds and damage them. Seeds which get damaged this way may not germinate.

The quality of the seeds has been destroyed by the pests.

Birds are also pests to some crops like maize, sorghum, millet.



A bean bruchid which spoils beans



A maize stalk borer that destroys maize in the garden

What is a disease?

A disease is a condition that makes any living thing unwell or sick.

Do you remember the last time you were sick?

May be you were not feeling well. You could not eat so you were feeling weak. In the same way, seeds with diseases may not germinate and when they germinate, the seedlings look unhealthy and cannot produce good seeds later on. Therefore, we should not plant diseased seeds.

In your exercise books, write true or false if the following are the characteristics of good quality seeds:

1. Rotten seeds _____
2. Seeds with holes _____
3. Seeds without holes _____
4. Wrinkled seeds _____
5. Seeds stored for a long time _____

Seed Viability

Seeds that germinate are viable. Seeds that do not germinate are not viable. The ability of a seed to germinate is called seed viability.

Activity 8

- Prepare a small plot of land.
- Plant 20 bean seeds in the plot.
- Water the plot on the advice of the teacher.
- After a week, count and record the number of seeds that have germinated.
- Subtract them from the total that was planted.
- This gives you the number of seeds that did not germinate.

How many seeds did not germinate?

If the number of seeds which germinated is bigger than those that did not germinate, then the planted seeds are said to have good seed viability. If the number of seeds that did not germinate is more than those that germinated, then the planted seeds are said to have poor seed viability.

In your plot how many seeds germinated?

What is the fraction of the seeds that germinated?

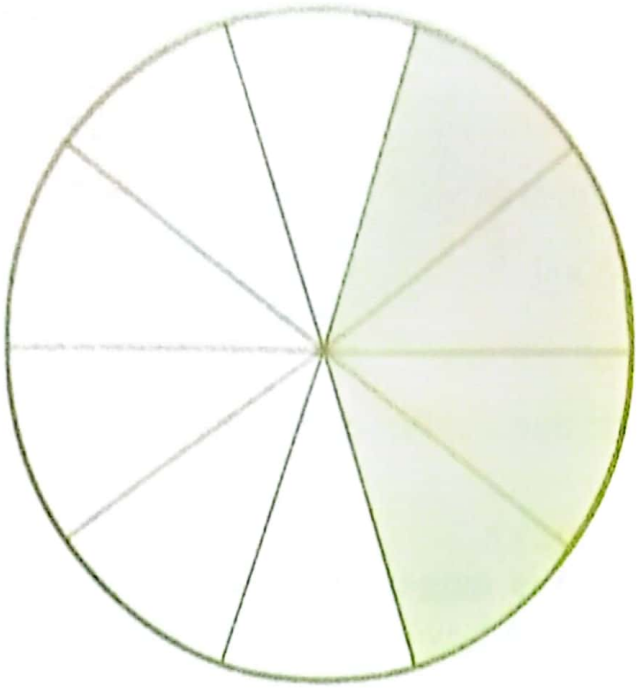
This is what took place in two small plots owned by two people who were neighbours. Nabirye and Okiror planted 10 bean seeds each. They planted the seeds during the same season and followed the same instructions. The table below shows the results for both plots.

Table 2

Farmer's Name	Seeds Planted	Seeds that germinated	Seeds that did not germinate
Nabirye	10	4	6
Okiror	10	7	3

The number of seeds that germinated in Nabirye's plot are 4 out of 10. This can be written as $\frac{4}{10}$.

This information can be represented on a circle graph below:



A circle graph showing the fraction of seeds that germinated in Nabirye's plot.

The shaded part represents the number of seeds which germinated which is $\frac{4}{10}$.

The number of seeds which germinated are less than the number of seeds that did not germinate.

This means that the seeds planted in Nabirye's plot were of poor viability.

Use the same information in table 2 to answer the following:-

1. The number of seeds that germinated in Okiror's plot were__out of__
2. What fraction of the seeds germinated in Okiror's plot?
3. Show this information on a circle graph.
4. Were Okiror's seeds of good viability or poor viability?
5. Why do you say so?

Practices that can lead to good germination of seeds

1. Seed selection:

Seed selection is the process of separating good and healthy seeds from bad seeds. Good and healthy seeds should not have any signs of damage. The selected seeds should be well kept until the time of planting.

2. Planting seeds from farm supply shops:

Good seeds are usually available at Farm supply shops. These shops keep selected and treated seeds which are good for germination. Farmers' organisations like Uganda National Farmers' Association (UNFA) also supply good seeds at low prices. These are usually high yielding seeds and farmers use them for planting.

A farm supply shop where good seeds can be bought

Do people in your area plant treated seeds from farm supply shops?

3. Storage:

Good storage of seeds is very important if seeds are to germinate well. Even when seeds have been kept well it is better to store seeds which have been treated. Treating seeds:

a) Keeps seeds viable for a long time.

b) Keeps pests off the seeds.

The following pictures show storage places for harvested seeds.

A maize crib can keep the maize crop for a long time

Improved granaries keep seeds safely

A traditional granary where seeds can be stored

Silos can store seeds in large quantities

4. Seed treatment:

Seeds can be treated by use of modern scientific methods or local methods. For example:-

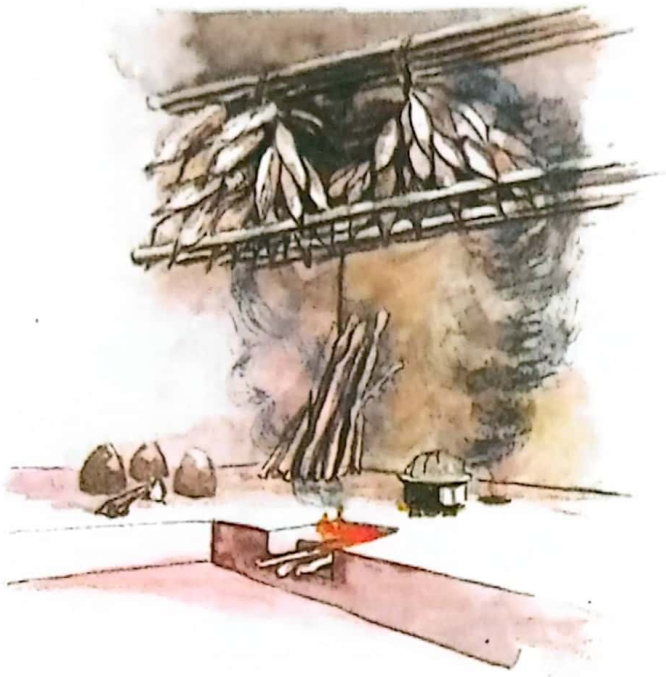
a) Seed dressing: This is the mixing of seeds with chemicals. Chemicals help to keep away pests from seeds.

b) We can also treat seeds locally. Seeds can be treated by smoking, smearing them with cowdung or by drying them in ash or pepper.

i) Smoking

This is a method of tying seeds in a bundle using local materials like banana fibres or grass. The bundle is then hanged or suspended well

above a fire place. The heat and smoke keep away pests.



Maize cobs hanged over a fire place

ii) Using cow dung

Cow dung is smeared on the seeds. The walls of the store or granary are also smeared. Cow dung helps to keep away the pests.

iii) Using ash and pepper

Some people use ash alone while others use pepper alone. Yet, other people prefer to use ash and pepper together. All the above, will work well to keep pests away from seeds.

There are many other local methods that can be used to treat seeds depending on the place where the farmer lives.

Give any other local methods of treating seeds.

Activity 9

- Discussing in groups give suggestions on how the local methods you have given above can keep away pests.
- Give two disadvantages of each seed treatment method given above.

Self Testing Exercise

1. *Write down any four uses of seeds to man.*
2. *What is germination?*
3. *Write down what happens to a seed during the process of germination.*
4. *List down at least five causes of poor seed germination.*
5. *What word is used to describe the ability of seeds to germinate?*
6. *What is:* a) *a disease?*
   b) *a pest?*
7. *How can we increase on the chances of seeds to germinate well?*
8. *List down local methods of keeping seeds safely.*
9. *When do we use the broadcasting method of planting?*
10. *What seeds should be planted deeper than others?*
11. *Why is it important to carry out selection of seeds before planting?*
12. *Name any two places where we can get good quality seeds for planting?*
13. *Give two advantages of treating seeds before storing them.*
14. *Give any three local methods of treating seeds used in your area.*
15. *Apart from using local methods, what other method can we use to treat seeds?*

CROP GROWING PRACTICES

There are many things we do to make our lives easy. These are things like going to school, going to hospital for treatment, selling things to get money and growing crops to have food for our families.

All these activities require resources. Resources are certain things a person must have in order to do something.

Growing crops:

In order to grow crops, there are certain resources a farmer needs. Let us find out more about them in the following activity:

Activity 1

- Visit a farmer near your school.
- Write down the crops grown by the farmer you have visited.
- Find out things the farmer needs in order to grow the crops.
- With the help of your teacher, group these needs under the following resources:-

  Capital, Land, Labour, Management, Time and Information on improved agricultural practices.

Land

In order to grow crops, a farmer must have land. People without land find it difficult to grow crops. A farmer can get land in the following ways:

1. buying land;
2. inheriting land
3. renting or hiring land

Buying land

Here the farmer first pays and then gets land . After paying, the farmer then owns the land.

Inheriting land

This is when someone gets land from the parents or close relatives after either parents or relatives have died. The land then becomes the property of the person who inherits the land.

Renting land

Somebody pays money to the land owner in order to use the land for the time agreed on. The person who rents the land does not own that land.

Labour

There is always a lot of work to be done on farms. This work is done by people and sometimes animals. Animals which can provide labour on a farm include donkeys, oxen and asses. These animals can be used to plough, fetch water or for transporting harvested crops to the market.

Oxen can provide labour to farmers

When people do work on a farm, we say that they are providing human labour. There are three types of human labour:

Hired labour: Here people work on the farm and are paid after working.

Family labour: Here family members work on their own farm but are not paid for their work. All family members benefit together from the food or money got from the farm. Family members learn farming skills while working on their farm.

Communal labour: Some neighbours organise themselves and work together. They work on each other's farm in turns. Using communal labour saves time and a lot of work is done on the farm. Communal labour is mainly used during ploughing, planting, weeding and harvesting. The family where work is done may provide a meal for the day.

What type of labour is commonly used in your area?

Let us find out the type of labour used on our farms in activity 2.

Activity 2

- Visit a farmer near your school.
- Find out the type of work which is carried out on the farm.
- Which of the three types of labour is used on this farm?

Time

Have you ever been unable to do something because of lack of time? May be you have ever been unable to do your homework because you went back home late.

Time is important if one has to do his activities.

A farmer needs time to carry out all activities on a farm.

It is also important that a farmer carries out farm activities at the right time. For example, ploughing has to be done before the rainy season. Planting and sowing have to be done at the beginning of the rainy season. Harvesting and drying are done during the dry season.

Activity 3

- Discuss with your teacher;
  1. the activities that farmers in your area do.
  2. the months of the year when the activities are carried out.

Information

It is important for a farmer to have information about farming. This may include information about;

Improved crop varieties.

Improved methods of farming.

Types of pests and diseases which attack different crops and how to contr them.

Prices of harvested crops in the market.

This information enables the farmer to make improvement on the farm.

This information can be got from;

1. Agricultural Research and Development Centres (ARDCs)
2. Agricultural research institutes.
3. Agricultural field workers (extension workers).
4. Radio and Television broadcasts.

Uganda can become a major supplier of grain for the region

Farmers must make haste and grow maize

Harvesting Money

By Patrick Luganda

FARMERS n it is planting time and the time to invest in farming is now.

Planting is taking place against a background of projections of continued serious food shortages in the Sub-Saharan Africa. The situation is particularly grave in the East Africa sub region with the most unfavourable food outlook for the continent, experts warn.

"The number of people facing severe food shortage is now estimated at [illegible] million of whom 18 million or 84% are in Eastern Africa.

Altogether 16 countries in the region face exceptional food emergencies," says the United Nations Food and Agriculture Organisation(FAO).

A FAO analysis of entitled *Food Supply Situation and Crop Prospects in Sub Saharan Africa* shows the food availability going down.

The report says, "Continued food assistance is necessary in all countries of eastern Africa and the Great Lakes region as well as in Angola, Guinea, Liberia and Sierra Leone."

The farmer community needs to take advantage of the early warning to grow more food to sell to those areas with a deficit. Already most parts of Uganda are receiving abundant supply of rain.

"Food production in southern Africa is projected to decline sharply, mainly due to adverse weather, while civil strife continues to disrupt food production in Angola, Burundi, Democratic Republic of Congo, Guinea, Liberia, Sierra Leone and Sudan, the report adds."

Meanwhile in neighbouring Kenya persistent drought has seriously undermined the food security of nearly 4.4 million people.

Elsewhere in eastern Africa, the report says the food supply situation is precarious for more than 1.8 million people in Eritrea caught up in the war with neighbouring Ethiopia.

Sudan is also facing serious food shortage in western and southern parts of the country due to drought, the report says.

Somalia has seen a sofis factory secondary season harvest, which was protected by a favourable main harvest and this, says the report, "has improved the country's food outlook."

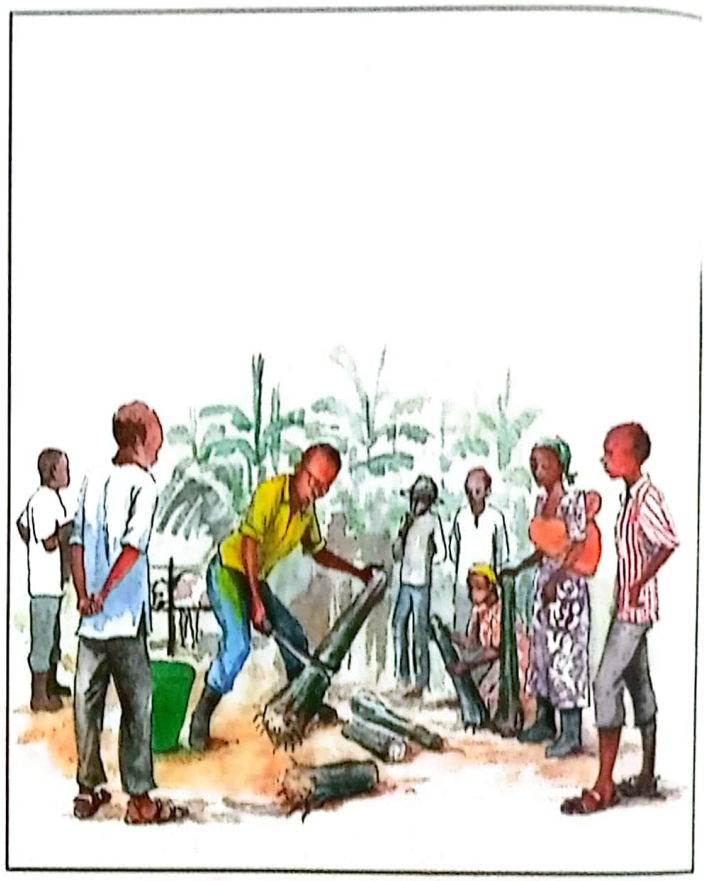
The report calls the food outlook in the Democratic Republic of Congo (DRC) "bleak." Matters have not been made better by outbreak of the devastating cassava mosaic disease in the DRC and other countries in the region.

Farmers are advised to make swift investments in maize growing. With an assured market on the continent, investors stand to gain substantial gains on investment. The latest FAO forecast for the maize crop, points to a decrease of 11% compared to last year. Maize accounts for 75% of cereal production in southern Africa.

The decline in maize production in South Africa, forecast at nearly 34% from last year, will mean a considerable reduction in its export surplus Uganda can become a major supplier of grain for the region.

PROFITABLE: Christopher Byakunaga checks out his maize

A newspaper is also a source of information about farming



An agricultural field worker teaching farmers new methods of farming

5. Newspapers and Magazines.
6. Experienced farmers in the area.

Name an Agricultural Research and Development Centre in your area.

Management

A good farmer should have control over the land, labour and capital on his farm. He should also be able to make decisions which are good for the farm. This is what we call **management**.

Good management on a farm can be achieved by:

1. hiring someone who has studied management skills from a University or College (farm manager)
2. A farmer learning management skills while working on the farm for sometime.

Capital

Farm machinery, buildings and money used to meet needs on the farm are called capital. We may need to buy seeds, pesticides, tools, fertilisers and pay workers on a farm. To do all these things a farmer needs money.

A farmer can get this money in the following ways:

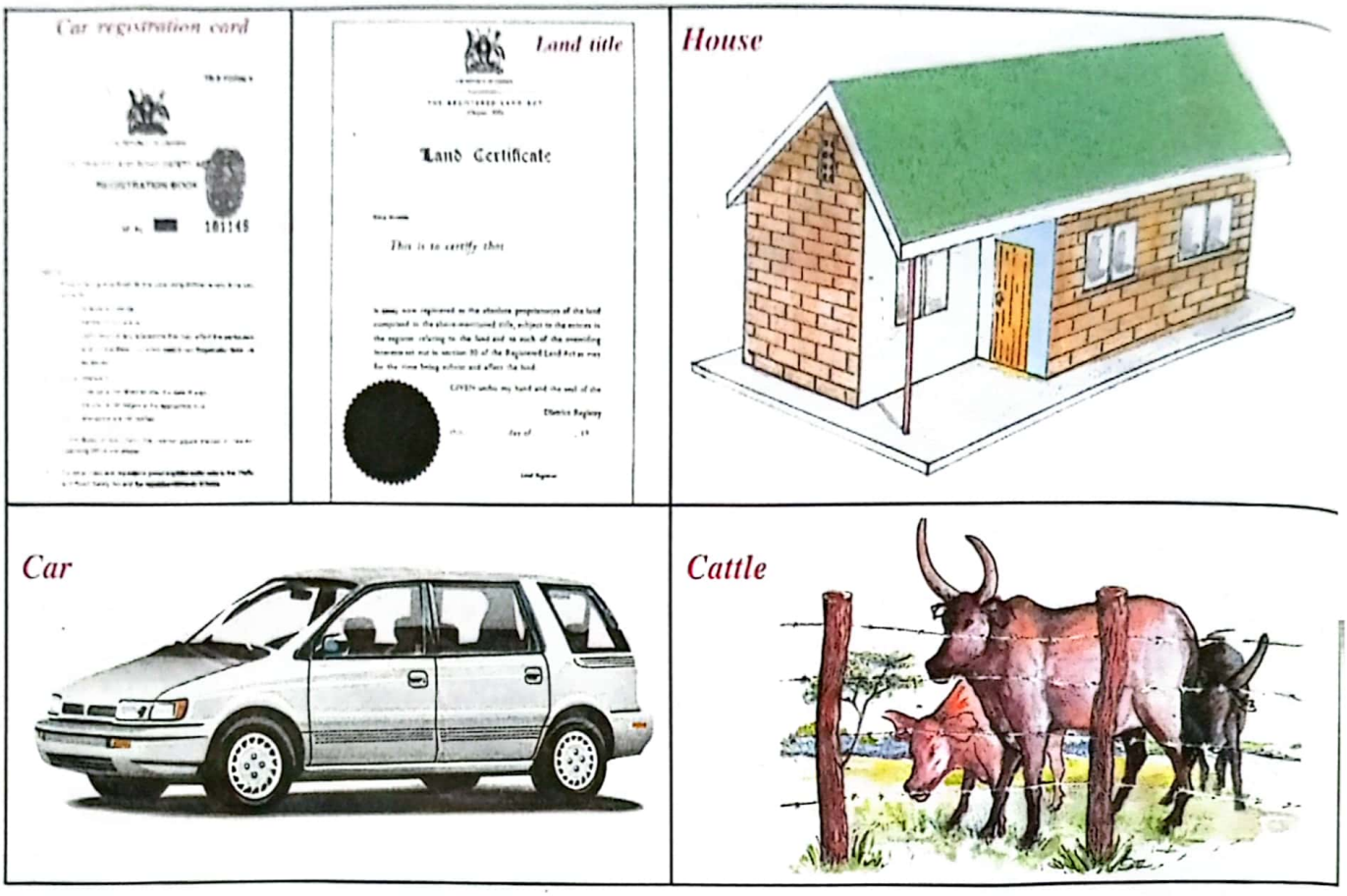
1. Loans:

A loan is borrowed money from individuals, traders, credit and savings societies or banks. A loan has to be paid back after an agreed period of time. At times, a loan is paid back with interest. In order to get a loan one needs security such as a land title, cattle, a building or a car. Household property like a television set, a fridge or a radio can also be used as security. There are organisations which give small loans without asking for security. Such organisations give loans in order to help poor people who may not have security.

How do farmers in your area get loans for use on their farms?

Security

Different types of security which can be used to get loans



Activity 4:

- With the help of your parents or guardians, discuss and list down organisations which give loans to people in your area.
- Discuss the organisations later on with your teacher in class.

2. Savings:

Saving is keeping money for future use. Saving is another way through which one gets capital. The possible ways of getting money for saving are:- selling harvested farm products, earning a salary and wages.

3. Donations:

Farmers can be given money by good friends and relatives. The friends or relatives who give money are called donors. The money they give is called a donation.

Problems faced by farmers in getting resources.

Farmers have many problems in getting resources they need for use on the farm. This is because of the following factors:

1. **Many farmers have a low level of education:**

   Some farmers do not know how to read and write. This makes it difficult for them to get information about new methods of farming and market prices of farm produce. Such farmers also find it difficult to keep farm records.

