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Better Farming Series No. 7: Crop Farming

Published by:

Food and Agriculture Organization of the  
United Nations

Via delle Terme di Caracalla

00100 Rome

Italy

Paper copies are \$ 1.50.

Available from:

UNIPUB

P.O. Box 433

Murray Hill Station

New York, NY 10157 USA

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# crop farming



## **BETTER FARMING SERIES**

Twenty-six titles have been published in this series, designed as handbooks for a two-year intermediate level agricultural education and training course. They may be purchased as a set or as individual documents.

### **FIRST YEAR**

1. The plant: the living plant; the root
2. The plant: the stem; the buds; the leaves
3. The plant: the flower
4. The soil: how the soil is made up
5. The soil: how to conserve the soil
6. The soil: how to improve the soil
7. Crop farming
8. Animal husbandry: feeding and care of animals
9. Animal husbandry: animal diseases; how animals reproduce

### **SECOND YEAR**

10. The farm business survey
11. Cattle breeding
12. Sheep and goat breeding
13. Keeping chickens
14. Farming with animal power
15. Cereals
16. Roots and tubers
17. Groundnuts
18. Bananas
19. Market gardening
20. Upland rice
21. Wet paddy or swamp rice
22. Cocoa
23. Coffee
24. The oil palm
25. The rubber tree
26. The modern farm business

# **Crop farming**

Published by arrangement with the  
Institut africain pour le développement économique et social  
B.P. 8008, Abidjan, Côte d'Ivoire

**FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS**

**Rome 1976**

**First printing 1976**

**ISBN 92-5-100146-4**

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le développement économique et social (INADES) 1970

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## **PREFACE**

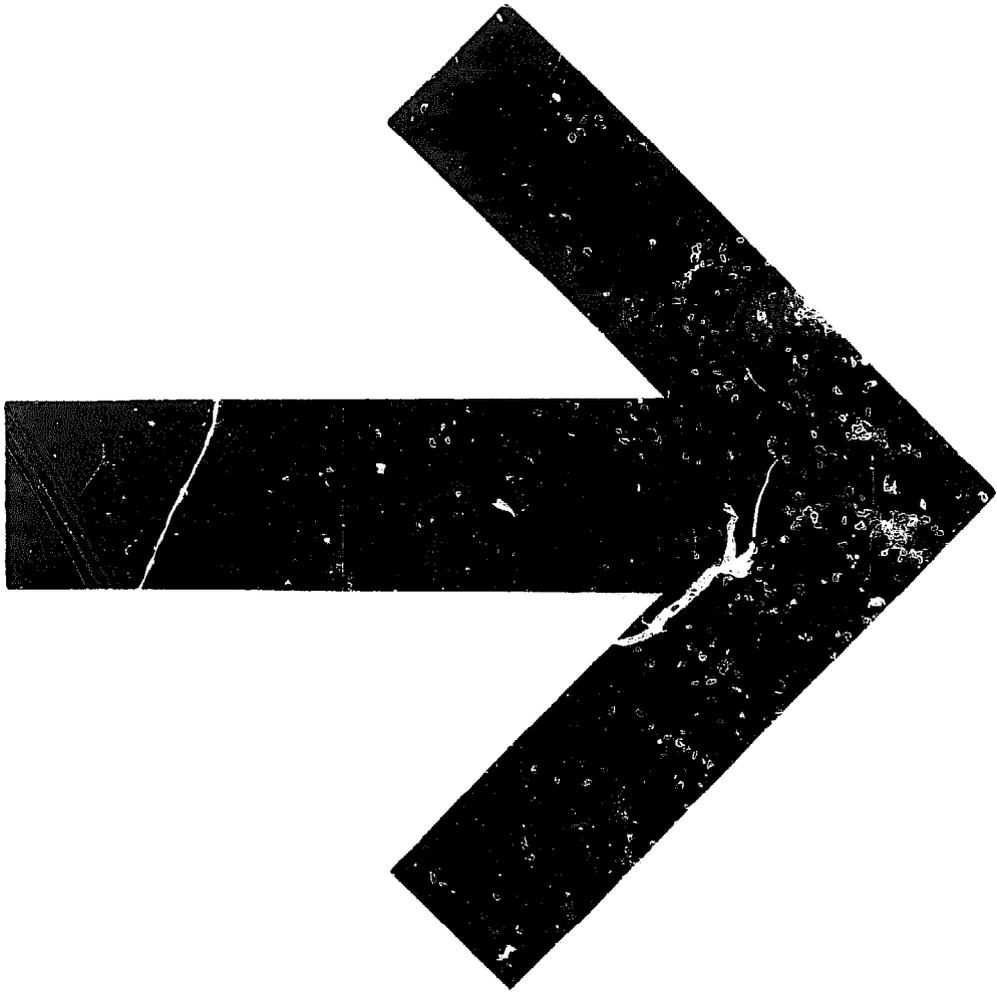
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This manual is a translation and adaptation of "Les travaux de culture," published by the Agri-Service-Afrique of the Institut américain pour le développement économique et social (INADES), and forms part of a series of 26 booklets. Grateful acknowledgement 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.



# OUTLINE OF COURSE

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# **PLAN OF WORK**

---

## **FIRST WEEK**

### **Tilling**

Read pages 4 to 11.

We take a look at tilling done with a hand hoe  
and tilling done with a plough.

Which is done quicker?

Which is done better?

Is tilling done at the right time?

Look carefully at a plough  
and see how it works,  
how it turns over the earth.

## **SECOND WEEK**

### **Sowing**

Reread pages 4 to 11.

Read pages 12 to 18.

Reread also Booklet No. 3, page 22 on choosing seed.

Let us take a look at sowing broadcast,  
sowing in rows  
and sowing in seed holes.

Why must we sow in rows, and how is it done?

Why must we sow as early as possible?

## THIRD WEEK

### Looking after crops

Reread pages 12 to 18.

Read pages 19 to 24.

Is the work of looking after the crops  
done well and at the right time?

What about weeding?

Earthing up?

Thinning?

Do you understand

why it is important to look after the crops?

## FOURTH WEEK

### Harvesting

Reread pages 19 to 24.

Read pages 25 to 28.

This week's work is important.

It's no use having a fine harvest  
if you sell it badly.

What do you do

to sell your harvest at a better price?

Reread the whole course.

Answer the question paper.

# **HOW TO CHOOSE A FIELD**

---

You must choose carefully  
the field you mean to farm.

Choose a field where plants grow well,  
where the grasses are tall.

**Choose good land.**

Choose a field near the village  
so as not to lose time going to and from the field.

Ask the village headman  
for permission to farm the field  
for a very long time.

## **PREPARING THE FIELD**

During the dry season prepare your field.

- **Improve the field.**

If the soil is wet,  
drain it (see Booklet No. 6, page 20).

If the soil is short of water,  
irrigate it (see Booklet No. 6, page 18).

If the soil is on a slope,  
mark the contour lines (see Booklet No. 5, page 8).

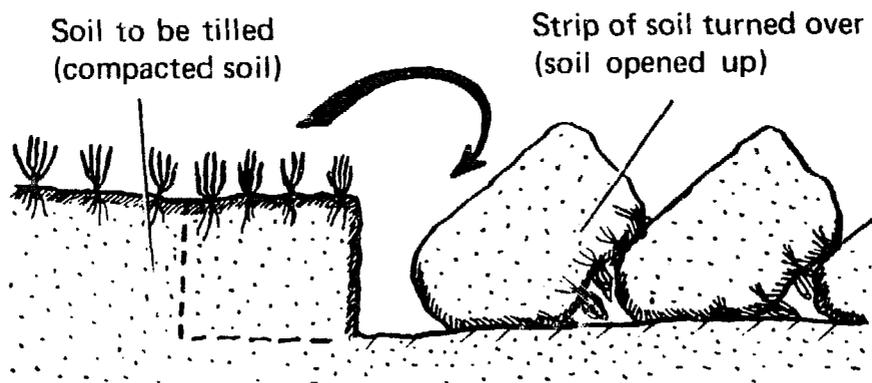
- **In order to use animal power (see Booklet No. 6, page 28),  
mark out a rather large right-angled field.**

Clear the land and grub the trees (see Booklet No. 6,  
page 21).

