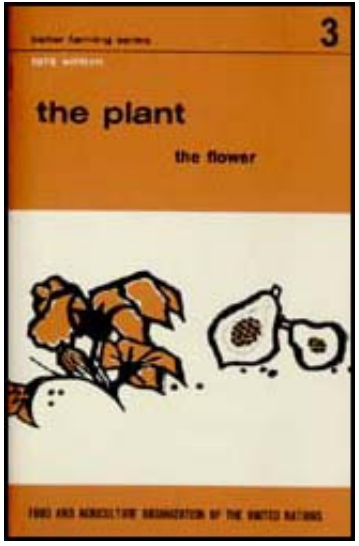

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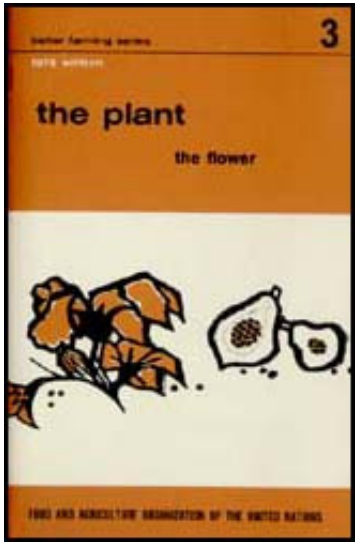
  - *(introduction...)*

- Mango
- Papaya
- Groundnut
- Rice



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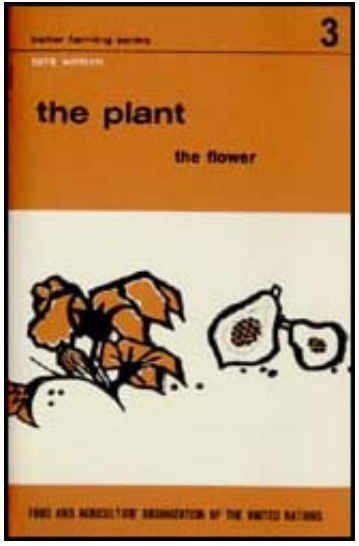

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Preface

This manual is a translation and adaptation of "La plante la fleur," published by the Agri- Service- Afrique of the Institut africain pour le developpement economique et social (INADES), and forms part of a series. Grateful acknowledgement is made to the publishers for making available this text, which it is hoped will find widespread use at the intermediate level of agricultural education and training in English- speaking countries.

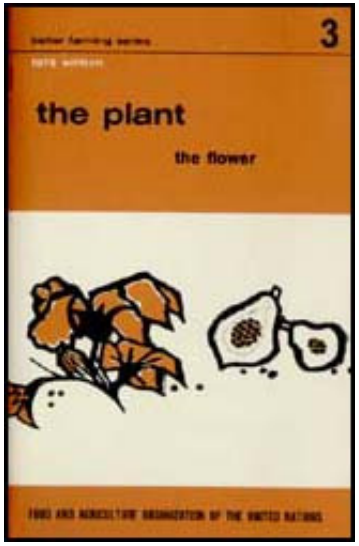
The original texts were prepared for an African environment and this is naturally reflected in the English version. However, it is expected that many of the manuals of the series a list of

which will be found on the inside front cover will also be of value for training in many other parts of the world. Adaptations can be made to the text where necessary owing to different climatic and ecological conditions.

Applications for permission to issue this manual in other languages are welcomed. Such applications should be addressed to: Director, Publications Division, Food and Agriculture Organization of the United Nations, Via delle Terme di Caracalla, 00100 Rome, Italy.

The author of this English version is Mr. A.J. Henderson, former Chief of the FAO Editorial Branch.

initiative, mastered by Software Developer Alex Weir and hosted by GNUveau Networks (From globally distributed organizations, to supercomputers, to a small home server, if it's Linux, we know it.)ar.cn.de.en.es.fr.id.it.ph.po.ru.sw



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  - Why we study the flower, fruit and seed
  - The flower
  - The fruit and the seed
  - Seeds and sowing

Suggested question paper

Plan of work

FIRST WEEK

The flower.

See below

- Take a good look at the flowers where you live.
- If the okra, hibiscus, cotton and groundnuts are not in flower, look carefully at the drawings.

Make sure you recognize the male and female organs in the flowers.

- In this course there are some new words. Learn them well.

Then you will follow the rest of the course more easily.

SECOND WEEK

The reproductive organs. Fertilization.

See below.

- This means you will study once more pages 10 to 15 on the reproductive organs.

- Make an effort to understand these pages, to look carefully at the flowers and the drawings.

It is very important to understand ferilization fully. If necessary, go over it again.

THIRD WEEK

The fruit. The seed. Germination.

See below.

- To help your memory, read again pages 10 to 15. They explain how fruits and seeds are formed.

- In learning how the germ grows, you will understand why it is necessary to sow seeds with great care.

FOURTH WEEK

Seeds and sowing: choosing, practical advice, storing.

See below.

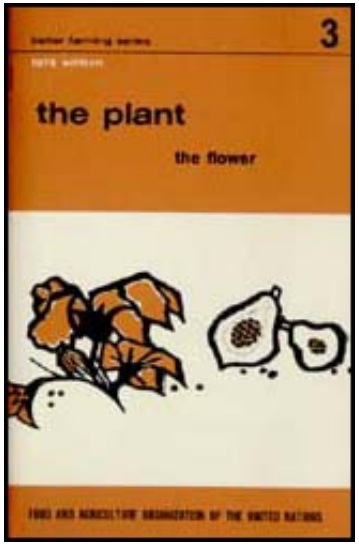
What you learn this week will be useful in all your work.

- Read again with care the whole course (especially pages 10

to 15).

• Answer the question paper. Try to answer the questions without looking at the course. Then look at the course to see if you have given the right answers.

Better Farming Series 03 - The Plant: the Flower (FAO - INADES, 1976, 29 p.)



Why we study the flower, fruit and seed

You want to understand what you are doing.
You don't want to work like a machine.

- You sow seed in order to get a good harvest, but you want to understand how the flower produces the fruit, how the fruit

produces the seed, how the seed produces the plant.

You want to know how the plant reproduces itself.

- You want to understand why you must choose good varieties, selected seed; why you must disinfect seed; how you can best store the harvest.

We must study the flower, the fruit and the seed in order to understand them better and to get good harvests.

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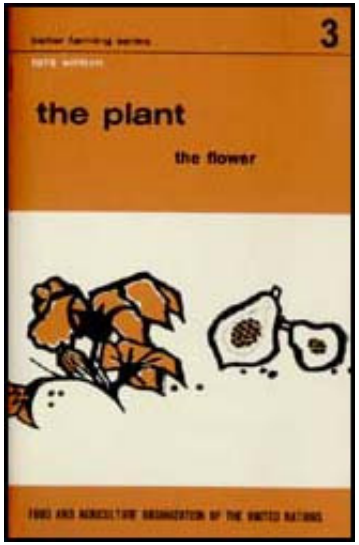

