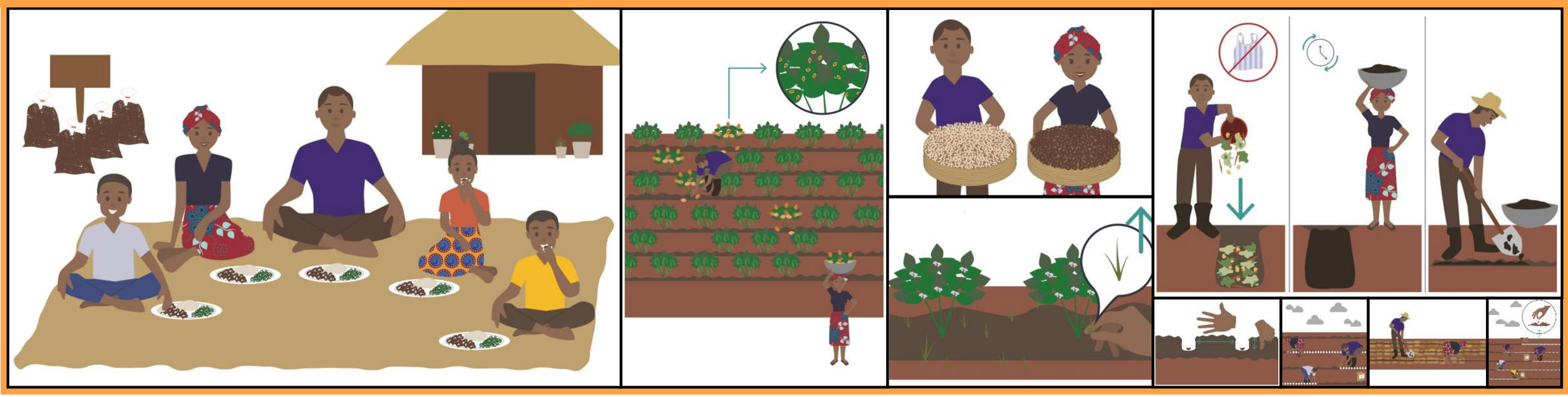
DRAFT 2020 EDITION

Production of Cowpeas

A manual for users and trainers (Why, Where, What, When & How)



Published by
giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

WHY WE PLANT COWPEAS

Cowpeas

- Are nutritious and healthy
- Help to improve soil fertility
- Are suitable for crop rotation
- Add cash to the household

Why we plant cowpeas

Task for the trainer:

1) **Discuss headline**

(Cowpeas feed us, they feed our animals and they feed our soil too)

1) **Discuss picture**

⊕ Family together

(take time for meals, have regular mealtimes)

⊕ Healthy food

(Eat diverse and include different food groups into your diet)

⊕ Its possible to sell Cowpeas

(First priority is to eat cowpeas as a source of protein but if you produce enough, you can sell the rest and earn some cash)

3) **Explain Info-Box***

4) **Ask question**

* INFO-BOX: Cowpeas

⊕ **Cowpeas** are nutritious. They are an important cheap source of protein for better nutrition. Even the **leaves are edible** and add further nutrients to our dishes.

⊕ **Cowpeas** can be rotated with other crops to **support living soil**.

⊕ **Cowpeas** assist to add **nitrogen** into the soil so helping to **improve soil fertility**.

⊕ **Cowpeas** can be sold adding **cash to our household**.

⊕ Cowpeas are very suitable for the **climate found in Eastern Province**

Ask the farmers about their experiences with cowpeas

LIVING SOIL FOR A GOOD HARVEST

Organic Material

Micro-organism

Minerals

Living Organism

Benefits of Living Soil

Increases harvest

Better protection against dry spells

Less chemical fertiliser inputs = saves money

Less pests and diseases

Living soil for a good harvest

Task for the trainer:

1) **Discuss the term “Living Soil”**
2) **Discuss Picture**
   - ⊕ Organic Material
     (good for the structure, holds water and nutrients, supports micro-organism)
   - ⊕ Micro-organism
     (microbes recycle nutrients, create humus, produce a variety of substances to promote plant growth)
   - ⊕ Minerals
     (act as bio fertilizer and supports plant growth)
   - ⊕ Living Organism
     (break down plant and animal tissues, releasing stored nutrients and converting them into forms usable by plants)
3) **Show different soils around you**
4) **Explain Info Box***
5) **Ask question**

* Info Box: Living Soil

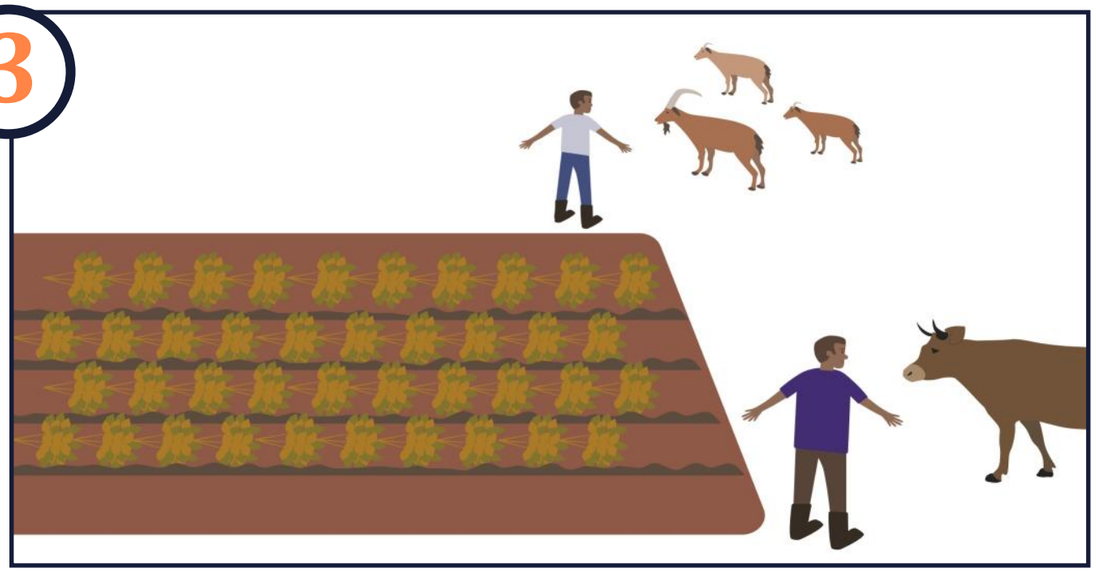
- ⊕ **Increases the harvest because** it maintains the **basic nutrients** for plants. Plants need this to grow.
- ⊕ **Protects the plants in case of dry spells** because plant leftover (organic materials) **holds water** for a long period.
- ⊕ **Requires less chemical fertilizer** because small living organism **break down plant leftovers** and produce **what our crops need to grow well**.
- ⊕ **Has less pests and diseases** because small organisms **protect our soil from harmful chemicals and suppress plant diseases**.