# TILLING

---

**Tilling means turning over the soil.**



**Tilling**

Tilling enables water and air  
to get right into the soil.  
It makes the soil less hard.  
**It loosens the soil.**

In well-tilled soil  
seeds germinate easily.  
Roots penetrate easily.

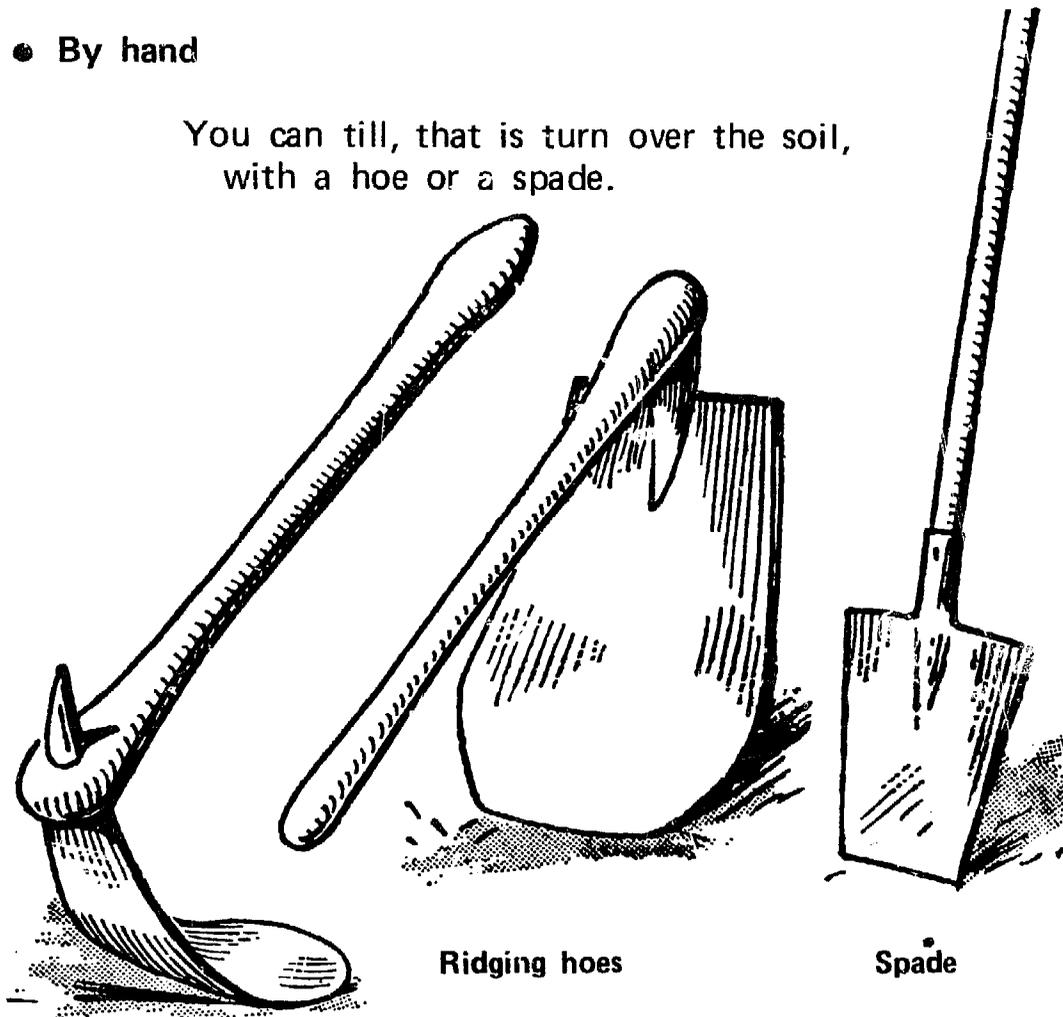
Tilling mixes earth and herbage.  
**It cleans the soil.**  
The herbage rots and makes humus.

By tilling the soil,  
you can mix fertilizers and manure with it.

## HOW TO TILL

- By hand

You can till, that is turn over the soil,  
with a hoe or a spade.



Usually this work is done  
with a hoe (daba).

The hoe should be heavy enough  
to cut into the soil  
even if it is rather hard.

You can also do the work  
with a spade.

With these tools you can turn over the soil  
and bury organic matter.

But this work is slow and tiring.

- **With animal power**

The trees in the field have been grubbed.  
The farmer uses a plough  
drawn by donkeys or oxen.

**The work is done better and done faster.**

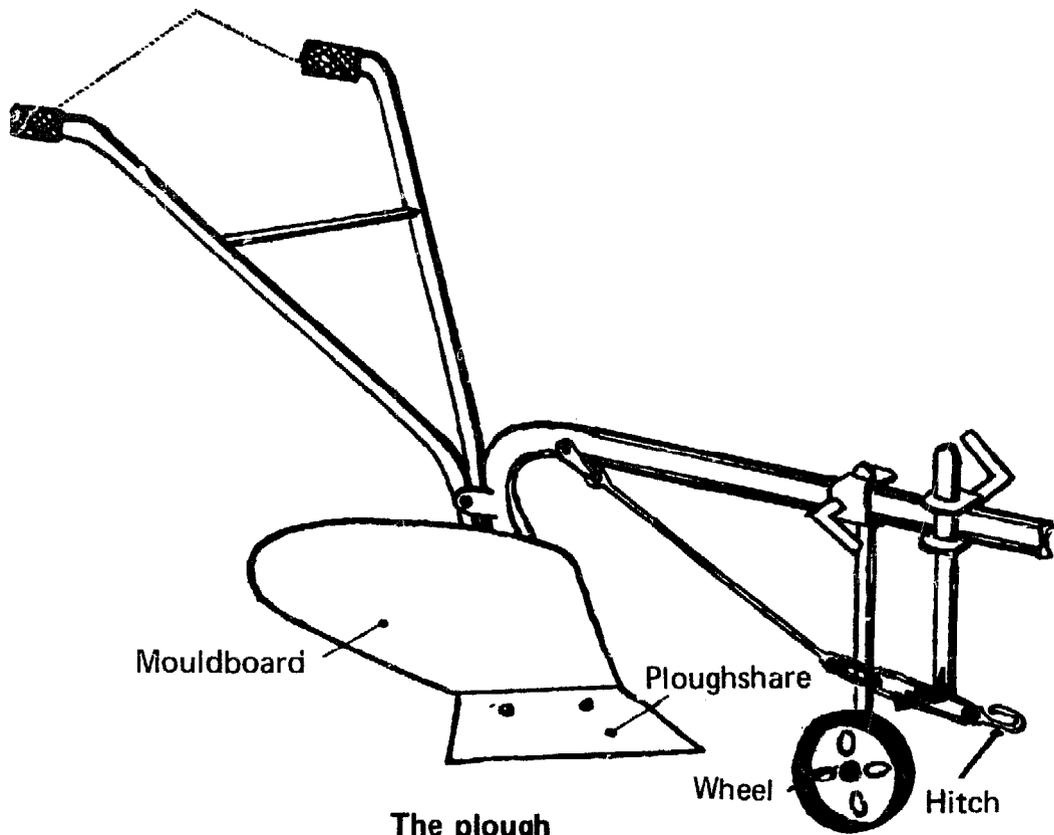
**The plough.**

Usually a simple plough is used.

