



"Before COMACO, we had so many problems. We didn't have food security, we didn't have money. Now, we are trained in organic farming...and markets are readily available. Today, life is better".

- Mabel Zulu, COMACO
Principal Lead Farmer



The Better Life Book





Implemented by:



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Published by COMACO

First published: 2015.

Second, limited edition: 2016

Third edition: 2018

Edited, illustrated, typeset, designed and layout by Beehive Associates Limited

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Citation: Community Markets for Conservation (2015), COMACO Better life Book 2018, Zambia

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Acknowledgements

Support for this third edition of the Better Life Book was made possible by a generous grant from the One World – No Hunger Initiative of the German Government. COMACO extends its deepest appreciation for this support and to the People of Germany for their continued help in building COMACO's services to small-scale farmers, and to the Royal Norwegian Embassy for its long and enduring support that put COMACO on its feet. COMACO also recognizes the important contributions from other partners, without which this manual would not have been possible. They include various ministries of the Zambian Government, EU, IFAD, USAID, UNDP, World Bank, WCS, and the Mulago Foundation.

Finally COMACO extends its appreciation to William B. Lloyd (in memory of) and Harvey and Heidi Bookman for their generous support over the years that helped contribute to the Better Life Book.



Implemented by:



Foreword



COMACO is about small-scale farmers - their energy, their intelligence, and their close link to Nature. As a partner to a growing number of farming communities that want to have a better life and keep their natural resources too, COMACO offers a sure path. It has produced this manual to help farmers along this path, learning the secrets of soils, better ways to farm, solutions to crop pests and a changing climate, new crops for improved nutrition and market value, safer ways to store crops, and much more.

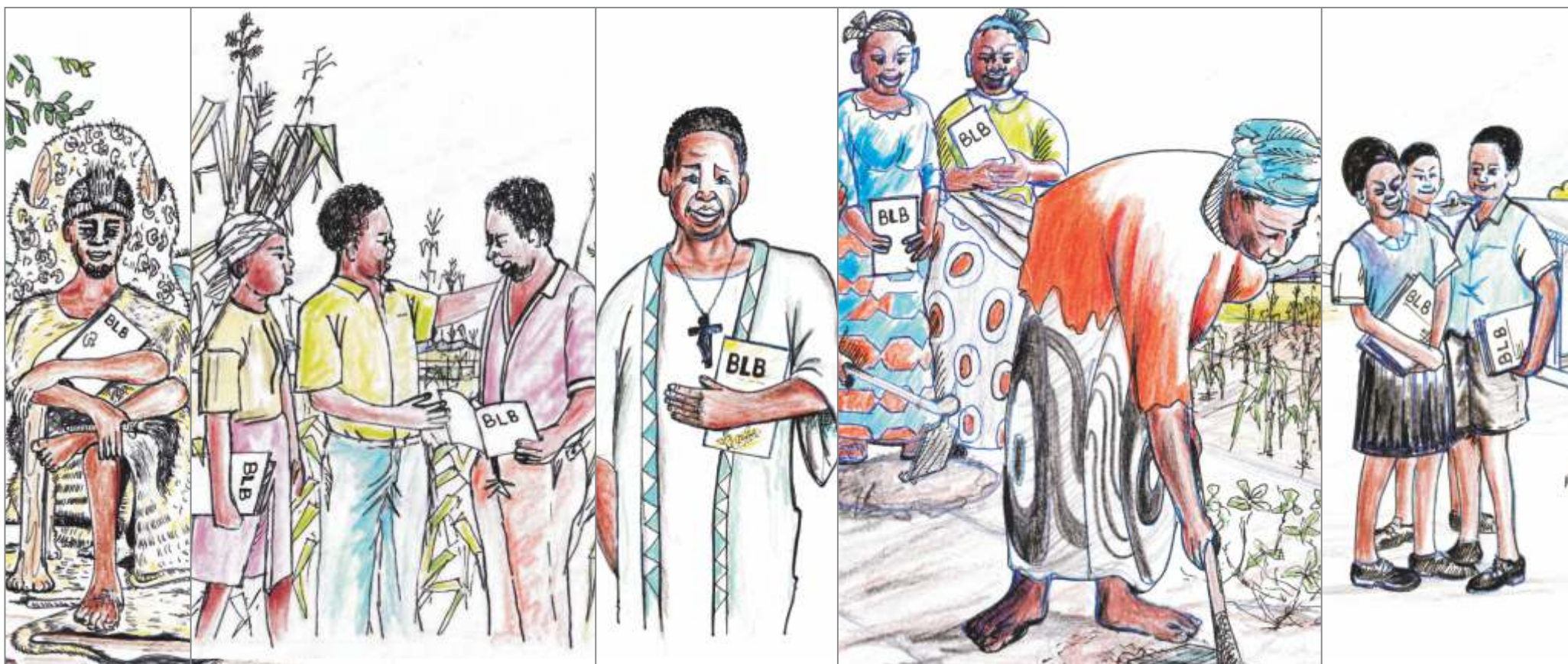
As communities follow this path, COMACO has made a commitment to develop markets that pay top value to farmers and bring business opportunities to their cooperatives when commitment to protecting soils, forests and wildlife is demonstrated. It is an exciting journey that COMACO hopes will attract many partners, gaining help and support along the way, to ensure poverty and hunger are replaced with resilient, healthy communities building markets that conserve.

A handwritten signature in black ink, appearing to read 'Dale Lewis'.

Dale Lewis

GETTING STARTED





- Everyone! chiefs, church leaders, women leaders, headmen, schools, cooperatives, producer group leaders, lead farmers ... and me and my family.

The BLB will ...

- help producer group leaders to conduct better meetings to help members learn as a group by sharing lessons, give confidence to farmers and find answers to life problems;
- help family members learn as a group;

- act as a library of practical skills for teachers and students in local schools;
- help chiefs improve the management and protection of natural resources to help earn a conservation dividend payment for their community.

How to get the most out of the BLB

This section explains how you can make the best use of this book. The Better Life Book is written for you. It teaches you and other members of the community on how farm, conserve natural resources and keep your family safe from hunger and poverty.

How to use the Better Life Book



The farmer

- Read the entire book and learn as a family.
- Discuss it with family members, friends and within the farming community/village.
- Use the farm calendar as a guideline throughout the farming year.
- Look for additional information, on how you can improve your life or start your business.
- Find solutions to solve family life issues.
- Learn and appreciate how and why it is important to conserve natural resources.
- Take the book to every producer group meeting and training.
- Share the book and the content with others.
- Use the text in the icons to discuss each section of the book.



The producer group leaders and lead farmers

- Use the Better Life Book as a guide for building safer, more productive lives among group members.
- Meet as a group and identify a topic for discussion from the book.
- Use the entire book for trainings, group meetings and to learn new skills for improving family well-being.
- Select topics from the farm calendar and to learn how to plan activities throughout the year to improve production and income.
- Learn how to apply and test new skills as a group to assess what works best and how to help others learn faster.



The cooperative leaders and traditional leaders

- Use the Better Life Book to better - inform local leaders who can inspire the entire community to practice better farming and life skills.
- Take the book as a source of information for conducting cooperative meetings to help guide and promote members to comply with Better Life Book skills.
- Apply the leadership calendar during the year and use the relevant learning pages.



The Better Life Book will bring hope by giving answers to our food and income needs. The book will help us as a community and as families to:

- increase crop harvests without expensive inputs (like fertilizers and other chemicals),
- protect and benefit from the natural resources such as wildlife,
- build a foundation for community leaders to solve problems,
- secure a better future for our families, and
- leave fertile, productive land for our children's future.