2. **Low mobility:**

   Many people can not easily reach places where other resources can be got. For example, some farmers can not easily go to places like banks because they are very far. Some farmers find it difficult to travel to Agricultural Research and Development Centres to get information.

3. **Lack of security to get loans:**

   Many people, especially women do not own things (property) that can be used as security. Without security, banks do not give out loans. In most cases land, cows, cars and houses belong to men.

4. **Lack of control over money:**

   Women provide most of the labour needed for the production of farm produce. After selling farm produce, some men use all the money for their own needs. When men do this women lack capital.

5. **High interest charged on loans:**

   High interest charged on loans makes farmers fear to get loans. When farmers fail to pay back the loan with interest the security is taken.

6. **Lack of information:**

   Local farmers may not have all the information they need on a farm. This may be information about good crop varieties, market for the farm products and timing of the rainy season so that they can plant.

Solutions:

1. Farmers should be taught how to read and write. This can be done through adult literacy classes in their villages.
2. Farmers should be given loans with low interest. The loans can then be followed up by local authorities (LC I).
3. Roads should be well maintained. This can be done through communal work.
4. Women should have a fair share of the farm earnings.
5. There should be frequent contact between farmers and the agricultural extension workers.

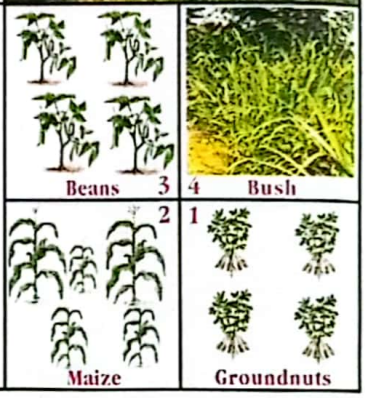
Crop Growing Practices

There are many practices to be followed when growing a selected crop. Table 3 below shows the practice, tools and materials used and the reason why a farmer carries out that activity.

Table 3

PRACTICE	TOOLS AND MATERIALS USED	REASONS	ACTIVITY
Bush clearing	Panga Sickle Slasher Axe	- To make it easier for the farmer to dig or plough. **N.B.** Do not use fire to clear the bush. - Do you know why? Discuss this with your teacher.	
Digging and Ploughing	Hoe Forked hoe Plough	- To soften the soil so that roots can easily grow in it. - To remove tree roots, stumps, stones and other unwanted materials. - To soften the soil so that water can easily sink in it.	
Harrowing	Rake Hoe Harrows	-Breaking big soil lumps into smaller lumps after ploughing.	
De-trashing	Hands	- Removal of unwanted matter in the garden e.g. polythene bags and plastic bottles. These prevent penetration of water in soil.	
Sowing and Transplanting	Hoe Trowel	-We want our crops to grow.	
Correct spacing	String, tape, measure, stick or a piece of wood	-To provide enough growing space for each plant in the garden. This reduces competition for nutrients, light and air.	

PRACTICE	TOOLS AND MATERIALS USED	REASONS	ACTIVITY
Providing shade	Panga Branches Leaves	-To protect young plants from too much sunshine, strong wind and heavy rain.	
Watering	Watering can	-To provide water to our crops mainly during the dry season or soon after transplanting.	
Gap filling	Hoe Trowel	-To fill up the spaces where seeds did not germinate.	
Thinning	We can use hands. Hoe Panga	-To provide enough growing space and nutrients for the remaining crops.	
Timely weed control	Hoe	-To remove unwanted plants (weeds) because weeds compete for nutrients, air and sunlight with our crops. -To remove weeds which would hide pests.	
Application of manure and fertilisers	Spade Garden fork Hoe Wheel barrow	-To improve on the fertility of soil	
Staking	Panga Small sticks Poles Wires Sisal strings Banana fibres	-To provide support to growing crops.	

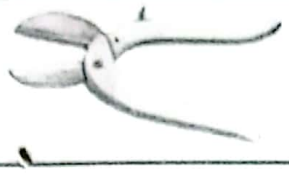
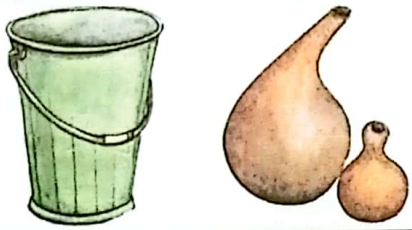
PRACTICE	TOOLS AND MATERIALS USED	REASONS	ACTIVITY
Pruning	Secateur Panga Knife	- To remove old branches which are no longer productive. - To reduce the number of braches on a plant so that competition for light is reduced. - To remove parts that have been attacked by diseases. - For some crops, it encourages the growth of new shoots e.g. in tea and tobacco.	
Harvesting	Knife Panga Sickle Hoe	- To collect ripe and mature crops from the garden	
Crop rotation		- To improve on soil fertility. - To reduce on pest and disease attack. - To control soil erosion.	

Farm tools, Materials and Equipment

These are things we need on our farms in order to do our work properly. In table 4 below we can find some of those that are commonly used on our farms.

Table 4

FARM TOOL, EQUIPMENT OR MATERIAL	DIAGRAM	USE(S)
1. Hoe		- Digging and Ploughing - Weeding - Planting and Sowing - Harvesting
2. Panga		- Clearing and cutting the bush or trees. - Harvesting - Pruning

FARM TOOL, EQUIPMENT OR MATERIAL	DIAGRAM	USE(S)
11. Secateur Pruner		- Pruning crops
12. Forked hoe		- Digging in stony areas - Digging in areas with hard soils. - Weeding - Digging out weeds with underground stems e.g. *Lumbugu* (*Luganda*), *Esirike (Ateso).*
13. Axe		- Cutting down big trees. - Splitting wood
14. Pick axe		Digging in rocky and stony areas
15. Pail, Jerrycan, Pot, calabash and others.		- Collecting water - Storing water
16. Trowel		- Carrying seedlings - Digging out seedlings from the nursery bed during transplanting.
17. Hand fork		- Light weeding - Removing seedlings from soil.
18. Garden fork		- Turning manure - Loading rubbish
19. Garden Rake		- Collecting rubbish and harrowing
Spray pump		- Used for spraying chemicals on plants and animals.

FARM TOOL, EQUIPMENT OR MATERIAL	DIAGRAM	USE(S)
18. Knives		- Harvesting - Pruning - Peeling
19. Tape measure		Used for spacing crops in a garden.
20. Agrochemicals (Fertilizers, Insecticides, Fungicides Herbicides)		-Fertilizers add nutrients needed by our plants to the soil. For example NPK, CAN. -Insecticides and fungicides protect crops against damage from pests and diseases for example Dithane M45.
21. Seeds		-Used as planting material
Watering Can		Watering crops in gardens
Wheel barrow		Carrying farm materials and harvested crops.

Mention crops that are harvested using the following tools:

1. a hoe 2. a panga 3. a sickle 4. a knife

Records of Farm Operations

All work that is done in a garden should be recorded in a record of farm operations. Recording helps to show information about the activities done and when they were done. Recorded information may include:

- Date of preparing the nursery bed;

- Date of planting in the nursery bed;
- Date of providing shade;
- Date of clearing the bush;
- Date of digging or ploughing;
- Date of transplanting;
- Date of watering;
- Date of weeding, spraying;
- Date of gap filling;
- Date of thinning;
- Date of pruning;
- Date of harvesting.

Activity 5

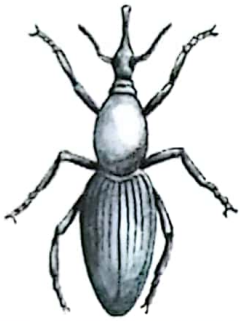
Make your own record of farm operations. In this record you should include activities that have been carried out in the garden at home or school.

Crop Pests and Diseases

What is a crop pest?

A crop pest is a living thing that destroys our crops. Below are examples of some common crop pests:-

Banana weevil

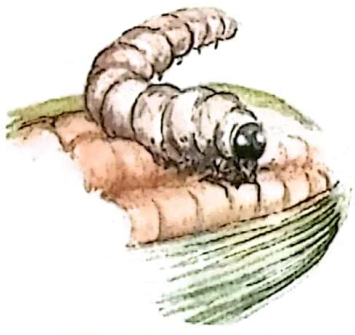


Slug

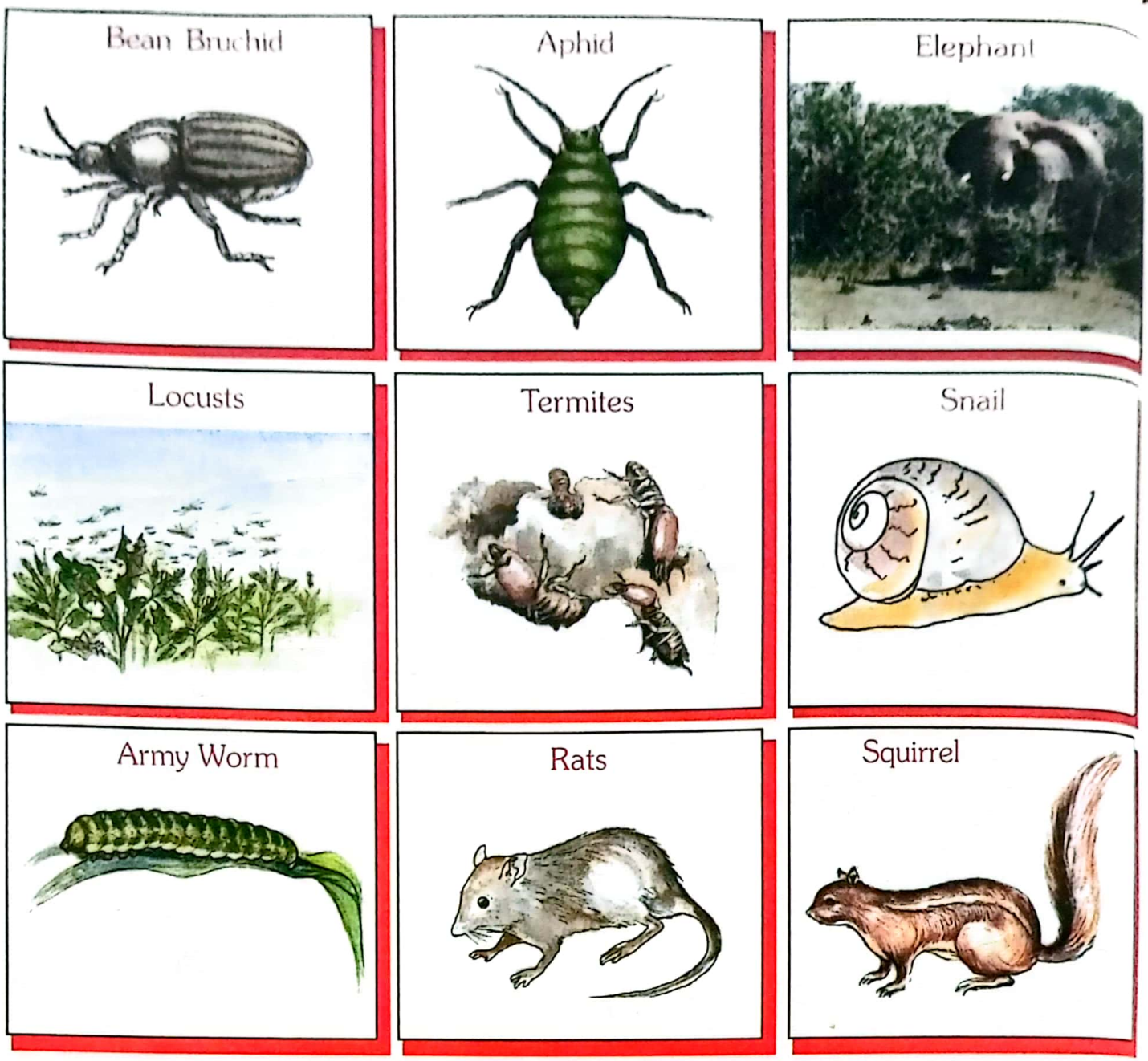
Cotton Stainer

Monkey

Maize Stalk Borer



Birds



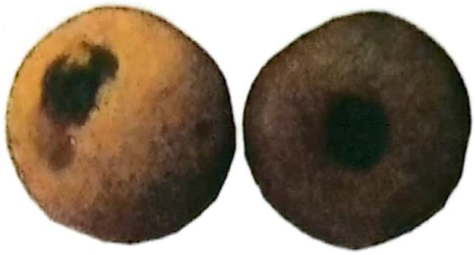
Signs of pest damage on crops:

These may include such signs like:

1. Damaged leaves;
2. Damaged fruits;
3. Cut off buds;
4. Damaged stems;
5. Damaged roots and
6. Damaged seeds.

Signs of damaged crops

Caterpillars destroy leaves of crops



Oranges with spots caused by disease

A crop damaged by a cut worm

Sugarcane stem damaged by pest;

Maize cob eaten up by weaverbirds

A rat destroying sweet potatoes in the garden

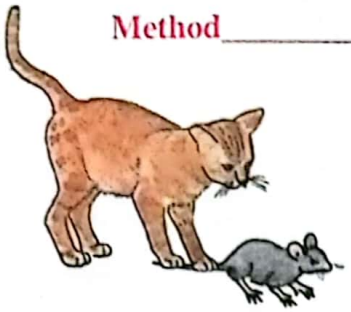
Pest Control

Farmers do not like pests. This is because pests destroy crops and reduce on yields. A farmer should therefore find ways of preventing or controlling the damage which pests can cause. This is called **pest control.**

Table 5 below shows different methods of pest control.

Identify each method and name the crops whose pests can be controlled in this way.

Table 5

Method: **Spraying** 	Crops 1. Maize 4. Oranges 2. Tomatoes 5. Cabbages 3. Passion fruits 6. Sweet potatoes
 Method_____	Crops 1. 4. 2. 5. 3. 6
Method_____ 	Crops 1. 4. 2. 5. 3. 6
Method_____ 	Crops 1. 4. 2. 5. 3. 6
Method: **Chasing birds.** 	Crops 1. 4. 2. 5. 3. 6

Other methods of pest control include:

1. Planting clean materials: Make sure you plant materials which are free of pests.
2. Weeding: Weeds are a hiding place for pests. When we weed, we remove hiding places for pests.

3. **Practising crop-rotation:** Different pests prefer certain foods. If we keep growing the same crop in the same area every time, pests will keep on destroying our crops.
4. **Mixing seeds with chemicals (pesticides)** . Pesticides kill pests that attack the seeds.
5. **Fencing the garden.** This can keep away big animals from the garden.

Activity 6

- As a class, discuss with your teacher the different pests that attack different parts of a plant.
- After the discussion, draw a table in your exercise books like the one shown below. Fill the information you have discussed in the table.

Table 6

Part of the plant	Pests that most likely attack that part
Leaves	
Fruits	
Stems	
Roots	
Seeds	

In which ways can you prevent insect pests from damaging crops?

How would you prevent birds from spoiling crops in your garden?

How do people prevent big animals from eating their crops?

Crop Diseases

Crops get diseases just like animals do. These diseases are caused by fungi, viruses and bacteria. Crop diseases affect the growth of crops and this in turn affects the yield. When diseases attack crops, farmers lose a lot of money. For this reason, farmers should always be on the look out for signs of crop diseases.

Signs of crop diseases include;

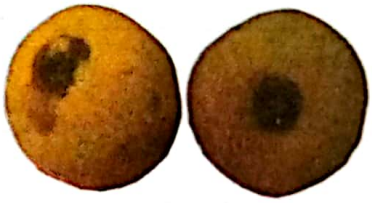
1. Poor growth
2. Loss of chlorophyll. The leaves become yellow in colour
3. Deformed leaves. The leaves develop abnormal shapes
4. Wilting of plants; Wilting is the weakening of plants caused by heat, loss of water or disease.
5. Brown or black spots developing on leaves, stems, fruits and roots;
6. Reduced yields;
7. Rotten plant parts.

Pictures showing some diseased plants.

Spots on leaves

Cassava leaves have lost chlorophyll and are deformed

These tomato fruits have rotten parts caused by disease.



Diseased orange fruits

Activity 7

With the guidance of your teacher, you should have a field visit to a nearby farm

Identify and collect;

1. Crops that are damaged by pests;
2. Crops affected by diseases.

Discuss your findings with the teacher.

Steps that should be taken to reduce crop losses during and after harvesting

1. Harvesting in time:

During harvesting, one should be careful not to cause losses. This can be done by harvesting in time.

(a) If harvested late, some crops get spoilt.

Examples are:

(i) Bananas - will get ripe.

(ii) Beans - pods tend to burst and scatter seeds in the garden.

(iii) Maize - may be attacked by pests like birds, and monkeys.

(iv) Tomatoes - may get rotten in the garden.

Activity 8

List down other common crops in your area. Together with your teacher, discuss how the crops would be affected by late harvesting.

(b) Early harvesting may also cause crop losses. The following are crops which may be affected by early harvesting:

i) Sugarcane - will have very little sugar content.

ii) Beans - may end up rotting.

iii) Oranges - Bad taste, little sugar and little water content.

2. Using proper methods of harvesting:

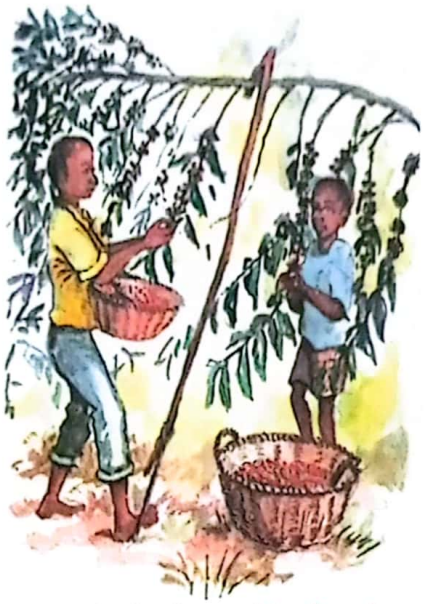
Proper methods of harvesting crops should be used to reduce losses. There are many methods of harvesting crops. The method used depends on the type of crop to be harvested. Each crop should be harvested using the proper method. Below are examples of crops and the harvesting methods that should be used;

a) Cassava - Uproot so carefully so as not to damage the tuber.

b) Coffee - Pick only ripe berries and not green ones.

c) Tomatoes - Leave short stalks to enable the fruits last longer.

Leave short stalks to enable the tomatoes last longer



Only ripe coffee berries should be picked.

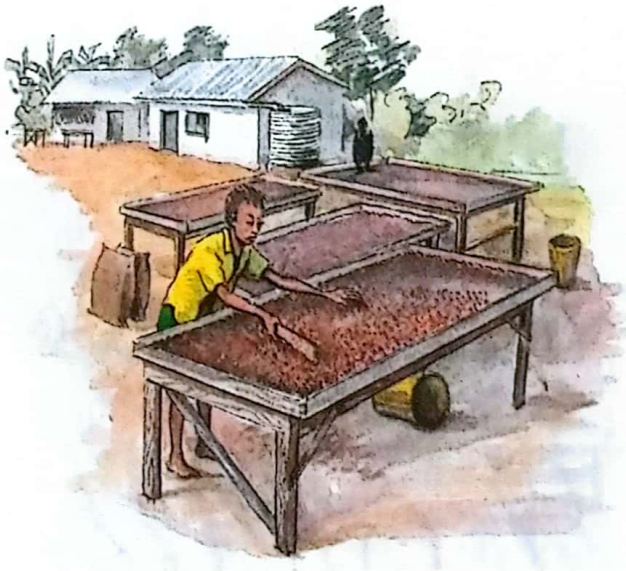
Uprooting cassava car

3. Proper drying:

Drying is the reducing of the amount of water in the harvested crops. Th most common method of drying crops is by putting them outside in the su to dry.

Some crops should be dried properly to reduce losses. If not dried proper the crops may rot. Rotting reduces the quality of the crops.

Examples of crops that should be dried properly are coffee, beans, mille sorghum and maize.



Drying coffee properly on raised wire trays

Activity 9

- Apart from the crops mentioned, list down at least 5 other crops that shoul be dried properly so that they do not get spoilt.

4. Processing:

Processing is the changing of harvested crops from their raw form to a better form. It may include drying, removing husks and grinding.

Processing of crops can reduce losses. For example when maize is ground into posho flour it will not be attacked by maize weevils. Processing also increases income to the farmer.

5. Good storage:

After harvesting, crops should be stored well. This also helps a farmer not to lose money.

When crops get spoilt due to poor storage, a farmer looses money.

Good storage should be done by:

a) Storing in places that do not have leaking roofs.

b) Storing in a place which is clean.

c) Storing in a place which is well ventilated.

d) Storing in a place which is big enough for the farmer's produce.

e) Using a store which is free of storage pests.

f) Using a store which is strong enough to guard against thieves and bad weather.

Profit and loss in crop growing

Growing crops can be a good business. Farmers may make profit. A happy farmer is the one who makes profit instead of a loss. Read the following story about Wanyama's root crop growing project.

Wanyama's root crop growing project

Wanyama had a root crop growing project. He grew four root crops on his farm. These were; irish potatoes, cassava, sweet potatoes and carrots. He grew the crops for sale.

In the process of growing these crops, Wanyama spent some money. He bought planting materials, tools, pestcides, paid workers and paid for transport. These are called costs of production.

The table below shows the crops that Wanyama grew, the total cost of production and the money Wanyama earned after selling the crops.