The plough consists of a **ploughshare**, a **mouldboard**  
and two **handles**.

The ploughshare cuts a strip of earth.  
The mouldboard turns this strip over.

Handles for holding the plough



Tilling should never bring the subsoil to the surface  
(see Booklet No. 4, page 6).

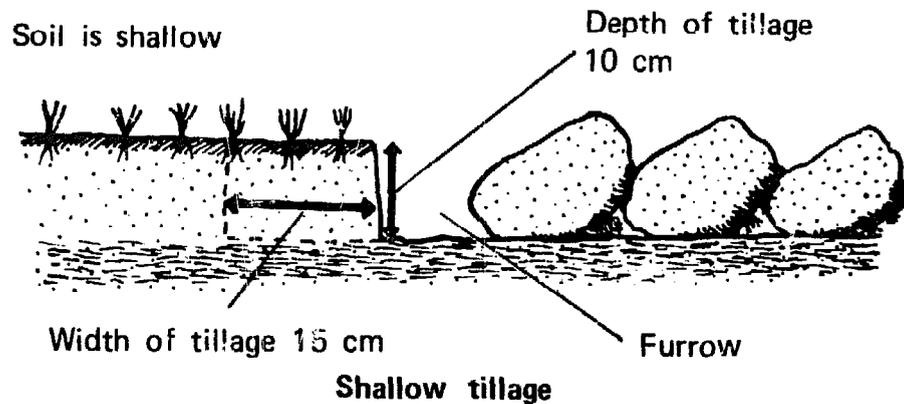
This layer of soil is poor in mineral salts.  
Doing this also destroys the soil structure.

## DEPTH OF TILLAGE

Tillage can be shallow, normal or deep.

- **Shallow tillage.**

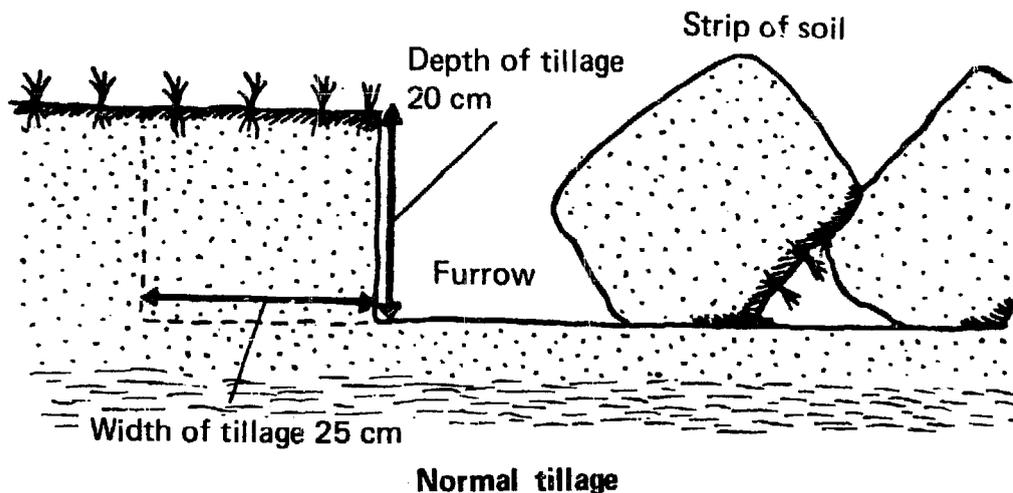
Look at this drawing:



The ploughshare cuts a strip of soil 10 to 15 centimetres thick. The tillage is said to be shallow when its depth is from 10 to 15 centimetres.

- **Normal tillage.**

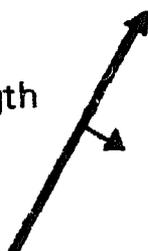
Look at this drawing:



Tillage is said to be normal when the depth of tillage is 20 centimetres. With normal tillage the soil can be well turned over and the remains of plants can be well buried.

# HOW TO PLOUGH

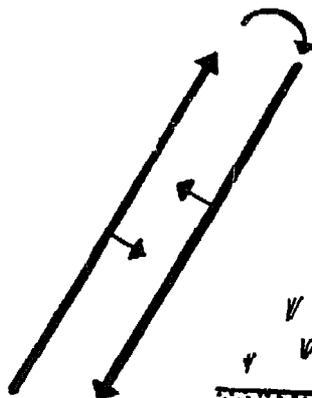
Make a first furrow with the plough across the whole length of the field.



First furrow

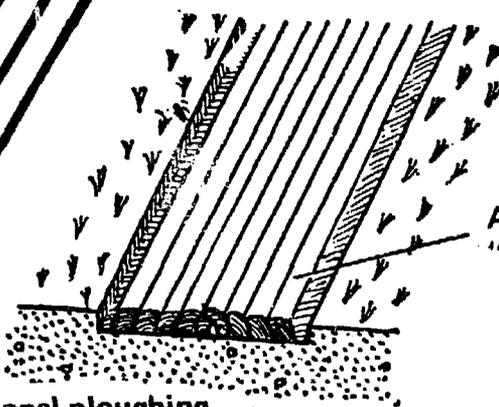
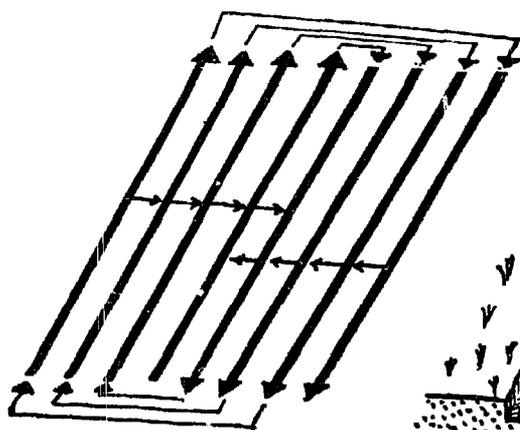
At the end of the field, turn.

Make a second furrow alongside the first. The second strip of ploughed field joins the first.



Second furrow

After that, keep turning round the strip of ploughed field.



A ploughed "land"

Conventional ploughing

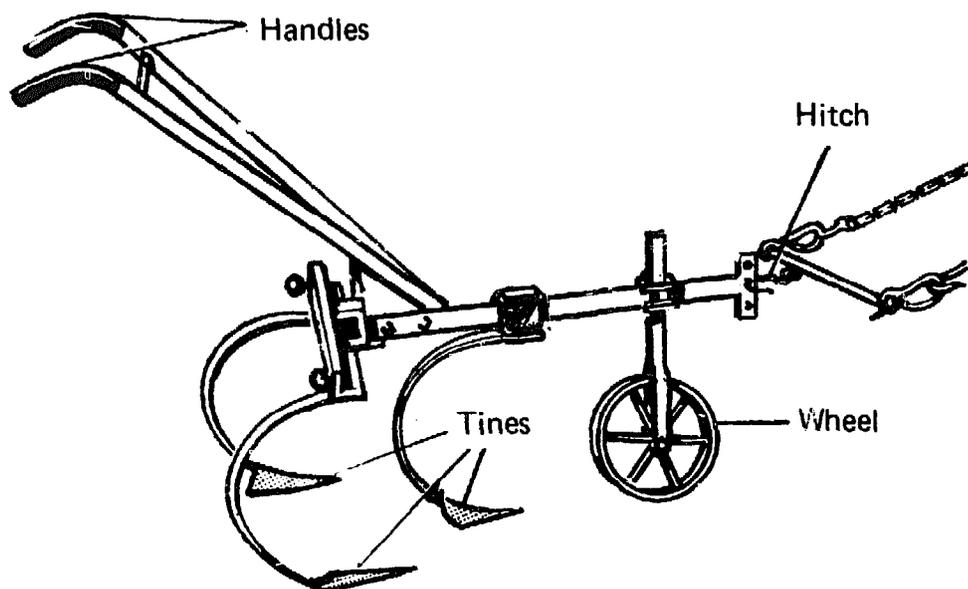
If the field is very big, make several "lands."