ABOUT COMMUNITY MARKETS FOR CONSERVATION (COMACO)

COMACO's Strategy

COMACO
as a company.



We make conservation farming and sustainable land use practices profitable for farmers.

COMACO as a community.

We stop poaching, and take care of our land & forests.



COMACO process.... from seed to shelf



The COMACO process starts with helping farmers learn and understand the underlying facts that allow farmers to keep soils healthy and productive for having more food and income. Step two is to organize farmers into groups with motivated leaders who can encourage adoption of these skills. Step three is to sell crop surplus into markets provided by COMACO that reward

farmers with good prices for adopting farming practices that are good for the soil. The last step is to turn farmers' crops into high-valued food products that will ensure a long-term solution for reliable markets that will keep farmers safe from hunger and poverty.

Building a path to a better life

1. How can I become a member of COMACO?

- Join a producer group to learn better skills and sign a conservation pledge – ‘I am now a COMACO member’.
- Attend group meetings and attend training sessions by group leaders and lead farmers.

2. How you and your family can gain the most

- Apply skills to increase yields of food and surplus for markets.
- Follow cooperative marketing plan to bulk crop and sell to COMACO for best price.
- Be active in a group to share lessons and learn from others.



What are the benefits of being a member?

- Market is near, food security achieved.
- You get top price from COMACO.
- By adopting conservation pledge guidelines as a community, your cooperative receives a conservation dividend payment.
- Your cooperative can be more helpful to you.

With more money, as a COMACO member you will be able to afford school fees, health care, and important necessities like bicycles.



COMACO will help you to understand and practice conservation farming practices like....”

- minimum tillage,
- crop rotation,
- use of compost manure and *Gliricidia* leaves,
- retention and non-burning of crop residue,
- use cover crops and intercropping techniques,
- planting of *Gliricidia* trees for soil fertility improvement, and
- making fire breaks.

This will lead to...

- no hunger, more income from more sources,
- more intact forest to maintain water table and increase benefits from forest products,
- no need to open new fields or to relocate,
- opportunities to increase assets on farm, and
- easy fuel wood supply for family cooking.

Understanding soil

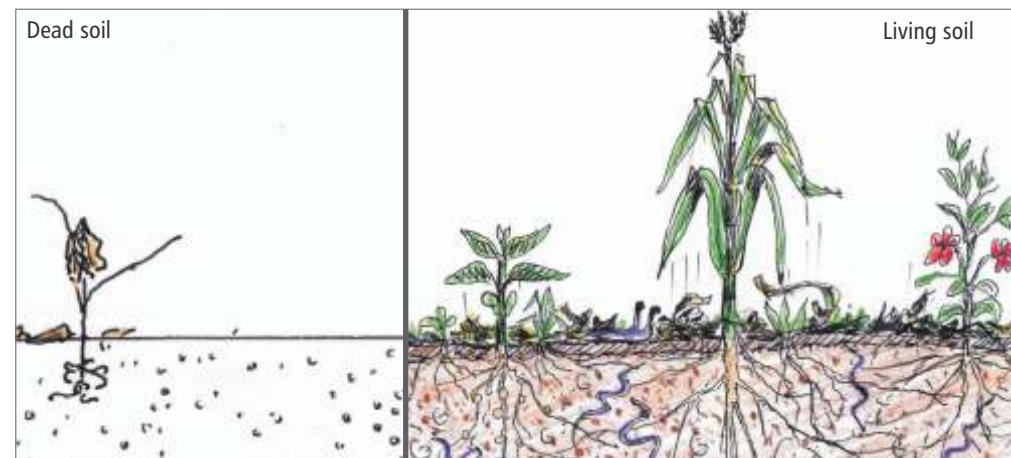
Living soil gives best yields – learn the secrets!

Take care of your soil and it will take care of you!

- A healthy soil is a living soil because it feeds your crops with its own nutrients.
- Living soils produce good yields free from disease and more protected from drought.
- Living soils reduce or eliminate the need for fertilizer inputs, saving you much money.
- Failure to care for farm soils can bring hunger to your family.



the roots for good root growth. They also enable the root to extend its length to absorb more nutrients and water.



How do living soils work?

- Living organisms we cannot see are called microorganisms. In living soils there are lots of these small little animals, invisible to our eyes.
- For the living organisms to feed the plant, they also need to be fed and require dead plant material we call organic material as their food. Important examples of organic material that a farmer can provide to the soils include:
 - ✓ keeping harvested crop material on the surface that will feed microorganism and keep the soil moist;
 - ✓ applying compost, using different source of plant material and other forms of nutrients; and
 - ✓ Using nutrient-rich leaves by burying them where crop seeds will be planted.

What is a living soil? Why do farmers, like you, need to know this?

A living soil has very tiny living forms of life (including bacteria and fungi) live close to the roots. These tiny living organisms help to feed the plant through its roots with a much larger range of nutrients than chemical fertilizers provide. These forms of life also help to loosen the soil to allow water to reach

Living soil: your source of food and money

- Microorganism (bacteria) change what they feed on into a range of different natural chemicals which they store or release into the soil for root absorption.
- When these microorganism die and rot, their own nutrients are released and taken in by nearby roots.
- Sometimes these microorganisms live in the root and produce nutrients (especially nitrogen) directly to the plant as well as into the soil. Some



Step 1: Pick Gliricidia Leaves Step 2: Putting Leaves in Riplines Step 3: Cover leaves with soil

legumes, like soybeans, groundnuts, and cowpeas do this well.

- Certain plants such as *Gliricidia* store a large amount of nutrients in their leaves and roots. By harvesting the leaves and applying them to the soil either directly or in compost, the microorganisms work to change these nutrients plant food.
- Finally, living soils also support larger forms of life that help to loosen the soil. From the waste of these forms of life, they support nutrient flow into plant roots. These include such creatures as
 - ✓ Earthworms. They loosen the soil, allow water to penetrate the soil, and supply nutrients to crops from excreta.
 - ✓ Termites. They also loosen soils and bring nutrients from below for plants to access and stay healthy.



How can you support living soils on your farm? What are the best practices?

Remember! The key for supporting living soils on your farm plot is having organic material in your soil!.

How to support living soils

- Increase organic material in the soil by use of compost manure.
- Practice minimum tillage to reduce soil disturbance that cause soil loss and damage to the soil.
- Cover soil with crop residues or other organic material like cut grasses or leaves from near by trees.
- Prevent fires such as, those started by children hunting for mice.
- Do not let animals graze on your plot.

Things to avoid!

- Avoid burning crop residues.
- Avoid ploughing the land, which exposes the soil to too much heat, wind that can carry nutrients away, and will kill the living organisms in the soils.
- Avoid grazing animals on your plot, they remove cover or organic material that feed the soil.
- Avoid too much use of chemicals, including fertilizer on your farm;
 - ✓ it kills the living organisms,
 - ✓ makes your soil sour or acidic and crops fail to grow,
 - ✓ it is expensive for you,
 - ✓ it destroys the power of your soil to support crops and you become dependent on the chemicals without which you produce nothing.

Understanding soil



Farming with positive practice without chemicals leading to good yield



Good soil = better yield



Why are these practices necessary?

Cover your soils with crop residues and other plant matter, Why?