Copy and complete the table then answer the questions that follow

Table 7

CROP GROWN	TOTAL COST OF PRODUCTION	MONEY EARNED AFTER SELLING THE CROP	PROFIT OR LOSS
Irish Potatoes	15,000/=	30,000/=	Profit = 15,000/=
Cassava	75,000/=	41,000/=	Loss = 34,000/=
Sweet potatoes	12,000/=	19,500/=	
Carrots	25,000/=	18,700/=	

Note that:

(a) When the money earned after selling is more than the costs of production, then a profit was made. Profit = money earned after selling - Total cost of production. For example for Irish potatoes, Profit = 30,000 - 15,000 = 15,000/=

(b) When the money earned after selling is less than the total cost of production, then a loss has been made. Loss = Total cost of production - money earned after selling the crop. For example for Cassava, loss = 75,000 - 41,000 = 34,000/=.

1. Which crop was the most costly to produce?
2. From which crops did Wanyama make profit?
3. For each crop named in 2 above, work out the profit made.
4. From which crops did Wanyama make a loss?

Self testing Exercise

1. Write down at least 4 resources.
2. List down 3 ways through which people can get the resource of land.
3. List down the types of labour.
5. What are the possible ways through which a farmer can save money to use as capital?
6. Write down two problems some women face in acquiring resources?
7. Write down at least 10 crop growing practices.
8. What garden tool can you use for the following activities on the farm:-

a) Digging the ground:_____ e) Transplanting seedlings:_____.

b) Collecting rubbish:_____ f) Clearing the bush:_____.

c) Cutting down big trees___ g) Weeding crops:_____

d) Watering crops:_____ h) Harvesting sugarcanes:_____.

9. Write down the common pests in your area and for each pest, name the crops which the pests destroy **Example:** 1. Bean Bruchid - Beans.
10. What crop is grown by most people in your area?
11. Give 4 reasons why farmers may choose to grow a certain crop and not the other.
12. Write down at least 3 things a farmer can use as security in order to get a loan.
13. How do farmers in your area locally treat cereal and legume seeds in order to keep away storage pests?
14. Write down 4 crops which may need **staking.**
15. Give two ways by which you can reduce on losses during harvesting.

i) _____

ii) _____

GOOD CROP VARIETIES

There are so many crops that exist. Examples are maize, bananas, beans, ground nuts, sugar cane, tomatoes and onions.

Identifying different varieties of a crop:

Activity 1:

- Get a sample of bean seeds. These can be from home, a market or school store.
- Collect all the seeds together with the teacher in one container.
- Organise in groups of 5-8 pupils per group as the teacher may advise.
- Each group leader will get seeds from the teacher.
- Each member of the group will select seeds similar to that identified by the teacher.

1. Do you have the same type of beans in your group?
2. If they are not, how many different types were there?

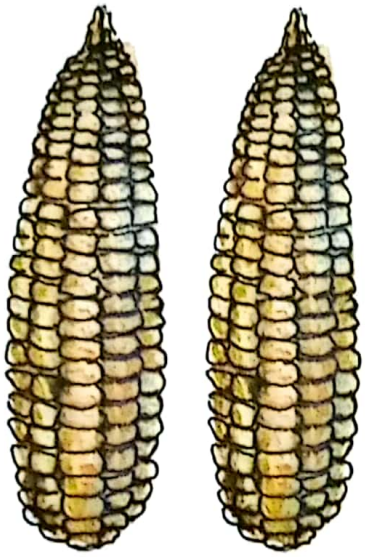
Each one of you in the group collected together beans of the same variety. From the above activity, we have found out that beans have different varieties.

Below are characteristics of some varieties of bananas, sugarcane and maize.

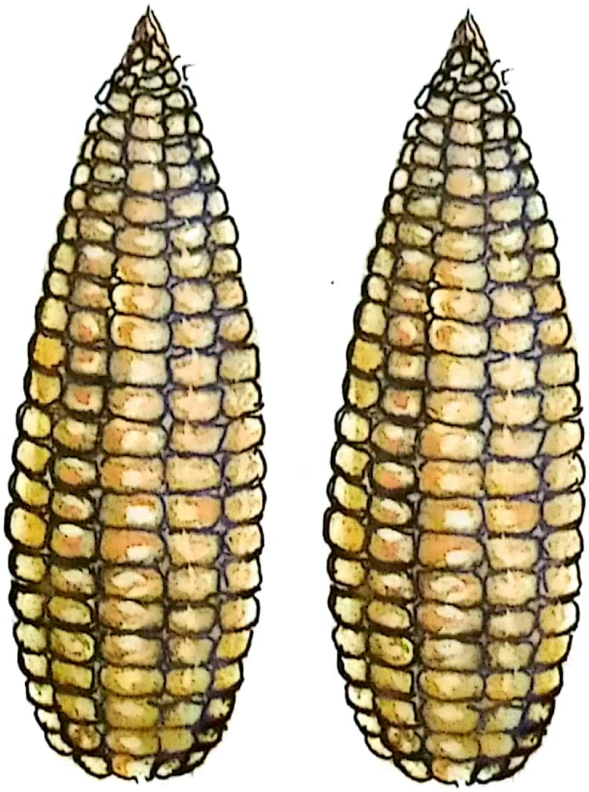
Table 8

NAME OF CROP	VARIETY	CHARACTERISTICS
Bananas	Beer type *(Mbidde in Luganda)* *(Embiire in Runyankole)* *(Adeke in Ateso)*	1. Tasteless if cooked. 2. Has a brownish colour if cooked. 3. Has a lot of sap.
	Sweet bananas *(Ndiizi) in Luganda* *(Kabalagala in Runyankole*	1. Has small fingers. 2. Very sweet if eaten ripe. 3. Becomes hard when cooked. 4. Takes long to mature (6-9 months).
Sugarcane	*Kawolo*	1. It is small in size. 2. It has a high sugar content. 3. It is resistant to pests and diseases. 4. It is hard. 5. The stem is greenish in colour.
	Goowa	1. It has a lot of juice. 2. It has a low sugar content. 3. It is soft 4. It matures quickly. 5. It is less resistant to pests and diseases.

NAME OF CROP	VARIETY	CHARACTERISTICS
Maize	Hybrid type	1. It has big seeds 2. It has a big maize cob 3. It is high yielding (many cobs on a stem) 4. It is not so sweet 5. It produces white flour 6. It takes 3 - 4 months to mature
	Local Type	1. It has small seeds and a small cob. 2. It produces a single cob on the stem. 3. It is very sweet.
	Pop corn type	1. It has small seeds. 2. It produces a single cob on the stem. 3. It produces yellow flour



Local maize



Hybrid maize

Find out the names of the different varieties of the following crops.

a) Beans b) Groundnuts c) Millet d) Sweetpotatoes

(you can use vernacular names).

Activity 2:

- Collect different varieties of 2 crops named by the teacher.
- Together as a class name the different varieties collected.
- Discuss the characteristics of each variety.
- Write down the characteristics in table form as on page 39.

Why do farmers choose to grow particular varieties?

Farmers have reasons for growing particular varieties. The reasons may vary for every farmer.

In activity 3 below, we shall find out some of the reasons.

Activity 3

- Study the characteristics of the varieties you saw in **Activity 2.**
- For each crop, choose a variety you would prefer to grow.
- Why do you prefer that variety?

Some of the reasons why farmers prefer to grow certain varieties are:

1. Some varieties are high yielding. An example is Bukalasa and Serere varieties of cotton.
2. Some varieties grow very well in a given area. An example is Arabica coffee which only grows well in highland areas.
3. Some varieties take a short time to mature. An example is the Sindano variety of rice.
4. Some varieties have good taste. An example is the smooth cane variety of pineapples which is sweet and has a lot of juice.
5. Some varieties are resistant to diseases The NASE varieties of cassava are resistant to cassava mosaic disease.
6. Some varieties are good looking for example the red rose flowers.
7. Some varieties take long to get spoilt for example the Marglobe variety of tomatoes.
8. Some varieties are on a high demand for example the small purple varieties of passion fruits.

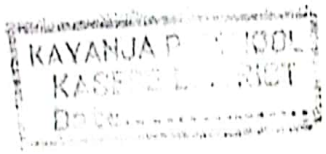
Growing varieties of a crop

A farmer chooses a variety of a crop to grow after comparing it with other varieties.

Activity 4

- With the help of your teacher, select a crop to grow.
- Choose 2 or 3 varieties of that crop.
- Prepare a good place where they are to be grown.
- Plant each variety on its own plot.

  All varieties should be given equal care.
- Observe and take note of the following:
  1. The quality of the harvested crops.
  2. The size of the harvested crop.
  3. The amount of yield from each plot.
  4. The time taken to mature.
  5. Resistance to pests and diseases.



Using your observations:

1. Did all the varieties take the same time to mature?
2. Did you get the same amount of produce from all plots?

Self Testing Exercise

1. *Name one common crop grown in your area.*
2. *Write down at least 3 varieties of the crop named above. (you can use vernacular names.)*
3. *Write down 3 reasons why farmers may like to grow a given crop variety?*

(a) _____

(b) _____

(c) _____

CHOICE OF FARM ANIMALS AND CROPS

Factors which farmers consider when selecting farm animals and crops.

Farmers consider many things before choosing animals to keep and crops to grow. Below are some of the things farmers consider:-

1. Whether the soil is good for growing crops;
2. Whether the farmers have all the necessary resources;
3. Whether the farmers know how to grow the crops chosen;
4. Whether the farmers know how to care for the animals chosen;
5. Whether it would be easy to sell the products.
6. Whether the plants or animals they choose will make profit.
7. Whether the climate of the area is suitable for the crops or animals chosen.

Soil and Climate

Activity 1:

- Get two types of soil (Pure sand and good loam soil);
- Put each type of soil in its own tin;
- Plant a few seeds of beans in each tin;
- Provide water and light to the two tins;
- Observe the growth of the plants for three weeks;
- Discuss what you saw as a class.

The type of soil in an area should be considered when choosing crops to grow. "Some crops should have fertile soils to grow whereas others can grow on less fertile soils. If the soil is poor it can be made more fertile by using fertilisers"

Different areas have different types of soil. Some crops have particular types of soils in which they grow best. For example groundnuts grow well in stony soils.

Crops grow well where the climate is suitable. For example, Arabica coffee grows well in cool highland areas. Crops like bananas and sugarcane grow in areas which receive enough rainfall. Farmers will also consider rainfall of the area when choosing which crops to grow.

Resources

Resources play a big role in influencing choice of crops to grow and animals to keep. Do you remember the resources we learnt in the topic of "crop growing practices?"

Activity 2

- Name the resources that we discussed.
- How can resources influence the choice of crops and animals to keep?

Here are a few examples we can look at.

1. Crops like tea or sugarcane are grown on plantations. So they require big pieces of land. Someone on a small piece of land can not choose to grow plantation crops like tea or sugarcane.

Sugarcane plantation

Tea plantation

2. Animals kept for beef must be in large numbers. This means that a big piece of land is required. At the same time, a lot of money is needed in order to care for the animals.

A farm on a large piece of land.

3. Zero grazing is carried out in urban areas due to shortage of land. T
farmers should however have enough money. This is because:

a) Special feeds need to be bought for the animals.

b) Constant care should be provided to animals.

c) Constant treatment is necessary.

d) Skilled labour is very much needed.

e) Good shelter for the animals has to be built.

f) There has to be a source of pasture.

Constant care of cleaning a kraal

4. Crops which are expensive to grow can only be chosen by people who have much money. An example is flower growing. It is expensive to set up a flower farm as the one shown on the next page.

A flower farm (Green house).

5. Crops which are grown on plantations also require a lot of labour. There must be enough workers to do all the work on the plantations in time.

Picking tea leaves at Kasaku - Lugazi

6. Some work on plantation farms is carried out using machines. Farmers with such equipment like tractors, overhead sprayers and ploughs, can grow plantation crops. Examples of plantation crops are sugarcane, sisal, wheat and maize.

A tractor is being used to weed a maize plantation

Activity 3

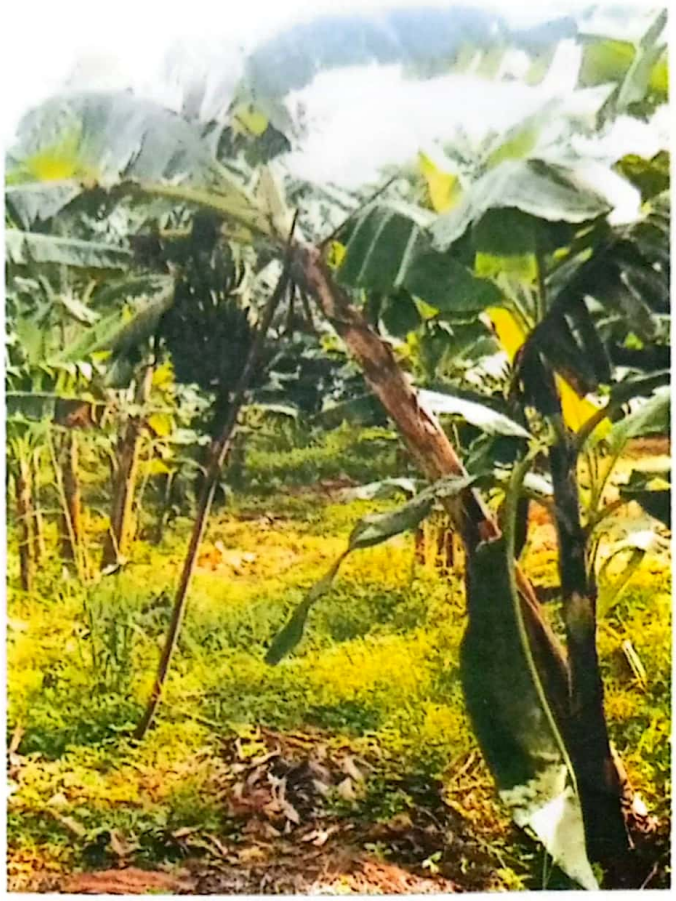
- In each of the numbers 1 - 6 above, identify a particular resource that is required.

Qualities of good crops

Below are qualities of a good crop to grow for profit:-

1. It should be able to produce high yields. (High yield variety).
2. It should be a crop that fetches a lot of money on the market.
3. It should be a crop that is not too expensive for the farmer to grow.
4. It should be a crop that is needed by many people.
5. It should be a crop that is resistant to diseases.
6. It should be a crop that takes a short time to mature.

A poor yielding matooke variety in Kajoba's farm.



A good yielding matooke variety in Kajoba's farm.

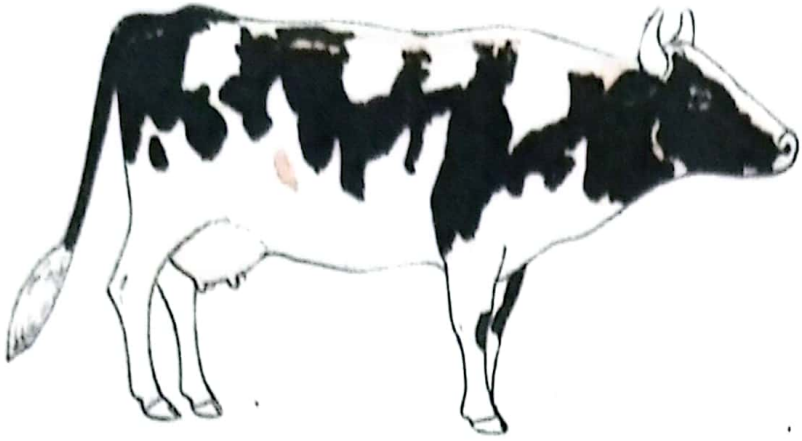
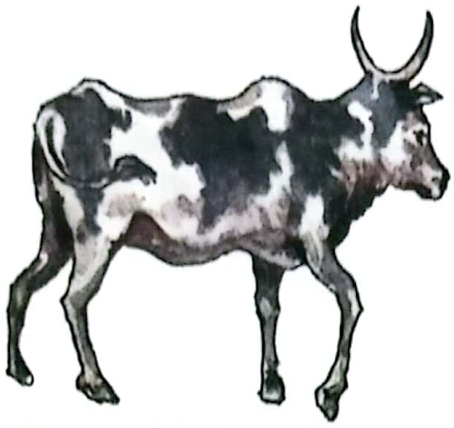
Activity 4:

- Given crops like maize, beans groundnuts, sugarcane, bananas, cocoa, peas, millet, sorghum, cabbage, watermelon, tomatoes, oranges, yams, mangoes, jack fruit, pawpaw, rice, potatoes, guava.
- Make choice of a crop you would grow.
- In preparation for a class debate, write down reasons why you would grow the crop you have chosen to grow.

Qualities of good animals to rear for profit

Likewise, there are qualities of good animals to rear for profit. Let us read about some of them below:-

- Animals should be resistant to diseases.
- Animals should be able to produce a lot of the needed products.
- The animals should be able to produce good products.
- They should be animals that take a short time to mature.
- Their products should be able to fetch a lot of money on the market.
- The animals should be able to survive in the climate of the area .

Cow	Milk Production
	 40 litres
	 7 litres

If you were a dairy farmer, which of the animals above would you keep?

Activity 5

- The teacher pairs pupils in the class.
- Each pupil in the pair chooses an animal he would keep. The animal should be different from his friend's.
- Each pupil writes all the good things he knows about his animal.
- In form of a conversation before the class, each pupil of the pair praises his animal before the class.
- The pupil also gives reasons why he does not like the friend's animal.

Growing crops and rearing animals for profit

We have discussed the qualities of a good crop to grow and animals to rear on farms. We should therefore learn how to care for them.

Do you remember the crop growing practices we discussed earlier on?

List them down.

Some practices are suitable for specific crops. For example, bananas need staking but millet does not.

Cabbages may need watering while bananas do not.

Therefore, the crop growing practices to carry out will depend on the crop to be grown.

Activity 6

- As a class, think of a crop to grow.
- Together with the teacher, discuss the crop growing practices you will carry out for that crop.
- In the correct order of the crop growing practices discussed, grow the crop and carry out the activities at correct times. (The teacher will guide you on how to carry them out).

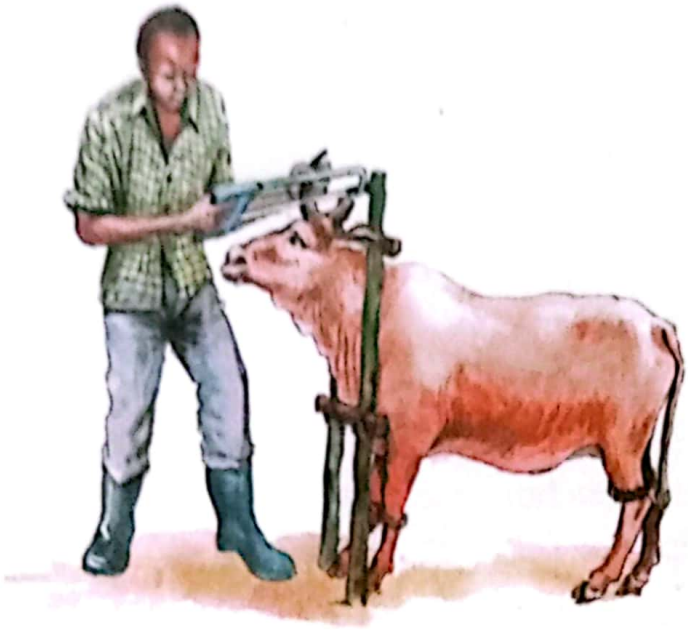
In the case of animals, we have animal rearing practices. These include:-

Providing animals with water: Animals need to drink water when they are thirsty. We should provide animals with enough water which is not contaminated.

Providing water to cows from a trough

Dehorning: Dehorning is cutting off the animal's horns. Animal horns should be cut off because:

1. Animals hurt each other
2. Animals can hurt people
3. Big horns reduce space in the kraal



Dehorning cows

Castration: This is the removal of testes from young male animals in order to prevent them from mating. Castration is done in order to:

1. prevent animals with poor characteristics from mating with those of good characteristics
2. Make animals grow fat quickly.
3. make animals calm all their life.

Feeding: Animals need feeding everyday . It is important to give animals feeds which are rich in nutrients. Good feeds enable animals to grow and produce well.

Feeding cows

Milking:

Milking a cow

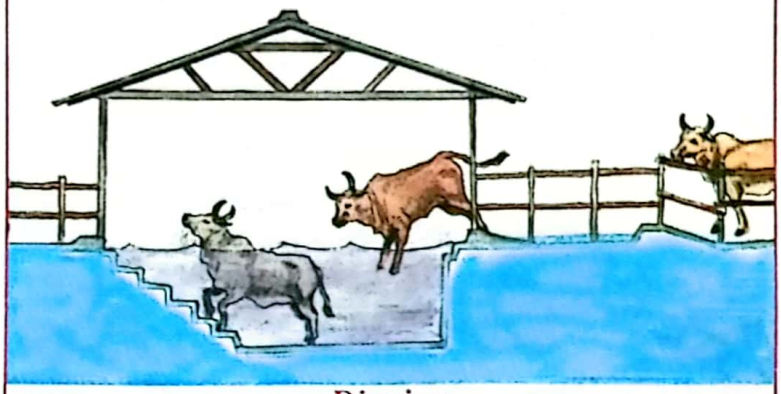
Some animals like cows and goats are reared to provide milk.

The process of getting milk from the animal is called milking.