If the field is on a slope, plough along the contour lines (see Booklet No. 5, page 8).

If the cultivated soil (see Booklet No. 4, page 9) is not deep,  
and if the soil is very light,  
ploughing is not necessary (see Booklet No. 4, page 17).  
It may even be a bad thing (see page 7).

Instead use a machine with tines, drawn by animals.

The tines stir the soil without turning it over.



Animal-drawn cultivator

With oxen

use five to eight tines.

With one donkey,

use fewer tines, say three to five.

For other work,

such as hoeing, weeding, earthing up (see page 21)

change the tines of the cultivator.

## WHEN TO PLOUGH

Ploughing can be done after the harvest  
or after the first rains.

- After the harvest, at the beginning of the dry season,  
the soil is not too hard,  
you can begin to plough your fields.  
Then the first rains will fall on soil already opened up,  
on loosened soil.  
The rain will penetrate easily  
and less water will be wasted.
- If you do not have time  
to plough after the harvest,  
you should do so  
as soon as the first rains have fallen.

Sow as soon as possible,  
so that the plants can use all the water  
of the rainy season (see Booklet No. 3, page 20).

Very often,  
farmers plough all their fields  
at the beginning of the rainy season  
and spend a lot of time on the ploughing.  
They sow much too late.  
When the sowing is too late,  
the plants do not grow well.

**A modern farmer sows in good time.**

A good farmer ploughs his fields  
immediately after the harvest,  
at the beginning of the dry season.

# HARROWING

Ploughing often does not leave the soil flat.

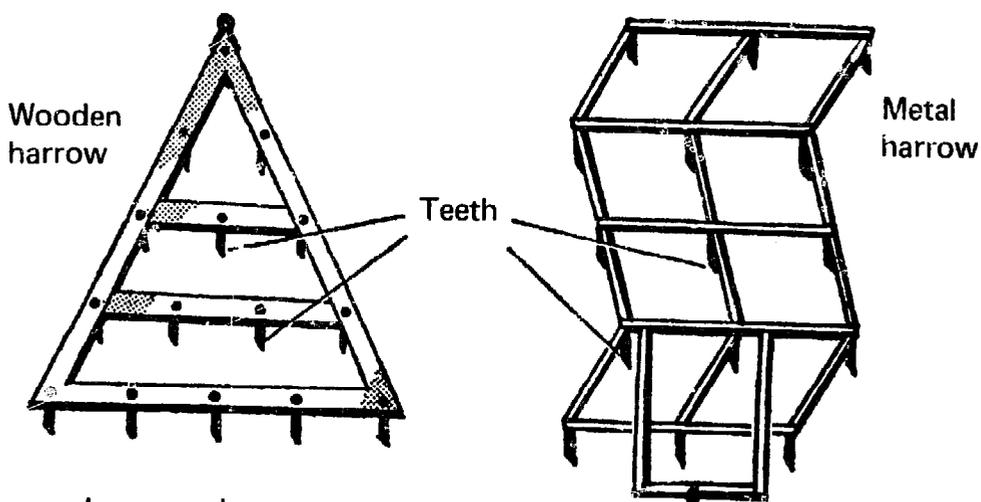
There are big pieces of earth — clods.

The clods must be broken up  
to make the soil quite flat,  
and to give earth that is fine, not lumpy.

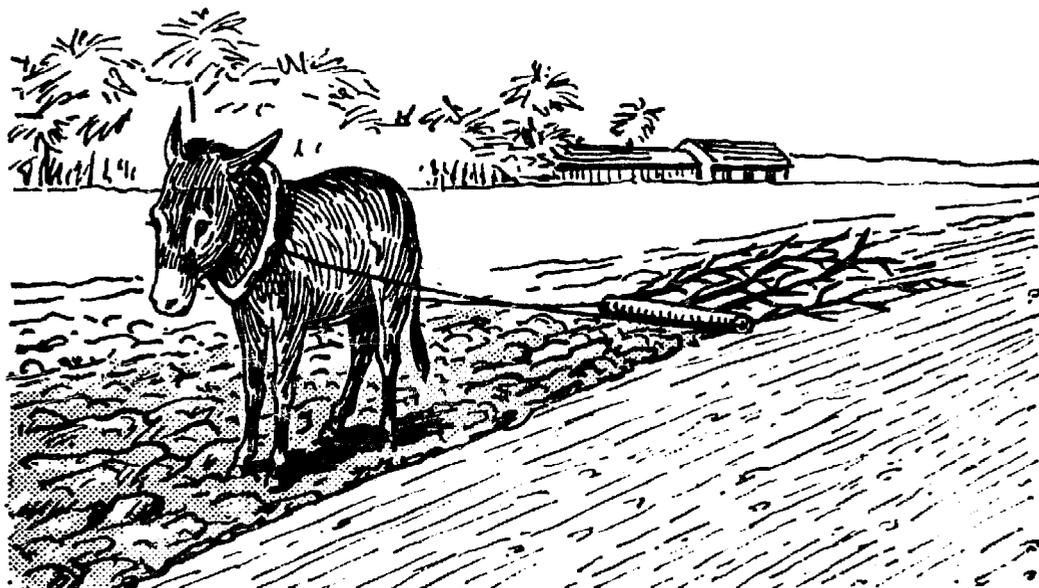
This is called **harrowing**.

You can break up the clods  
with a hoe or rake.

But you can do the work more quickly  
with a harrow drawn by an animal.



If you have no harrow,  
you can make an animal pull big branches over the soil.  
The branches will break up the clods.



# **SOWING**

---

## **CHOOSING SEED**

In Booklet No. 3, pages 20 to 26,  
we dealt with seeds and sowing.

Reread these pages.

Seed must be carefully chosen;  
seed must be from **good varieties**,  
must be **protected against disease**,  
must be **graded**.

## **WHEN TO SOW**

- When the soil is well prepared  
sowing can be done.  
In savanna country especially,  
sowing should be done  
at the beginning of the rainy season.  
In this way the plants will make full use of the rains.
- If you sow very early,  
the plants will grow up  
before they are hindered by weeds.

**Sowing must be done  
at the right time.**

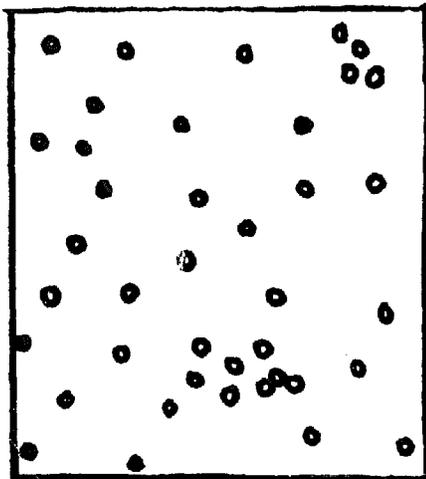
## HOW TO SOW

Farmers have the habit of sowing in seed holes.