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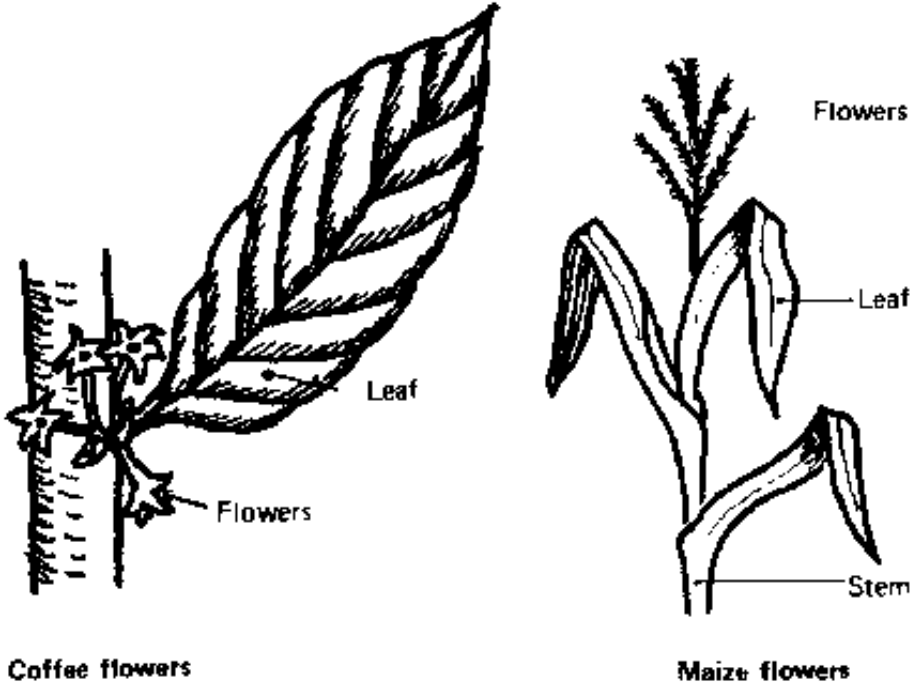
      - The protective organs
      - Summary
    - What the flower does
      - *(introduction...)*
      - Fertilization

Better Farming Series 03 - The Plant: the Flower (FAO - INADES, 1976, 29 p.)

The flower

Where is the flower?

The stem bears buds. The buds produce leaves or flowers. Often the flowers are between the stem and the leaf.



Coofee and maize flowers

Flowers can also grow at the tip of the stem.

How flowers are made

All the plants you grow have flowers.

- The cotton flower is like the hibiscus flower. There are flowers which are alike; they belong to the same family.

- The cotton flower is not like the maize flower. There are flowers which are different; they do not belong to the same family.

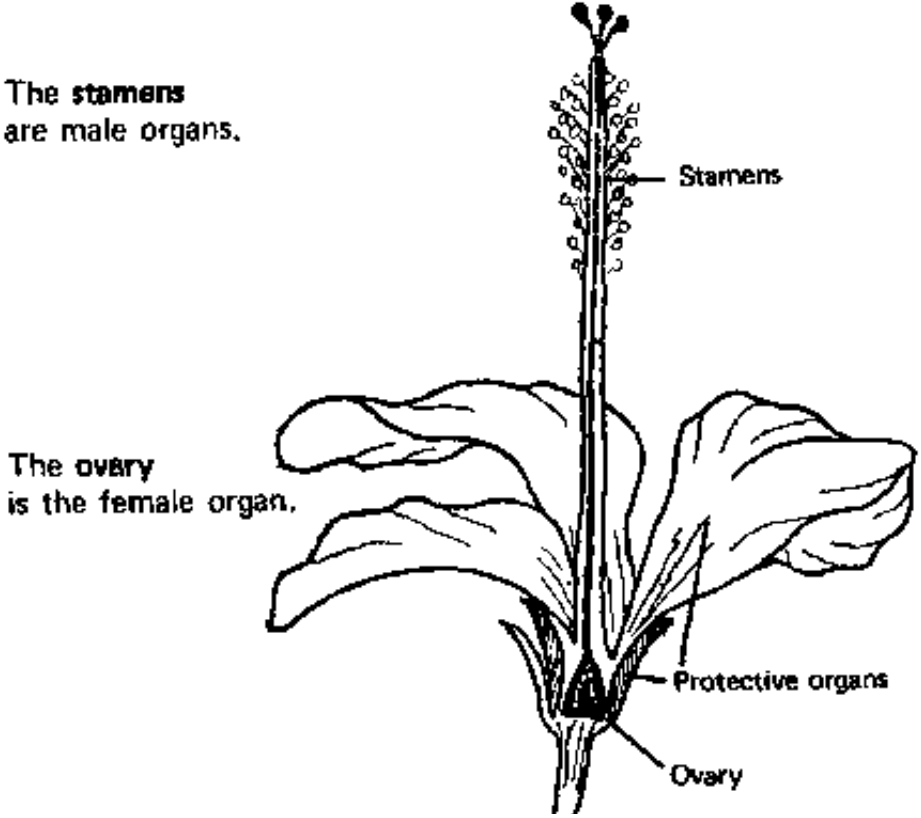
- The flowers of rice, maize, sorghum are pressed close together round an axis, a main stem. They make a spike. The flowers of coffee and hibiscus are not pressed close together.

- There are flowers of all colours: reds, yellows, violets, greens, greys.

For instance, grass flowers are green,

Let us look at a hibiscus flower, or one of cotton, which has been cut in half with a razor blade.

The stamens are male organs.
The ovary is the female organ.



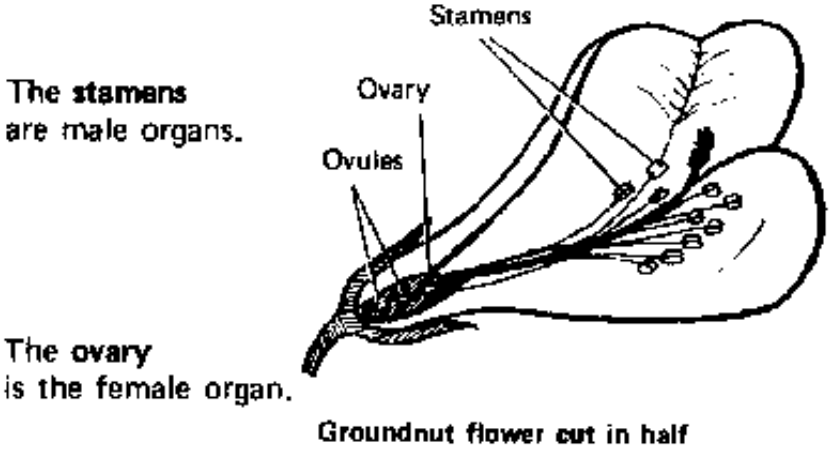
Hibiscus flower cut in half

Hibbiscus flow cut in halt

Around the ovary and the stamens there are protective organs.

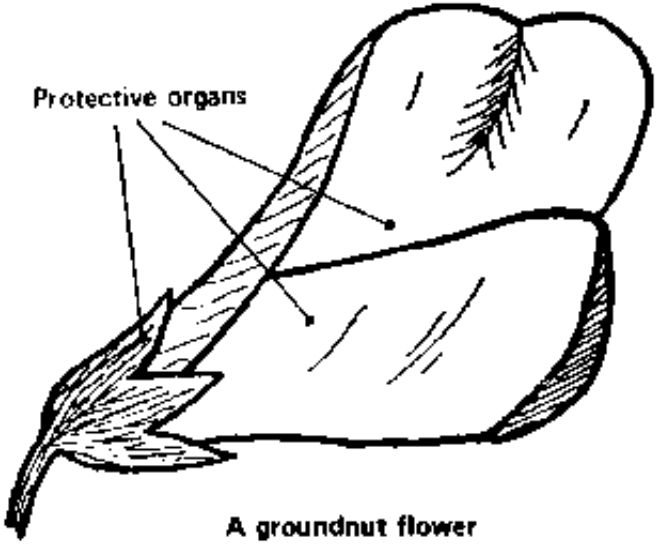
Let us look at a groundnut flower.