HOW WE SUPPORT OUR LIVING SOIL

1

2

3



Why we cover our soil

Reduces high temperatures and soil moisture loss

Allows the rain water to enter the soil easily

Reduces weeds

How we support our living soil

Task for the trainer:

1) **Discuss Pictures**

1. Dead plant matter and compost

(Leave dead plant matter in the field and applying compost manure

2. Cover the Soil*

(Cover the riplines/basins with crop residues or other organic material like cut grasses or leaves from nearby trees. This reduces the soil erosion and improves moisture retention on the field)

3. Keep Animals away

(Keep animals away and do not let them graze on our plot. Animals eat the organic material on our field. This makes the plot less productive)

2) **Show different ways to cover the soil**

3) **Ask question**

* Info Box: Why we cover the Soil

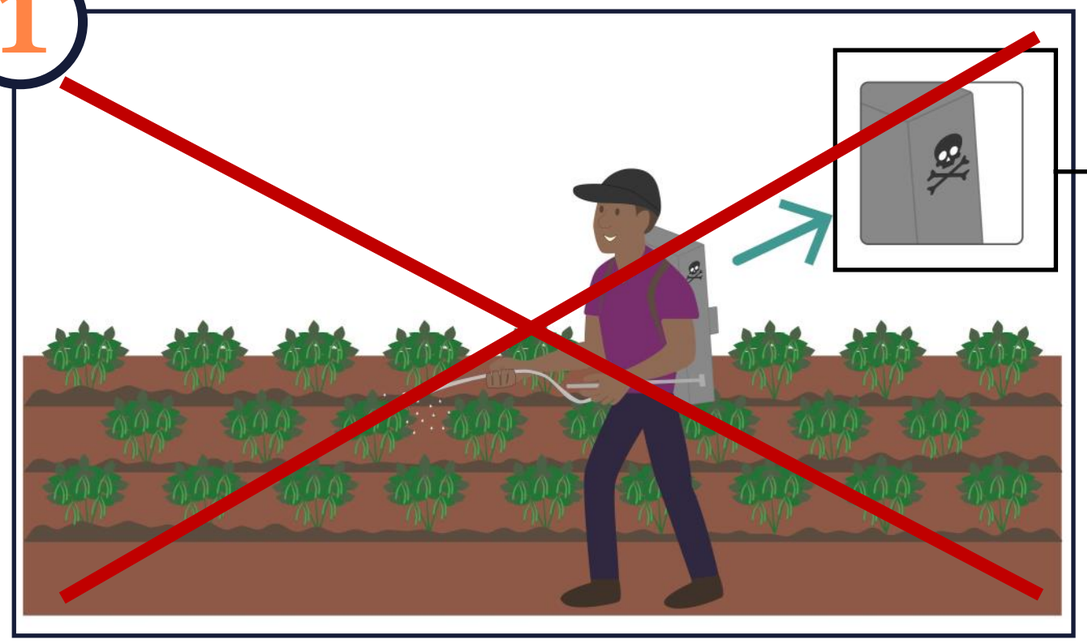
⊕ **It reduces high temperatures** to support populations of **microorganisms** (This are small living organisms one cannot see with the eye). They cannot survive when it is too hot.

⊕ **Allows the rain water to enter the soil slowly** without damaging the surface thereby **supporting plant growth**.

⊕ **It reduces weeds. Weeds compete with crops** for what they need to grow. The dead plant matter will transform into natural fertilizer.

THINGS WE SHOULD AVOID TO PROTECT OUR SOIL

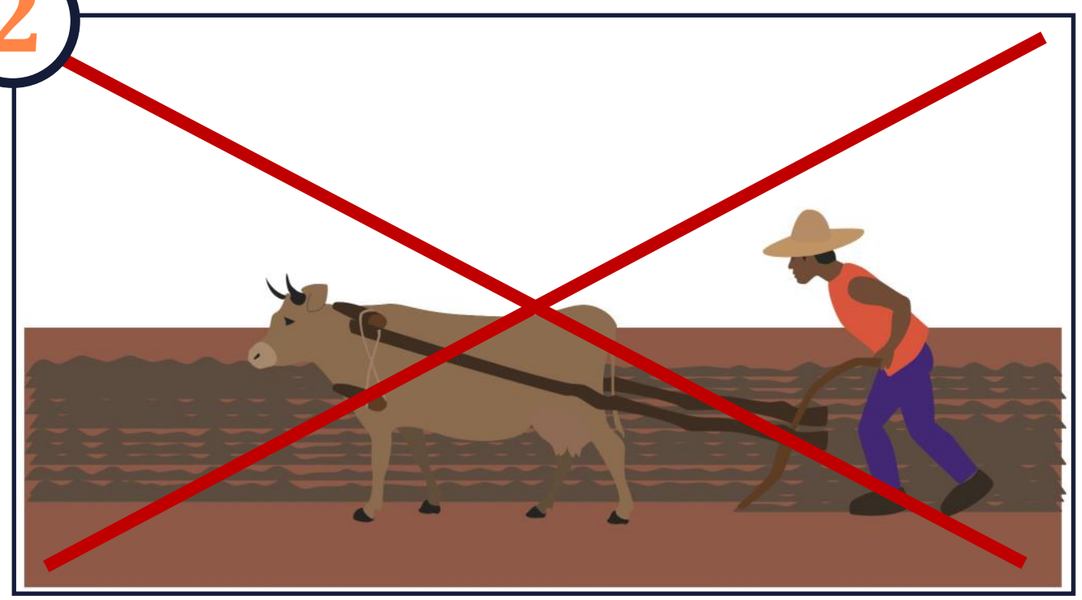
1



Why we reduce chemical fertiliser

- Less power of our Soil
- Less money input needed
- Less living organism die

2



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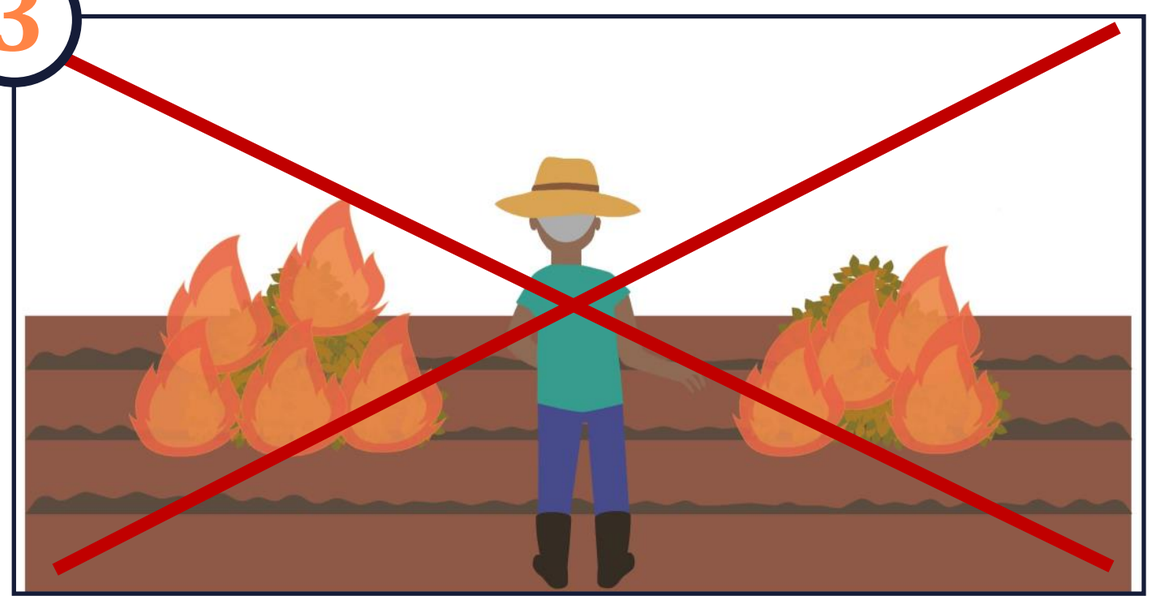