Disease and parasite control:

This involves; spraying, dipping, deworming, vaccination

Spraying



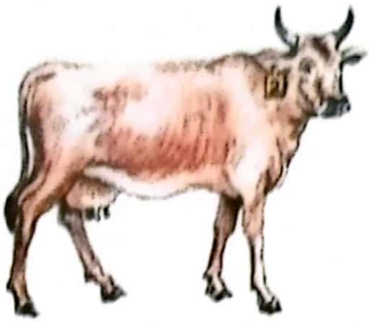
Dipping

Deworming

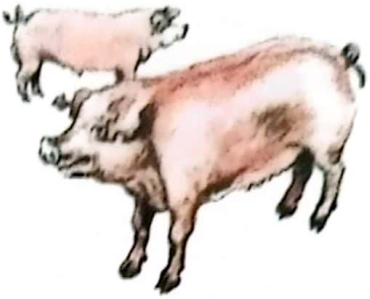
Vaccination

Identification of animals: This practice involves;

- ear notching;
- ear tagging;
- branding;
- naming;
- identifying by birthmarks



An ear tagged cow



An ear notched pig

Some animals have natural birth marks which can be used to identify them.

What birth marks have you ever seen on some animals?

Debeaking: Debeaking is cutting short of birds' beaks. Birds may use their sharp beaks to eat their eggs and to harm other birds.

Collecting eggs: Eggs should be collected regularly so that the birds do not eat them or break them.

Cleaning farm houses: Farm houses should always be kept clean. This helps to prevent diseases.

Servicing: Female animals should be provided with male animals for servicing when they are on heat. Serviced animals become pregnant and produce young ones.

We can do some of these practices ourselves BUT other practices require that we invite an expert to do them.

Activity 7

Together with the teacher, discuss and write down:

(a) Practices which we can carry out ourselves (without an expert).

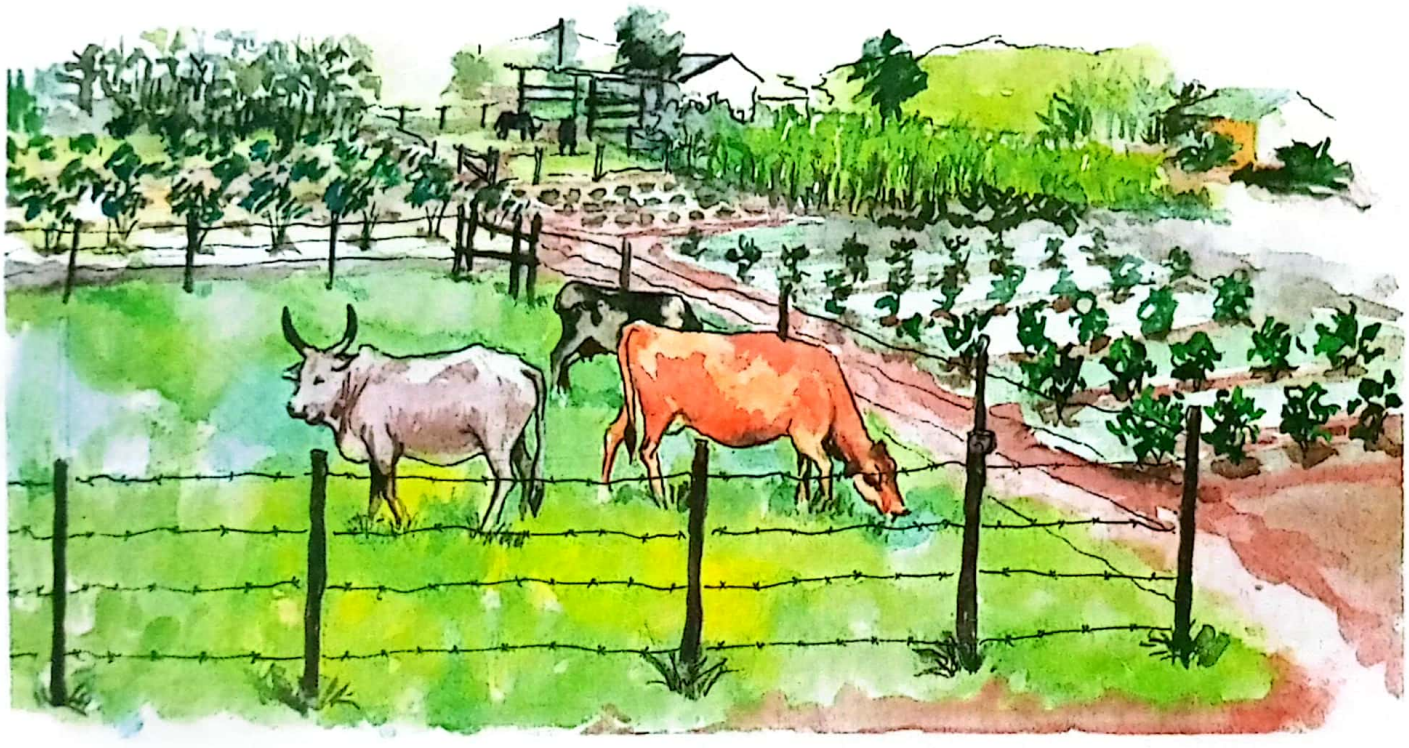
(b) Practices which should be left for experts only.

Activity 8

- Prepare a place where animals can stay. It could be an animal shed.
- Find out where you can get animals from.
- Look for where you can get animal feeds and how much they will cost.
- Get the animals and bring them to your prepared animal houses.
- Care for the animals and carry out the animal rearing practices at correct times. NB: The school could be having an already existing animal project.

Mixed farming:

Mixed farming is the growing of crops and rearing of animals on the same farm.



Mrs. Kasiriginyi's mixed farm on which livestock is kept and crops are grown She practices mixed farming.

Activity 9

- In preparation for a simple class debate, write down:-
  (a) All the good things you know about mixed farming (Advantages)
  (b) All the bad things about mixed farming (Disadvantages)
- The teacher will then organise you for a class debate with a motion: "It is good to carry out mixed farming."

(Make sure you give at least five points for your side)

Advantages of mixed farming

1. From the same farm, a farmer gets a variety of products (animal products and crop products).
2. Animal droppings are used as manure for crops on the farm.
3. The farmer will at least get products from either animals or crops when one of them gets problems.
4. Crop remains like sweet potato stems and leaves may be used to feed animals.
5. All the farm land can be used even when part of it is not good. For example, fertile areas are used for crop growing while poor areas are used for rearing animals.

Activity 10

- Make a visit to a nearby farm where mixed farming is practiced.
- Take note of the animals reared on the farm.
- Take note of the crops grown on this farm.
- List down the different types of animals kept and crops grown on this farm.

How do farmers prevent animals on a mixed farm from destroying their crops?

Factors that led to the distribution of crops and animals.

Some crops and animals are grown and reared in particular areas because of historical factors. Some of these factors are:

1. Early Migration

(a) The Bantu were mainly crop farmers. They therefore introduced crop farming in the areas where they settled. For example Bantu introduced

the growing of bananas in parts of Ankole, Buganda and Busoga.

(b) Nilotics were mainly cattle keepers. They introduced cattle keeping in those areas where they settled like Karamoja, Sebei, Teso, Lango and Acholi.

(c) In the same way, Hamites introduced cattle keeping in Ankole.

2. Tradition and Culture

When Europeans, Arabs and Asians came to Uganda, they introduced some of their culture. For example the Arabs introduced their religion (Islam). Moslems do not keep pigs. In areas with many Moslems you may not find any pigs. Culture is when people follow what their parents and grand parents did.

For example:

People in Buganda grow bananas as their main food.

People in Teso grow millet and cassava.

People in Lango, Acholi and Arua grow cassava and sorghum.

People in these areas have got used to growing the crops that were grown by their grand parents.

Activity 11:

- Visit an elder in your area.
- Ask him the crops that his parents used to grow.
- Find out the type of crops grown in that area now.

Copy table No. 9 below in your exercise books and fill in the spaces with the correct crops.

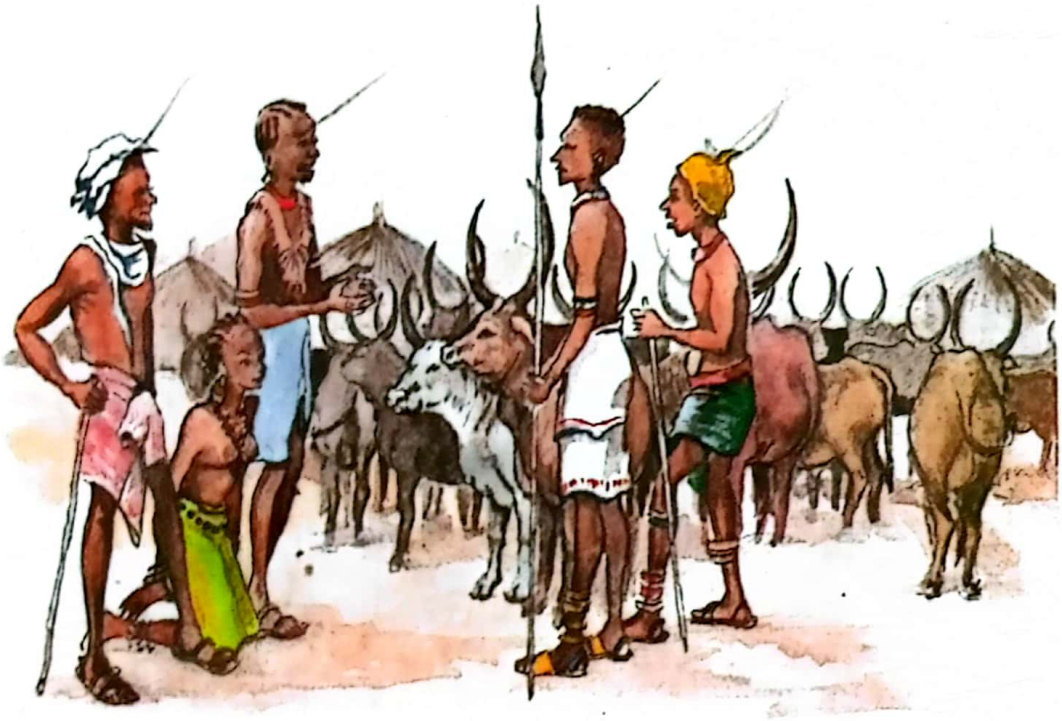
List of crops that used to be grown by grand parents	Crops that are being grown today
_____	_____
_____	_____
_____	_____
_____	_____

From your table, you may find that crops which were grown long ago are still grown in some areas up to today. The culture of people also influences the animals that people keep in an area. In Teso, Lira, Apac and Karamoja, people

pay dowry in order to marry a wife. In Busoga and Buganda, money and other items are used. People use animals or money to pay dowry. There are many animals in areas where animals are used to pay dowry. On the other hand in areas where money is used to pay dowry animals are few. We can find out more in the following story.

Mawanda comes from Buganda. In his culture when a person is getting married, he pays money, clothes, sugar and some other gifts to the inlaws.

Kiganda introduction ceremony



Karamajong introduction ceremony

One day Mawanda visited his friend Lomong in Moroto district. Lomong's daughter Acan was getting married to Okip. Okip also comes from Moroto district. Lomong was given 150 cows, 55 goats and 30 hens. Mawanda was happy to see his friend being given dowry for his daughter.

From this story answer the following questions.

a) Where do the following people come from?

Mawanda _____

Lomong _____

Okip _____

Acan _____

b) Do people in Buganda use cows for dowry?

c) Who was getting married to Acan?

d) How many cows were given to Lamong?

e) From the story, in which of the two areas do we find many cattle?

Another area with the same culture as Lomong's is Ankole. In this area, people also keep many cattle.

3. The coming of the Europeans

The first European rulers of Uganda (colonialists) introduced some crops. They wanted Africans to grow the crops for the European countries. Cotton, coffee, and sugar cane are examples of such crops. If the Europeans had not come to Uganda, probably those crops would not be here now.

4. Types of Soil

Some crops grow well in certain types of soil. An example is Arabica coffee which grows well in volcanic soils but does not do well in other soils. It is for this reason that Arabica coffee is mainly grown on the slopes of Mt. Elgon.

Rice is another crop that grows in specific soils. For example paddy rice can only grow well in waterlogged soils.

Paddy rice growing in waterlogged soil

5. Vegetation:

Vegetation includes trees together with shrubs and grasses. Some areas have tall trees and grass (forest).

Vegetation affects the distribution of animals because;

Tall trees can not be easily eaten by animals. Big trees growing near each other can not allow animals to move easily. In such areas, few animals are kept.

In other areas, short grass and a few trees grow. Such areas are good for keeping animals.

It is difficult to keep animals in a forested area

6. Climate:

The climate affects the distribution of animals and crops. Rainfall and temperature are some of the factors that make up climate. These two factors greatly affect the growth of crops.

a) Rainfall:

Where there is enough and reliable rainfall, there are many crops that are grown. Areas with little rain can not support the growth of crops.

b) Temperature:

Hot and dry areas are not suitable for growing certain crops. For example, Coffee and Bananas may not grow well in hot and dry areas like Karamoja. Temperature therefore, affects the distribution of crops.

7. Pests and Parasites

Crops and animals that are attacked by pests and parasites may die.

Examples of pests and parasites which affect crops and animals;

Crop pests - Locusts, Monkeys, Rats, Birds and Elephants.

Animals Pests - Tsetse flies and ticks are animal parasites and they transmit diseases.

In areas where there are many tsetse flies, few or no cattle are kept.

In areas where there are many monkeys, people may not grow maize.

Self testing exercise

1. *Why would a farmer choose a particular crop to grow (Give at least four reasons).*
2. *Write down five characteristics of a good crop to grow;*
   - *i)* _____
   - *ii)* _____
   - *iii)* _____
   - *iv)* _____
   - *v)* _____
3. *How does the type of soil influence the type of crop to grow?*
4. *Why would a farmer choose a particular animal to rear profitably? (Give at least five reasons).*
5. *Write down four characteristics of a good animal to rear.*
6. *Name two crops and write down crop growing practices that you can carry out for the crops.*
7. *What are some of the animal rearing practices that you know?*
8. *Write down at least four animal rearing practices that you can carry out yourself.*
9. *What is mixed farming?*
10. a) *Write down three advantages of mixed farming.*
    b) *Write down three disadvantages of mixed farming.*

COMPOSITION OF SOIL

What is Soil?

Soil is the top layer of the earth's surface. Most of the activities done by man are carried out on soil. Therefore, soil is important to us.

Mention five activities that man carries out on soil.

In the activity below, we shall take a visit around to look at what soil looks like.

Activity 1

- Visit different areas of bare ground on the school compound.
- Take note of the different colours of soil.
- Does the soil look the same in the different areas visited?

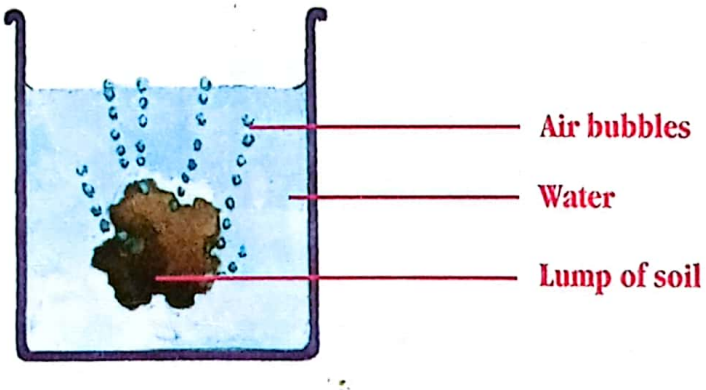
Components of Soil

These are the things that make up soil. Do you know of any soil components? Let us find out some of the components of soil from the following activities.

Activity 2

- Get a lump of dry soil.
- Get a container and put some amount of water in it.
- Put the lump of soil in the container of water.
- Observe carefully to see what takes place.

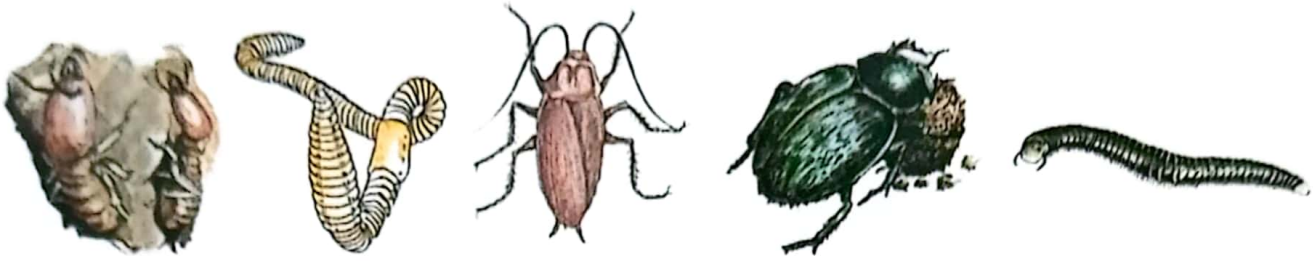
What do you observe?



The bubbles you see is air coming out of the soil. **Air is therefore a component of soil.**

This air is useful to living things found in the soil.

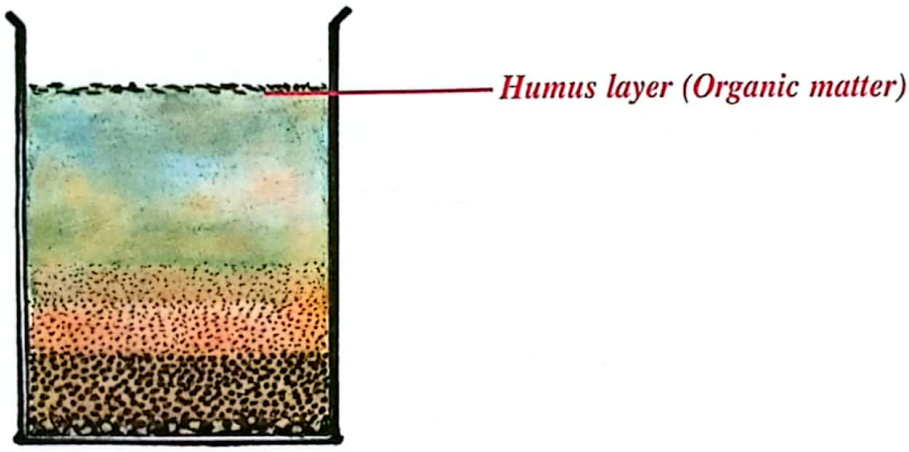
Let us look at some of the living things found in soil



Termites *Earthworm* *Cockroach* *Beetle* *Millipede*

Activity 3

- Get some amount of soil (It is better to use loose soil).
- Put the soil in a transparent container with water and mix thoroughly.
- Leave the mixture to settle on its own.
- Observe after about 15 minutes.
- What can you see?
- Do you see any layers formed?



You may have observed that there is some floating matter on top of the water. This is part of the **organic matter** in the soil.

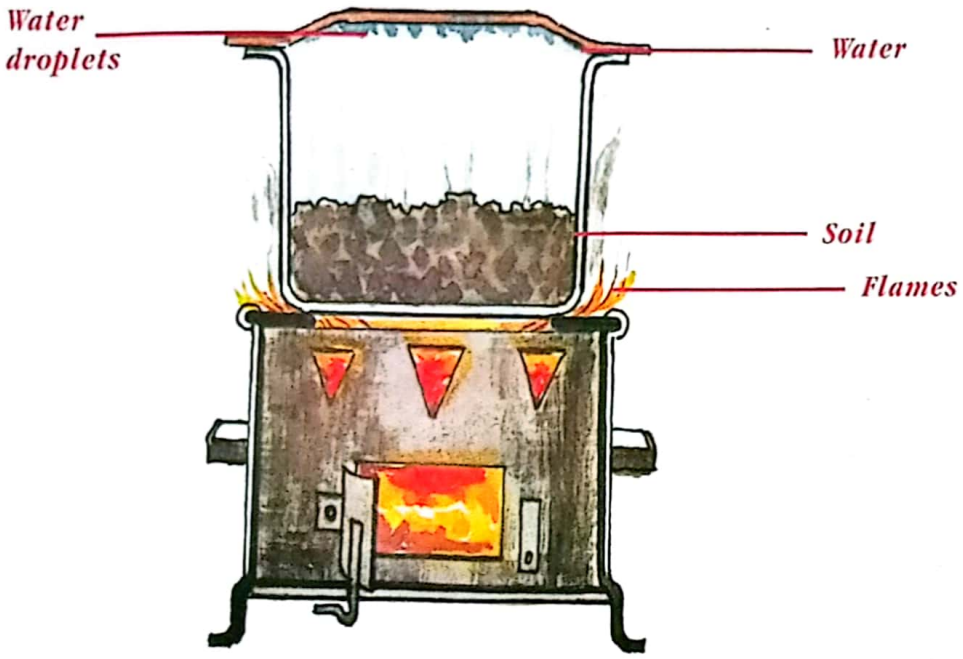
Organic matter is another component of soil. It is made from dead plants and animals. This organic matter breaks up to form humus. Humus is black in colour. So, it is the humus which gives top soil the dark colour.

Activity 4

- Collect a sample of soil from within the school compound.
- Put the soil in a dry container where you can heat it (This may be a tin, sauce pan or test tube).

Heat the soil in the container. (The teacher will guide you on how to heat and trap steam)

Discuss with the teacher what you can see.