- They reduce soil loss from erosion by wind or rain.
- They reduce temperatures to support healthy populations of microorganisms in the soil. Microorganisms cannot survive when soils are too hot.
- They provide organic matter as a source of food for healthy growth of soil microorganisms to feed your crop.
- They allow the rainy water to enter the soil more easily to support healthy plant growth.
- They reduce weeds and help to rebuild nutrients in soils.

Remember! Weeds starve crops of their soil nutrients, so use crop residues to help prevent weeds.

- Increase yields and reduce input costs.



What are some of the bad effects of using chemicals on your farm?



Fertilizers can kill soil and result in poor crop yields like this one

Negative effects of chemicals

- Overtime, chemical fertilizer, pesticides and herbicides will damage the soils by increasing acidity and preventing microorganisms to survive.
- Crops become less efficient in absorbing nutrients.
- Reduces total nutrients in the crops because chemical fertilizers supplies only limited nutrients to the crops: nitrogen, phosphorus and potassium, yet there are many other nutrient plants require.
- Can contaminate or poison groundwater and soils.
- Human risks from exposure to toxic chemicals can cause a range of health problems such as – deformed babies, sick mothers, cancer and many other illnesses.
- Soils without organic material can only produce yields with costly chemical fertilizers. And without fertilizer will produce very poor yields.
- Over time soils become acidic and will lead to poor yields even with fertilizer.

Understanding soil

How to recognise damaged soils

- Poor water drainage, caused by hard pans from years of ploughing.
- Badly eroded soils where all the healthy, organic soils are washed away leaving poorer quality soils with a lot of small stones.
- Soil colour is often pale yellow or light brown, showing lack of dark organic material in the soil.

How to restore damaged soils

- Plant *Gliricidia*, it will breakdown and loosen the soils. It will also help to restore microorganisms and increase organic material content in the soils.



Destroyed farm soils from erosion caused by burning and ploughing



Good soil management using practices shown here gives good yield

As roots die, they become part of organic material.

- Add compost and other organic material to the soil.
- Adopt minimum tillage to keep organic material covering the soil.
- Eventually the living soils characteristics will break down the hard pan.
- Stop fires, including those caused by children hunting for mice. Find other ways to hunt mice without destroying your soil.
- Fallow damaged field with such crops as velvet beans until the soils are restored and then return to practices that can keep soils healthy and in production for life.

Know the type of soil on your farm

Soils have different capacities to hold water. The capacity to hold water is influenced by the kind of mineral content of the soils. The type of soil solids of your soil, known as 'mineral particles', can either be Sand or Clay. These solids leave 'air spaces' between them, which are filled with water and air combined. It is also in these spaces where living organisms live.

- In a very dry soil, it means the air spaces have no water. Crops start wilting in such a soil and eventually die.
- If the air spaces are completely filled with water then it is water logged.
- A well cared for soil can cope with these conditions very well.
- If the soil is too sandy with large spaces between the sand grains, water passes through quickly and plants can dry out quickly and wilt.
- The soil is very easy to work, but it is very poor in crop food.
- It drains water very fast, carrying crop food or nutrients along with it to deeper layers.
- It is usually very dry unless you care for it.
- It becomes very hot during the day and cold at night.
- Plant *Gliricidia* and manage it well to help supply some crop food and



Composting restores organic material and enriches the soil

How to prevent damaged soils



What can you do to improve poor soils?

- provide residue to cover the soil surface.
- Add compost or animal manure, which helps to hold the soil particles together. Manure also;
 - ✓ adds crop food,
 - ✓ helps the soil to hold water for a longer time,
 - ✓ keeps the soil warm in cold weather for the crop roots, and
 - ✓ encourages the small living organisms which are beneficial to crops to live in the soil.
- Always cover the soil with crop residue to cool it and avoid the solids being carried away by rain water and wind.
- Covering the soil with crop residue or mulch will also helps to:
 - ✓ Retain moisture in the soil, improves activity of living organisms, suppresses weeds and adds humus when it rots.

If the soil has too much clay, water will not pass through fast enough and

the soil can become waterlogged and can damage crops

- The soil is very heavy and cracks easily when dry.
- This soil drains water very slowly hence can easily be water logged.



Without ground cover soil erosion can result in fields like this one

What to do! for clay soils

- Add compost manure. This will loosen the soil particles, allow water to pass through easily, and increase air circulation for the crop roots.
- Plant *Gliricidia* trees in your field to loosen it and add crop food.
- Leave crop residue in the field.

Good ground cover/mulching of field



Good ground cover together with *Gliricidia* will give the farmer good yield

No groundcover in the field



Without ground cover crops suffer more from drought and poor yields

COMACO FARM CALENDAR AND BEST PRACTICES



Chapter 5

COMACO farm calendar

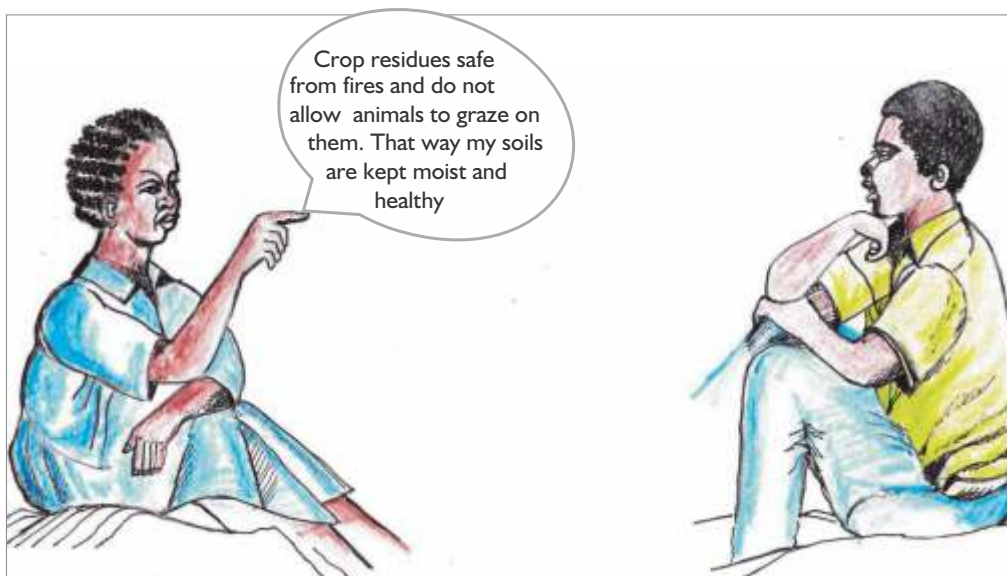
As a farmer you have a lot of activities that you do throughout the year.
We can organise these activities in a calendar so that we do not miss any one of them. Below is a farm calendar.