Things we should avoid to protect our soil

Task for the trainer:

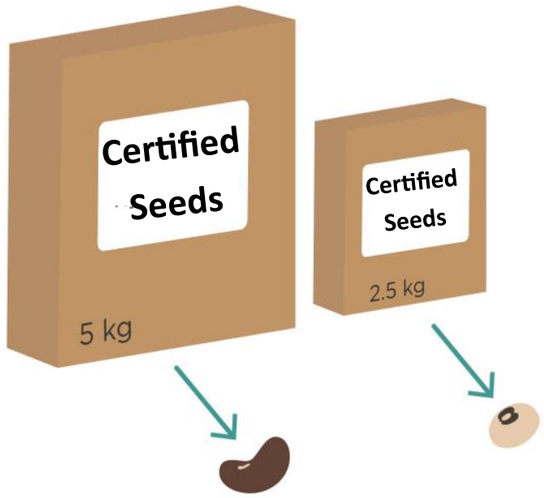
1) **Make it clear, that the crossed out section means "we do not do it"**
2) **Discuss Pictures**
   1. Avoid chemical Fertiliser*
      (Do not use much chemicals, including fertiliser on your field. But apply organic matter such as compost and manure)
   2. Avoid ploughing the land
      (Avoid ploughing the land, which exposes the soil to too much heat, wind that can carry soil nutrients away, and can kill the living organisms in the soils - we encourage ripping)
   3. Avoid burning crop residues
      (Do not burn crop residues because they protect the soil against wind, heat and erosion. Also the burning kills small beneficial organisms.)
3) **Ask question**

* Info Box: Why we reduce chemical Fertiliser

- ⊕ If chemical fertilizers are used over a longer period, the soil might need **regular input to support normal plant growth**.
- ⊕ Chemical fertilisers are **expensive**. The **money** we spend on them could be **utilised for something else**.
- ⊕ **Excessive use** of chemical fertiliser can **kill small beneficial organisms** that our soil needs to support crops.

TIPS FOR HIGH YIELDS

1



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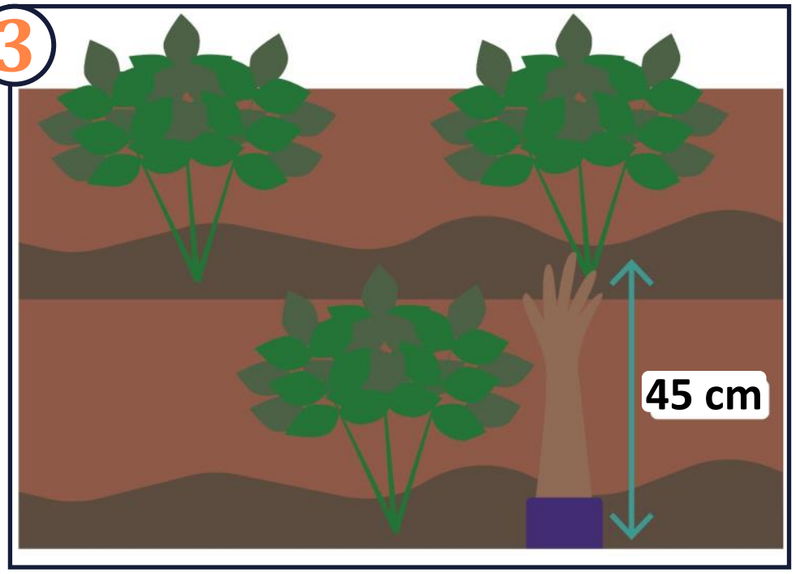

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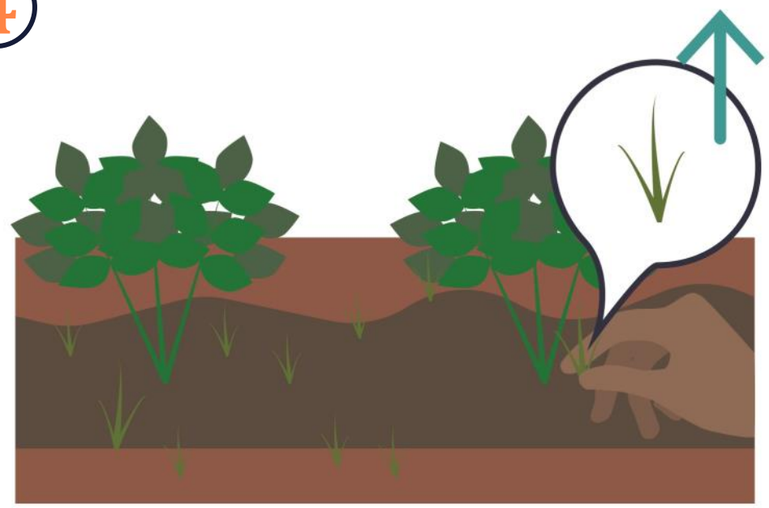

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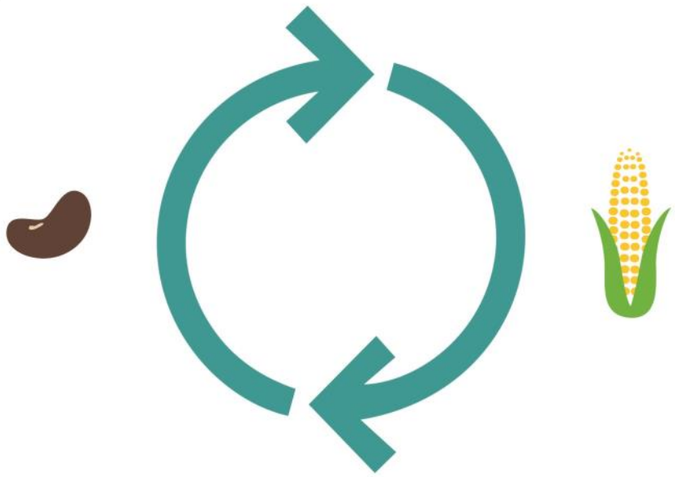