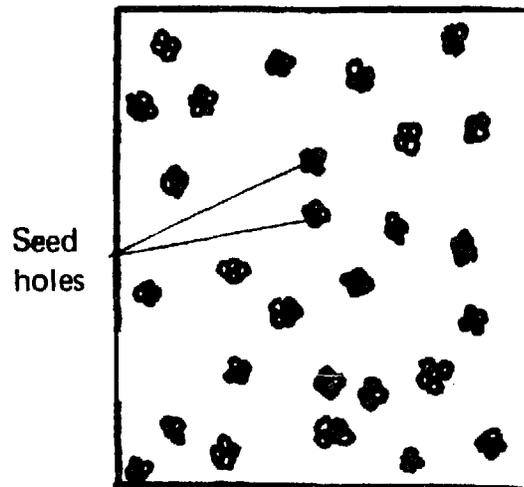
The farmer makes a little hole  
with a stick or hoe,  
drops in several seeds  
and covers them with soil.

Some seed, such as rice, is sown broadcast;  
that is, it is thrown into the air,  
and falls all over the place.

Then a harrow is drawn to mix the seed with the soil.



Broadcast sowing



Sowing in seed holes

But the seed falls anywhere.

Sometimes the plants are too close together  
and get in each other's way when growing.

Sometimes the plants are not close enough.

They do not make full use of the soil.

With broadcast sowing it is not possible  
to get the right density (see Booklet No. 1, page 26).

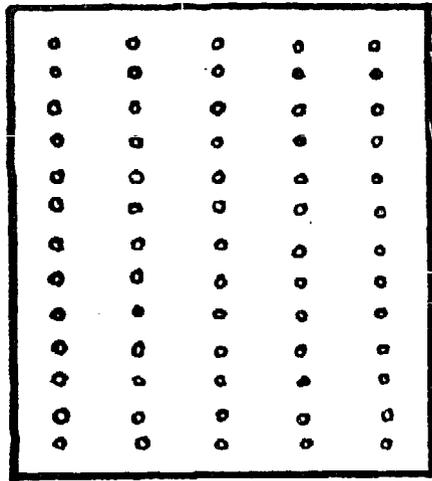
When you want to get rid of weeds,  
you walk on the young plants  
and often spoil them.

## SOWING IN ROWS

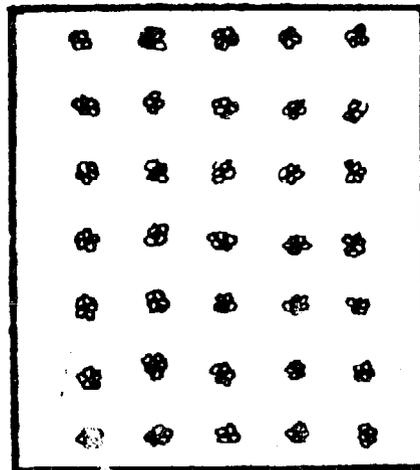
By sowing in rows you can:

- **get rid of weeds more easily.**  
The animal drawing the cultivator can walk between the rows.  
The work is done more quickly, and can be done more often.
- **give each plant the same amount of fertilizer.**
- **apply water when possible.**

It is better to sow in rows.



Sowing in rows



Sowing in rows and  
seed holes

On sloping land,  
make the rows across the slope  
to stop erosion.

- **As an example take groundnuts:**

*Leave 60 centimetres between rows.*

*Leave 15 centimetres between seeds.*

*This gives about 110 000 groundnut plants to the hectare.*

## SOWING IN ROWS BY HAND

When you sow or plant, make the lines quite straight.

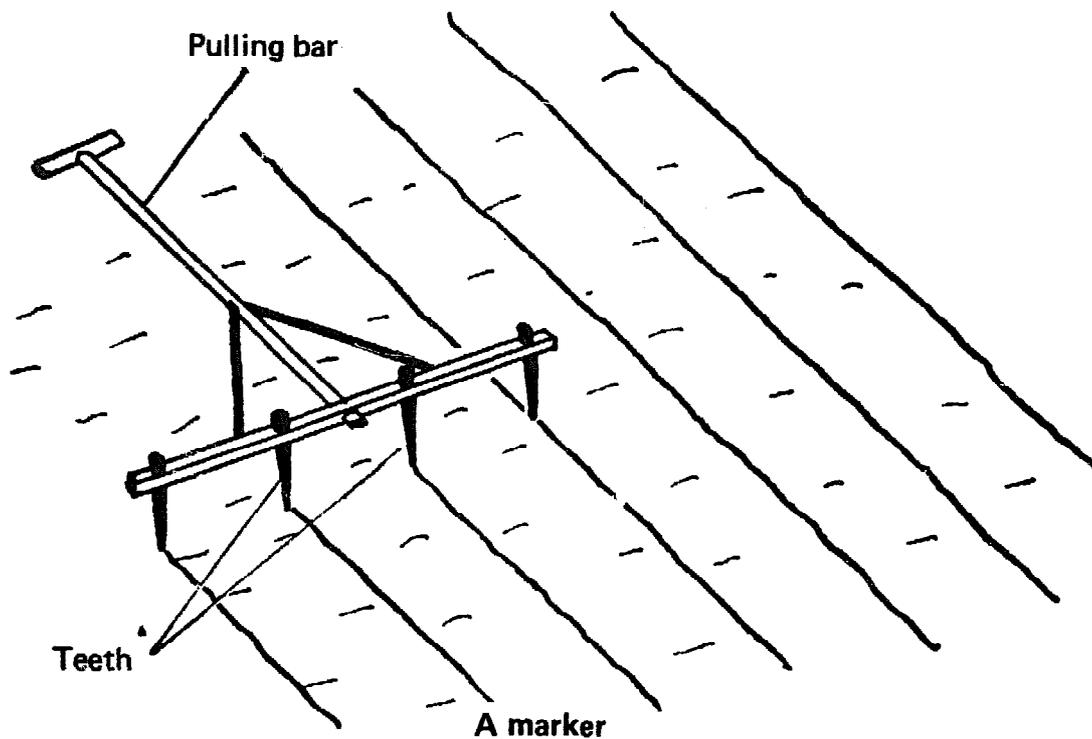
Use a **marker** to make the lines.

This is a wooden bar with teeth.

Each tooth marks a row.

To get the first row quite straight,  
stretch a string between two stakes.

Then follow the string with the marker.



**The distance between rows changes  
according to the size of the seed.**

Put the seeds in the rows at the same distance apart  
and at the same depth (see Booklet No. 3, page 21).

Cover the seeds with a little earth.  
Walk over the row to press down the earth.

Then the field will be sown at the **right density**  
(see Booklet No. 1, page 26).

- Certain plants such as cotton and millet are sown in seed holes.

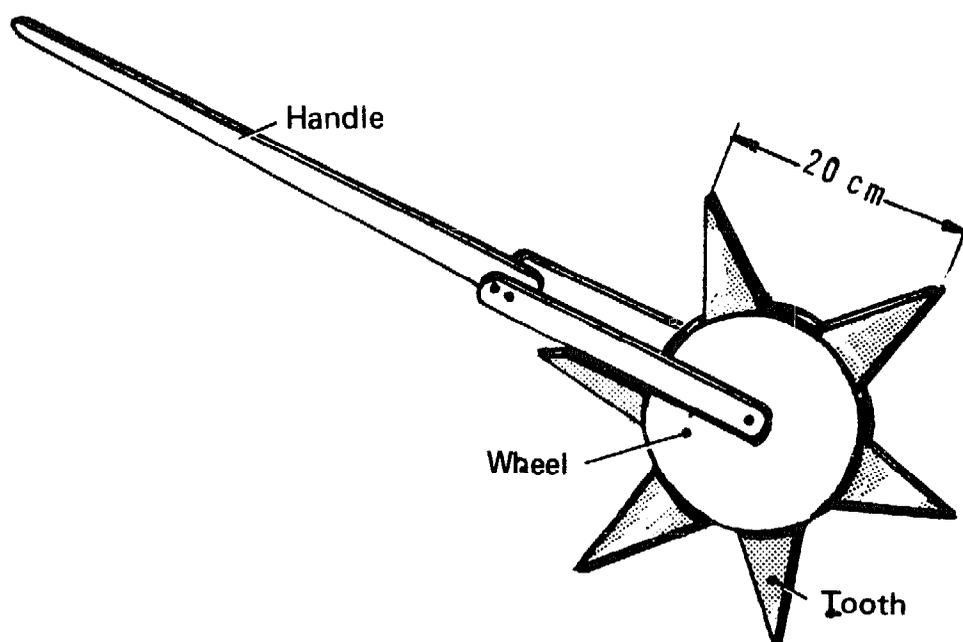
**Seed holes too must be made in rows.**

By that means you can be sure of the right density,  
you can get rid of weeds  
and apply pesticides more easily.