ACTIVITY	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR
Crop Residue: Closing of Fields Chapter 6: Page 16												
Fire Break Establishment Chapter 7: Page 17												
Basin Making and Ripping of Fields Chapter 8: Page 18												
What are riplines and ripping? Chapter 8: Page 19												
Compost Manure Making Chapter 9: Page 20												
Compost Manure for planting in a basin Chapter 9: Page 21												
Farming with Gliricidia Trees Chapter 10: Page 22												
Transplanting and Managing Gliricidia Chapter 10: Page 23												
Maize production Chapter 11: Page 25												
Groundnut Production Chapter 12: Page 28												
Bean Production Chapter 13: Page 30												
Soybean Production Chapter 14: Page 32												

COMACO farm calendar

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ACTIVITY	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR
Cowpeas Production Chapter 15: Page 34												
Making SRI Nurseries Chapter 17: Page 37												
SRI Rice Production Chapter 18: Page 39												
Sweet potato Nurseries Chapter 19: Page 41												
Sweet potato Production Chapter 20: Page 42												
Cassava Production Chapter 21: Page 43												
Managing weeds in your field Chapter 22: Page 46												
Sustainable Crop Pest Management Chapter 23: Page 47												
Harvesting of Crops Chapter 24: Page 52												
Establishment Gliricidia Nurseries Chapter 25: Page 54												
Vegetable Gardening Chapter 26: Page 58												
Livestock Control on the Field Chapter 27: Page 60												



Tips for residue management and closing fields

- After harvesting maize or any crop, lay down the drying remains of the crop flat on the surface of the ground to block any sunlight reaching the soil. This will retard or blocks weed growth and seal in moisture for a healthy soil.
- Demand compensation through the chief for anyone who allows their livestock to eat your residue.
- You can gather plant matter from surrounding vegetation to enhance the ground cover requirements.
- Make sure children do not catch mice by starting fires. Educate fellow-parents about the risks of uncontrolled fires and for all families to cooperate to educate their children.

Protect your soil, it will also feed you

Note: Cover your soils evenly with leaves and crop residues. The more you cover the soils the better for you and your crops.



Field with crop residue to cover the soil. This is how your field should look



Keep as much crop residue as possible to maintain healthy soils

Tips:

1. Grow a fodder bank for your livestock.
2. Feed your livestock with grass.

When you feed your livestock in the field on crop residue, soils will not support your plants and you will lose out on nutrients for your crops.

Bushfires are farmers' worst enemy. They can destroy crops and crop residues that are so important for maintaining healthy soils. Fires expose the soil to excess heat from the sun and wind, leading to wind erosion of top soil and loss of organic life in the soil. Most weeds drop their seeds before the fire and are designed to withstand fires.



To prevent fires from reducing your yields, you must leave a strip of cleared land around your field. This strip of cleared land is called a firebreak.

You should make sure that the firebreak is wide enough to keep the fire from crossing into your field. The firebreak should have a minimum width of 3 metres. Burning crop residues is actually burning your fertilizer.



What is the use of firebreaks?

Important tips for making firebreaks

1. Make a strip of about 3m around your field.
2. Ensure you leave your crop residue lying on the field after harvesting the crops well within the fire breaks.



Burning of fields by children destroys your soils and could spread to forests. Talk to them, teach them the harmful effects of burning fields

3. Make the strip in May after the last rains.
4. Use a hoe to make the strip. Do not use fire.
5. In November before rains start, make two ridges in the strip and plant sweet potatoes in them.
6. Did you know that this makes a permanent fire break and you will not need to make again?

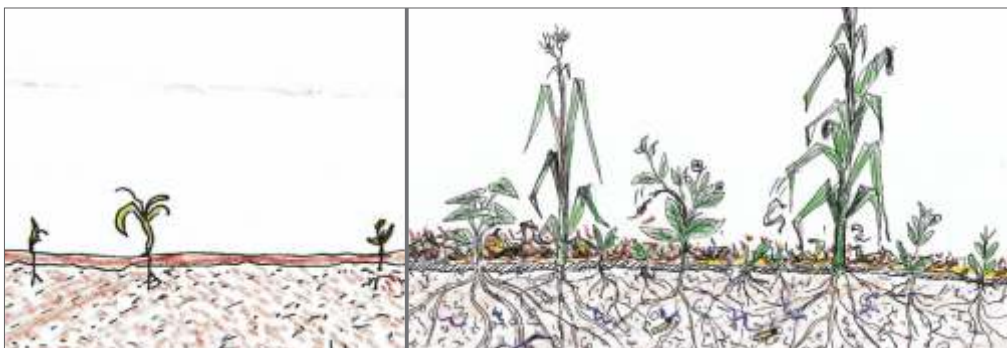
Basins



Mould board ploughing makes a hard pan for your crops

Did you know that over time ploughing destroys your **soil**?

Over time, ploughing reduces the size of the soil grains and the finer grains filter down to a level where they accumulate and form what is called a “hard pan”. Hard pans restrict root growth and can cause crops to lose productivity. Ploughing also exposes the soil to wind, rain and sun. It increases erosion and reduces organic life in the soil.



Hard pan caused by continuous ploughing Healthy crop no hard pan

What are basins and why farm with basins?

- Are evenly spaced holes that meet the requirements for a particular crop.
- They are dug 15 cm deep and about 30 cm long.
- It is best to dig the holes just prior to plant to reduce the destruction or disturbance to the soil.

- When preparing the hole, make sure your compost and/or your *Gliricidia* leaves are ready to apply to the soil.
- Once the compost or *Gliricidia* leaves have been applied, cover the soil loosely until it is time to plant.
- Either plant the seed at the same time or just before the rains by loosening the soil covering the basin to deposit the seed.
- Basins provide a wonderful retention of water from rains that gives the seed a better chance of shooting and staying healthy until the next rains.
- Basins also concentrate the nutrients where they are most needed while helping to build up soils with organic material that will feed soil life, necessary for passing nutrients into the roots of your crops.



- Make sure you maintain the same basins from year to year. This will further improve the quality and health of the soils for these points.
- For some crops, like groundnuts, the basins need to be spaced closer together.