This shows that in the soil we heated, there was water. **Water is also a component of soil.**

Plants need water to grow. It is this water which is found in soil that plants absorb and use. They use it to make their own food.

What happens to plants during the dry season?

What is the best season for planting crops?

Why do we plant in this season?

Importance of Soil to Plants

Soil provides water and mineral salts needed by plants. Mineral salts dissolve in water to form a solution. This solution contains the nutrients needed by the

plants. The solution is absorbed by the plants through the roots.

Let us find out more about the importance of soil to plants in the following activities.

Activity 5

- The class should visit a nearby field.
- Try to uproot or push a tree.
- Is it easy for you?

Activity 6

- The class should also visit a pond which has floating plants growing on water.
- Try to uproot the floating plants growing on the water.
- Do you find any difficulty in pulling out the plants?

From the above activities 5 and 6, we can see that plants which grow on land are firm. **Soil helps to hold plants firmly.**

The tree is held firmly by the soil

Water plants are easy to uproot

Self Testing Exercise

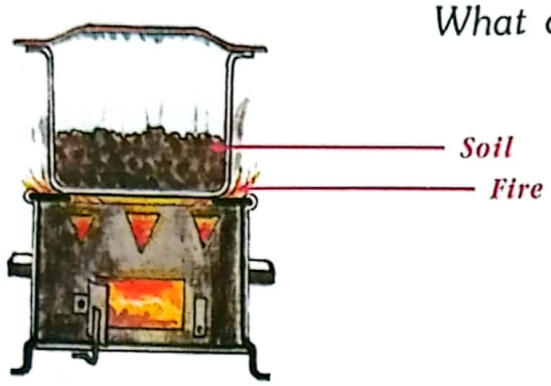
1. List down the components of soil.

(i) _____ (ii) _____ (iii) _____

(iv) _____ (v) _____

2. How can you show to your friend that there is air in the soil?

3. What does this experiment prove to us?



4. Barigye mixed a sample of soil with water and left it to settle. There was floating matter on top of water. What is this floating matter called?

5. Give <u>One</u> importance of air in the soil.

6. What is the importance of water in the soil?

7. What makes up organic matter in the soil?

8. In what ways do crops benefit from soil (Give two ways).

(i) _____

(ii) _____

FARM WATER SUPPLY

Water is very important on every farm. Many things can not be done if there is no water on a farm. That is one of the reasons why many people with farms prefer to settle near sources of water.

Uses of water on a farm

There are many uses of water on a farm. Let us find out more about some of these uses in the following activity.

Activity 1

- In groups of five write down the different uses of water on a farm.
- With the help of your teacher, discuss the different uses of water that you have written down.

You might have discussed the following uses of water with your teacher.

1. Irrigation

This is when water is supplied to crops by means of channels or pipes. Irrigation is practiced mainly on big farms. On small farms, people can use watering cans to supply water to crops. This is called watering of crops.

Watering crops using a watering can

Irrigation of crops with sprinklers

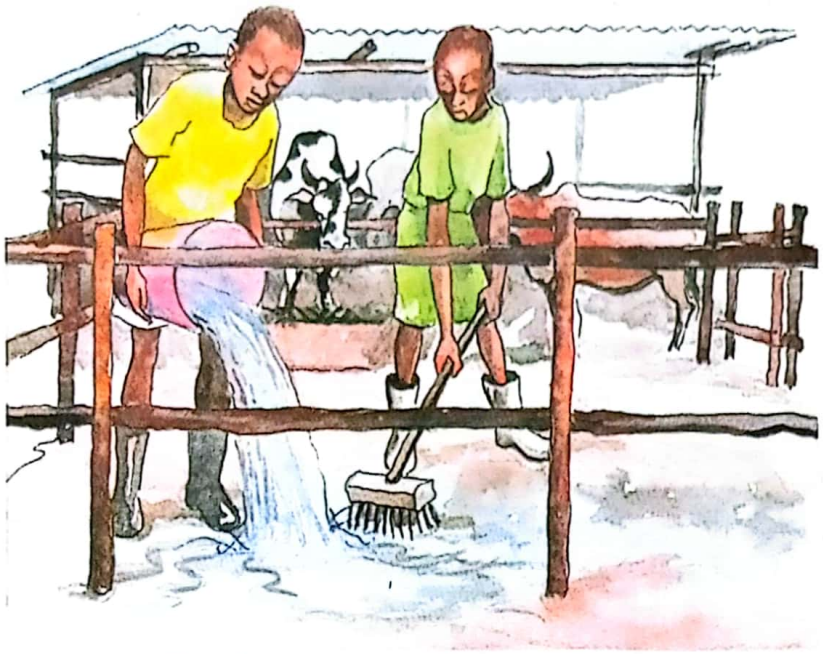
Activity 2

- The class participates in the watering of crops in the school garden.

2. Washing and Cleaning

People on the farm use water to wash clothes and to clean their bodies. It is proper to wash hands before eating and after visiting the toilet. Water is used in cleaning farm tools as well. Water is also used to clean animals and the houses where animals are kept. Each time after milking, the milking place must be cleaned with water.

What happens to milk if the milk containers are dirty?



Cleaning an animal house using water

Activity 3

- The class should participate in cleaning one of the following using water: a cowshed, a milking parlour, farm tools and milk containers.

3. Drinking

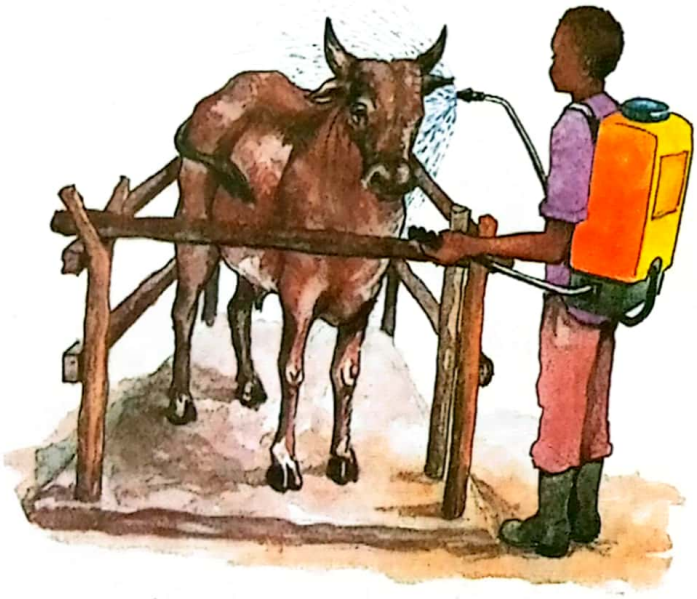
People and animals on the farm drink water. Water is required for proper food digestion. Water also keeps our bodies cool.

4 Mixing Chemicals

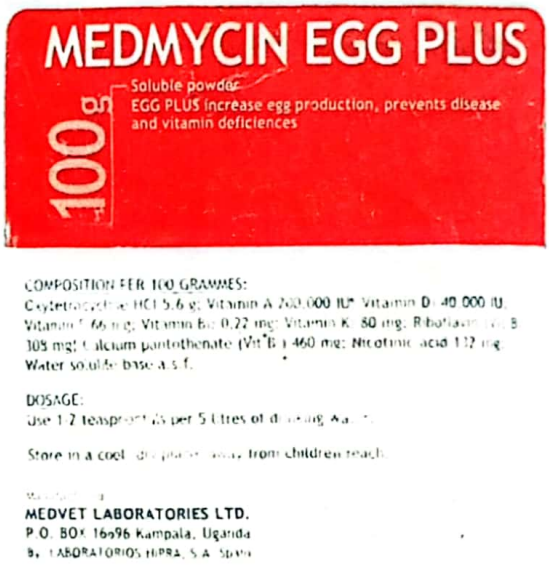
Some chemicals are mixed with water before being used on the farm. Chemicals are used to control pests, diseases, parasites, and weeds. Chemicals can then be sprayed on animals, crops and weeds using a sprayer.

While mixing chemicals it is important to follow proper instructions. Instructions are always written on the container of chemicals.

A farmer spraying his crops to kill pests



A cow is being sprayed to kill ticks.



A list of chemical instructions on a chemical container

5. Cooking

We use water to cook our food.

6. Cooling machines

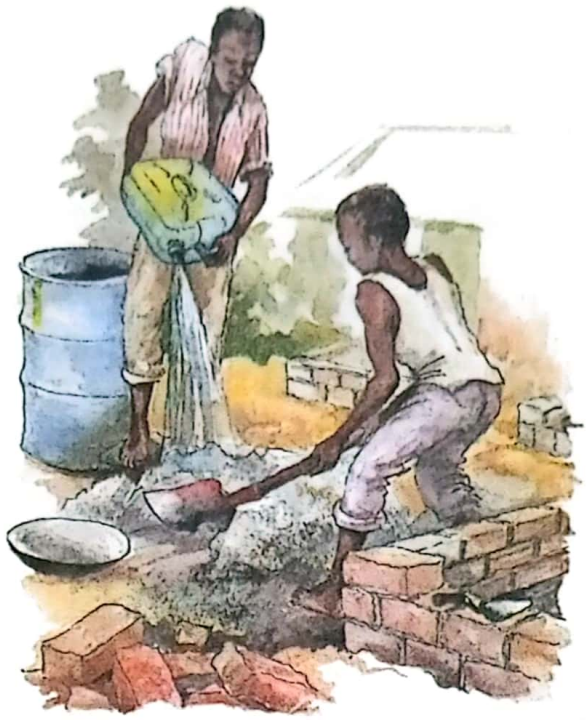
Some machines on a farm need water. Water is used to cool such machines. If engines are not cooled, they may breakdown.

7. Building

In the process of building, water is needed.

Water is used in the making of bricks, mud and concrete.
Concrete is a mixture of sand, cement, stones and water.

Water is filled in the car radiator to cool the engine



Builders are using water to mix sand and cement for building a house

What other uses of water can you think of?

Sources of water

We have discussed the importance of water on a farm. But where does the water on the farm come from?

Read the story below and answer the questions.

During the holidays, Mr. Mugisha went to the village. He went to collect some food. After two days, he returned with the food. His car was very dirty because the road to the village is a murram road. He asked his two sons Jacob and Jordan to wash the car. They got jerrycans to go and fetch water from a nearby well. Before they had left home it started raining. They decided to trap the water from the roof of the house.

Jordan and Jacob collected enough water and washed the car until it was clean.

1. List the sources of water mentioned in the story.
2. List down any other sources of water that you know.
3. Discuss other sources of water with your teacher.

Sources of water are grouped as follows:

1. surface sources;
2. ground sources;
3. rain water.

Surface sources

These are sources of water found on the land surface. Surface sources of water include; lakes, rivers, streams and reservoirs. Waterdams and ponds are examples of reservoirs.

A stream

Part of a lake

Ground sources

Ground sources of water are found under the ground. Ground sources include: springs, wells and bore holes.

A bore hole

A well is a ground water source

Rain water

The sun causes water to evaporate from seas, lakes, rivers, streams and ponds. The evaporated water goes into the atmosphere in form of water vapour. Water vapour condenses into drops and forms clouds. The clouds later release the water in form of rain. When it rains this water can be collected from roofs of houses. The water is then collected and stored in tanks. From the tanks water can then be used on the farm. Crops get rainwater directly.

Gutters can be used on a house to collect rain water into a tank.

Where do you collect water that you use at home?
Where do you collect water that you use at school?
State whether it is a ground source, surface or rain source.

Problems of water supply on a farm

1. Water shortage

During the dry seasons, there is a shortage of water. Sources of water like wells and springs may dry up. The rainfall is too little to provide enough water. This means that water is in short supply. When water is not enough, animals may die and crops fail. People should be taught not to waste water.

2. Water contamination

Unprotected sources of water contain water which is not clean. Surface sources of water therefore, need protection to reduce contamination. Water can be contaminated in the following ways:

a) When it rains soil erosion takes place. The soil is washed away by the running water. This soil may find its way into the source of water making the water unclean.

b) When animals drink from this water source, they may contaminate the

water. Contamination may take place because animal dung and urine may find its way into the water source.

c) People who wash near or in the well spoil the water.

d) Children playing in water make it dirty.

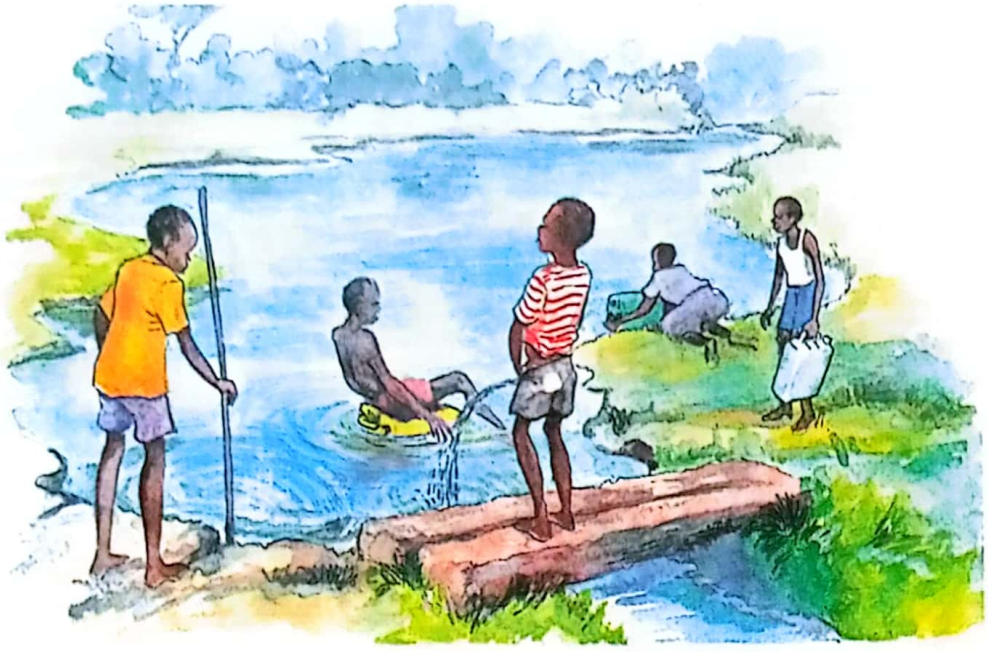
e) Water can also be contaminated by chemicals from industries.

f) Water can be contaminated by fertilisers from farms.

g) Sewage and other waste matter from densely populated areas may also contaminate the water.

h) Water can also be contaminated when dirty containers are used to collect water from the water source.

All contaminated water is not safe for anyone to use.



Children swimming and playing in water can make it dirty

3. Long distance to the water source

In some areas water sources are very far from where people live. It is not easy to take water to such places. It becomes tiresome if people have to carry water over long distances. It also becomes expensive if pumps, pipes, electricity and fuel have to be used to carry water to such places.

4. Expensive Water treatment

Water should be cleaned before it is used. The process of cleaning water is called water treatment. During the treatment exercise, dangerous materials and chemicals are removed in order to make the water safe. This process is however very long and expensive.

5. Failure to store water

It is a good practice to store rain water for future use. Many farmers however

do not store rainwater. This is because they lack a place where they can store water. Containers like tanks are too expensive for an ordinary farmer to buy or construct.

How can people in your area be helped to have clean water?

Activity 4

- The teacher should organise a visit to one of the homes around the school.
- What water problems do the people have in the home you have visited?
- How can these problems be solved?

Collection and storage of water.

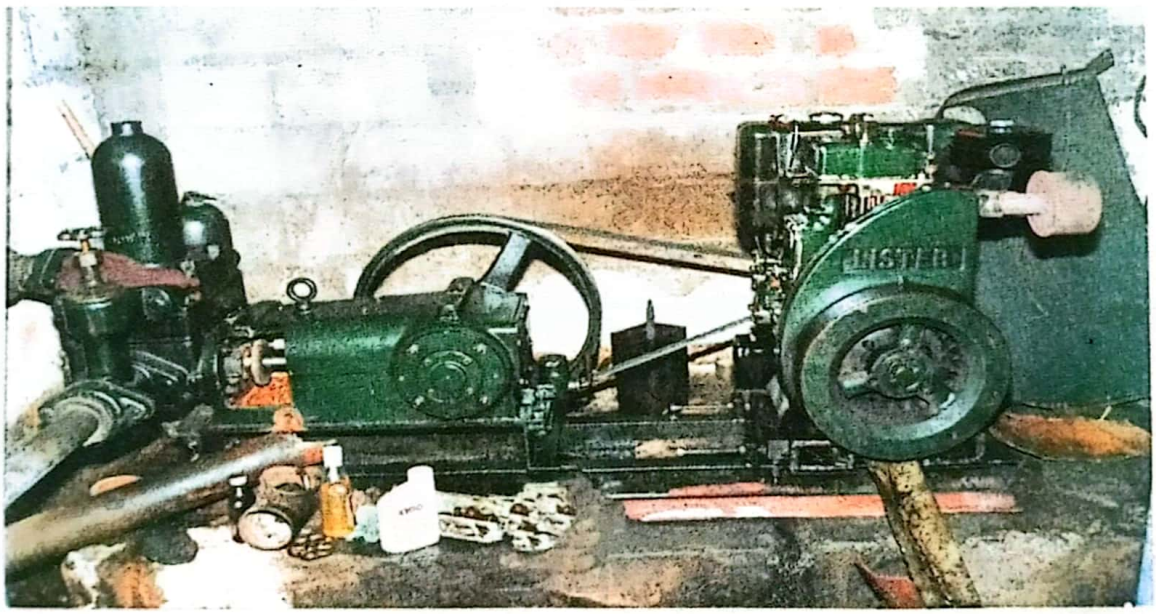
Water is usually not used at the source. Water has to be collected and taken to where it is to be used.

How do people collect water from water sources to their homes?

Activity 5

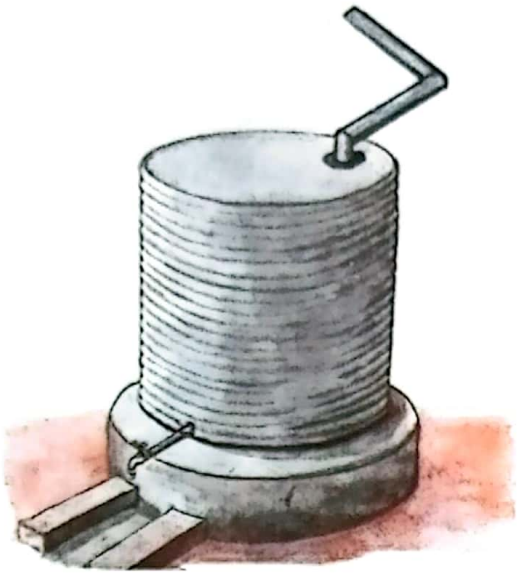
- Visit a home around your school.
- Find out how the home gets water for use.
- Participate in the collecting of water for the home.
- Discuss with your teacher the different ways of collecting water.

Some homes have piped water. This water is collected from sources like lakes, rivers or streams. It is then pumped through pipes to these homes. Pumping is one way of collecting water to our homes.

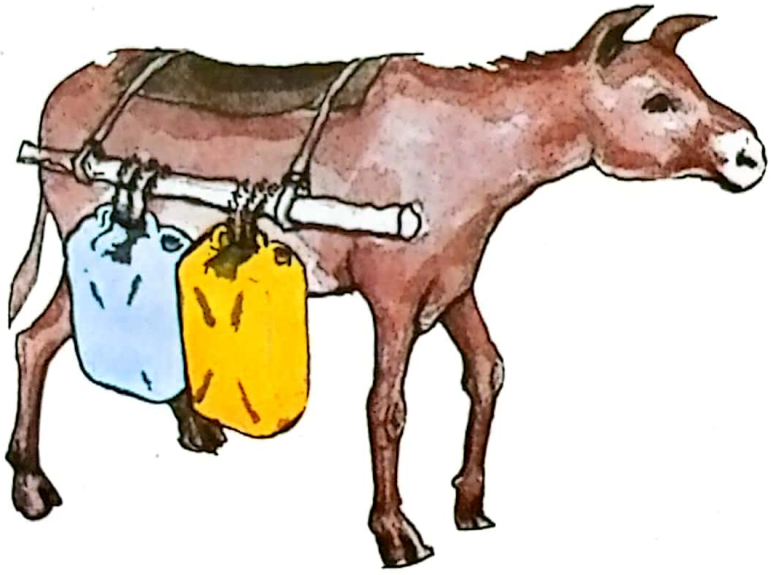


A water pump is used to pump water from the source to where the water is needed.

We can also get water from the rain. When it rains, water is trapped from the roof of the house using gutters. The water then collects into a tank. The tank is then used to store water.



Some people use animals to collect water. Examples of animals that are used to collect water are oxen and donkeys.



A donkey can be used to carry water

Sometimes people carry water themselves.

They collect water using jerrycans, saucepans or pots.

The containers are put on the head or lifted using hands.