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Tips for high yields

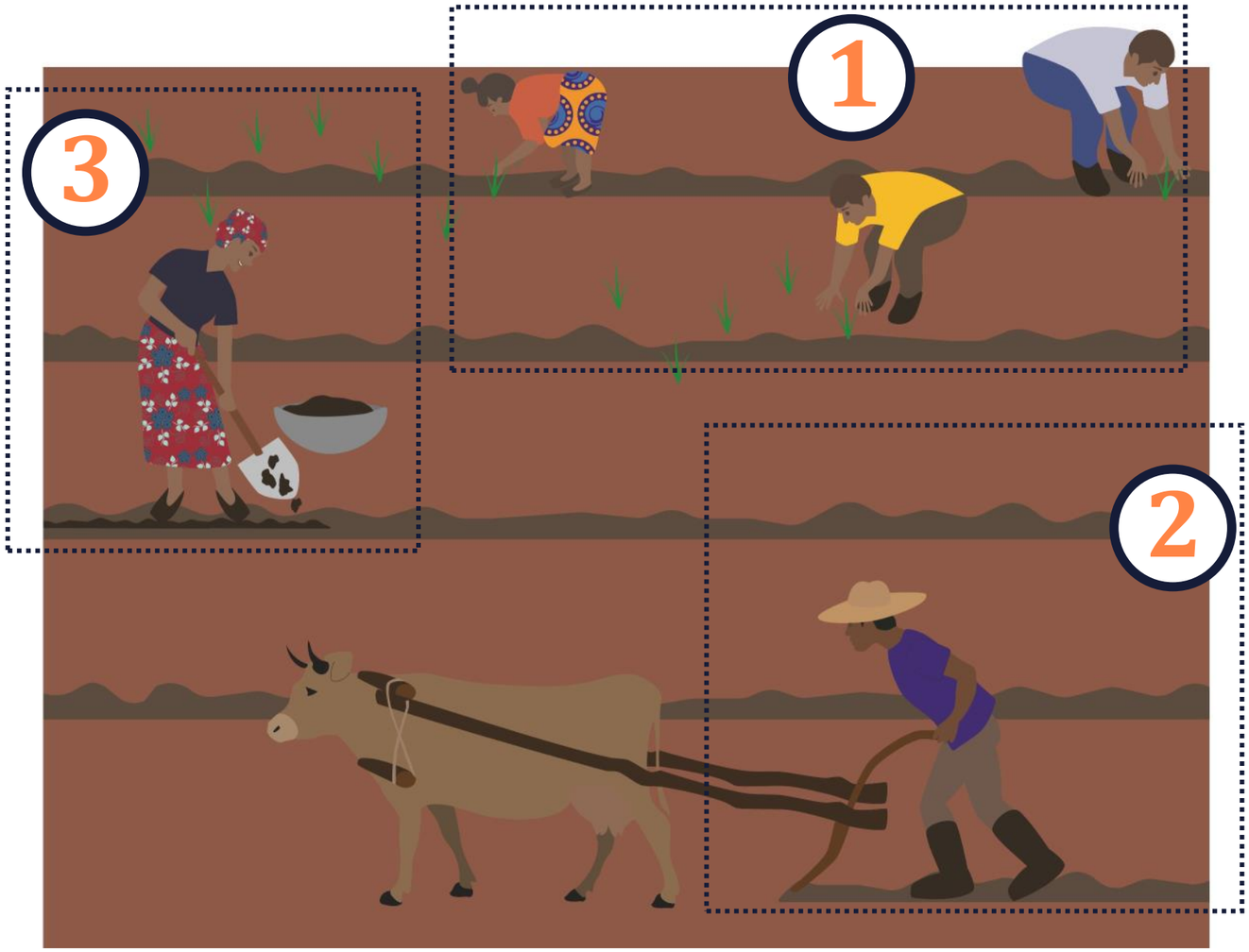
Task for the trainer:

1) **Discuss pictures**

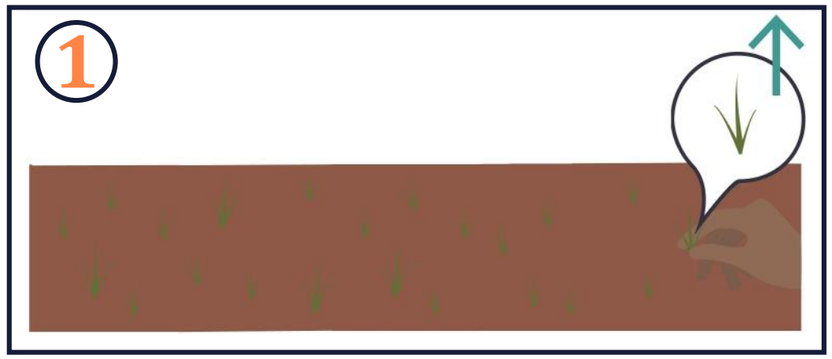
1. Plant **certified seeds**. Certified seeds are tested by the government for best plant growth and quality.
2. Plant cowpeas in January and February**. Times can vary and need to be adjusted to rainy season.**
3. Plant in rows **45 cm apart** to leave enough **space for plant grow**. Also leave 5-10 cm space between the plants.
4. Keep the fields **free of weeds**: They compete with crops for what they need.
5. **Rotate your cowpeas with other crops,** (e.g. Cereals and Tuber Plants). Cowpeas add some elements to the soil that farmers usually apply through chemical fertilizer (Urea). This will benefit your maize next year.
6. To ensure high yields for the **next year, always keep the best cowpeas for replanting** after the harvest**. You can replant for max three seasons.**

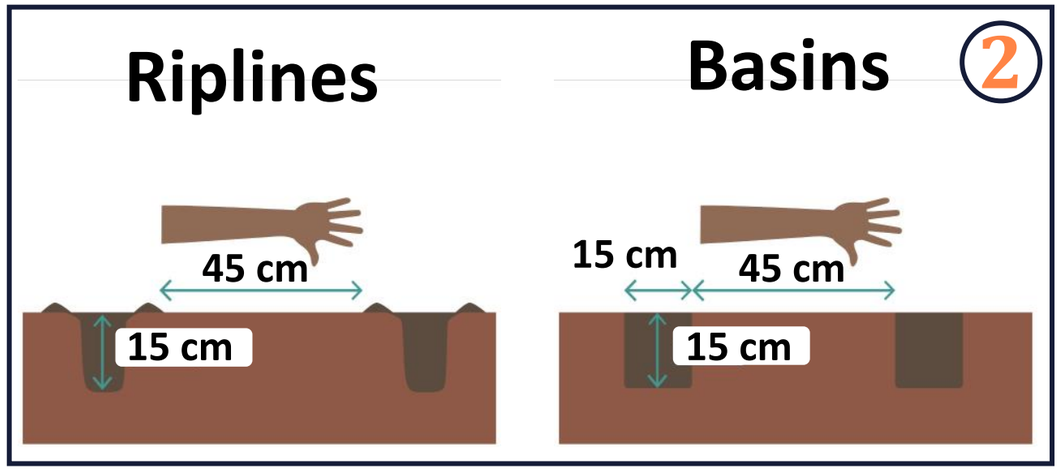
2) Ask question

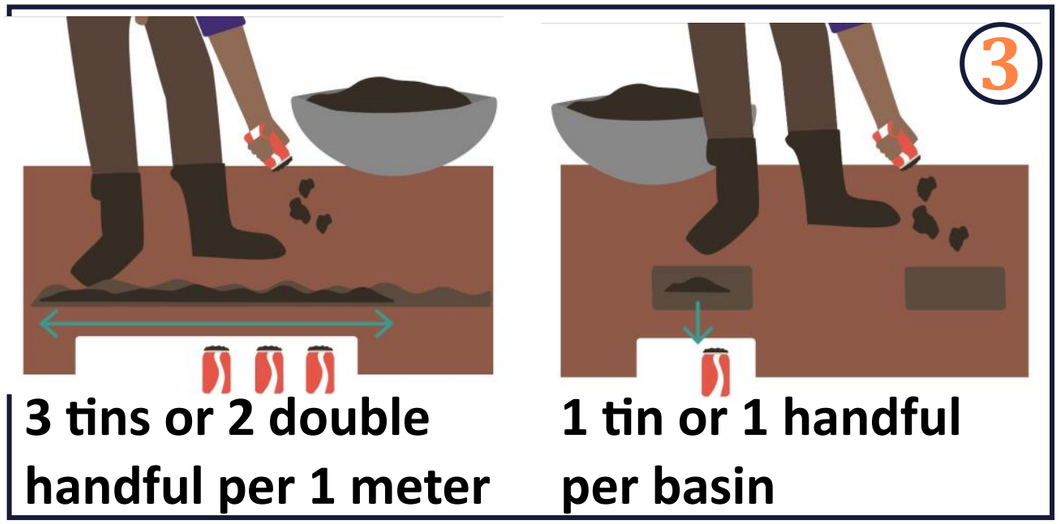
COWPEAS: LAND PREPERATION



Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec







COWPEAS: Preparing the land

Task for the trainer:

1) Discuss calendar

(Emphasize, that the fields should be prepared to allow the **harvest to take place after the main rains have past**. The normal growing period of cowpeas is 75-90 days. Times can vary according to the variety and need to be adjusted to rainy season.)