The stamens are male organs.
The ovary is the female organ.



Groundnut flower cut in half

Around the ovary and stamens there are protective organs. They protect the stamens and the ovary.



A groundnut flower

Let us look at a maize plant.

- At the tip of the stem there are a lot of little flowers.

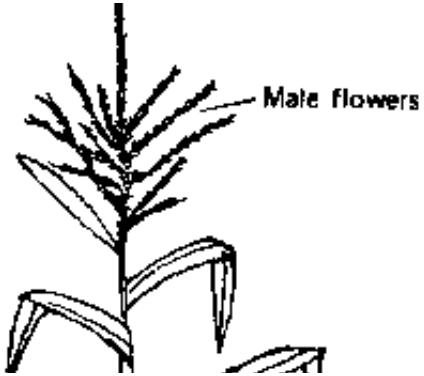
They have stamens but no ovary.

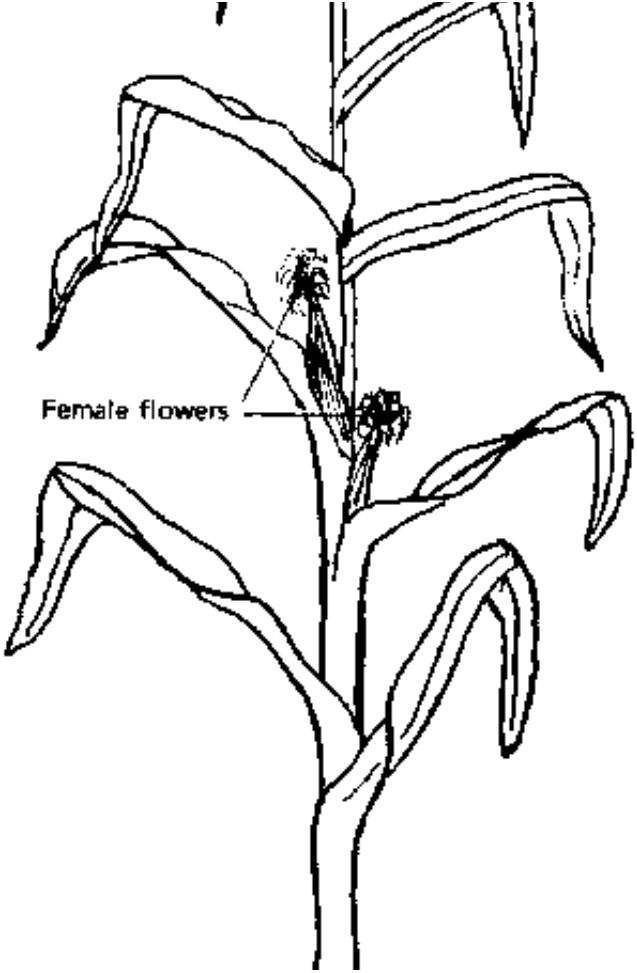
They are male flowers.

- In the middle of the stem there is the spike (see page 6).

It consists of many flowers. Each flower has an ovary but no stamen.
These are female flowers.
Each flower, each ovary, produces a fruit, a seed.

- The male flowers and the female flowers also have protective organs.




Female flowers

A maize plant

The stamens and ovaries

These are the most important parts of a flower.
Let us now look in more detail at each of these parts.
This will help you to understand the rest of the course.

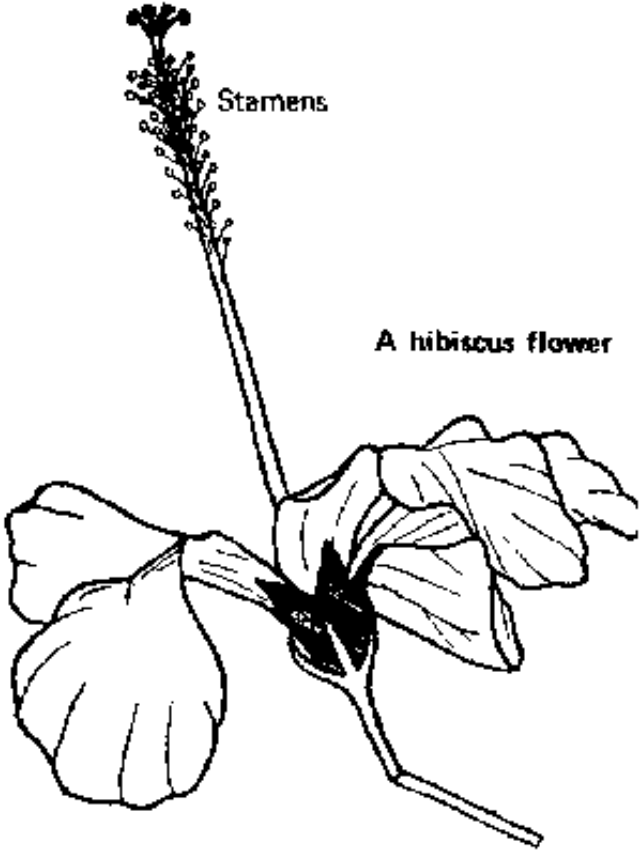
- The male organs. Each stamen consists of a thread with a little bag at the end. In this little bag there is a yellow powder. This is pollen. If you touch the stamens of a flower, pollen sticks to your fingers. Pollen is produced by the stamens.

Not all flowers have the same number of stamens.

The hibiscus flower has many stamens.

The groundnut flower has ten stamens.

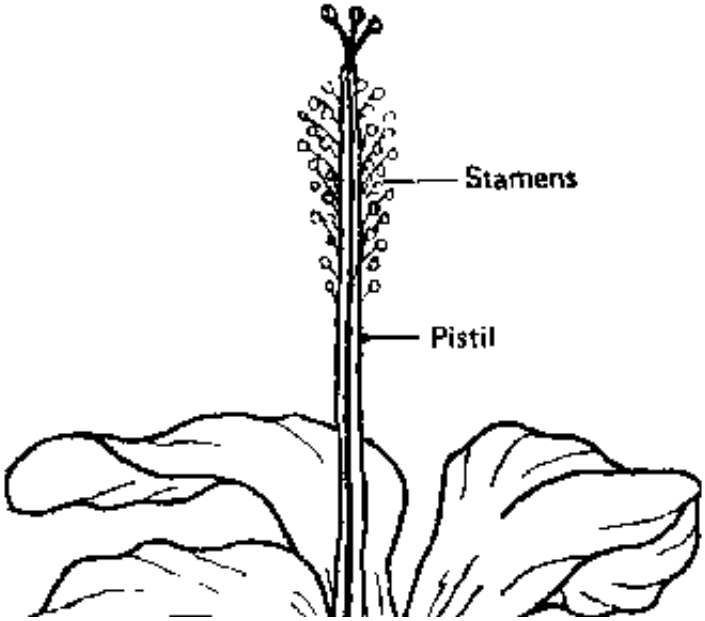
At the top of the maize stem there are many flowers.
Each male flower of maize has three stamens.

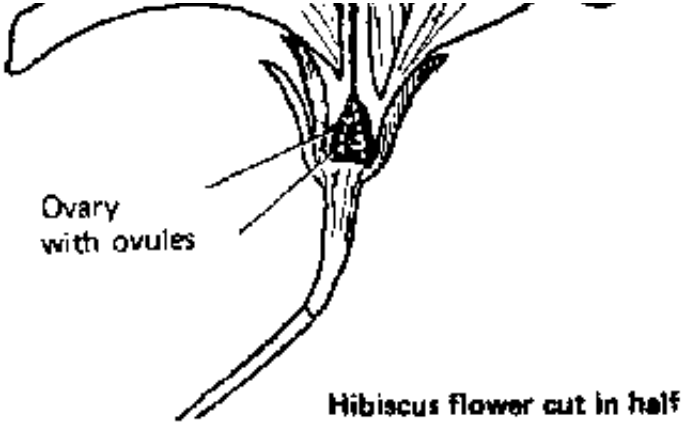


A hibiscus flower

- The female organs.