Some methods of collecting water

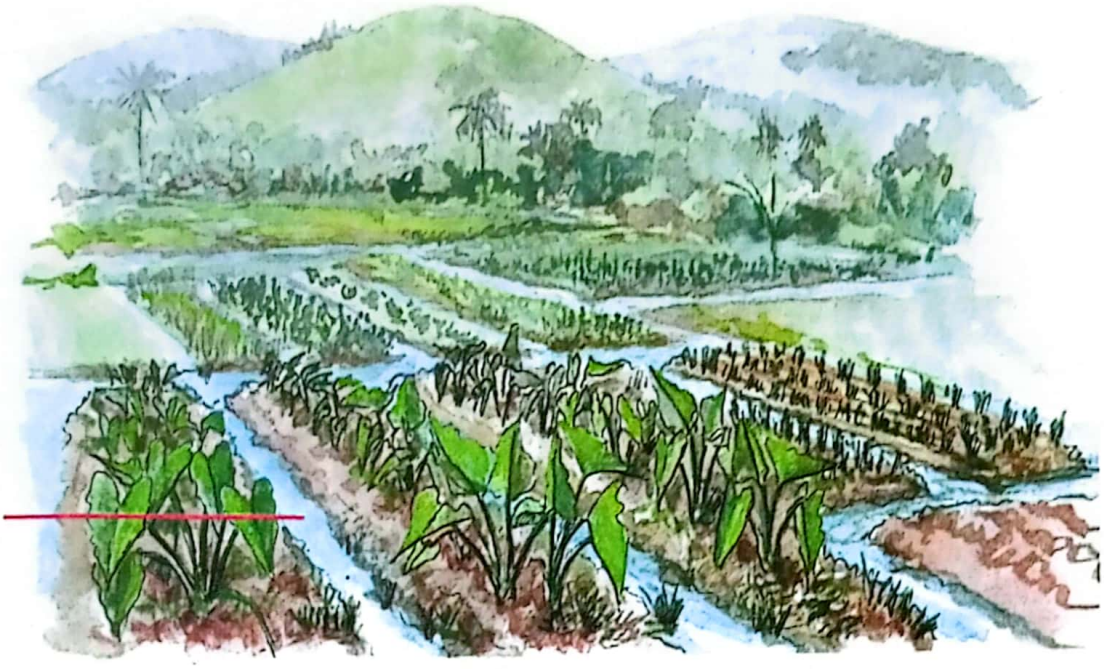
Which method of collecting water do you use in your area?

Which of the above water collection method is more expensive?

Which of the above water collection methods is more tiresome?

Some times, people collect water using lorries, pick-ups or cars. Have you ever seen a school lorry carrying water?

Drainage channels are used to transport water for irrigation. The type of irrigation shown below is used in areas that are flat. The water is transported from one part of the farm to another by drainage channels.



Using drainage channels to collect and transport water

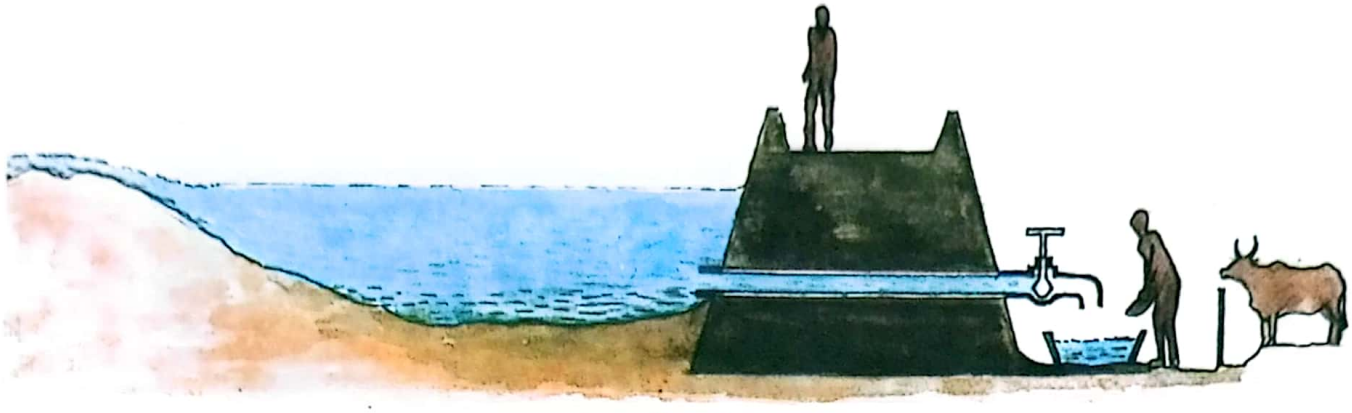
After collecting water in the different ways discussed above, we may find it necessary to store the water for future use.

How can we store this water? Here are some ways of storing water.

1. Valley dams are constructed across streams. Soil is normally used to make the dam. The dam traps and stores water behind it. People and animals can now use the water from the dam. A number of valley dams have been constructed in different parts of the country.

Is there a valley dam in your area?

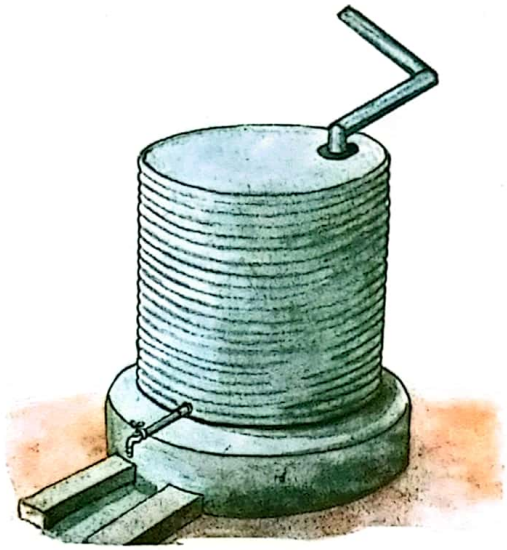
Where does the water in the valley dam come from?



A valley dam

2. Water storage tanks are used to store water. Water storage tanks provide water when it is needed. Water stored in the tanks during a rainy season can be used during the dry period. Storage tanks may be underground tanks or surface tanks. Below are two types of surface tanks.

A plastic water storage tank



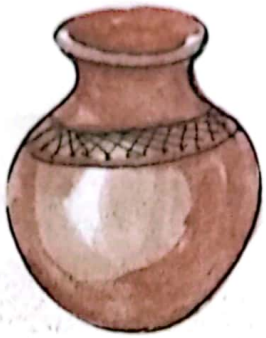
A metallic storage tank

Which of these tanks is common in your area?

3. Water can also be stored using

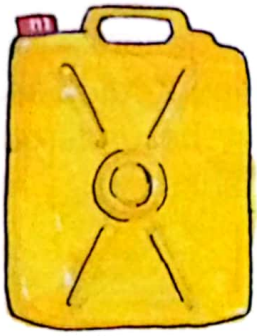
Jerrycans, water pots, pails, calabashes and drums.

A pail

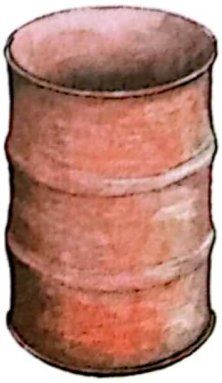


A pot

Calabash *Gourd*



A Jerrycan



A drum

Which of the above containers do you use to store water in your home?

Maintaining Water Sources

We should always care for sources of water. If we do not care for the sources of water the following are likely to happen:-

The water may become dirty.

Water sources like wells may be filled with silt.

Walls of dams may become damaged.

Methods of protecting and maintaining water sources

1. The dam must have a concrete spillway. A spillway is a channel that allows excess water to drain away so that the walls of the dam do not brake.

A valley dam with a concrete spillway.

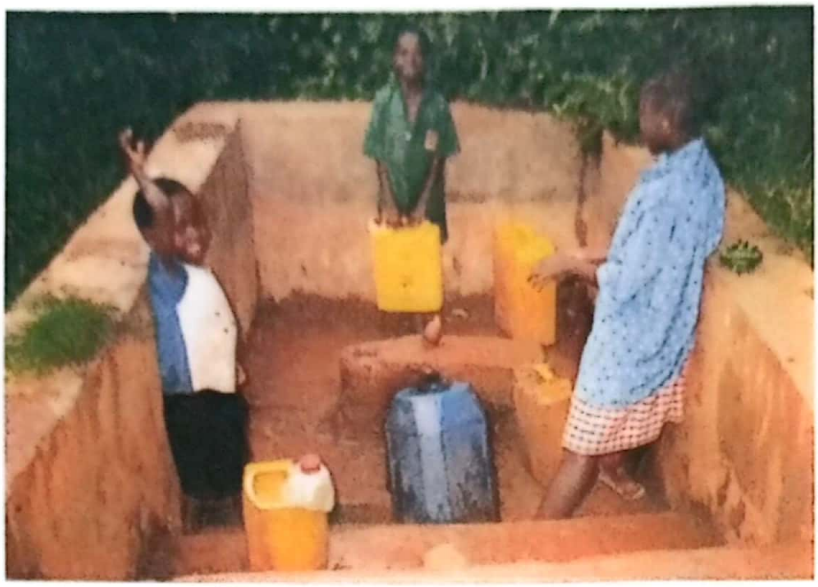
2. Trees should not be allowed to grow near water dams. Roots from the trees can destroy the dam base. The water then sinks in the ground. The dam can then no longer be able to store water.

Activity 6

- Visit a water source near your school.
- Look out for any steps taken to care for the water source.
- Suggest ways of improving the water source.

3. With the assistance of organisations like Rural Water and Sanitation (**RUWASA),** many protected wells have been constructed in different parts of Uganda. An improved water source reduces water contamination. People can then be able to collect clean water.

Which building materials are used to improve wells?



A protected spring

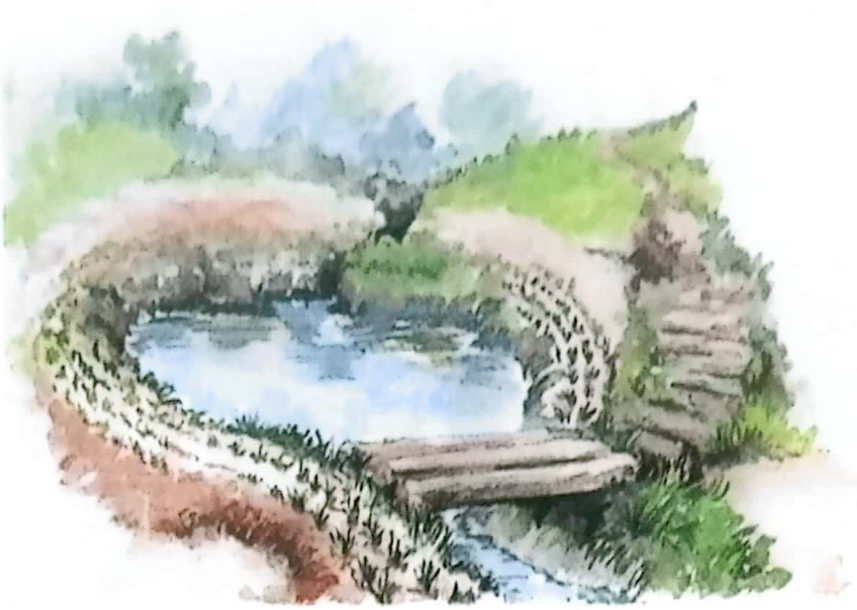
4. A fence can be built all round the water source. This keeps animals away so that they do not drop dung and urine into the water source. Hooves of animals do a lot of damage to the soil near water sources. Water should be provided to animals in a container placed far from the water source.

Animals drinking from a water trough placed at a distance from a water source.

5. Trimming Vegetation: Plants around the water source should be trimmed. This is done by slashing and clearing the bush around the water source.

6. Planting silt traps: Soil erosion can lead to the contamination of water sources. We can protect water sources by controlling soil erosion. This can be done by planting grass like paspalum around the water source. The grass reduces the amount of soil entering the water source when it rains.

We can also dig trenches around the well to take rain water away from the water source.



Paspalum grass planted around the water source acts as a silt trap.

7. Chemicals that we use can be harmful when wrongly used. For example, fertilisers that we use on our farms mix with water as the water sinks in soil. In this way the chemicals reach underground water. If we use this water, it may be harmful to our bodies. Farmers should therefore only use chemicals which become harmless before they reach the water source.

8. Water can also be contaminated by chemicals from factories and industries.

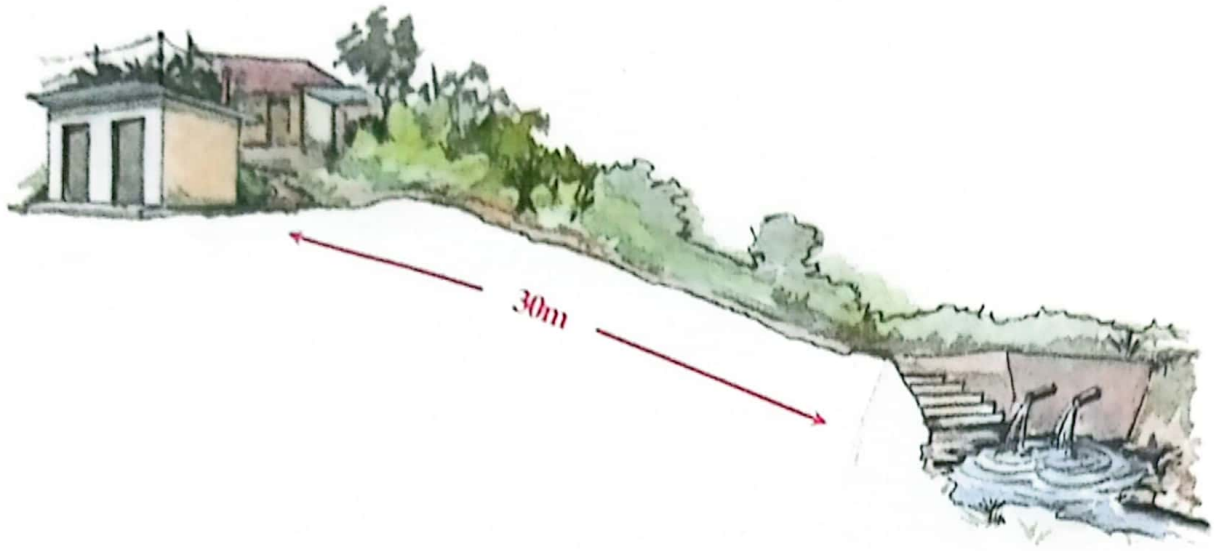
Water contamination from factory wastes

9. Human waste from toilets and pit latrines can also contaminate water sources with germs. This problem is very common in slum areas. Pit latrines should be built far from the water sources.

How far is the water source from the latrine in the following places?

a) At school; b) At home;

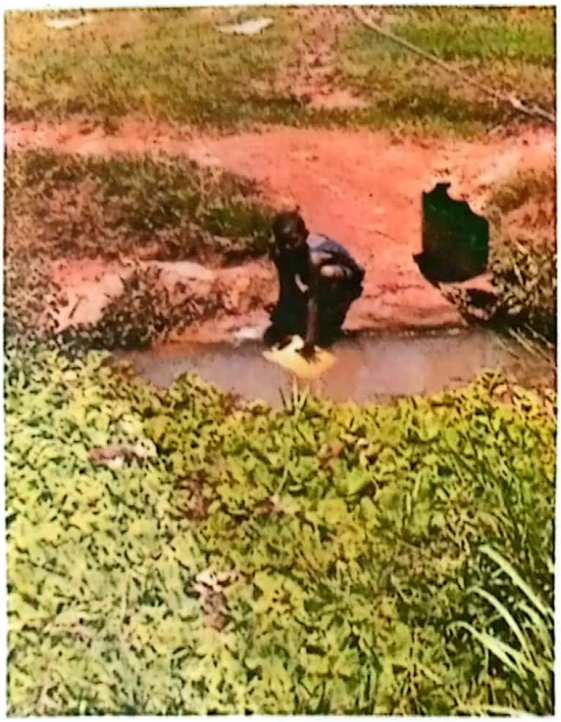
If the distance is less than 30 metres, the water may be contaminated. All drinking water must be boiled.



Recommended distance of a water source from a pit latrine.

10. Sometimes weeds grow in water sources. Examples of such weeds are water lilies and water hyacinth. Such weeds block water channels that bring or take water. The weeds should be removed in order to clear the water.

What methods can we use to control the water weeds?



Nile cabbage plants growing in a well.

Water lily plants

Water hyacinth plants growing on a water source

11. Soil erosion takes place when moving water, wind and animals remove the top soil. Most of the erosion is caused by moving water. Every time it rains, soil erosion takes place. The eroded soil may end up in our water sources. In the end water sources like wells will be filled up with soil. We should therefore, remove the soil from the sources.

Activity 7

- Accompanied by your teacher, take a visit to a water source.
- The source may be a stream, a spring or a well.
- Find out if the well, spring or stream needs any cleaning.
- If so, help the community to clean the water source.

1. What activities did you do to clean the source?
2. What tools did you use?
3. Why is it important to clean a water source?
4. What can you do to protect water in the source you have cleaned?

Pupils cleaning a water source and planting silt traps

Making water safe (water treatment)

Caring for water sources is not enough. Water from such sources may still have germs and other impurities. Water should therefore, be made safe before we use it. The process of making water safe is known as water treatment. Water from an underground source is usually clear and may look safe. But it may contain germs which are harmful.

Activity 8

- Get five litres of water from any water source.
- With the help of your teacher use it to prepare drinking water for the class.

How did you prepare that water?

Methods of making water safe

Boiling

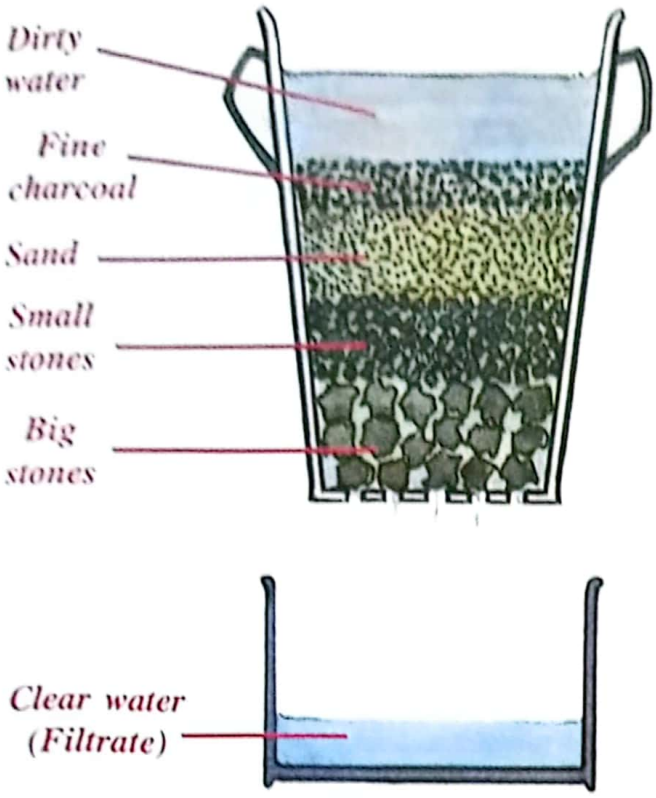
Water for drinking must be boiled. Boiling kills the germs in water. We must not drink water that has not been boiled.

Filtering

Activity 9

- Get a reasonably big tin.
- Make holes in the bottom of the tin.
- Put a layer of large stones in the tin.
- Put another layer of smaller stones on top of the large ones.
- Put a layer of coarse sand (lake sand).
- Put another layer of fine charcoal on top
- Pour dirty water gently and let it sink.
- Collect the water that comes out at the bottom of the tin in a clean container.

Does the water still look the same?



Water filtration.

Good water should be clean. It should be free of any particles, germs, chemicals and even smell. All these make people and animals sick.

The filtering that we have done above, removes particles from water. As water passes through the different layers, the particles get trapped. Some factories and water treatment plants use this method. Filtering is one of the steps taken to obtain clean water.

After boiling the water, it can also be filtered by using a clean piece of cloth. This removes particles.

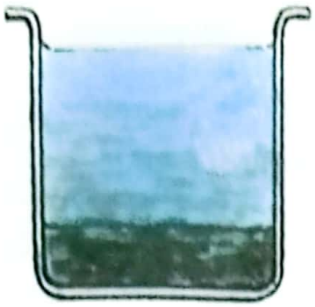
Do you know any water treatment plant? Discuss it with the teacher.

After filtering the water, the next step is killing germs. This is done by either boiling or adding chemicals. The amount of chemicals used is not harmful to people and animals. One of the chemicals used is called chlorine.

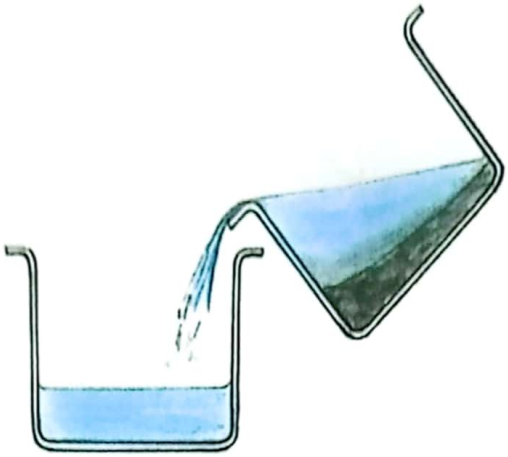
Decanting:

When water is left to settle, particles settle at the bottom of the container. Clean water remains at the top. When this water is gently poured into another container we get clean water. This process is called **decanting**. After decanting, the water must be boiled in order to kill germs.