Rielines

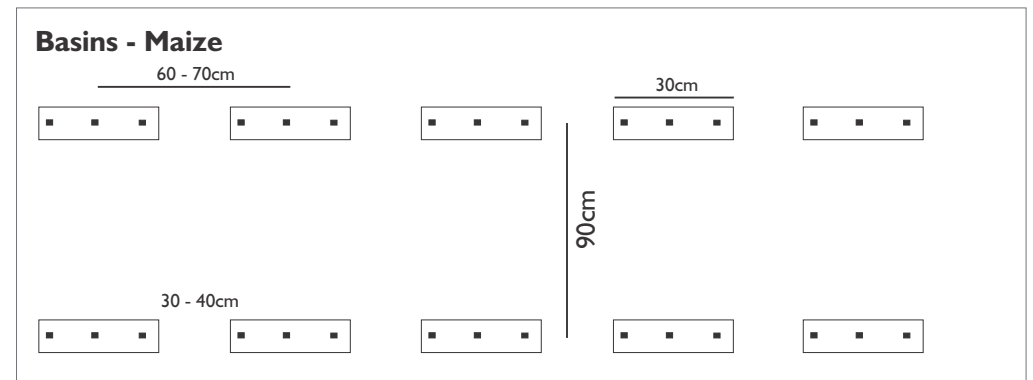
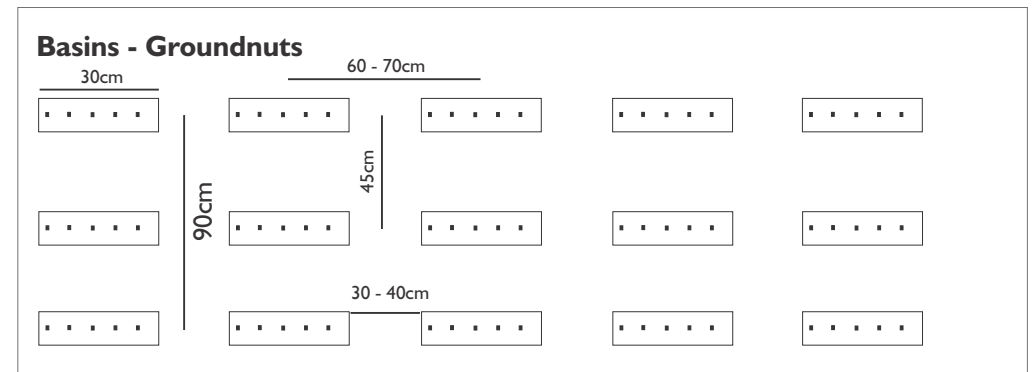
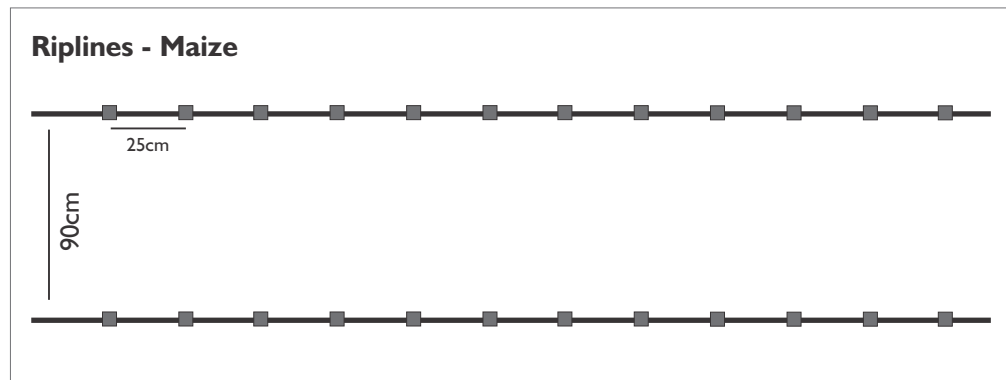
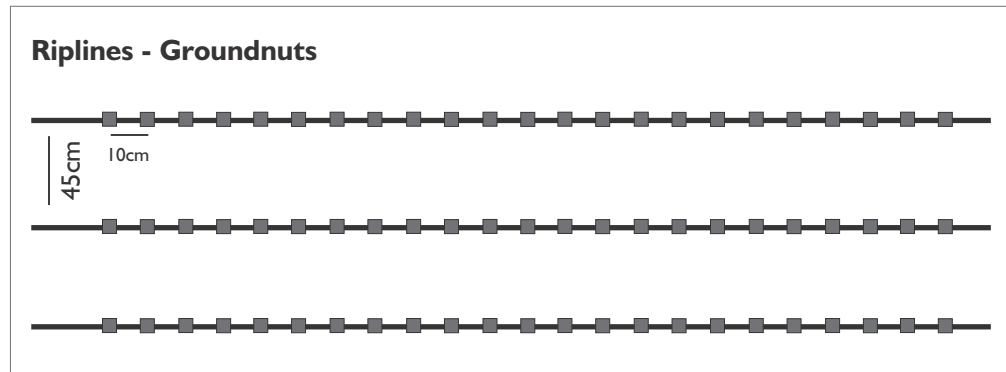
What are riplines and ripping?

- Ripping is a form of tillage that minimizes the amount of disturbance to the soil by creating a narrow cut into the soil that is deep enough for planting crop seeds.
- Rielines refer to the continuous cut in the soil made by ripping.
- Farmers use a special plough typically pulled by oxen for making a ripline.
- Ripping is far less labour intensive than basin farming. Many farmers prefer it because it takes less time.
- For very big fields, ripping may be preferred.

- It is important for farmers to try both practices to compare results and chose the approach that gives the best results.
- The key is to add organic material into the soil and to keep the soil covered with residue as much as possible.

Advantages of minimum tillage practices are:

1. Harvest water for your crops.
2. Improves seed germination and early growth.
3. Effective in concentrating compost and nutrients for the crop.
4. Minimum soil disturbance to keep soil healthy and living.



Compost is a home-made fertilizer. It is cheaper than chemical fertilizer and can save you a lot of money. If made properly with the right materials, compost manure can double your yields.

Composting is one of the fastest ways to build up your soil with organic-based nutrients that feed your crops for very good yields. The concept is to add the right combination of materials that can give you the best results. The greatest benefit is having fertilizer when you need it and not waiting for chemical fertilizers that are expensive and often late in coming.



What are the right materials for making compost manure?

Materials required for compost making

- Green vegetation materials (preferably *Gliricidia* leaves if available).
- Dry materials mainly crop residues for maize and groundnuts. These should be chopped into small fragments for easy decomposition.
- Manure (e.g. chicken, cow, wildlife and goat manure).
- Biochar (Ground Charcoal powder).
- Water.
- Twigs.
- Two meter long stick for monitoring the heat inside the compost heap to assess progress in composting.

Methods of composting

There are two methods of Compost making.

1. Pit Composting and 2. Surface heap Composting

COMACO recommends heap composting because it is less labour intensive.

It is important to start compost making as early as April when there is ample nutrient-rich green vegetation available growing nearby to add to the compost and when water is available to keep the condition moist. For green vegetation, *Gliricidia* is recommended but other leaves, especially from the legume family like acacias, are also fine. April is good time for preparing compost pits because the soils are still softer to dig.

Other points to remember

- Normally, your compost should take 3 to 4 months to mature.
- Never use disease infected plants.
- Never use plants that take too long to decompose.
- Never use cat or dog manure. (Chicken manure is best but may also be acidic if still fresh).
- Keep compost always moist but not soaked with water.

Heaping method

Step 1: Select site for making your compost under a tree. This will keep the heap cool and not dry out the moisture, which is needed to speed up composting. Make a small depression of 20cm for laying twigs or maize stalks.

Step 2: Lay your materials to form a heap in the following order,

1. First layer: put down coarse materials such as twigs or maize stalks to a depth of 30cm.
2. Second layer put 20cm of dry vegetation (Dry grass, dry leaves or crop residues). After the second layer, sprinkle with water.
3. Third layer: put down green materials to the height of 10cm
4. Fourth layer: put 5cm layer of manure or anthill/clay soil.
5. Fifth layer: Put a thin layer of biochar.
6. After the fifth layer, repeat the process but this time by starting with the dry vegetation. Continue with the same procedure until the pile is about 1.5 meters high. Then cover the whole pile with a 1cm layer of soil.



Heap composting

Step by step process of making your compost

- Step 3:** Your heap should be 2m long, 1m high and 1m wide for easy management.
- Step 4:** Remember to push the stick into the middle heap and leave it there. This is used to check the inside temperature of your heap. If warm, then the composting process is proceeding well.
- Step 5:** The heap of the compost should be watered every 2 to 4 days depending on the prevailing temperatures. Each watering may require 20litres of water.
- Step 6:** **B:** Add one more step. Turn the heap over to allow mixing and even composting every 2-3 weeks. **ALWAYS KEEP YOUR HEAP MOIST.** Turn your heap over after 10-14 days which will allow mixing and resume process.