With a razor blade we will cut in half an okra flower, or a cotton or hibiscus flower.
The ovary is full of little white grains. These are the ovules.
The ovules will produce the seed.





Hibiscus flower cut in half

- From the ovary grows a long tube, called the pistil.

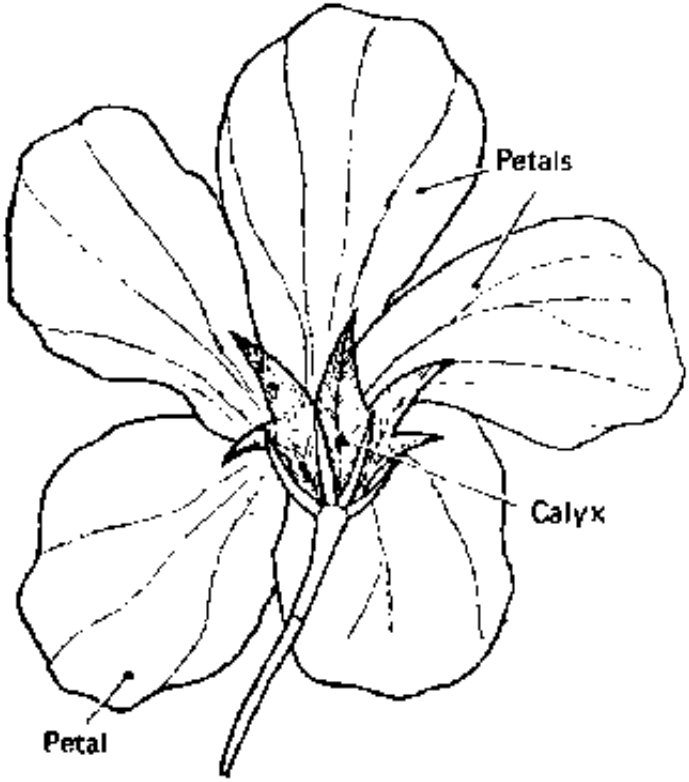
The pistil of a hibiscus flower carries five little red globes covered with moist hairs.
The pistil of a coffee flower has only one globe .
The pistil of the female flowers of maize is highly developed. On the female flowers of maize you can see many pistils (they look like hairs).

At the end of each pistil there is an ovary that produces a seed.
If you cut off the pistils, there will be no seed.

The protective organs

Take a hibiscus flower.

The male and female organs are protected by five red petals. These petals go all round the flower.
At the base of the petals is a little bowl made of five green leaves. This is called the calyx.



Hibiscus flower seen from below

Hibiscus flower seen from below

When the flower opens, the petals come out of the calyx. The calyx and the petals protect the inside of the flower.

Summary

A plant flower has always: a male part the stamens; a female part the ovary; around these two parts the protective organs.

Stamens and ovary can be in the same flower, for example, hibiscus, okra, cotton, pimento, tomato, tobacco.

Stamens and ovary can be in different flowers. Then there are male flowers and female flowers, for example, in maize and oil palm.

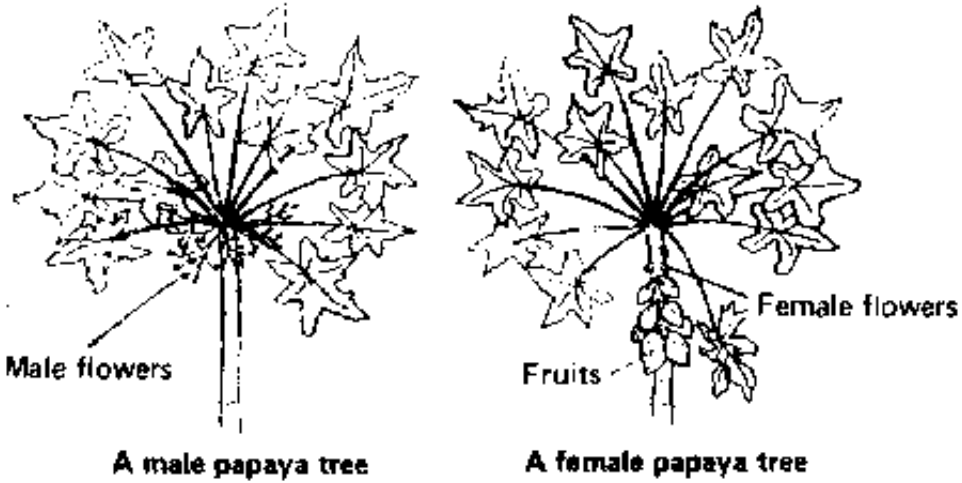
Stamens and ovary can be in different flowers and on different plants.

In the papaya tree, the male flowers and the female flowers

are not on the same tree.

There are male papaya trees and female papaya trees. Only the female papaya trees bear fruit.

The male papaya trees cannot produce fruit, but sometimes papaya trees that have male flowers do produce fruit.



A male papaya tree & A female papaya tree

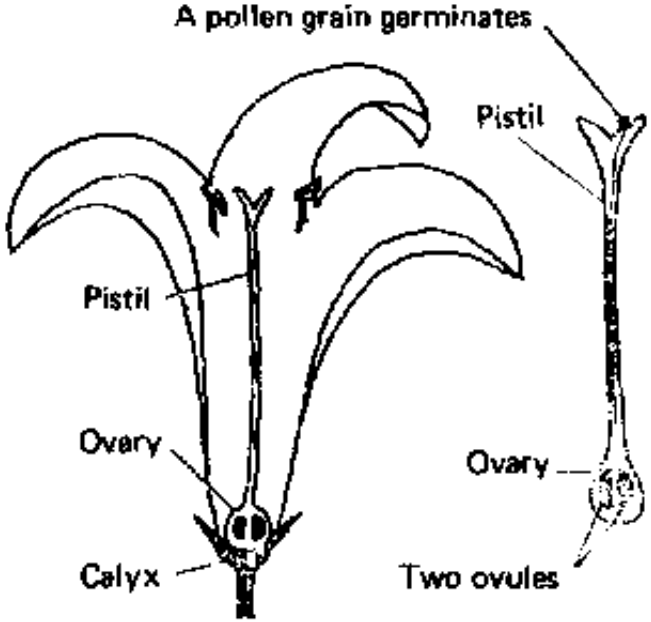
What the flower does

Flowers have male organs and female organs. The union of pollen and ovule produces a seed. The seed can produce a plant.

Fertilization

- How does the union of pollen and ovule take place?

The stamens produce pollen. The pollen is very light. Wind or insects can carry it a long way. The pistil hairs are moist. Pollen sticks to them. The pollen germinates in the pistil as a seed germinates in moist earth. The pollen penetrates inside the ovary and into the ovule. The ovule is fertilized.



Coffee flower cut in half

Coffee flower cut in half

Fertilization is the union of pollen and ovule.

If the flower dries up before the pollen arrives, there is no

fertilization.

When the pistil is dry, the pollen cannot germinate.

A very dry wind, for instance, can prevent fertilization and reduce the harvest.