3) Discuss pictures

1. Weeding of the field

(Keep the fields free of weeds before preparing riplines or basins. Weeds compete with crops for what they need to grow. Weeding can be done **by hand or using tools**)

1. Digging riplines or basins

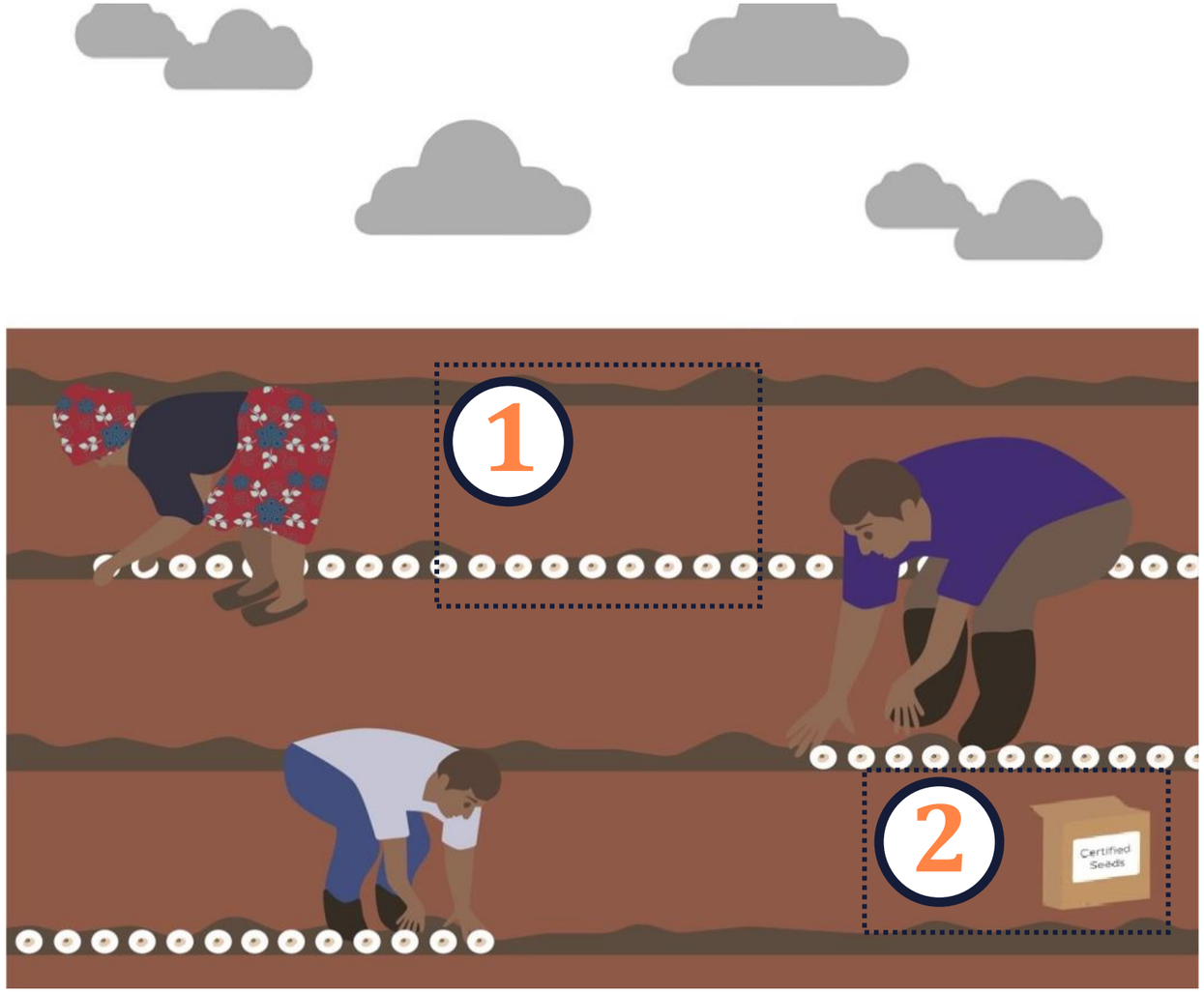
(Dig riplines or basins. Riplines should be 15cm deep; basins are 30cm long, 15cm deep and 15cm wide. Between the rows, we leave 45cm space. **Riplines and basins are equally suitable for growing cowpeas**)

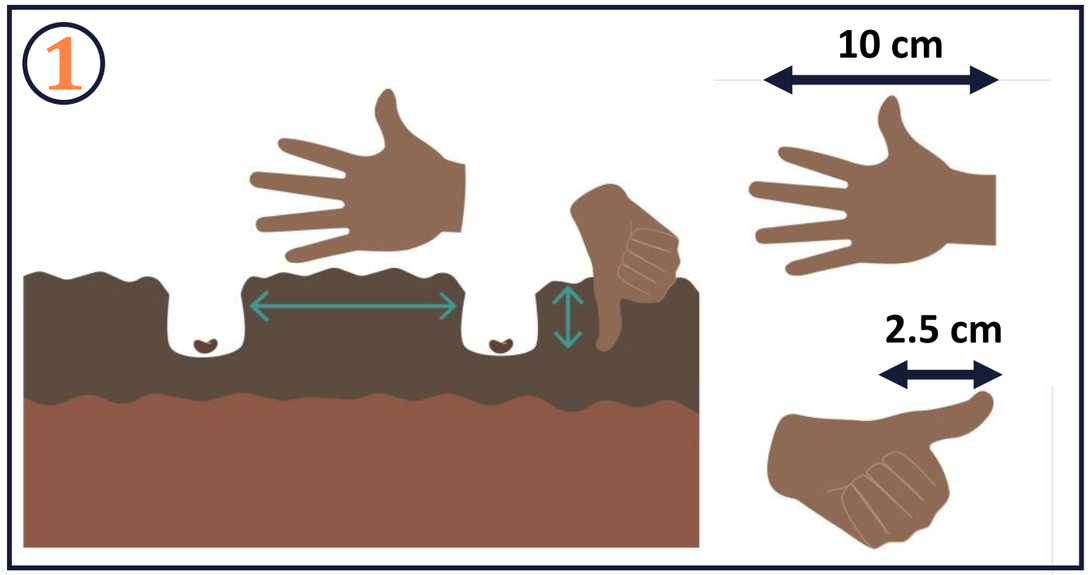
3. Applying compost and dry manure

(Apply compost or **dry** manure to the riplines or basins. Use **one double handful per basin [one full soda tin]** or **three double handful in riplines [3 tins] per meter**)

4) Ask question

COWPEAS: PLANTING





Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

COWPEAS: Planting

Task for the trainer:

1) Discuss calendar

(Cowpeas should not be grown in excessive water conditions or water logged areas because it increase the danger of diseases. Cowpeas have a slight tolerance to water logging. **Cowpeas** can be planted during **effective rains** of he season. Times can vary and need to be adjusted to the rainy season)

2) Discuss pictures

(Select good seeds without holes or wrinkles for planting)

1. Spacing

(The seeds are spaced 5-10cm apart and planted 2.5cm deep with one seed per station - one seed only if you use certified seeds. One hand is approximately 10cm. The distance between the tip of the thumb and the palm is approximately 2.5 cm.)