Pit Compost making Method

- Step 1:** Select site for making your pit compost under a tree or shade to reduce the rate of evaporation.
- Step 2:** The Compost pit should be 1m deep, 1m wide and 2m long. Two or more pits are required to turn and mix the contents from one pit to

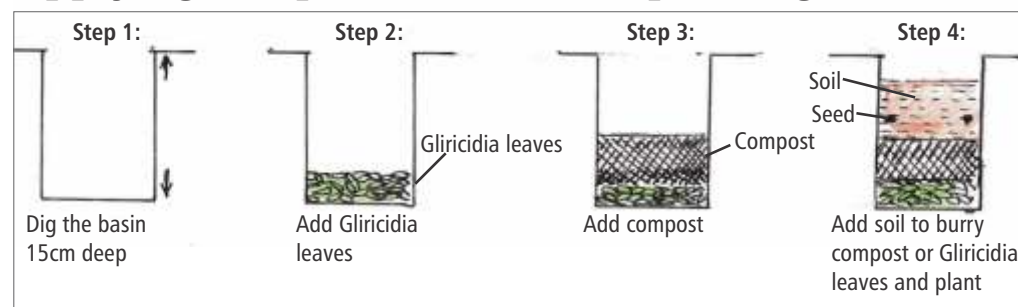


Pit composting

another. The arrangement of materials is just the same as in the heaping method.

- Step 3:** Water your Compost 5-6 days with 20 litres of water. Covering the pit with grass helps to maintain moisture.
- Step 4:** Turn your compost every 3 weeks.
- Step 5:** Your compost should take about 8-10 weeks to mature.
- Step 6:** Make sure you keep a stick planted into the middle of compost for checking inside temperature and progress of decomposition. If not very warm, then something must be wrong.

Applying compost manure in a planting basin



Once ready, your compost should look like healthy soil? Then pack into 50kg sacks and store in a cool, dry place until ready for applying. Preferably you may make your compost near to the fields if sure of security to avoid transportation.

The Importance of BIOCHAR and how to use it in Composting

An easy way of making biochar is putting your cooking fire out at night with water and gathering the small pieces of charcoal in the morning. Pound these pieces until you have $\frac{3}{4}$ of 50kg bag. This is enough for 1 compost heap. Once biochar enriched compost is applied in the basin, there is no need to use biochar for several years in the same basins. Biochar makes soil nutrients more available to plant roots and will boost crop yields.

Chapter 10 Farming with *Gliricidia* trees

Maintaining soil fertility is the most important practice for a farmer. It ensures that any crop grown on that soil will produce good yields.

One way to do this and save much money to make farming profitable is to farm with agroforestry trees such as *Gliricidia*. *Gliricidia* is a small tree that grows very fast and becomes a quick and effective source of natural fertilizer from the second year after it is planted.



Cut *Gliricidia* and applying leaves in riplines Basins, *Gliricidia*, crop residue, all improves soil fertility

COMACO advises all small scale farmers to plant *Gliricidia* in their fields because of its multiple uses as shown below:



Women are carrying firewood sticks from *Gliricidia* cuttings



- It brings back lost fertility in a soil and supports the growth of crops.
- It is a cheaper method to fertilize crops, since fertilizers are expensive. It has been proved that maize yield in fields with *Gliricidia* are similar to those where chemical fertilizers are used.
- Stems are used as fuel as well as for light construction and staking of crops like tomato.
- Can be used for fencing fields, gardens and homesteads.
- It attracts bees and is good for beekeeping programmes.
- The leaves can be used in the storage to repel pests. In *Gliricidia* fields pests such as stem borers and army worms are reduced.
- It's good for the environment.

Transplanting and managing *Gliricidia*

When to transplant

- When seedlings are 6 weeks old on the nursery, they will be ready for transplanting.



- Remember, it is best to transplant when it is cool - in the evenings or when it is raining and you expect the rain to be a substantial amount.



For planting in a farm plot: alley-cropping

Dig planting holes 30cm deep, 100cm apart, and 5 meters between rows. Do this in a legume crops (Soybean, groundnuts, cowpea). If enough compost, apply in basins at the time of planting, use top soil to bury first.

For planting woodlots, dig planting holes that are 30cm deep, 2m apart and 2m wide.

Plant in a legume crop to avoid shedding of the young seedlings.

1. Plant in mixture with a crop. Use hoes to weed your field as soon as weeds appear.
2. Look out and take maximum care of *Gliricidia* plants when harvesting the crop.
 - a. Maize-Harvest line by line, do not heap stocks as this will kill *Gliricidia* plants.
 - b. Groundnuts- Dig plants well without cutting the *Gliricidia* plants.
3. Herd livestock throughout the year so that they don't browse or destroy *Gliricidia* plants in the field.
4. Make firebreak around the field to avoid fire scotching the plants.
5. Make basins or rip lines prior to planting time and cover with crop residue.
6. Cut *Gliricidia* trees that are two years old or more to knee high or 50cm
7. Remove the leaves and add a handful in a basin.
8. Use the sticks for cooking, or staking crops.

How *Gliricidia* works

- When *Gliricidia* leaves are buried in the soil, they add food for crops, and the soil is not easily washed by rain. This will increase soil fertility and you will avoid the costs of buying chemical fertilizer.
- Crop yields increase up to 10-15 bags of maize per lima when you do this.
- *Gliricidia* sticks can also be used as firewood in the kitchen, especially good in energy saving cook stoves.

Farming with Gliricidia trees

Land preparation in Gliricidia fields

Land preparation in Gliricidia fields in the 1st year

- *Gliricidia* is initially planted in a field with a legume crop like groundnuts, soybean or cowpea. Trees are planted after the crop has been planted following the spacing of 5m (5 plant rows or between the *Gliricidia* lines) and a meter between plants.

Land preparation in Gliricidia fields in the 2nd year

- Land preparation in the second year is easily done by hand making basins using a 'Chaka hoe' or ripping using oxen.
- Oxen must be guided properly to avoid damaging the plants.



Farmers making planting basins in a Gliricidia field Animals ripping in a Gliricidia field

Land preparation in Gliricidia fields from the 3rd year onwards

1. For farmers who use 'Chaka hoes'- plant basins are done before cutting the *Gliricidia*. After the *Gliricidia* stems are cut, the fresh leaves are applied and buried with compost and soil in the basins.
2. For farmers who rip using oxen have to cut *Gliricidia* plants around October at a height of 30-50cm to allow animals move properly during ripping. Strip and apply the *Gliricidia* leaves along the rip lines.

Cutting of Gliricidia trees

- When to cut: From transplanting, *Gliricidia* is managed in the field, for at least two years before you start cutting them. Cutting should be done between October and November before crops are planted.
- Tools to use - 'matchet', axe or bow saw to cut the *Gliricidia* plants.
- Cutting height- Cut trees at knee high or 30-50 cm height.
- Strip or remove the leaves by hand and apply them while fresh along the rip line or in the basin.



Farmer cutting Gliricidia with a machete

Steps in applying Gliricidia leaves

- Make your plant basins using hoes
- Cut the *Gliricidia* stems at knee high- (30-50cm).
- Strip the leaves from the stems
- Apply a handful of fresh *Gliricidia* leaves in the basins.
- Bury the leaves with two handfuls of compost manure. Use both if available if not then use either leaves or manure .
- Bury with a thin layer of soil in advance of rains.
- Wait for the rains to plant the seeds
- Remember, when planting maize, space the seeds at least 15cm apart for basins and 25 cm apart for rip lines.



Stripping leaves for application in basin/ripline

Chapter 11 Maize production

Maize is a simple crop to grow, especially if you follow proper steps on land preparation, planting and weeding. You will reap better yields for your family and excess for sale. Make sure you plant your maize seeds after the first heavy rains.

1. Land preparation



What steps do you follow when preparing land for maize planting?



Be a good steward of the land, make sure you preserve the land by adding compost and residue back to your farm.

If you want to produce the maximum amount of maize for minimum inputs, the best method to use is conservation farming which has been promoted locally as "Farming with Nature."