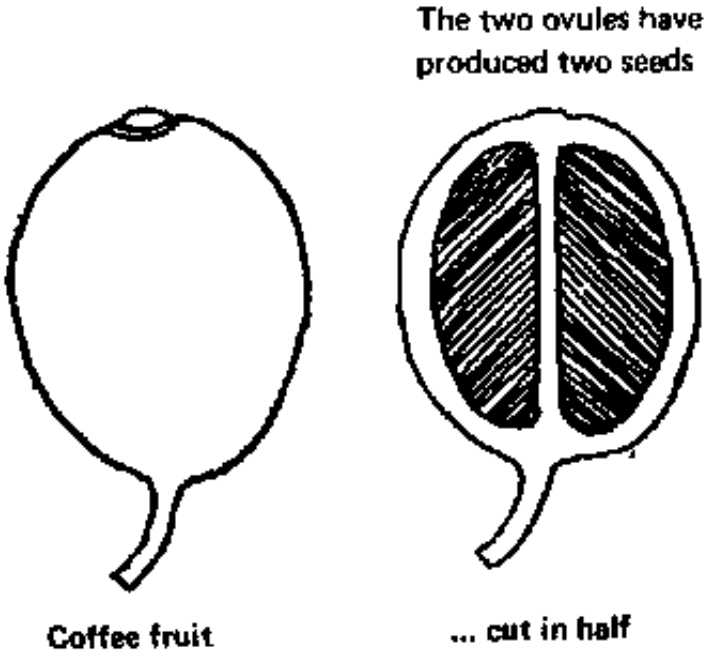
After fertilization the ovary and the ovules swell.

The ovary becomes the fruit. The ovules become seeds.

If the ovary has only one ovule, the fruit will have only one seed, for instance, mango, avocado.

If the ovary has several ovules, the fruit will have several seeds, for instance, orange, papaya, bean, coffee.

The two ovules have produced two seeds



Coffee fruit & Coffee fruit cut in half

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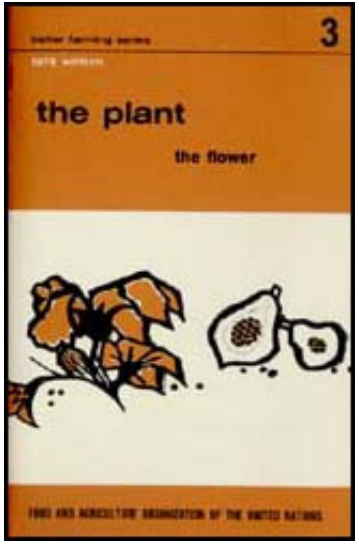

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  - The fruit and the seed
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    - Papaya
    - Groundnut
    - Rice
    - Summary

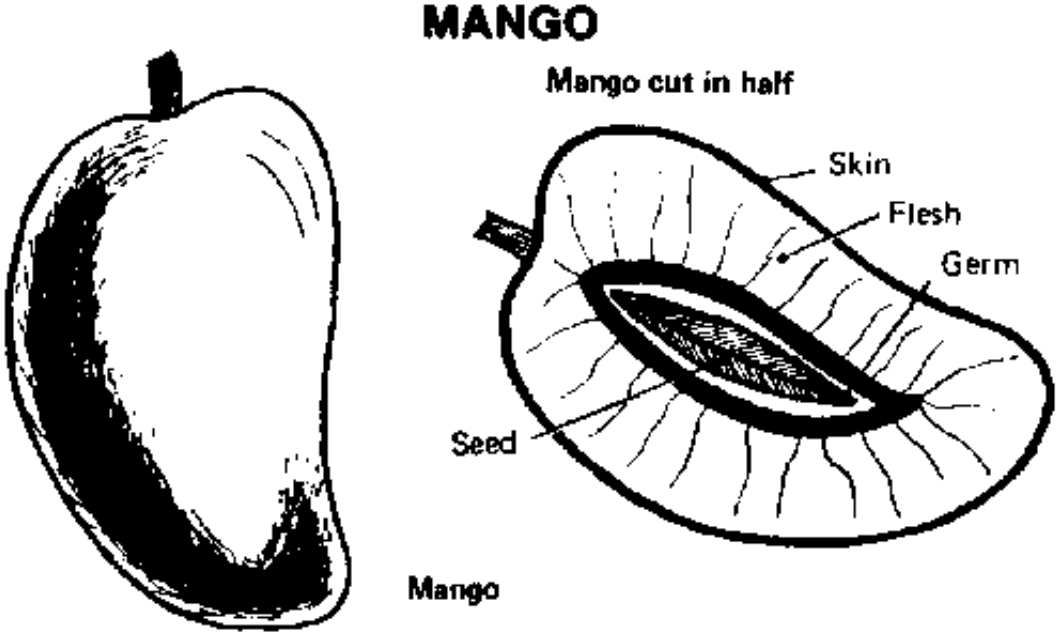
Better Farming Series 03 - The Plant: the Flower (FAO - INADES, 1976, 29 p.)

The fruit and the seed

Plants are not all alike, Roots, stems, leaves, flowers are different. The fruits too are different.

The mango, cocoa pod, grains of maize, the avocado, papaya and cotton boll are all fruits. But they are not alike.

Mango



Mango

The fruit of the mango is covered with a hard skin.

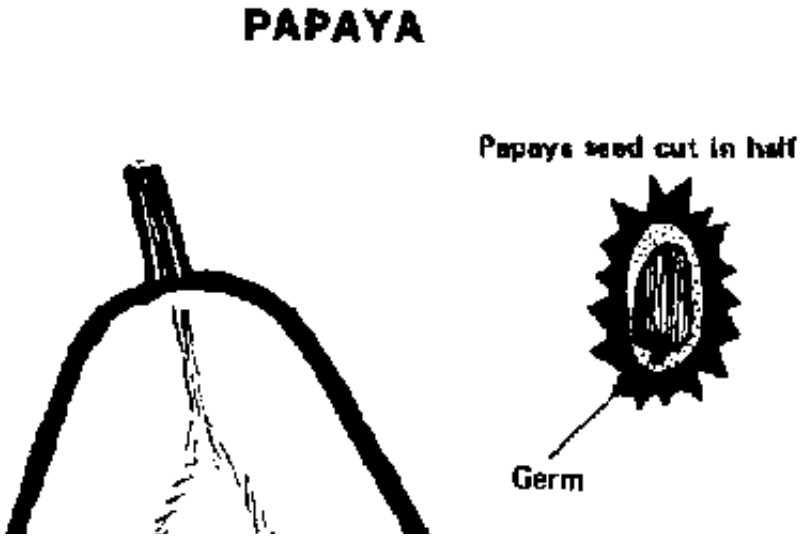
The flesh is underneath this skin. It comes from the ovary of

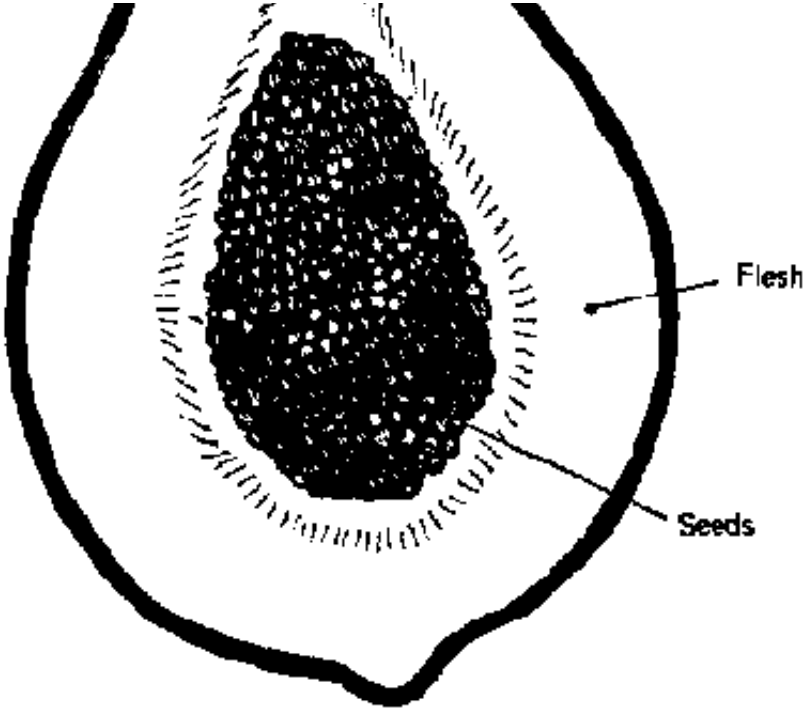
the flower. It is yellow, juicy, good to eat. It covers the seed.