2. Seeds

(Use certified seeds and plant one seed per station. **Use 2.5kg of seeds** per lima)

3) Demonstration

(Have every farmer prepare three planting holes. Discuss their choice regarding distance and deepness)

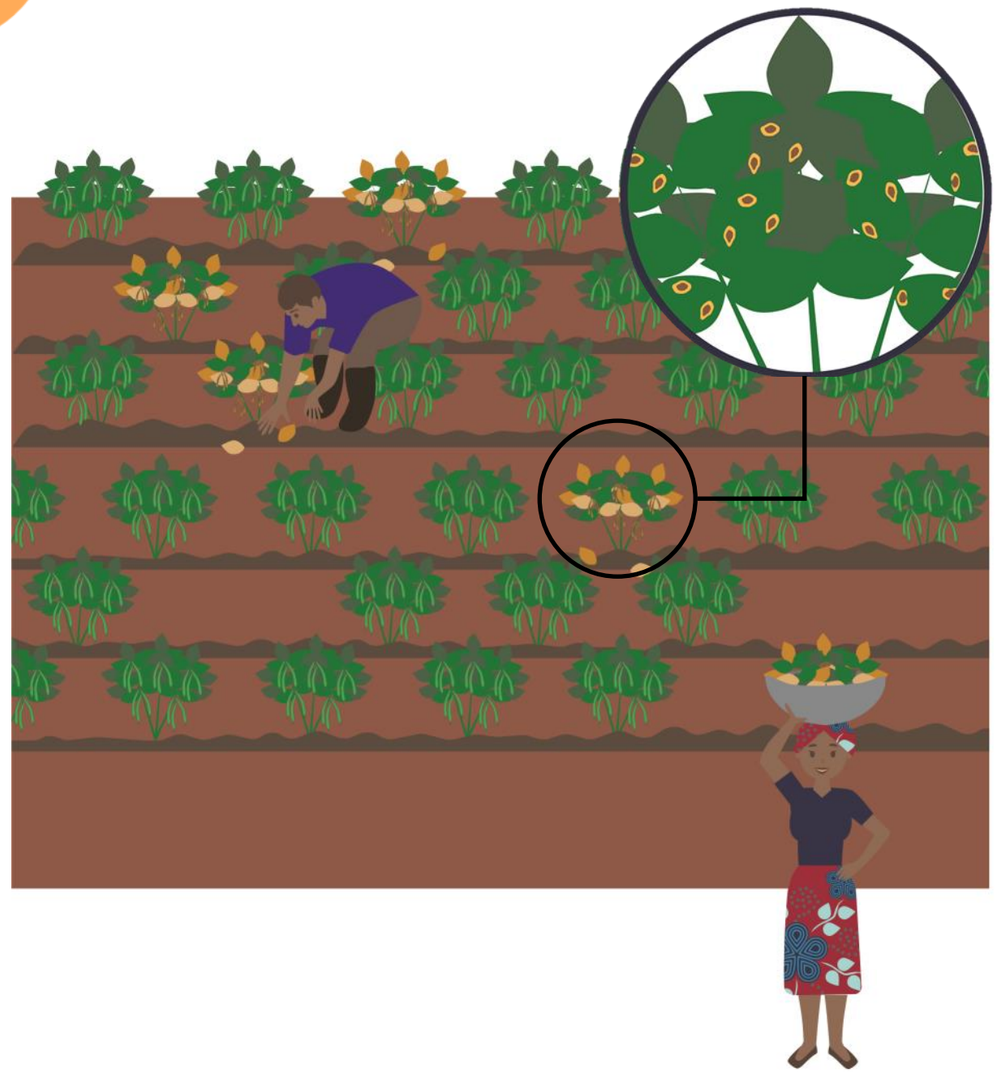
4) Ask question

Additional task for trainer: Introduce Intercropping

Intercropping

- **As a cover crop Cowpeas can be intercropped with maize, sorghum or millet.**
- **Intercropping cowpeas enhances soil quality, keeps moisture for your maize, sorghum or millet.**
- **If intercropped, Cowpeas should be planted at about 4-6 weeks after planting maize, sorghum or millet with 20 cm between rows.**
- **We do not intercrop with maize if we plant cowpeas as seeds.**

COWPEAS: PESTS AND DISEASES

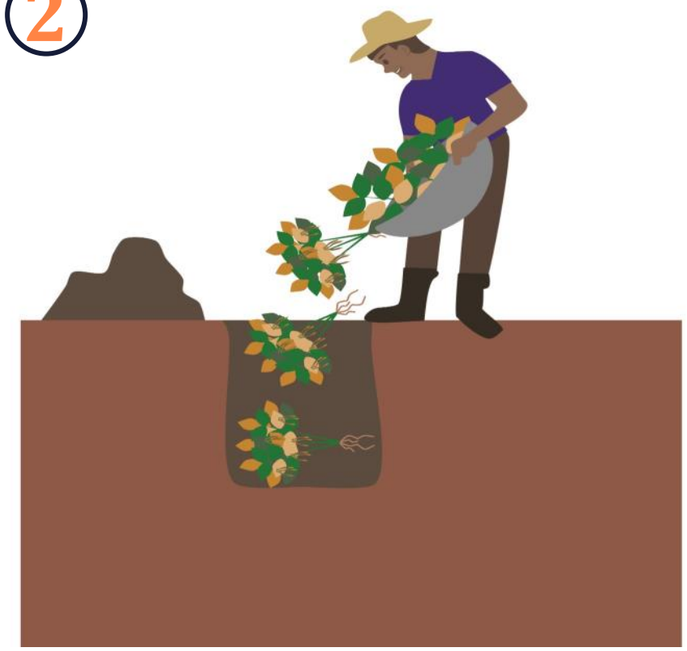


Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
●	●	●									●

1

After Planting	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6
1st Weeding		●				
2nd Weeding				●	●	

2



After Planting	Check
Week 1	
Week 2	
Week 3	●
Week 4	●
Week 5	●
Week 6	●
Week 7	●
Week 8	●
Week 9	●

COWPEAS: Pest, disease and weed management

Task for the trainer:

1) Discuss calendar

(During the **whole time** while the plants grow, you need to observe the fields to ensure the crops are healthy. Remove diseased plants as soon as possible)

2) Discuss pictures

(Diseased plants can be identified by various signs – mostly on the **leaves or stems**)

1. Weeding

(Weeding should be done regularly. To avoid dropping of flower buds you should do **hand weeding** during **flowering stages** rather than using a tool. Weed control reduces competition for nutrients, water and sunlight)

2. Diseased and infested plants

(Shortly after the germination, during flowering stage, after the first pods show and during dry spells, cowpeas are most effected by pests.

Diseased plants need to be removed with their roots **immediately**. They should be buried **away from the fields**. If kept close to the fields or garden they might **infect healthy plants** even when buried.)