- Prepare basin/riple lines starting after the rain season ends.

- Prepare enough compost manure- 4-5 heaps per lima- April to June.
- Rotate maize in alternating years with Soya beans or groundnuts. This is called crop rotation. (Avoid growing maize crop in the same land for consecutive seasons).
- Space your basins or riple lines at 90cm between rows.
- Make your basins 30cm length, 15cm depth and 15cm width and 30-40cm between basins.
- Apply compost manure and *Gliricidia* leaves for nutrient soil enrichment at least 1 month before planting. Cover the compost and *Gliricidia* leaves to avoid loss of nitrogen by direct sunlight.



2. Planting

- Plant with the first heavy rains particularly early or mid-November.
- In a ripline, plant 1 seed per station at 25cm apart to maximize yields.
- Make sure no stone or heavy soil clods cover the seeds.
- Keep enough seeds for gapping in case of poor germination due to droughts, pests.
- Make sure you complete planting in a day to maintain even germination and later an even crop canopy that will shed out any weed growth.

Maize production

3. WEED AND PEST MANAGEMENT

- Weeding should be done as soon as weeds appear and should be done continuously.
- Weed first in the basins or ripe lines 7 to 11 days after planting once weeds emerge.
- Secondly, weed the whole field after 14 days and weed until harvesting.
- After harvest, weeding must be done always before weeds mature and produce seeds.
- Spraying aphids and army worm eggs on plants using some plant extracts like *Gliricidia* and *Neem*. Crush leaves and immerse in 1 litre of water for 24 hours, add soap and spray.
Gliricidia planted in the field for its role to increase soil fertility has an important added benefit. It actually repels insect pests! By planting a row around your field, your field will be much better protected from army worms and other pests. It is free and safe!

Maintain a disciplined and regular weed control. Weeds take moisture and nutrients which should be available to your crop.

Pesticides are poisonous and expensive. *Gliricidia* trees kept uncut around your field will block insects from attacking your crop.

- Shell the diseased cobs separately and keep only healthy grain and bury the diseased remains in the ground.
 - Store unshelled healthy maize in a cool dry place and use *Gliricidia* leaves in the granary to repel weevils.
1. You should add fresh *Gliricidia* leaves to the granary mixed with cobs. It is also recommended that you plant *Gliricidia* around the granary to further reduce the risks of weevils.
 2. Shelled maize can be stored in air tight bags to avoid attacks by pests such as weevils.



Maize granary with *Gliricidia* leaves to repel pests

4. Harvesting and storage

- Harvest when it is dry and ready. When silk near the tip of the ear of the maize is dry, then you can harvest after 10 days- May to June.
- Harvest the cobs whilst the stalks are still standing and later cut the stalks. Spread the stalks on the ground and leave the residues covered on the ground.
- During harvesting, separate the diseased cobs from non-diseased to avoid contamination when put in the granary.
- Remove maize cobs without shelling from the field during harvesting.

Harvesting of Maize

Harvesting of Maize

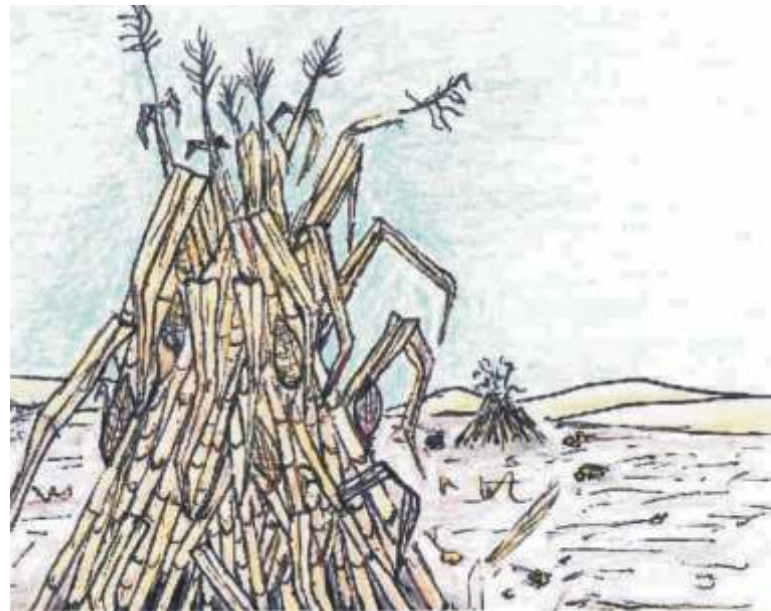
Harvesting of maize is quite important for conservation farming. If you do not retain the residues from your harvest in the field, you may end up losing up to 70% of yield in the next season.



If you are planning to start conservation farming, what should you do?

Tips

- Harvest your maize by the first week of May.
- Harvest your maize when both the cob and the silk are completely dry.
- When you harvest your maize, leave the stalks standing in the field.
- Heap the cobs in the rows between the upright stalks.
- When all the cobs are removed from the stalks, then move into the field with a machet or slasher, cutting the stalks at least 10cm from the ground and scatter the stalks in the field.



- Never heap the stalks in one section when harvesting as it increases labour and some other sections of the field will be denied the required nutrients.

Dangers of heaping

1. Invites mice.
2. Wastes your nutrients.
3. Risks of fire.
4. Labour intensive.
5. Invites pest attacks.

Steps

1. Allow maize to dry in the field
2. Remove cobs from the stalks while in the field.
3. Cut maize stalks.
4. Spread the maize stalks to close up the field.

Step 1



Maize to dry completely while in the field

Step 2



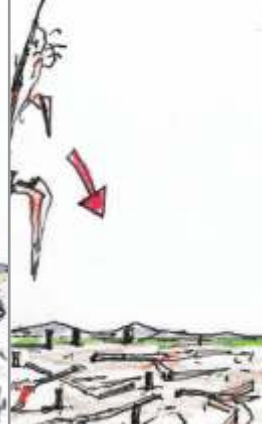
Remove cobs from stalk while standing

Step 3



Slush stalks in the field

Step 4



Spread the stalks to close the soil with residue

Note: No burning of field. Make sure fire break is established



Suppose you have cattle and you would like to feed it on crop residue, what should you do?



Groundnut is highly nutritious and gives good market value. It also improves soil fertility by fixing up to 40kg of atmospheric nitrogen per hectare for the next crop.

Groundnuts add nitrogen to the soil, it is strongly recommended that farmers rotate groundnuts with maize in alternate years to improve maize yields. In addition, it is an excellent cover crop, meaning if it grows close enough it will block weed growth and keeps soil moisture.



What can you do to have high yields in groundnuts production?

- Plant early by - 1st heavy rain in mid-November.
- Plant 1 seed per station.
- Maintain correct seed population.
- Use certified seed from recommended sources.
- Apply compost in clay soil.
- Control weeds at all cost.
- Always practise crop rotation.
- Seeds of improved varieties should not be mixed with local types.

- Weeds should not be allowed to grow above 5-7cm.
- Empty pods with shrieked nuts are a sign of soil lacking calcium and needs lime.

1. Early land preparation

Make compost fertiliser between April - June

- Land preparation should be done between May –June.
- Prepare your land after and preferably in a field where you harvested maize .
- Keep residues (no animal grazing or fire to burn residues).
- Make rip lines following the measurements below;
 - ✓ 45cm between rows, and
 - ✓ 15cm depth .
 - ✓ For basins, follow the measurements described on page 19.
- Apply compost one month before planting as it helps to improve soil texture, especially in clay soils, and will add nutrients to your soil for better yields.