The seed is big and hard. It comes from the ovule of the flower. It contains a germ.

In the ground the germ can produce a mango tree.

Papaya





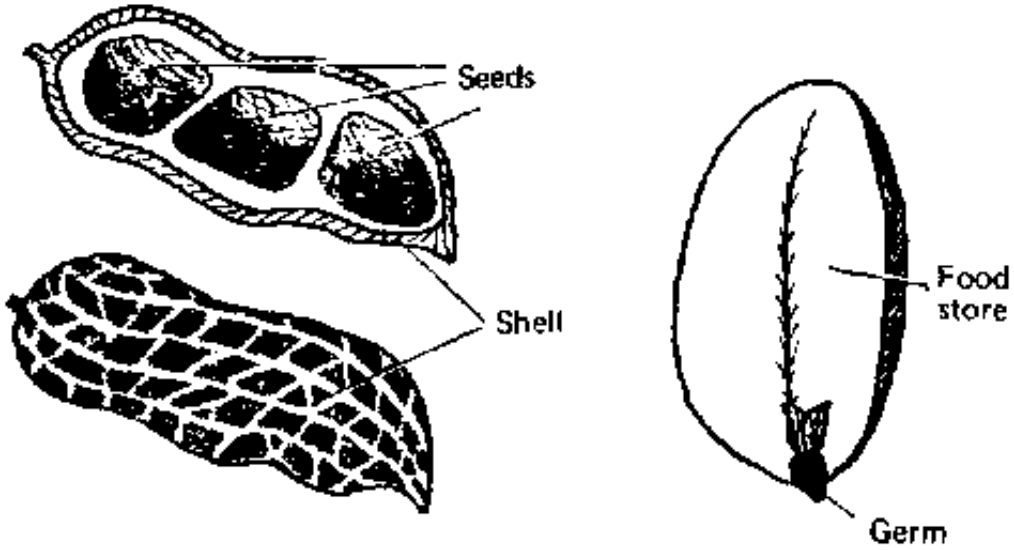
Papaya cut in half

Papaya cut in half

The fruit of the papaya tree is covered with a very thin skin.

The flesh is underneath this skin. It is yellow, juicy, good to eat. It covers very many seeds. Each seed contains a germ. In the ground the germ can produce a papaya tree.

Groundnut

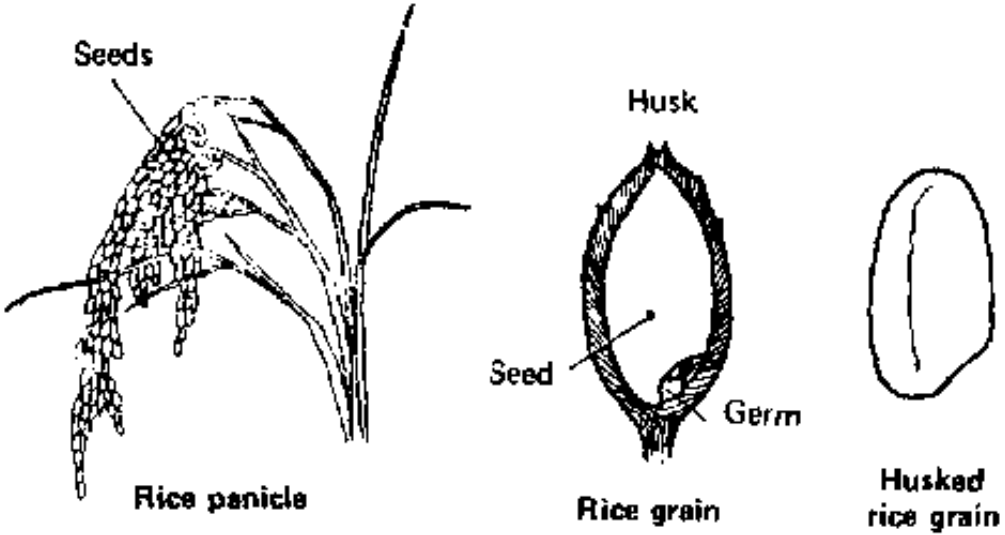


Ground nut

The fruit of the groundnut is covered with a shell. This shell is yellow; it dries when taken out of the ground.

It covers one or more seeds. Each seed contains a germ. In the ground the germ can produce a groundnut plant.

Rice



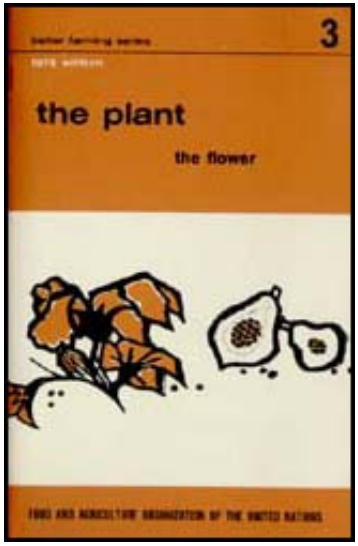
Rice

Each grain of rice is a fruit.
The fruit of rice consists of two parts: the seed and fine, dry husks.
Each grain contains a germ. In the ground the germ can produce a rice plant.

Summary

The flesh of the papaya and the mango, the shell of the groundnut and the husk of rice contain one or more seeds.
All fruits consist of a covering containing one or more seeds.
We eat or sow only the seeds and not the coverings of millet, groundnuts, cotton or rice.
Removing the coverings of millet or sorghum is called threshing.
Removing the covering of cotton is called ginning.

Removing the covering of groundnuts is called shelling.
Removing the covering of rice is called husking.
Threshing, ginning, shelling or husking can be done by hand in the traditional way or by machine.
For instance, there are ginning mills for cotton.
We shall have more to say on this in the courses on particular crops.



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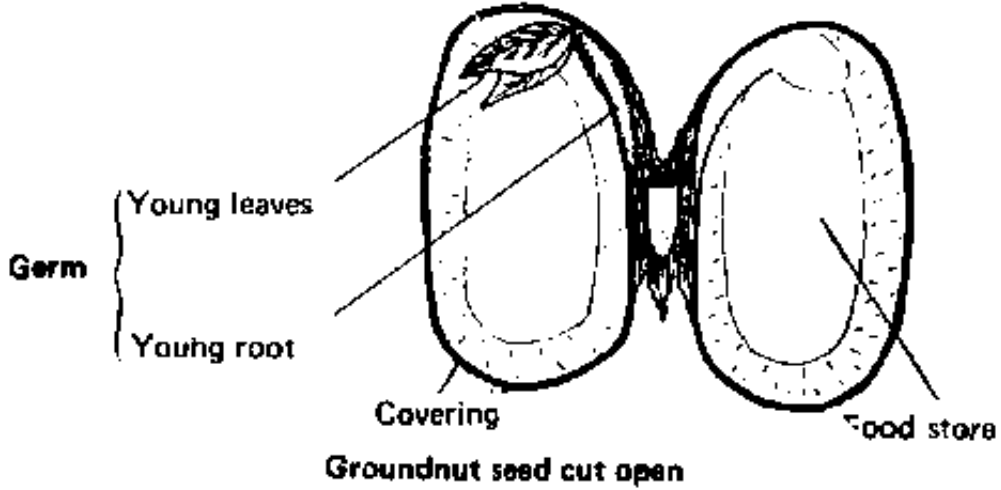
Seeds and sowing

How the seed grows

- A seed consists of:
    - a protective covering which is more or less hard;
    - a store of food;
    - a germ.
    - The germ is alive.