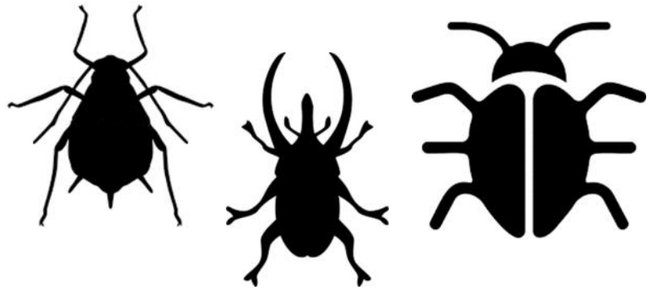
3) Ask question

COWPEAS: HOW TO IDENTIFY PESTS AND DISEASES

Common Pests

Cowpea is very attractive to insects. The main pests during the growing season are:

1. Aphids
2. Pod sucking bugs
3. Blister beetle
4. Pod borer



Practice crop rotation, companion planting, mixed cropping and regular weeding to avoid pests. Natural substances can be used in addition:

- ⊕ Tephrosia
- ⊕ Chilli powder
- ⊕ Tobacco snuff
- ⊕ Moringa tea/powder
- ⊕ Garlic powder
- ⊕ Neem/Eucalyptus tea

Signs of diseased plants

Angular leaf spot: Small greyish-brown spots at the leaf veins. In severe cases, the leaves turn yellow and drop prematurely.

Rust: Redish-brown spots in the upper and lower leaf surface, stems and pods.

Common bacterial blight: Water-soaked lesions on leaves. The lesions enlarge and merge.

Stem rot: Often observed in waterlogged areas. The disease infects the stem.

COWPEAS: How to identify pests and diseases

Task for the trainer:

1) **Discuss common pests**

(Ask about the different pests and experiences the farmers have. Explain that farmers should **always** keep an eye on their plants. Pests can come at any time but for cowpeas, the **most dangerous** times are **after planting, shortly before flowering and during dry spells.** Explain that **controlling pests** by one or two applications of **substances** is often necessary - most of the natural substances are applied by mixing them with water. Discuss the ratio with your Camp Officer.)

2) **Ask the farmers about their experiences with organic pest control**

3) **Discuss common diseases**

(Diseased plants can be identified by various signs – mostly on the **leaves or stems.** Discuss **each picture** and highlight the **differences between the diseases**)

Diseased plants

(Diseased plants need to be removed with their roots **immediately**. They should be buried **away from the fields**. If kept close to the fields or garden they might **infect healthy plants** even when buried)

4) **Ask question**

COWPEAS: HARVEST & PROCESSING

1

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

2

Screen out !

Branches

Sick legumes

Husks

Leaves

3

COWPEAS: Harvest & processing

Task for the trainer:

1) Discuss calendar

(The harvest should be done when the pods are **fully mature -** when pods turn brown and the leaves start dropping off. With cowpeas a **second or third harvest is possible** to ensure we get the cowpeas when they are fully ripe and dry. **Do not uproot** the plants, because the little balls around the roots [nodules] contain elements that farmers usually apply to the soil through chemical fertilizer [Urea]. Leaving cowpea roots in the soil saves money on fertilizer for the next crop.)

Delayed harvesting encourages weevil infestation in the field

2) Discuss pictures

Screening

(To sort out good and clean cowpeas by grading, **use your hands or a mesh**. Screen out any foreign matter like little branches, leaves, sick cowpeas or husks)

Winnowing

(Clean the cowpeas and **separate them from chuffs** through winnowing)

3) Ask question

COWPEAS: STORAGE

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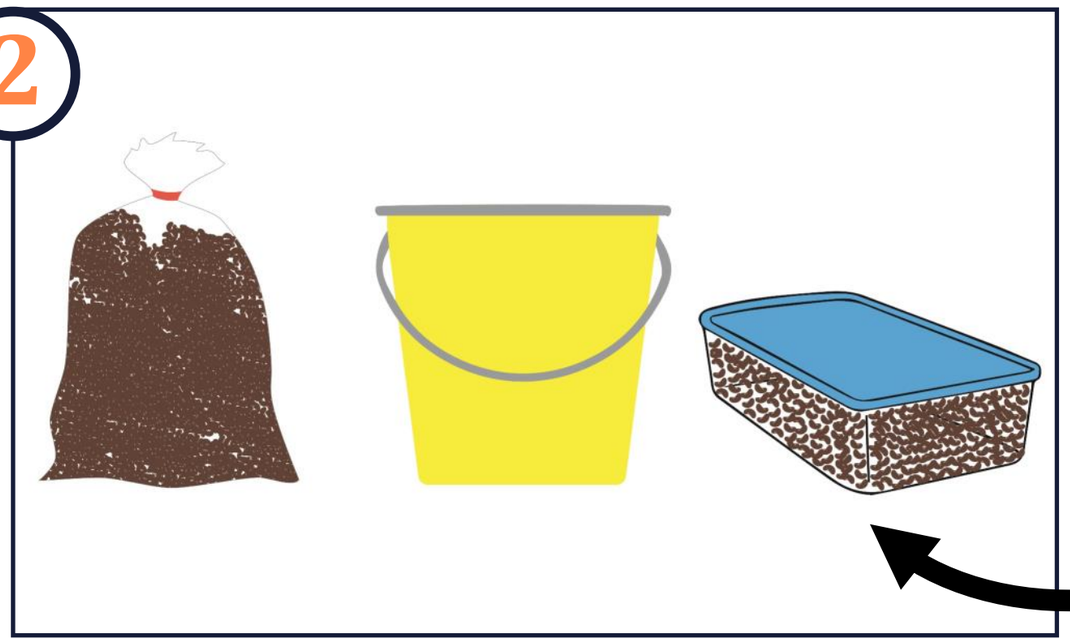
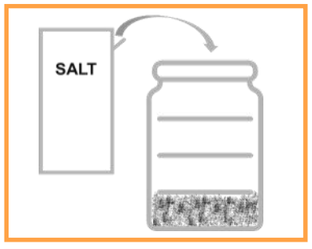
2



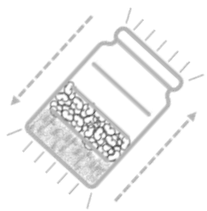
Are cowpeas well dried: The Salt Test

Use a clean dry jar, salt and a sample of the dried seeds.



Fill the salt into the jar. (up to a quarter)

Add the sample of cowpeas into the jar. (up to half)



Close the jar, shake it and let it settle for about 10 minutes.

Check if no salt is stuck on the sides of the jar.

COWPEAS: Storage

Task for the trainer:

1) Emphasize long-term benefits

Dried cowpea seeds can be stored **up to 8 months**. **Cowpea leaves** can also be preserved by **adding salt water** and keeping the vegetables in **a clean and air tight container** for future home consumption especially in the dry season when vegetables are scarce.