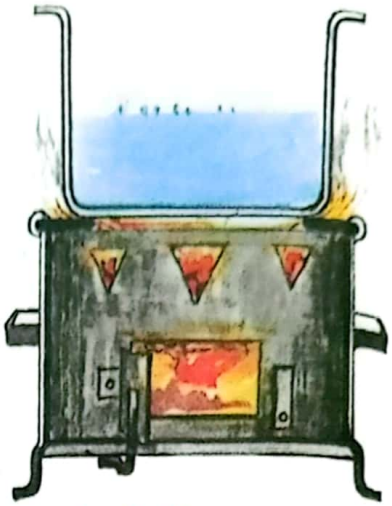
Storing water for more than 36 hours kills Bilharzia germs without using any chemicals. Other germs found in water are Liver flukes, Typhoid and Cholera germs. Using dirty water on farms is dangerous. Some animals get liverflukes which damage the liver. Poultry can get infected with typhoid when they drink dirty water. People can also get infected with typhoid and cholera when they drink dirty water.



1. *Settling water*



2. *Pouring water*



3. *Boiling water*

After decanting, the water should be boiled.

A water treatment plant

Self Testing Exercise

1. What do we use water for a) at school?
   b) in our home?
2. Name the different sources of water.
3. What source of water do you use a) at school?
   b) at home?
4. What are the different ways of collecting water?
5. What are the problems of water supply in your area?
6. How is water stored in your area?
7. Mention 2 examples of underground sources of water.
   i) ii)
8. Clean water is good for our health as well as health for our animals. Which animals need water at our homes?____, ____, ____, ____.
9. Unclean water causes diseases to our animals such as _____, _____, _____. It is good for us and our animals to drink clean water. Clean water can be obtained by _____ and _____.
10. How are valley dams useful to people?

INTERCROPPING

What is intercropping?

In the previous topics, we have learnt about crops. Each of these crops was planted in a separate garden. Some crops however, can be grown together. The growing of different crops together in a garden is called **intercropping**. In this method, it is better to grow the crops in rows as shown below.

Beans	B	B	B	B	B	B	B
Onions	O	O	O	O	O	O	O
Cabbages	C	C	C	C	C	C	C
Beans	B	B	B	B	B	B	B
Onions	O	O	O	O	O	O	O
Cabbages	C	C	C	C	C	C	C

Intercropping

Where is intercropping commonly practiced?

Intercropping is very common in areas with fertile soil. This is because fertile soil is able to support more than one crop at a time. Intercropping is also practiced in areas where there are many people. In these areas people have small plots of land yet they may want to grow a number of crops at the same time.

Why do farmers practice intercropping?

Is it better to plant each crop alone?

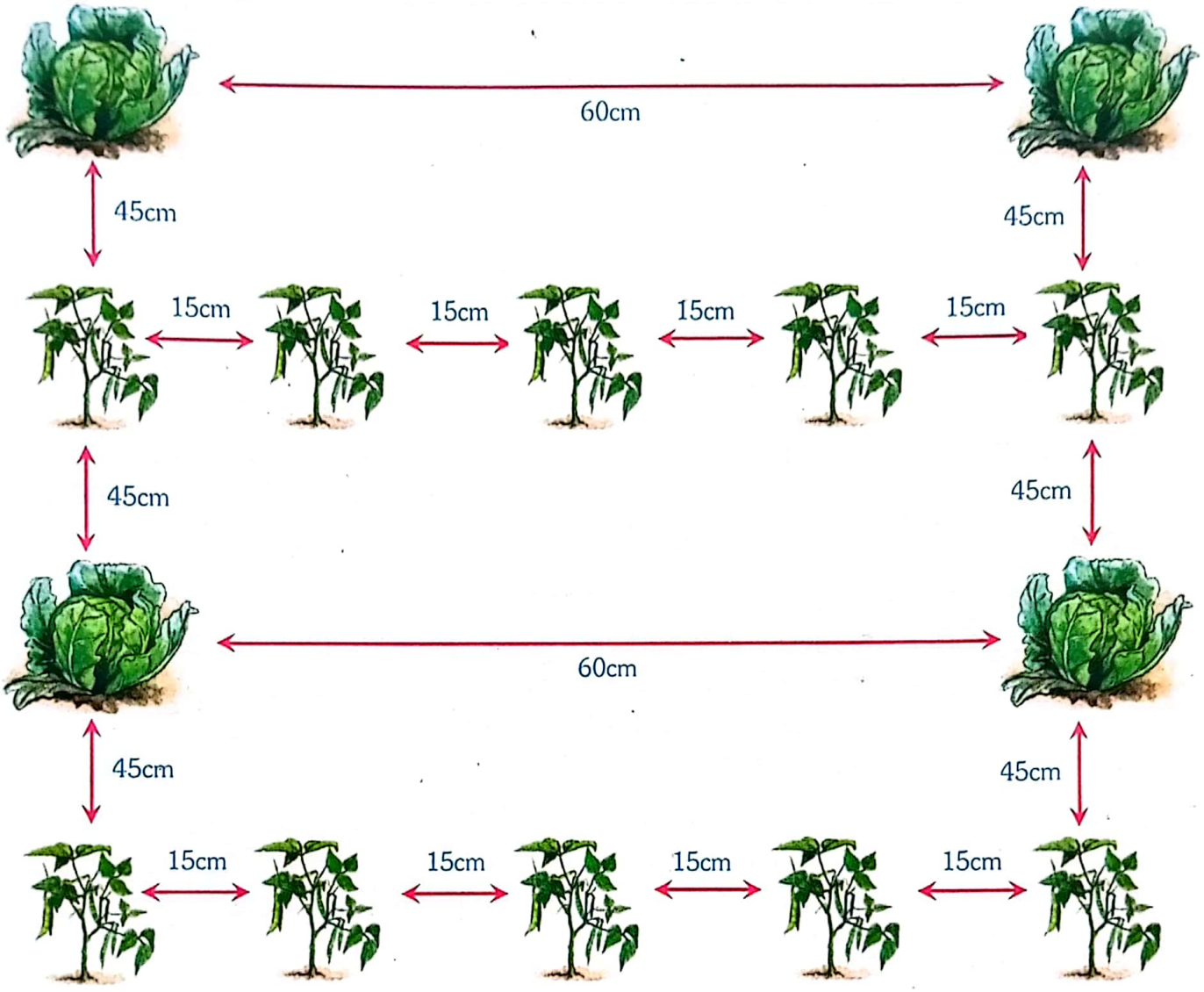
Is it good to plant crops together?

Let us use the activity below to find out the answers.

Activity 1

- Prepare three plots of land in the school garden.
- The plots should be about 6 m by 6 m.
- Plant only beans in plot 1. Let the spacing be 60 cm by 15cm.

- Plant only cabbages in plot 2. Let the spacing be 90cm by 60 cm:
- Plant cabbages and beans in plot 3 according to the following spacing.
  1. 45cm between cabbage row and beans row.
  2. 60 cm between the cabbage plants.
  3. 15cm between the bean plants.



Arrangement and spacing of crops in plot 3

Activity 2

- Make and record observations on all the plots. This should be done every 3 weeks until harvesting time. Take note of the following while observing the plots:
  1. Find out the plot with very few growth of weeds.
  2. Find out the types of crops growing in each plot.

How many products were harvested from

(a) plot 1?

(b) plot 2?

(c) plot 3?

What differences can you see between cabbages from plot 2 and 3?

Give one difference you can see between beans from plots 1 and 3?

Advantages of intercropping

Cabbages and beans were harvested from plot 3.

Beans were harvested from plot 1.

Cabbages only were harvested from plot 2.

When you intercrop you get more than one product during the same season.

Intercropping is very helpful in times of famine. Crops that take a short time to mature can be intercropped with those that take a longer time. Crops that mature quickly can provide food so that people have something to eat.

Intercropping reduces the number of weeds growing together with the crops. The crops leave little space for weeds to grow. Intercropping helps to reduce soil erosion because most of the ground is covered with crops. This is clearly shown in activity 2 above. Plots 1 and 2 had more weeds than plot 3.

Apio and Akello who live in Lira District decided to grow maize. Akello intercropped beans with maize but Apio planted only maize. One month after planting, a disease destroyed all the maize in the district but the beans were not affected. Akello harvested and sold the beans while Apio had nothing to sell.

What do we learn from the above story?

Activity 3

- Carefully dig out a leguminous crop with its roots from a school garden. Examples of leguminous crops are beans, cowpeas, soya beans and groundnuts.
- Do you see any round structures on the roots?

The round structures on the roots are called **root nodules.**

Intercropping with legumes improves on the soil fertility.

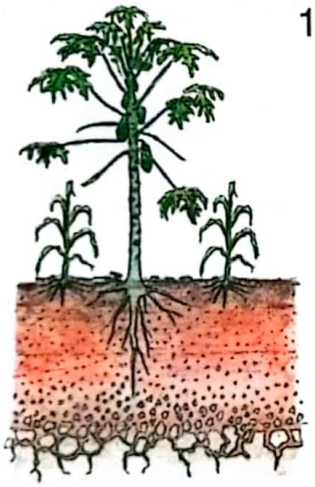
A leguminous plant with its nodules

Legumes have swellings on their roots called **root nodules.** There are Nitrogen fixing bacteria living in these nodules. These bacteria can absorb nitrogen from the atmosphere and change it into a form that plants can use to make their own food.

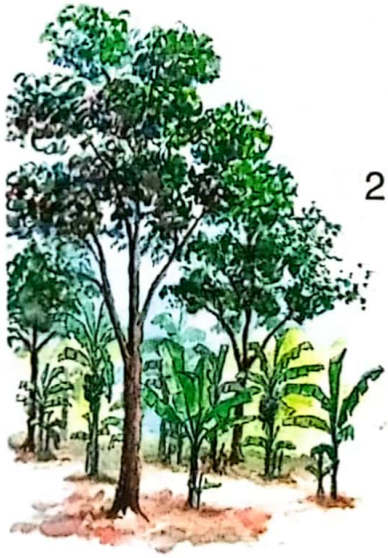
Nitrogen is very important to crops. Other crops grown with legumes benefit from this Nitrogen and grow well.

Choosing crops for Intercropping

Some crops should not be intercropped. It is very important that a farmer carefully chooses the crops to grow together. Below are a few guidelines one can follow.



1. Deep rooted crops should be grown with short rooted crops. This reduces competition for nutrients in the soil. Deep rooted crops use nutrients which are deep in the soil while short rooted crops use nutrients near the soil surface.



2. Crops that require shade can be grown with crops which provide good shade.

3. Crops that have climbing stems can be grown with those that can provide good stakes.

4. Crops that can be affected by the same disease or pest should not be grown together.

What crops are commonly intercropped in your home area?

For each guideline (1 - 4) above, give an example of crops that can be intercropped.

Self Testing Exercise

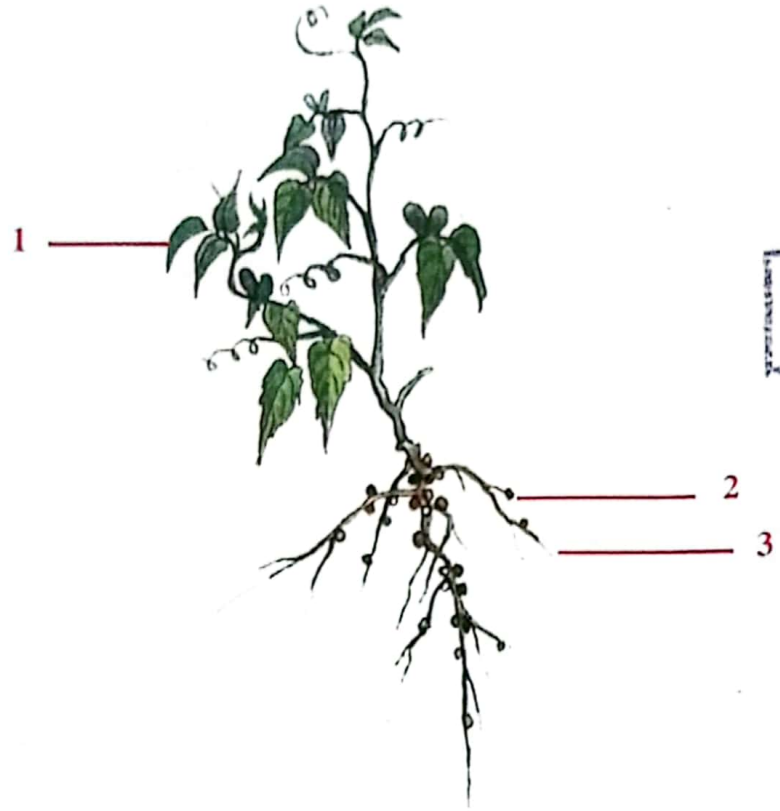
1. *What is intercropping?*
2. *Give two reasons why intercropping is good to a farmer.*
3. *Write down two reasons why intercropping is useful to crops.*

4. *Write down four crops that are legumes.*

5. *The diagram below is of a legume crop.*

   a) *Name parts 1, 2 and 3.*

   b) *What living things do we find living in the structure marked 2?*



6. *Which of the following is a good pair of crops to intercrop?*

   a) *Short rooted crops with other short rooted crops.*

   b) *Deep rooted crops with short rooted crops.*

   c) *Deep rooted crops with other deep rooted crops.*

7. *Name three things a farmer should consider when selecting crops to intercrop.*

PASTURES

What is pasture?

Animals such as cows, sheep, goats and pigs feed on grass. Grass and other plants eaten by animals are called **pasture**. When animals eat pasture in the open land, they are **grazing**. There are different pasture plants. These can be different types of grass, legumes, trees or shrubs. Some pasture is eaten by animals when it is fresh. Other pasture plants are dried before they are used to feed animals. Dry pasture is called **hay**.

A tree

A shrub

Grass

Are all plants pastures?

Farm animals do not eat all types of plants. Therefore, not all plants are pasture plants. In the activity below, we shall find out more about the different plants that animals eat.

Activity 1

- Visit a place or farm that has farm animals.
- Find out the different animals reared on that farm.
- Observe what the animals are eating.
- Collect pieces of the plants the animals are eating.

- Ask the farmer or teacher the names of those plants.
- Copy table 10 in your exercise book and fill in the information.
- Go with the plant pieces you collected to class.
- Discuss your plant pieces with friends and the teacher.
- Find out those which are grasses, legumes, trees or shrubs.
- Copy table 11 in your exercise books and fill in the information.

Pasture plants that the animals were eating

Table 10

Animal	Names of plants

Different groups of pasture plants.

Table 11

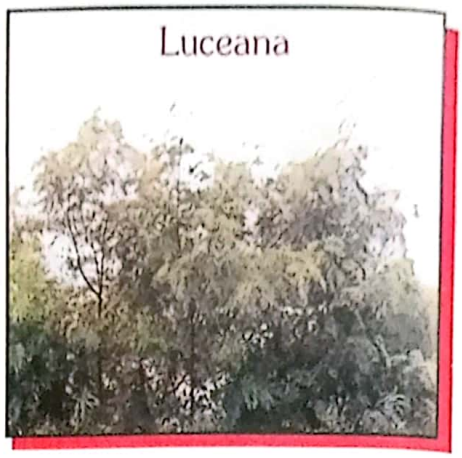
Type of plant	Names of plants
Legumes	
Grasses	
Trees	
Shrubs	

Below are examples of pasture plants.

Elephant grass

Silver leaf desmodium

Guatemala

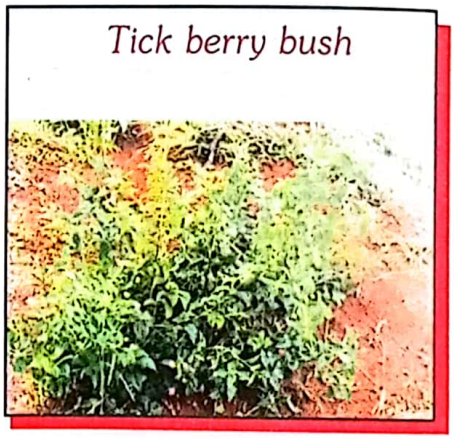


Poisonous plants in our pastures

Pasture plants are not poisonous to animals, but at times they grow together with poisonous plants. We should identify these poisonous plants and remove them from the pasture by weeding.

Examples of poisonous plants:

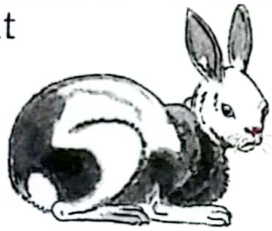
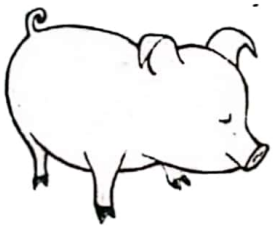
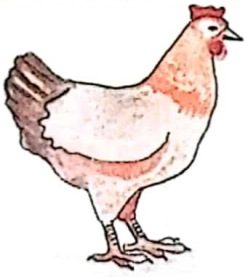
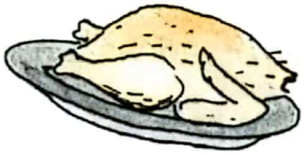
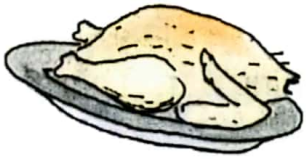
1. Thorn apple.
2. Sodom apple (*Entengotengo* in Luganda), (*Etulerut* in Ateso) (*Ocokocok* in Luo).
3. Tick berry bush (*Akayukiyuki* in Luganda)(*Ejelejele* in Ateso) (*Abelwinyo* in Luo). (*Omuhuukye* in Lunyankole).



Importance of pasture plants

1. Pasture plants are a source of food nutrients for animals. These nutrients are: fats, proteins, carbohydrates and vitamins. The nutrients are used by the body to produce good products. Examples of such products are eggs, milk, meat, wool and hides. Since good pastures enable animals to produce good products, we must choose good pastures for our animals.

Table 12 Identify and name the given products for each farm animal given in table 12:

Animal	Products of animals
Cow 	 
Sheep 	
Goat 	 
Rabbit 	
Pig 	
Chicken 	 
Duck 	 

What other products do we get from the above animals.?

2. Some pasture plants survive during the dry season. Such pasture plants continue providing food to our animals in the dry season. Examples of such pasture plants are barkcloth tree and elephant grass.

3. Some pasture plants are legumes. When these are planted, they can improve on the soil fertility. An example of a leguminous pasture plant is **Lablab.**

4. Pasture grasses cover the soil and reduce soil erosion.

Growing pastures

Whereas some pasture plants grow naturally, at times there is need to grow more pasture plants for our animals.

We should then know how to do it. We can grow new pastures from seeds or from cuttings of already growing pastures.

Activity 2

- In your group choose a pasture plant to grow;
- Collect seeds or cuttings of the chosen plant;
- Prepare a plot in the school garden;
- Apply manure on the plot;
- Harrow the plot to make it suitable for planting;
- Plant the seeds or cuttings on the plot;
- Keep animals away from the young pasture.

Take note of the following:

1. Grass seeds are planted by broadcasting method.
2. Legume seeds are planted by broadcasting or in rows.
3. Cuttings are planted in small ditches called **furrows.**
4. After four weeks topping is done for grasses. **Topping** is the cutting off of the top part of the plant with a slasher. It encourages the growth of many new shoots from the remaining part. This makes the pasture to spread quickly.

5. A pasture that is planted is called a **ley.**

6. An area with naturally growing pastures is called a grassland. **A grassland** can be improved by removing plants that are not pastures. These plants can be replaced with pastures by planting.

A natural grassland

Caring for pastures

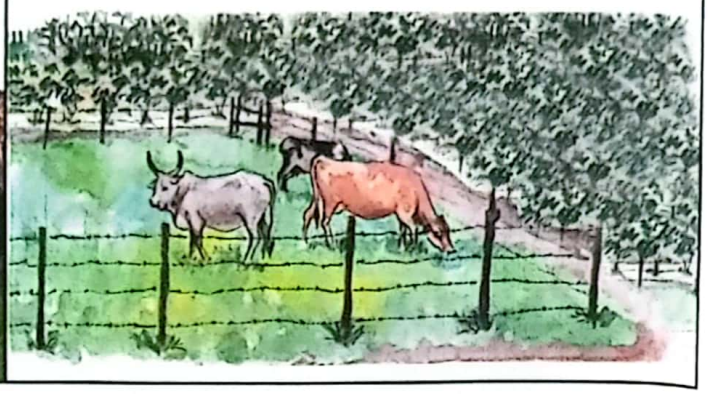
Pastures need proper care in order to grow well. The following should be done.

1. Remove plants that animals do not eat.
2. Dig channels to remove water from pasture fields if necessary.
3. Keep the right number of animals that the pasture can support.
4. A farmer should graze animals on the pasture in a controlled way like rotational grazing. Rotational grazing is the grazing of animals in different parts of the farm at different times.
5. A farmer should add fertilizers to the pasture.
6. Slash or top the pasture
7. Irrigate the pasture if necessary.

FARM A

Too many animals on a small piece of land

FARM B



The right number of animals on a piece of land

Self Testing Exercise

1. *What is pasture?*
2. *Write down five animals that feed on grass.*
3. *Write down five grasses that are used as pasture in your area. (Use local names).*
4. *What name do we give to grass that is cut, dried and fed to cattle?*
5. *Give any two ways by which we can improve on a natural grassland to make it good for grazing animals.*
6. *Name two pasture plants that are resistant to drought or dry season.*
7. *What tool do we use for topping grass?*
8. *Why do we carry out topping?*
9. *Name three legume pasture plants that grow in your area.*
10. *What is rotational grazing?*

FARM RECORDS

A record is written information about something. A record helps to explain what happens in a place. Farm records contain information about what takes place on a farm. This information includes:

1. What happened on the farm sometime back?
2. What is happening on the farm now?
3. What may happen on the farm in the future?