Groundnut seed cut open

The germ takes its food from the store of food built up in the seed.
The leaves and roots cannot yet feed the plant; they are still in the seed.

- The seed needs water.

The germ is a plant.
To grow it needs water.
The germ of a dry seed cannot grow.
When the soil is moist, water enters the seed.
Its skin becomes soft and splits. The germ grows.
Sowing must be done in moist soil.
But if there is too much water, seeds die. They rot.

- The seed needs air.

The germ is a plant. It breathes.

The seed must find air in the soil.

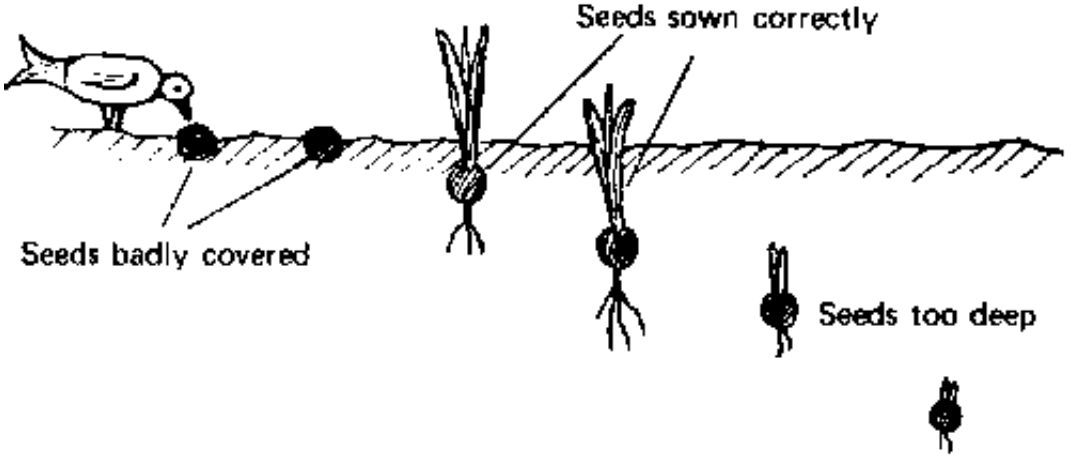
Before sowing, the soil must be worked so that air can get into the soil.

The soil must not be packed too hard over the seeds.

If the soil is packed too hard, the germ will lack air and grow badly.

The seed must not be sown too deep. If it is, it will lack air, and its food reserves will soon be used up. The plant will not be able to come out of the ground.

However, the seed must be sufficiently covered. Seed that is not sufficiently covered germinates badly. And the birds may eat it.



Seed planting

If seeds are sown at the same depth, the plants come out of the ground at the same time. They will all be the same size, and you can more easily choose the moment to put down fertilizers, apply pesticides, and harvest.

Choice of seed

- To get fine healthy plants and good harvests, you must sow

good seed.

A child is like its parents.
An ailing, small plant produces bad fruits and bad seed.
Bad seed produces bad harvests.
A modern farmer chooses good seed and gets good harvests.
Choosing good seed does not take a lot of work, does not take a lot of money. It only needs care.

- How to choose good seed.

To get a better harvest, you must choose better seed, better varieties.

What is a variety?

For example:

All maize plants are not alike.

The height of the plants, the size of the heads of grain, are different.The grains are not all the same colour, or the same shape;the harvest is not always at the same time.

There are many varieties of maize.

Some varieties give a bigger harvest.

For instance, local cotton yields 150 to 200 kilogrammes per hectare.
Allen cotton can yield 1 000 kilogrammes per hectare.
The wild oil palm yields about 20 kilogrammes of fruit clusters per year.
Selected oil palm can yield 100 kilogrammes of fruit clusters per year.

Some varieties can be harvested earlier.

In northern Cameroon gara sorghum grows in 110 to 130

days; shoukouloum sorghum grows in 160 to 170 days.

Some varieties yield a better product.

Cotton fibres may be long or short.
Allen cotton has fibres that are longer than Mono cotton.

Some varieties are more resistant to diseases.
Some varieties of groundnuts (varieties 48- 37 and 1.041) do not get the disease called rosette.
These varieties are said to be rosette- resistant.
In your home district, what varieties do the extension officers recommend for millet, sorghum, cotton, groundnuts, rice, tomatoes?

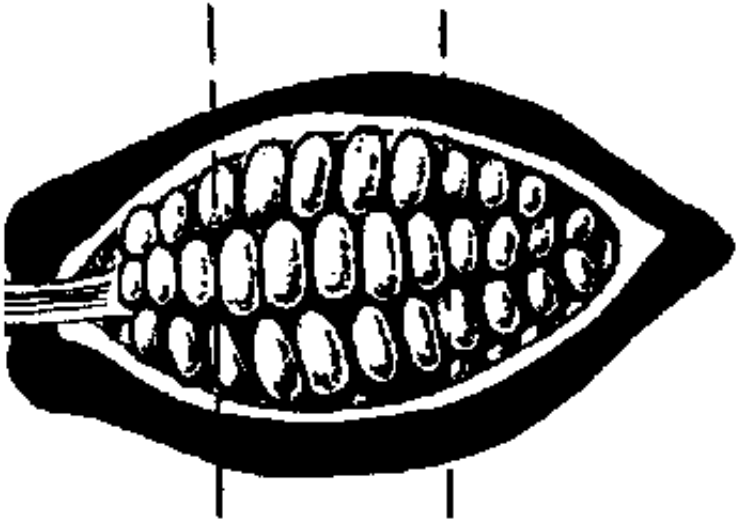
Practical advice

- Buy your seed from the agricultural service.

Grow the best varieties
You will get good harvests.
To buy seed you need money.
So as not to waste money, you must prepare your field well, sow at the right time, do the harvesting well.

- You can produce your own seed.

Choose the finest fruits from your finest cocoa trees, from your best field of groundnuts.
Take the best grains of maize.
The plant's good qualities will be passed on to the new plants.



Take the best beans from the middle of the pod

Take the best grains from the middle of the maize cob

Take the best beans from the middle of the pod

- Sort out your seed.