2) Discuss Pictures

1. Dry cowpeas

(After separating the cowpea seeds from **chuffs and diseased plants** dry them in the shade and not under direct sunlight - sunlight drying would increase the moisture reabsorption that can lead to mold and insect damage during storage. Regularly clean them and remove dust and other foreign matter. Use the **salt test*** to check if they are sufficiently dried)

2. Use airtight packaging material

(Store the cowpeas in on a raised platform in **clean and dry containers**. You can use **airtight polythene bags, plastic buckets or bins**)

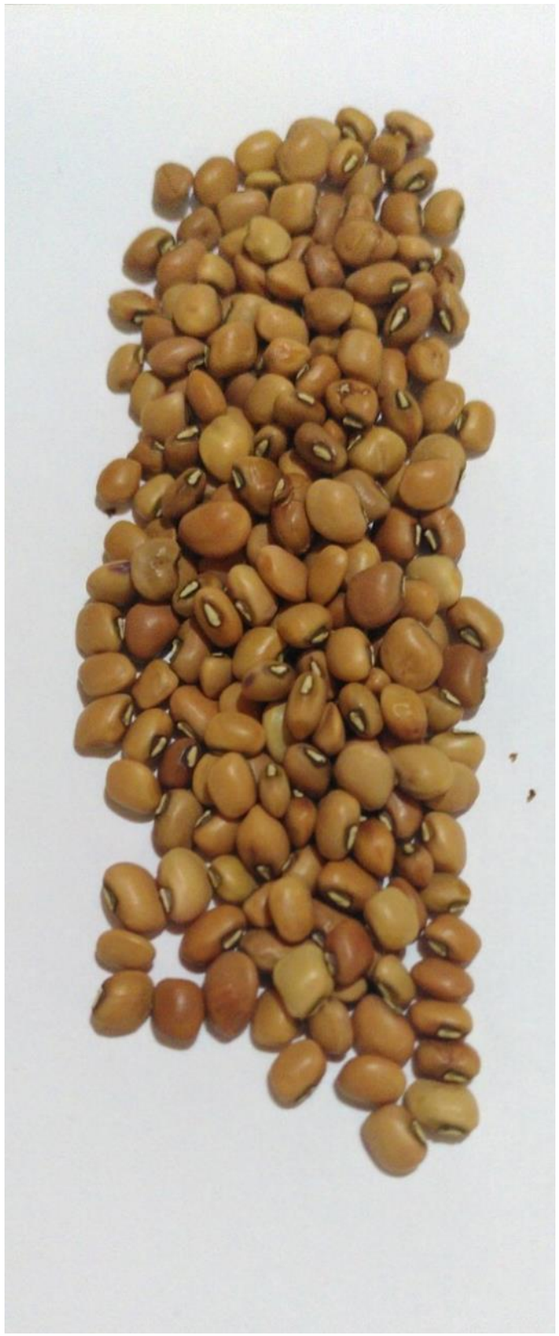
3) Ask question

* Info Box: The salt test

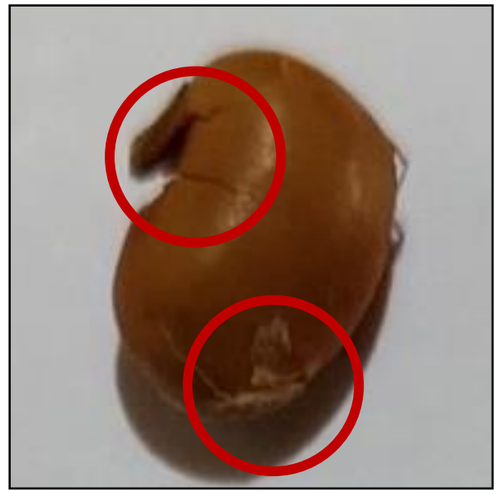
Cowpeas should be dried before storage. Assess the moisture with the salt test.

- ⊕ To check if the jar is dry, use one spoon of salt in the empty jar and shake it. The salt should not stick to the jar.
- ⊕ Fill the salt into the jar (up to a quarter).
- ⊕ Add the sample of beans into the jar (up to half).
- ⊕ Close the jar, shake it and let it settle for about 10 minutes.
- ⊕ Check if the salt is stuck on the sides of the jar. If damp salt is stuck on the sides of the jar, the beans are still too moist.

COWPEAS: REPLANTING FROM CERTIFIED SEEDS



The embryo should be visible



No cracks should be visible

No signs of diseases or pest attacks

Store seeds for the next season

Select the best cowpeas produced from certified seeds for replanting

Store in a cool place. High temperature might damage the seeds

Use fully filled airtight containers - regularly check the seeds

COWPEAS: Replanting from certified seeds

Task for the trainer:

1) Emphasize problems in relying on seed supplies

2) Emphasize that seeds can replanted

- Explain that if the cowpea seeds from certified seeds are selected and stored carefully, they can be **replanted for three years** before loosing too much germination power **(Mention germination test).** To continue getting high yields, it is better to by new certified seeds after this period

3) Discuss importance of proper storage techniques

- Select **dry cowpeas** to avoid the baby plant inside the seed gets rotten
- Use **airtight** containers to suffocate insects that have been overlooked

4) Discuss how to identify the best cowpeas to be kept as seeds for replanting next season

- The **embryo** should be clearly **visible**
- The cowpeas should **not have cracks or holes**
- **No signs** of **diseases or pest attacks** should be visible

4) Ask question

* Info Box: Storage

The main factors determining the storage life of seed are the moisture content and temperature.

Therefore:

⊕ Dry the seeds before storing (use salt test to check moisture).

⊕ Select the best cowpeas for long time storage.

⊕ Store the beans in airtight container on a raised platform.

⊕ Use a cool place for storage.

⊕ Regularly check the seeds and sort out any infested or diseased seeds. If you do not sort out this seeds you might loose all stored seeds.

THE GERMINATION TEST

- Plant 100 seeds (10x10)
- One seed per hole
- Each hole should be 2cm deep
- The holes should be 2 to 5 cm apart

- Cover the seeding holes with sand or soil
- Water constantly but not too much - keep the seeds moist but not wet
- Ensure birds and other animals do not eat the seeds

- Check after nine days
- Count the seedlings
- Calculate the percentage (80 seeds out of 100 planting holes = 80 percent)

The germination test

Task for the trainer:

1) Why do we do the germination test?

- Avoid re-sowing in case the seeds have not germinated (Re-sowing is expansive - Labor and additional seeds)

1) Avoiding yield losses (The germination rate has impact on your yields - 60% germination means only 60% of the planed yield
2) Use the right amount of seeds for your cultivated area - don't use too much seeds but only the amount you need
3) Allow to adjust planning in case the seeds do not germinate well - if the germination rate is too low you can plant other seeds

2) When do we do the germination test?

The germination test should be conducted at least a month before planting to allow an adjustment of plans in case the test the germination rate is too low

3) How do we do the germination test? (Explain pictures)

You can use a protected place in your garden or a container filled with soil and a hole to allow water to drain off. Plant 100 seeds in 10 rows with 10 seeding holes. The holes should be 2 cm deep and at least 2 cm apart. Use random seeds from different parts of your stored bags of cowpeas. Cover the seeds with sand or soil and water regularly (moist but not wet). Make sure, animals will not eat the seeds because this would give wrong results. After nine days, check how many seeds germinated. Count the seeds and calculate the percentage (15 germinated seeds = 15%, 60 germinated seeds = 60 percent, 85 germinated seeds = 85%).

4) What does the germination test tells us?

For cowpea seeds the germination rate should be higher than 80 percent but can go down to 70 percent after one or two years. If the result of the germination test is lower, we loose to many seeds during planting and should buy new seeds to compensate for the decreased quality.

5) Ask question

Legumes: Cowpeas Production

A manual for users and trainers

(Why, Where, What, When & How)

EAT HEALTHY
EAT DIVERSE
EAT DIFFERENT
FOOD GROUPS

Published by

Food and Nutrition Security, Enhanced Resilience Project
Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH
No. 5, Chaholi Road, Rhodes Park
Private Bag RW 37X
Lusaka, Zambia

On behalf of the

Federal Ministry for Economic Cooperation and Development (BMZ) Germany

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Sources

The Better Life Book, COMACO, 2018; Beans Production Guide, ZARI , 2018; Product Varieties, ZAMSEED, 2018

Illustrations

Francis Smeins

Design

GIZ

Printing