Types of farm records

There are different types of farm records. Examples of farm records are: Farm diary, Livestock records, crop records, financial records and inventory records. Let us discuss them one by one.

1. Farm diary

This record shows all activities already done and those to be done on a farm. It includes dates and activities. A farm diary is very similar to a personal diary. Do you have a personal diary? What do you write in such a diary? Study table 13 below.

Table 13: **Musisi's Farm Diary**

DATE	ACTIVITIES (THINGS TO DO)
December 21st 2000	Harvesting and selling Matooke for Christmas.
December 22nd 2000	Harvesting and selling more matooke.
December 23rd 2000	Paying salaries to farm workers.
December 26th 2000	Spraying of animals to control ticks
December 27th 2000	Changing animals from paddock 2 to 3.
December 28th 2000	Weeding paddock 2.
December 30th 2000	Registering new workers.
January 3rd 2001	Ploughing plots 1 and 5.
January 4th 2001	Ploughing plots 1 and 5
January 7th 2001	Harvesting and selling matooke.
January 10th 2001	Spraying of animals to control ticks.
January 12th 2001	Changing animals from paddock 3 to 4.

What activity was done on January 10th?

In the activity below you will now make a diary. This can be a diary of a school farm or a farm at your home.

Activity 1

- In groups of 8-10 pupils, write down seven possible activities that can be carried out on a farm.
- Discuss as a group the order in which you would carry out these activities one by one.
- Suggest the date each activity would be carried out.
- Each pupil in the group should now use this information to make a farm diary for one week.

2. Livestock records

There are many types of livestock records. Livestock records include records of types of animals, production records, feeds records and breeding records.

a) Records of types of animals

These records show the types of animals on the farm. They also show the numbers of each type. Animals are counted and recorded each week or month. The number of animals on a farm may change. This is because animals give birth, some may die, some animals are sold and new ones are bought. Below is an example of a record on types of animals.

Table 14: **Types and numbers of animals on Sarah's farm.**

Animal Type	Number on 1st January 2000	Number on 1st February 2000	Number on 1st March 2000	Number on 1st April 2000	Number on 1st May 2000
CATTLE	4	5	7	6	7
PIGS	3	8	10	5	4
LAYER BIRDS	200	198	196	194	193
BROILER BIRDS	0	200	190	187	5

Every month, there was a change in the number of each type of animals. There was a big change in the number of broilers between April and May. What do you think brought about such a big change?

There could be many types of animals in the neighbouring villages and on the school farm.

Activity 2

- Visit a school farm or any nearby farm. What animals did you see? These could be cattle, pigs, chickens, goats or rabbits.
- Keep a record of the animals you have seen. Count and record their numbers on the day you visit and after 30 days.
- Where the numbers have changed, find out the reason.

1. According to your records, were there any change in the number of animals?
2. If yes, what were the causes of the changes?

b) Production records:

These are records that show the amount of products from each animal on the farm. Examples of production records are;

i) Milk production records.

ii) Egg production records.

If the milk production of Mrs. Kirunda's cow has been 15 litres per day, and it drops to 10 litres, then there must be a problem. She has to find out the cause of the drop in the milk production and must then try to find a solution to the problem. On the other hand if the milk production increases to 18 litres this shows an improvement. She finds out the cause of improvement in milk production and tries to maintain it at that level of production. Production records therefore help us to see changes in production.

Take an example of Okello's poultry farm. He keeps layers on his farm. He is able to collect eggs everyday. Table 15 shows an egg production record of his poultry farm.

Mr. Okello's poultry farm

Table 15: Egg production record on Okello's Farm.

Day and Date	No. of Eggs collected in a day 1st	2nd	3rd	Broken eggs	Total No. of eggs laid	Remarks/comments
Monday, 1.2.2001	58	83	30	0	170	
Tuesday, 2.2.2001	50	89	27	4	170	
Wednesday, 3.2.2001	43	72	35	2	152	Some birds are still weak because of vaccination
Thursday, 4.2.2001	48	71	39	1	159	Some birds are still weak
Friday, 5.2.2001	55	82	35	1	173	Birds are now healthy
Saturday, 6.2.2001	53	91	31	0	175	
Sunday, 7.2.2001	50	89	30	3	172	

Mr. Okello has 183 birds on his farm.

On Monday, the birds laid 170 eggs. The birds which did not lay were 183 - 170 = 13. This shows that most birds were laying. The birds on Okello's farm were therefore producing well.

In the following activity you will make an egg production record;

Activity 3

- Visit a poultry farm near your school or any home with local birds (This can be a school poultry farm);
- Ask the farmer about egg production of the birds.
- Make an egg production record for that farm.

1. What was the number of birds on the farm?
2. What was the greatest number of eggs laid in a day?
3. What was the lowest number of eggs laid in a day?
4. Did you record any broken eggs?

Milk Production Record

A milk production record should be made for each day.
It should include the following:

1. Name or number of animal;
2. Day and date of the week;
3. Litres of milk produced in the morning and evening.

Here is an example of a milk production record:

Table 16

Name or number of the animal	Date	Amount in litres		Daily Total Production in Litres
		Morning	Evening	

From the record:

1. the farmer can tell the animals that produce much milk.
2. the farmer can also tell changes in the amount of milk produced by each animal.

An increase in milk production could be due to good feeding and good health.
A decrease in milk production could be due to sickness or poor feeding.

Now make a milk production record.

Activity 4

- Visit a nearby farm chosen by your teacher.
- Ask the farmer for the milk production records for the last two weeks.
- Discuss the records with the farmer.

As you discuss the records with the farmer, try to find out more useful information about the following:

(i) On which day was the highest amount of milk produced?
(ii) What was the highest amount of milk produced?
(iii) Which animal produced the highest amount of milk?
(iv) Which animal produced the lowest amount of milk?

- From what you found out during the visit make your own record.

c) Feeds records

These show:-

i) The amount of feeds kept in the farm store at a given time.

ii) Amount of feeds given to the animals each day.

iii) The different types of feeds stored.

From the records, the farmer will know when to buy more feeds.

In activity 5 below, you will prepare a feeds record. Use a school farm or visit a nearby farm.

Activity 5

- Find out the different types of animal feeds on the farm. These could be feeds like chicken feeds, dairy meal and banana peelings.
- Find out the amount of feeds kept for the animals at that time.
- Record your information in your exercise book.
- Use the table below as an example and make a feeds record in your exercise books
- Using the feeds record that you have made answer the following questions;

1. How much of each type of feeds is eaten everyday?
2. Which type of feeds will get finished first?

Table 17

DAY AND DATE	TYPES AND AMOUNT OF FEEDS			
	Chick Mash	Layers Mash	Banana peelings	Dairy meal
Monday 13th Jan. 2000	60Kg	120Kg	5 sacks	60Kg
Tuesday 14th Jan. 2000	55Kg	90Kg	3 sacks	53Kg
Wednesday 15th Jan. 2000	50Kg	60Kg	1 sack	46Kg

Read the following story to find out how farm records can be useful.

Once upon a time, there was a good poultry farm in Masindi. There were 1000 layer birds on the farm. Everyday, about 800 eggs were collected. The owner of the farm was a lady called Miss Migisha. She employed a farm manager to help her.

One day, she was invited to a wedding far away from her home. During her absence the farm manager was to take care of the farm. After 3 days, she came back. She asked for the records. The production records were showing that only 500 eggs were collected each day. The farm manager explained that the birds were sick. For the next two days the birds laid 800 eggs. This surprised Miss. Migisha. She decided to check on the health records. She found out that no birds had been treated. Probably the birds had not fallen sick. She checked the feeds record. She found out that the birds had eaten the same amount of food each day.

That day in the evening, a stranger came on a bicycle. He asked Miss. Migisha to sell to him some more poultry feeds. This surprised her very much. She told the man that the farm had never sold any poultry feeds before. The man was very disappointed. He rode his bicycle away while grumbling.

Use the passage to answer the following questions.

1. What is the name of the owner of the farm?
2. What was the main product of the farm?
3. What was the usual egg production per day?
4. How many eggs were produced per day, when the owner was away?
5. What reason did the manager give for the low egg production?
6. The owner of the farm got surprised twice. Why was she surprised?
7. Do you think the reason given in question 5 above was correct?
8. Why did the stranger get annoyed?
9. Do you think the stranger had ever bought poultry feeds from this farm?
10. Why do you think the birds laid 500 eggs instead of the usual 800 eggs a day?

From the story, we learn that for animals to produce well:

1. they must be fed properly.
2. farms should have good managers.
3. when animals are sick, they produce poorly.

What else do we learn from the above story?

d) Breeding records

These provide information about parents and offspring of farm animals. Each animal has its own record card. The record card contains:

i) Information about the parents of that animal such as:

- ❑ If parents were local or exotic animals;
- ❑ Identification numbers of the parents.

ii) Information about the animal itself such as:

- ❑ Its date of birth;
- ❑ Its sex;
- ❑ The day and date it was served;
- ❑ The male animal that was used to serve it.

iii) Information about its offsprings such as:

- ❑ Date of birth;
- ❑ Sex of the young animal.
- ❑ Identification number of the young animal.
- ❑ Date of weaning.

Activity 6

- Identify a cow on a school farm or a farm around your school.
- In your exercise books make a breeding record for that cow using the table below as an example:-

Breeding record

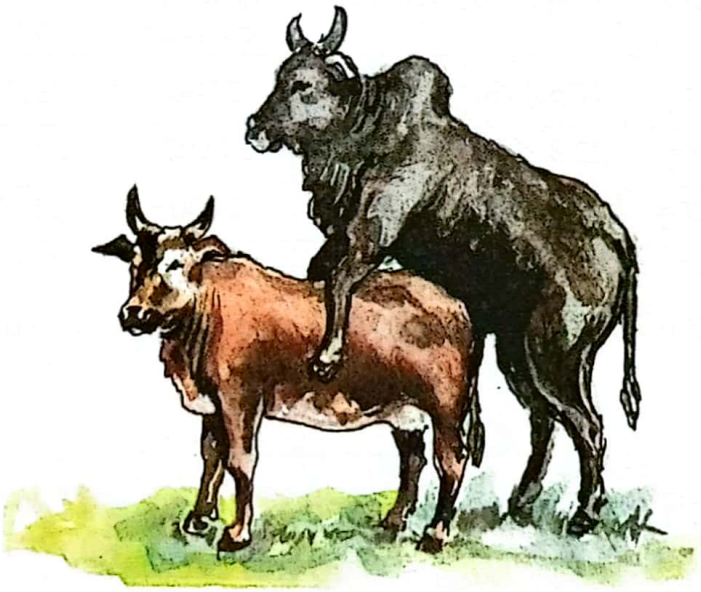
Table 18

Information about the animal itself	i) Name or identification number _____. ii) Date of birth: _____. iii) Sex: _____.
Information about its parents	i) Breed of the male parent: _____. ii) Breed of the female parent: _____
Information about its offspring	i) Identification number of offspring: _____. ii) Date of birth: _____. iii) Sex: _____.

Note the following words used:

Serving:

This is when a male animal mates with a female animal. The male deposits its semen into the sex organ of the female animal. As a result of this the female animal may become pregnant.



Weaning:

This is the separation of young animals from their mothers in order to stop them from suckling. The young ones start feeding on their own.

Calving:

This is a process of giving birth to a calf by a cow.

3. Crop record:

The crop record contains information about crops. A crop record is used to show the following:

a) the types of crops planted;

b) the area of each crop planted;

c) the quantity of the crop planted;

d) the time of planting;

e) the time of weeding;

f) how much of each crop is harvested;

g) how much money is spent to grow each crop;

h) how much money is got after selling each crop and;

i) what profit or loss is made for each crop.

The table below shows Mrs. Cherotin's crop record. Study it and answer questions that follow.

Table 19

Crop Planted	Date of Planting	Quantity of crop Planted	Date of Weeding	Quantity of crop harvested	Amount of money spent on growing the crop	Amount of money got after selling	Profit made	Loss made
Beans	25.4.2000	2Kg	17.5.2000	80Kg	2,000=	35,000=	33,000=	---
Maize	3.1.2000	3Kg	22.3.2000	120Kg	25,000=	24,000=	---	1,000=
Cabbages	31.3.2000	100g	12.5.2000	300Kg	6,000=	15,000=	9000=	---
G. Nuts	16.5.2000	6Kg	20.6.2000	200Kg	9,000=	45,000=	36,000=	---
Carrots	3.4.2000	100g	19.7.2000	200Kg	5,000=	25,000=	20,000=	---

Activity 7

- How much of each crop was harvested?
- How much money was got after selling the beans?
- How much money was got after selling cabbages?
- When were the cabbages planted?
- When was the weeding of groundnuts done?
- How much profit was made from the beans?
- From what crop did Mrs. Cherotin get the biggest profit?

- What crop was grown at a loss?
- How many types of crops did Mrs. Cherotin have on her farm?
- Which two types of crops were planted in the same month?

4. Financial records

These are records about money. Financial records show the income and expenditure on farms. Income refers to all money received by the farm while expenditure refers to money spent on the farm. Each time money is spent, it must be recorded. Likewise, each time money is received, it must be recorded.

Exercise: In your exercise book:-

1. List down any three things that can be bought for use on a farm.

a. _____.

b. _____.

c. _____.

The amount of money spent on buying these items, is an expenditure of the farm

2. List down any three things that can be sold from a farm.

a. _____.

b. _____.

c. _____.

Money got from selling these items is an income of the farm.

We can use a financial record to find out the profit or loss of the farm.

Activity 8

Kisenyi studied the receipts of the school farm. He noted the following:-

a) Receipts got after buying farm needs. These showed him the expenditure.

b) Whenever receipts were given out after selling farm products, an income was recorded. Kisenyi was able to make a financial record as below;

Study Kisenyi's farm record and answer questions after it.

Table 20

EXPENDITURE		
Item	Cost of each item	Money spent
2 hoes	1,700/=	3,400/-
6 rakes	600/=	3,600/-
2 spades	1,250/=	2,500/-
1 wheel barrow	8,300/=	8,300/-
3 pangas	1,400/=	4,200/-
6 sacks	150/=	900/-
5 kg of bean seeds	740/=	3,700/-
Total		
		INCOME
Selling crops		90,450/-
Selling milk		60,000/-
Selling butter and ghee		35,000/-
Total		

N.B If the expenditure is less than the income, the farm was making profit. If the income is less than the expenditure, the farm was making a loss.

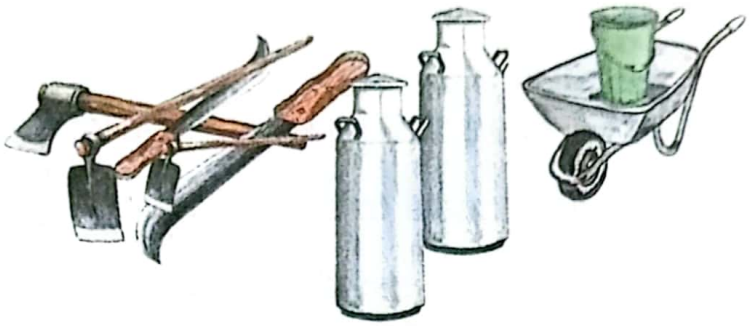
1. Which of the two (expenditure and income) was more than the other?
2. Did the farm make a loss or profit?
3. If the farm made a profit, how much was it?
4. If the farm made a loss, how much did it lose?

5. Farm inventory

An inventory is a record of the tools, property and equipment owned by a farm. Table 21 below is an example of a farm inventory record.

Table 21

ITEM	QUANTITY
1. Hoes	7
2. Pangas	10
3. Seeds (G. Nuts)	3 Sacks
4. Milk cans	5



Some tools and equipment which can be recorded in an inventory

An inventory record is prepared every year. This is because some tools get lost, get broken, and others become old. An inventory will help to show which new items should be bought.

Activity 9

- Prepare an inventory of the school farm or a nearby farm.
- As a class discuss your record with the teacher.
- Give at least two reasons why we should have an inventory.

Uses of Farm Records

Records are useful because of the following;

1. They help the farmer to work out his profit or loss. A farmer makes a profit when his income is more than his expenditure. If the expenditure is greater than the income then the farmer has made a loss. Farmers must therefore avoid spending more than they earn.

2. Records help farmers to make right decisions as in the story below.

   Mr. Kale was a cattle keeper. He had two types of animals on his farm, the Boran and Zebu. He always gave them the same feeds. The production records were showing that the Boran was producing 15 litres of milk each day. The Zebu produced 9 litres of milk each day. He went to the bank to get a loan.

In order to qualify for the loan Mr. Kale was asked to keep only one type of cattle.

a) If you were Mr. Kale, which type of animal would you decide to keep?

b) Why would you choose that type?

From this story we learn that records help farmers to choose breeds of crops and animals that make the biggest profit.

3. Records help farmers to be taxed fairly.

The amount of tax to pay depends on how much a person owns or earns. It is easy to determine taxes when one looks at records. A farmer who does not keep records may be cheated or overtaxed by tax collectors.

What should a farmer do to avoid being overtaxed?

4. Farm records help farmers to plan better for the farm.

By looking at the tools, property and equipment in the farm inventory, the farmer can then plan for;

a) What to buy.

b) What activities to carry out according to the available tools and property.

5. Records help farmers to know how much it costs to grow a crop or keep animals.

6. Records help farmers to tell how much a crop or an animal may produce. Production records show how much is produced. When the amount in production reduces the farmer can know that there is a problem.

Self Testing Exercise

1. *Name at least five records that you know.*
2. *What problems are you likely to face when you do not record what happens on the farm?*
3. *There is a record that shows all events of the farm. These are events that took place, that are taking place and those that will take place. Which record is it?* _____
4. *Fill in the type of record to which the following activities belong?*

(a) *The day and date your cow produced a calf.* _____ *record.*

(b) *The tools and equipment in your farm store.* _____ *record.*

(c) *The number of eggs collected on a given day.* _____ *record.*

(d) *The expenditure on your farm.* _____ *record.*

(e) *The amount of food given to chicken each day.* _____ *record.*

5. *Name four ways in which a farmer can find farm records helpful.*

(i) _____

(ii) _____

(iii) _____

(iv) _____

GLOSSARY

Bilharzia : one of the diseases transmitted to man through dirty water.
Branding : a method of marking an animal with a permanent letter on the body
Breeding : producing young animals or plants.
Broiler birds : chicken which are kept for producing meat.
Cholera : a disease transmitted to man through dirty water and food.
Colonialists : people from other countries who were ruling African countries long ago.
Competition : a situation where two or more things need the same thing but it is not enough.
Concrete : a mixture of sand, cement, small stones and water used in building
Deworming : giving animals medicine or drugs to kill worms in the body.
Disease : an infection that makes plants and animals grow poorly.
Dipping : making farm animals swim in treated water to control ticks and some parasites.
Drought : a situation where dry weather continues a situation whereby dry weather becomes continuous and may cause famine.
Ear-notching : a method of marking animals on the ear by cutting off small parts.
Ear-tagging : a method of marking animals on the ear with a labelled plastic piece.
Famine : a time when there is little food in a place.
Harrow : breaking big lumps of soil into small particles.
High Yielding : a crop or animal that gives a lot of farm products.
Interest : extra money paid when paying a loan
Layer birds : chicken which are kept for laying eggs.
Management : controlling and making decisions in farming.
Milking Parlour: a place where animals are taken for milking.
Mobility : how easy or difficult it is for someone to move.
Nitrogen : one of the soil nutrients used by crops.
Offspring : the young of an animal.
Paddock : a fenced piece of land with pastures.
Parasites : A living thing that depends on another living thing for food.
Plumule : part of the seed that grows into a shoot.
Post-Harvest : something that is done or happens after harvesting.
Propagate : to grow and increase the number of plants.
Radicle : part of the seed that grows into roots.
Resistant : crops or animals that are not easily attacked by a disease.
Shelter : a house constructed for farm animals.
Silt : very fine soil particles.
Spillway : passage for excess water from a dam.
Stakes : sticks or poles used to give support to crops in the garden.
Suckling : When a young one feeds on milk directly from a mother's breast or udder.
Taste : the flavour of something on the tongue.
Thinning : uprooting some of the seedlings to leave just enough plants.
Transplanting : transferring of young plants from the nursery bed to the garden.
Trough : open containers from which animals drink or eat.
Typhoid : a water born disease spread through contaminated water or food.
Vaccination : injecting animals with vaccines to protect them against diseases.
Valley Dam : artificial reservoir made in the valley to trap water.
Zero-grazing : system of keeping animals under shelter and feeding them from there everyday.

MK Primary Agriculture Course has been written with the aim of developing a desire in primary school pupils to engage in Agricultural activities.

This course provides to the learners the basic knowledge and skills needed to be able to use their immediate environment for sustainable Agricultural production.

MK Primary Agriculture pupil's Book 4 is intended for pupils of 10 years and above. This book contains a lot of knowledge, skills and activities concerning crop husbandry, soil management, animal husbandry, farm record management etc.

The approach in this book is field oriented thus pupils do a lot of practical work in order to understand the principles being taught.

MK Primary Agriculture pupil's Book 4 is based on the new Primary Agriculture Curriculum and is supported with a teacher's guide.

The teacher's guide contains topics, aims and objectives, advice on teaching methods, suggestions of discussion, practical work and answers to the self testing exercise in the pupil's book.

MK Primary Agriculture Pupil's Book Four
ISBN: 9970-04-024-5

Setting a New Trend in School Book Publishing