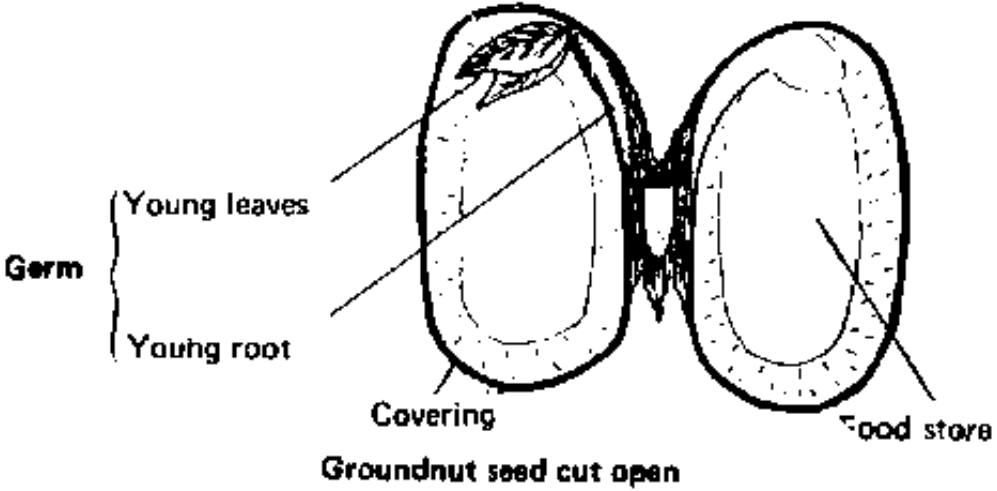
Do not use seed that is too old.
The germ is dead, the seed will not germinate.
Use whole, well shaped seeds.
Remove all bad seed, all small, broken, diseased seed, and seed eaten by insects.
Well sorted seeds will all germinate. You will get a good density.

- Disinfect your seed.

Seed can be attacked by insects and diseases.
Protect seeds against insects and diseases.
Mix a pesticide with the seed.
You can buy it from the agricultural service.
The agricultural adviser will tell you how much to use.
You must follow his advice.

- Make sure that the seeds and the pesticide are well mixed,

that all the seeds are covered by the pesticide.



Groundnut seed cut open

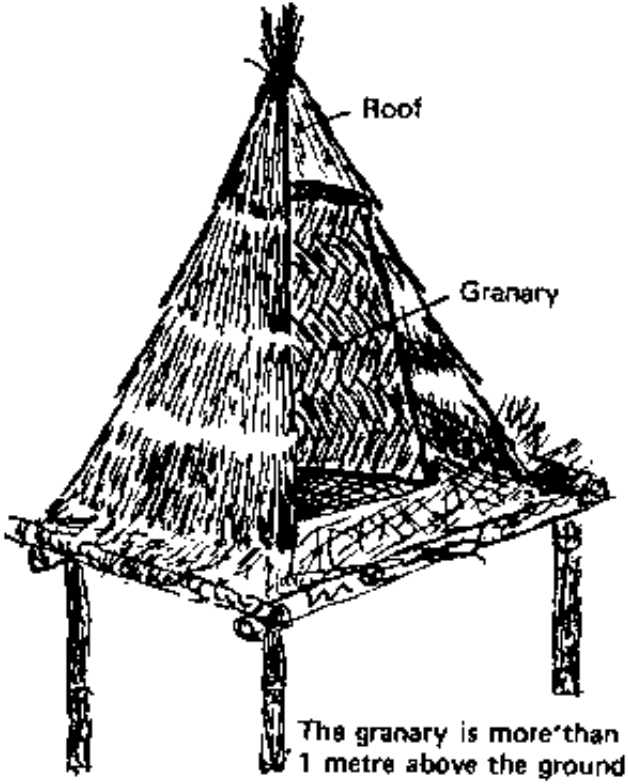
Equipment for treating seeds

- You must take great care. The pesticide is a poison. Wash well after handling it. Do not leave the pesticide near children.

Do not eat or give to animals any seed treated with pesticide.

Storing grain and seed

The farmer puts his harvest in granaries.
In this way he keeps his grain and seed for the following year.
Not all granaries are alike.
They may be made of wood or clay or basketwork.
Granaries must not touch the ground.
Then the grain will keep dry.
Animals cannot knock over the granary and eat the grain.



Basketwork granary

Basketwork granary

Before putting grain in granaries:

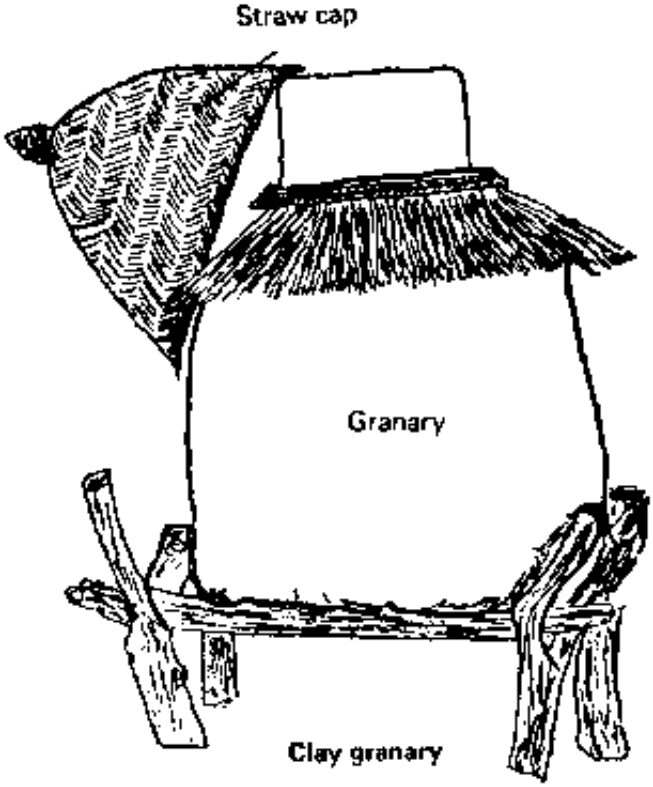
- the grain must be well dried.

Grain that is not dry enough may rot.
It will not be any good to eat or sow.
It is very important to dry grain well.

- the granary must be well cleaned.

Two weeks before harvest, sweep and disinfect the granary.
Kill insects with a pesticide.

Ask advice from the agricultural officer; some pesticides are poisonous.



Clay granary

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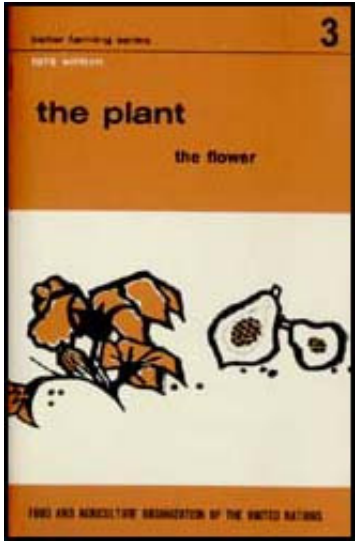

- Better Farming Series 03 - The Plant: the Flower (FAO - INADES, 1976, 29 p.)
  - *(introduction...)*
  - Preface
  - Plan of work
  - Why we study the flower, fruit and seed
  - The flower

Suggested question paper

FILL IN THE MISSING WORDS

The ... are the reproductive organs of the plant.
The flowers have male organs called ... and a female organ, called ... .
These reproductive organs are protected by the ... and the ...
The union of ... from the stamens and of an ... contained in the ovary, produce a ...
A seed consists of a ... some ... and a ... .
Like all living things, a seed needs ... and ... .
A farmer chooses the best seeds, the best ... .
He removes the broken and eaten seeds, he ...the seed.

To protect them from insects and diseases, he ... the seed.

ANSWER THE FOLLOWING QUESTIONS

What is the ovule?
What is pollen?
How is a fruit formed?
Why must seeds be sown at the same depth?
What does the germ need to grow?
How should seed be stored?
Explain to a friend why you use the best seed, the best varieties.
Explain how to choose seed.
Did the courses on the plant (Nos. 1, 2 and 3) interest you?
What part did you find most useful?