To put the seeds at the same distance apart,  
you can use a **spacing wheel**.

### **The spacing wheel.**

This can be made of wood or iron.  
Each tooth of the wheel makes a little hole in the soil.  
Put one or more seeds in each hole.  
Cover the seeds with a little earth,  
either with the hoe or your foot.



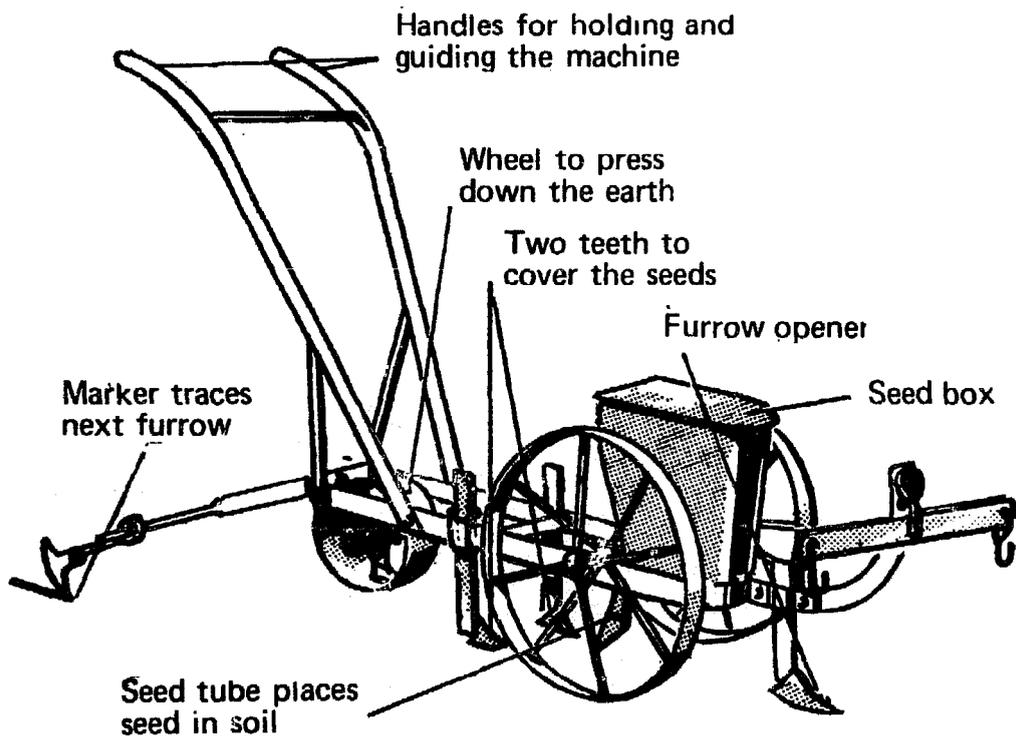
**A spacing wheel**

## SOWING WITH ANIMAL POWER

### The seed drill.

In several countries  
people are beginning to use the seed drill.  
This is drawn by a donkey or an ox.  
The seed drill makes furrows  
and the seeds fall into the furrow  
the same distance apart  
and at the same depth.

At the same time, the drill  
covers the seed  
and presses down the soil.



Seed drill

# TRANSPLANTING

Certain plants are first sown in a nursery.

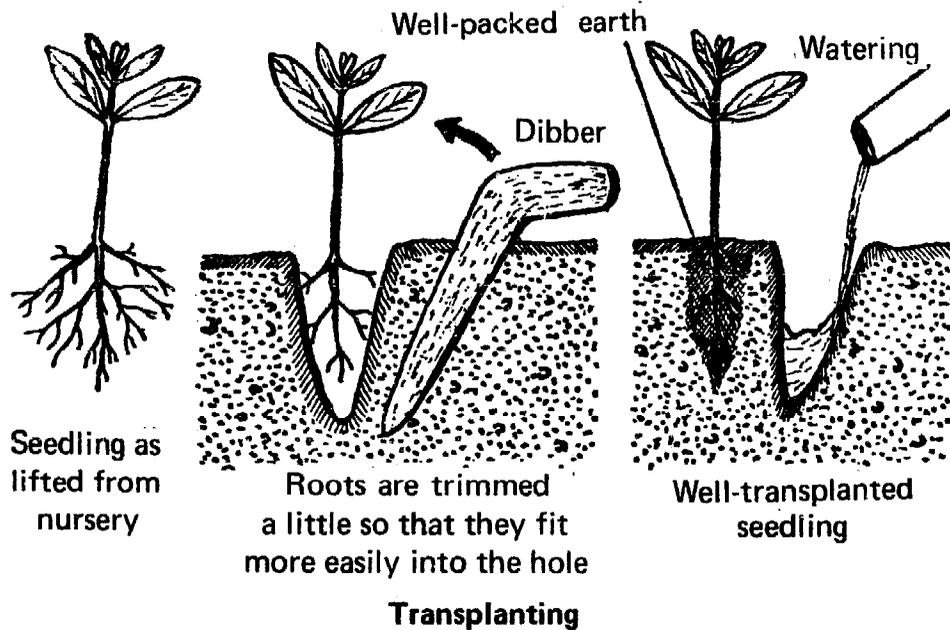
In a nursery you can sow very thickly.  
When the seeds have germinated,  
when the plants have grown a little,  
they are lifted  
and planted out in the fields.

They are **transplanted**.

Tobacco, tomatoes, salad plants, rice  
and many trees, such as oil palm, mango, avocado,  
are first sown in a nursery and then transplanted.

## Good transplanting.

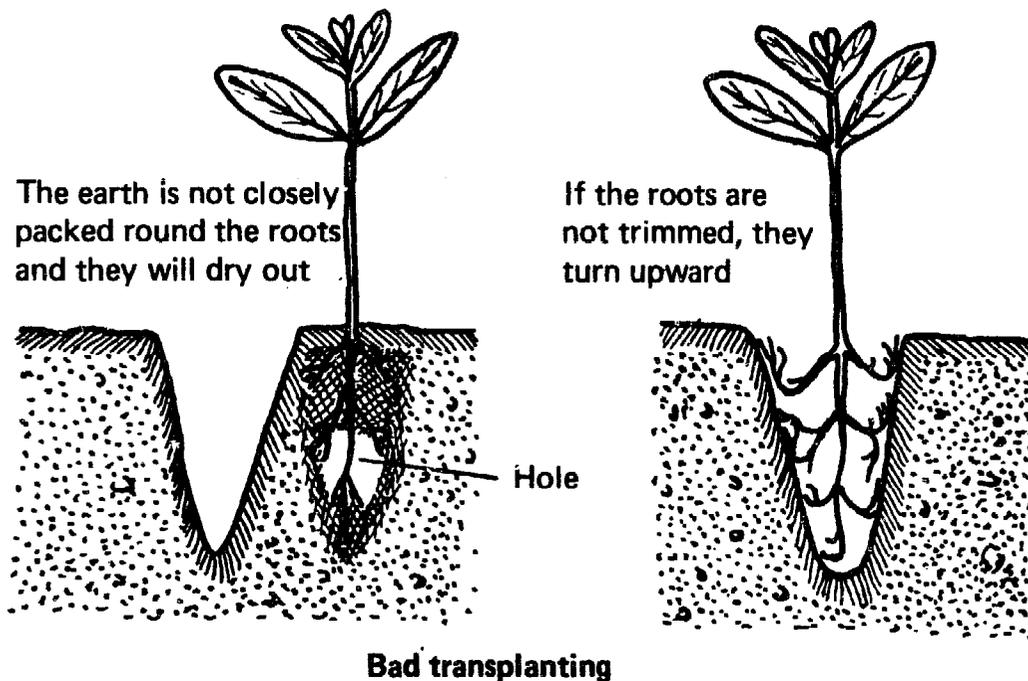
Plants are lifted from the nursery.  
But before transplanting them in the field,  
they must be prepared.  
Cut off roots that are too long.  
Cut off damaged roots.  
Take off half the leaves.  
Put the plant in the soil up to the base of the stem.  
Pack the earth well round the roots.



To protect the transplanted seedlings from the sun,  
make a little shelter.

## **Bad transplanting.**

The roots have not been trimmed;  
they turn upward.  
The earth has not been packed down;  
the roots dry out.  
If the transplanted seedling is not watered,  
it will not grow well.



**Cassava is not sown.**  
You put pieces of stem into the earth.  
**Cassava is planted.**

You do not sow pineapples or bananas.  
You put shoots into the earth.  
**Pineapples and bananas are planted.**

This planting must also be done in rows,  
to get the right density and  
to get rid of weeds more easily.

# **LOOKING AFTER THE CROPS**

## **WEEDING**

Weeds prevent plants from growing well  
(see Booklet No. 2, page 24).

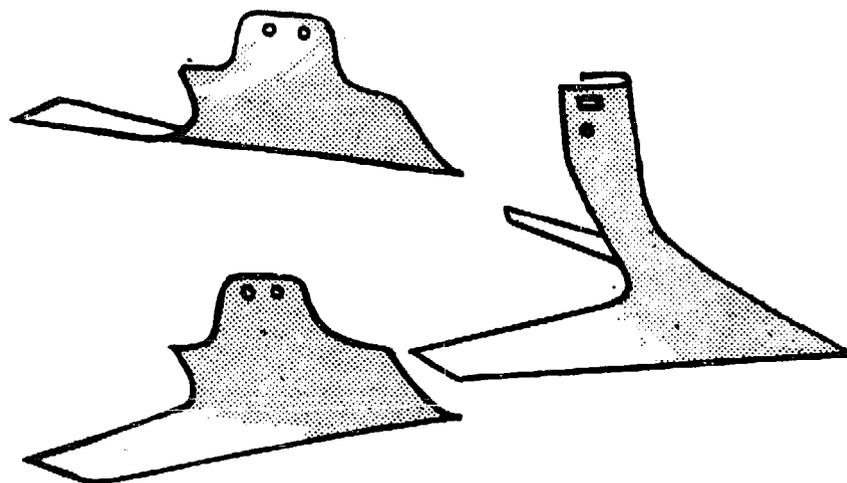
They take out of the soil the mineral salts  
that the crops need.

**The weeds must be removed.**

Weeding can be done with the hand hoe (see page 6),  
or with an animal-drawn cultivator (see page 10).

**Sowing in rows makes weeding easier.**

The cultivator has tines  
that cut the weeds between the seed rows.



**Weed-cutting tines for  
fixing to a cultivator**

You must weed each time new weeds grow.

For cotton and groundnuts  
weed three or four times.

With an animal-drawn cultivator  
you can only get rid of weeds  
between seed rows.

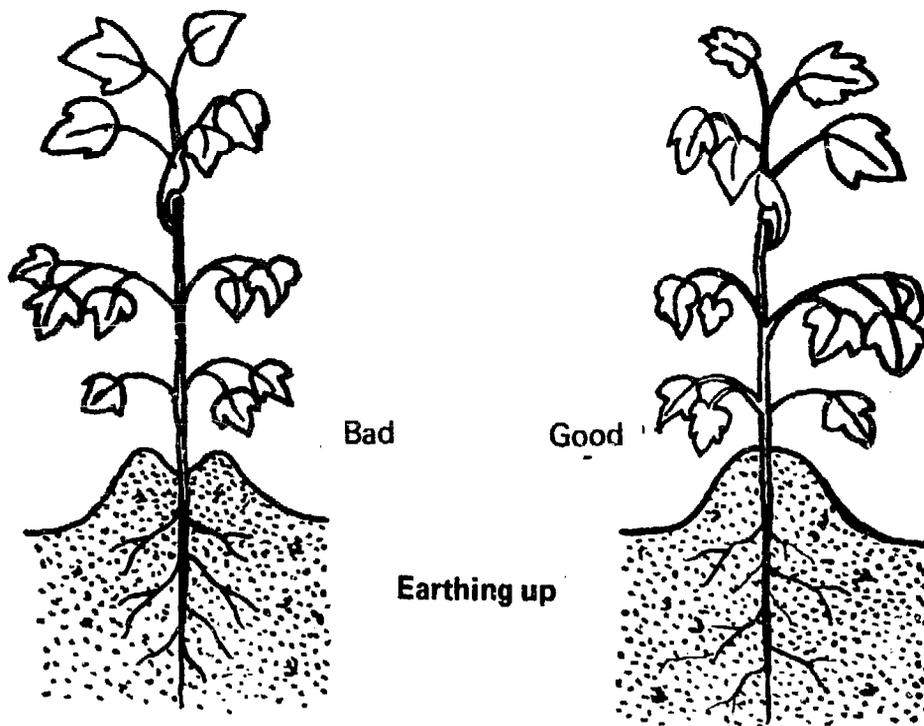
Remove the weeds among the plants in a row  
by using the hand hoe.

Weeding must be done  
when the weeds are still small.  
Then the work is easier and quicker.  
Weeds are destroyed more easily  
when they are still small.

Let the cut weeds dry between the rows.  
They will rot and form humus.  
They will also protect the soil against erosion.

## EARTHING UP

Earthing up, sometimes called ridging up,  
is putting earth round the collar, or crown, of plants  
(see Booklet No. 1, page 15).



With certain plants, such as maize and millet,  
adventitious roots then grow in the mound of earth.

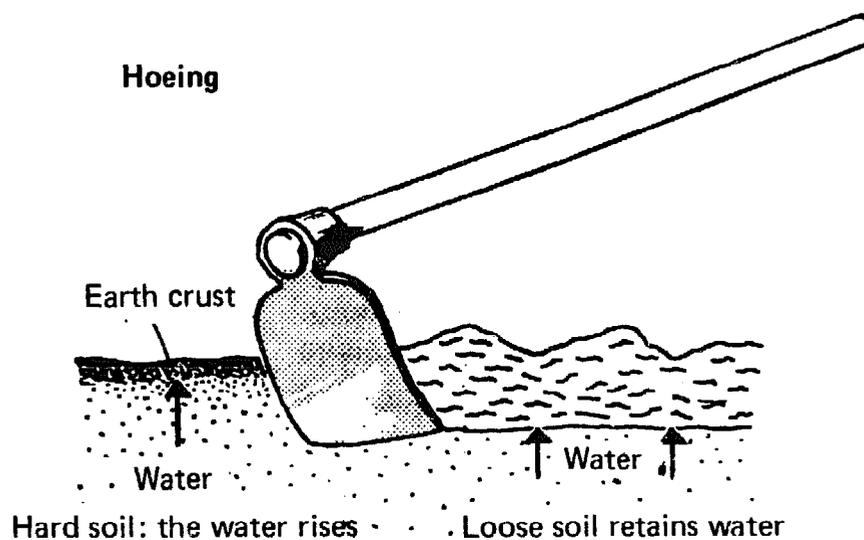
## HOEING

With some soils the surface gets hard after rain;  
a crust of earth is formed.

Water rises in the crust

as it rises in lumps of earth (see Booklet No. 4, page 30).

- The earth crust must be broken up  
to prevent the water rising.  
This is called hoeing.



- Rain that falls on a well-hoed soil goes in easily.  
It does not run off the surface.  
It is not wasted.
- Hoeing is done with a hand hoe  
or with an animal-drawn cultivator.  
Weeding often serves both purposes:  
it gets rid of weeds  
and breaks up the soil crust.

# THINNING

Thinning is removing surplus plants.

When you sow in seed holes,  
you put in four or five seeds.  
They grow together.

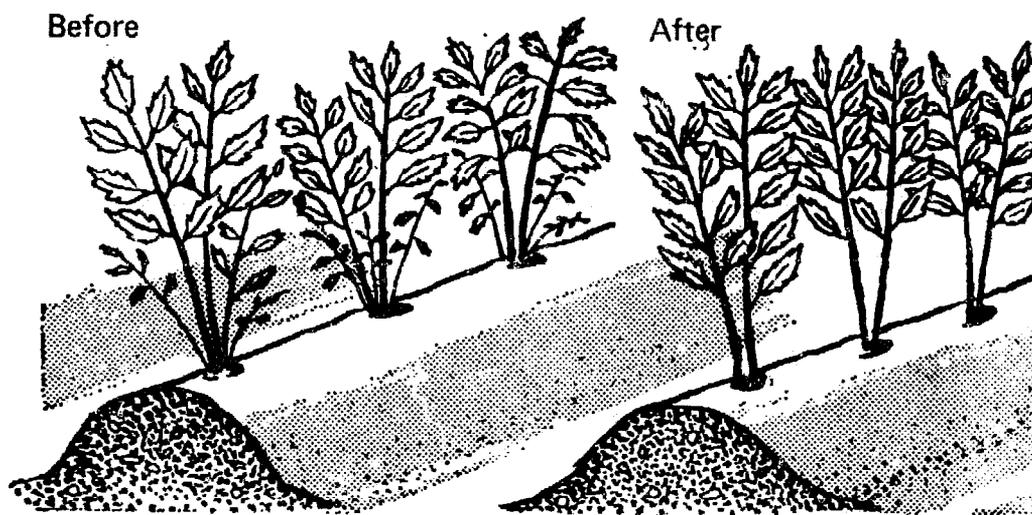
There are too many of them  
and some must be taken out.  
Then the plants that are left can grow better.

As a rule the two best plants in each seed hole are left.

Thinning should be done  
when the plants have a few leaves,  
but before they are too big.

In pulling out the surplus plants,  
the soil is disturbed.  
So it must be pressed down again  
round the plants that are left.

The first weeding and thinning  
are done at the same time.



Thinning

# HARVESTING

## HOW TO HARVEST

As a rule harvesting is done by hand.

This work can be improved

by using better tools, for example:

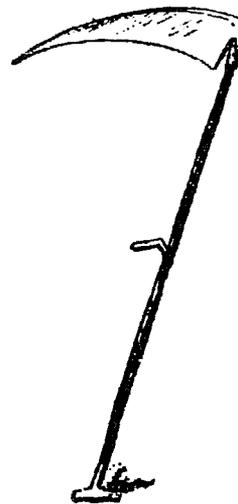
a three-pronged lifting fork or hook for lifting cassava;

a sickle for cutting rice;

a scythe for cutting grass fodder.



A sickle



A scythe

**Harvesting must be done at the right moment  
when the crop is quite ripe.**

For example:

The fruits of the oil palm cut at the right moment  
yield more oil.

If you harvest cotton too late,  
part of the cotton has already fallen to the ground.  
It is dirty and sells for less.

If sorghum or millet is harvested too late,  
the grains fall to the ground and are lost.

## HOW TO GET A BETTER PRICE FOR THE HARVEST

- **Grade your crops.**

To get a better price,  
separate what is good  
from what is less good.

Grade your crops.

If the harvest is not graded,  
if it is of poor quality,  
you get a low price.

For example:

*In Cameroon in 1969,  
cocoa of first quality sold for 85 CFA francs;  
cocoa of second quality sold for 80 francs;  
In Upper Volta in 1969,  
white cotton sold for 30 CFA francs;  
yellow cotton sold for 28 francs.*

At the market,  
tomatoes and yams of good quality  
sell at a better price.

To grade crops:

separate the good coffee beans  
from the broken ones;  
separate the white cotton  
from the yellow cotton;  
take out groundnut pods that are empty;  
take out spoiled grain,  
fruit that is rotten or eaten by insects.

If you do not grade your crops,  
you will sell them at the lowest price.

**Grading your harvest crops  
means earning more money.**

- **Store your harvest well.**

Cassava can be kept in the earth.  
You can harvest it all through the year.  
Maize and groundnuts cannot be kept in the ground.

Harvests are kept in houses, in granaries.  
Sometimes they are hung on trees.

But rats and birds  
eat part of the harvest.  
Another part may rot.  
Farmers lose part of their harvest.

To store your harvest well,  
build granaries (see Booklet No. 3, page 27),  
where rats can't get in,  
where the rain doesn't get in.  
Clean and disinfect the granary to kill insects  
(see Booklet No. 3, page 28).

- **Store your harvest  
to earn more money.**

For example:

Just after the harvest the price of millet is low.  
Ten months after harvest the price of millet is higher.

*Mamadou sells 700 kilogrammes of millet  
just after the harvest at 12 francs the kilogramme.  
Mamadou earns  $700 \times 12 = 8\ 400$  francs.*

*Moussa sells 700 kilogrammes of millet  
ten months after the harvest  
at 25 francs the kilogramme.  
Moussa earns  $700 \times 25 = 17\ 500$  francs.*

*Because Moussa stored his millet,  
he earned 9 100 francs (17 500 less 8 400) more  
than Mamadou.*

*By keeping his harvest,  
Moussa made a lot of money.*

● **Farmers get together to sell.**

A farmer by himself  
often sells his harvest badly.

When he is alone he cannot go and sell his crops  
where the price is high.

A dishonest dealer can easily trick the seller

- on the weight of his harvest  
by means of false scales,  
by weighing very quickly.  
The farmer can't check him.
- on the quality.  
The dealer often says  
the quality of the harvest is bad  
and buys at a lower price.
- on prices.  
The farmer needs money.  
The dealer knows this  
and buys at low prices.
- on the reckoning.  
Some dealers make mistakes  
in the reckoning on purpose.

Farmers who get together can defend themselves  
against dishonest dealers.

**Unity is strength.**

# SUGGESTED QUESTION PAPER

## FILL IN THE MISSING WORDS

A good farmer ploughs his field immediately after the .....  
at the beginning of the ..... season.

Then he will be able to sow at the ..... of the rainy season.

The plants will use all the ..... of the rainy season,  
they will grow up without being hindered by .....

A good farmer sows in .....,  
so that he can get the weeds out better.

It is very important to harvest at the ..... moment.

It is useless to farm well if you harvest .....

Finally, a good farmer stores his harvest and sells when the price is .....

He can get together with other farmers to .....  
himself better.

## ANSWER THE FOLLOWING QUESTIONS

When should ploughing be done?

When should sowing be done?

Why should plants be earthed up?

Why should plants be thinned?

What is a scythe used for?

Tell a friend why it is better to sow in rows.

What should a farmer do to sell his harvest at a better price?

What was most useful to you in the course on the soil (Booklets Nos. 4, 5, 6, 7)?

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