2. Sowing/planting

Recommended seed rate/lima is 20kg

- Plant with 1st heavy rains not later than 30th November.
- With riplines, plant 1 seed 10cm apart in rows. Spacing of rows 45cm.
- For seeds planted in basins, make sure seeds are not to close. recommended space between seeds is 3cm.
- Re-plant in station where there is poor germination within 7 days after Germination.
- Intercrop with *Gliricidia sepium* 1m in row and 5m between rows.

Remember to re-plant where seeds have failed to germinate

Groundnuts production

3. Weed management

Groundnuts are poor competitors with weeds. At the start of development weeding should be done at least two and often three times. Close spacing is necessary to prevent weeds from growing.

The following schedule is recommended;

	WHEN?	HOW ?
1st Weeding	2 weeks after emergence	Hoe or use ridger between lines and hand weed between plants. Note: The ridger must be adjusted so as not to cover the seedling
2nd Weeding	4 weeks after emergence	Earth up lines with hoe or ridger and hand weed between plants
3rd Weeding	6-8 weeks after emergence	Hand pulling of weed only

- Scout your field and remove any diseased plants, dig a hole outside the field and bury them.
- For pests you can spray using organic remedies or in fields with *Gliricidia* pesticide showed to be minimal.



What happens when the weeds are not removed in a groundnuts field?

4. Harvesting and storage

Save life, time, labour and money, harvest groundnuts in shells always!!

- Harvest as soon as leaves start turning yellow and falling off but should be confirmed by test harvesting at several places in the field.
- When you dig out the plants for a day, put them upside down in a circle manner in the field for drying.
- After removing the groundnuts pods, spread the residue across the field as mulch.



Dry your groundnuts carefully in the field

- Do not let any animals or fire disturb the residues, so they can feed the soils.
- Store groundnuts in shells at low temperatures and dry places which should be safe from rats and mice.
- Avoid iron roofed rooms as they become too warm.
- Avoid drying them on direct sunlight (iron roof tops or bare ground).

Take Note. Be mindful of *Gliricidia* seedlings as you are harvesting groundnuts to avoid cutting or damaging them.



Beans is a high value cash crop, and good food crop. It does not do well in soils with too much water or water logged areas. You should also avoid growing beans in clay soils with poor drainage.



Tips for high yields

- Beans should not be grown in excessive water conditions or water logged areas. It does not do best in sandy loam soils.
- Plant rows 45 cm apart to prevent weed growth.
- Practice early land preparation.



How do you go about preparing land for beans?

- Plant certified tolerant and renowned seed varieties.
- Weeding is key for production. Keep fields clean from weeds.
- Compost manure will increase your yield.
- Plant with correct spacing of seed.

1. Land preparation

- Always practice crop rotation (Plant where there was cereal or sunflower the year before).
- Prepare your land between May and June after harvesting of cereal and do not allow livestock eat the crop residue on your plot.
- Make rip lines/basins using hand hoe or oxen(not intercropped)
 - ✓ 45cm inter rows.
 - ✓ Basin 30cm length, 15cm width and 15cm depth.
 - ✓ Ripline planting is 5-10cm.
- Apply Compost manure before planting. This is critical.

2. Sowing/ planting

Seed rate - 15kg/lima.

Select good seeds without holes or wrinkles for planting. Beans can be grown as a cover crop to reduce weeds.

- Plant by 1st week of January and finish the same day.
- Plant 1 seed per station with spacing 5cm between seeds, 2.5cm depth when sowing.
- Should not be intercropped.
- In case of drought or disease occurrence leading to poor germination, gap within 7 -10 days after germination of the seeds.

Beans production



3. Pest & weed management

Weeds are a serious problem in beans production. If the weeds are not well managed they can provide a home for pests and a drain on soil nutrients. This will reduce both the yield and quality of the seed.

- Weed twice with a hoe.
- 1st weeding: 2 weeks after planting.
- 2nd weeding: 4-5 weeks after planting to ensure a clean field.
- Wilt, bacterial and viral disease affect beans. Remove diseased plant immediately and bury.
- Planting 45cm apart to reduce weeds.

The following are the control measures for weeds and diseases;

- adopt crop rotation,
- use a resistant variety,
- uproot and bury infested plants outside the field, and
- use clean seeds without holes or wrinkles.

4. Harvesting and storage

- Harvest when pods are fully mature and dry (when pods turn brown and leaves drop off).
- Harvest beans 2 times depending on maturity because pods do not mature at the same time due to staggered flowering periods.
- After harvest, thresh pods using a stick, clean beans and separate from chuffs through winnowing.
- Sort out good and clean beans by grading using hands.
- Pack the graded beans in airtight polythene bags, plastic buckets or bins.
- Whilst in storage, ensure good hygiene and inspect your crop every 2 weeks for any change in condition.
- Separate the damaged beans (rotten and beans with holes) from the rest and store again by grading.



Beans is healthy and it has a good market value



It is advisable that the beans in storage should not come into contact with water. Why?

Chapter 14 Soybeans production

Soybeans is nutritious, with high protein content. Many products are made from it for human consumption, including yummy soy energy foods made by COMACO, soy milk, soy flour, soy sausage and others. It is also good feed for livestock. It is planted between 15th November -15th December. Planting late (in January) reduces your yield.



Have you grown soybeans before? What is the best spacing for soybeans to get good yields and reduce weeds?

Climatic Requirement

Soybeans require enough moisture at planting. Critical moisture is needed for pod development and seed filling, at least by March. This is what limits soybean production in valley areas.

Soybeans varieties

Common varieties, open pollinated, which do not need to be inoculated at planting are: Magoye – small seeded; Hernon 147- medium seeded; Kaleya and Lukanga-large seeded.



Months to maturity

'Magoye' takes 4 months while 'Hernon 147' takes 4 and half months to mature, Lukanga and Kaleya takes 3 and half months.

Soils and land preparation

Deep well drained fertile soils are good for soybeans since water is easily drained. No water logging is required.

Rip the field early after harvesting of the previous crop. Being a self pollinated crop, 5m away from other field crops is sufficient for isolation.

Rip lines must be made at 45cm by hand or 45cm using ox drawn rippers.



Flowering and pod formation require enough moisture

Planting and managing soybeans fields

Planting

Plant between 15th November - 15th December. Planting late (in January) reduces your yield 15kg (1tin) of Magoye and 20kg of Hernon (1.5 tins) per lima is required.

Always plant after first heavy rains. Do not use seeds which is older than one year because it does not germinate well.

Plant in moist soils. Drill the seeds in ripped line at 3-5cm to aim at 35 seeds per meter, or 8-10 seeds per basin.

Cover the seeds with a fine layer of soil or 1fingertip deep.

Intercropping with other crops reduces yield, but planting soybeans in *Gliricidia* alleys is recommended.

Soybeans production

Weed control

Weeds are a serious problem in soybeans production. If the weeds are not well managed they can provide a home for pests and a drain on soil nutrients. This will reduce both the yield and quality of the soybeans.

- Weed twice with a hoe.
- 1st weeding- 2 weeks after planting.
- 2nd weeding - 4-5 weeks after planting to ensure a clean field.
- Wilt, bacterial and viral disease affect beans. Remove diseased plant immediately and bury.
- Planting 45cm apart to reduce weeds.

Fertilization

Use of compost in the plant lines/basins is adequate. As a legume, Soybeans makes its own nitrogen in the roots. NO Top dressing is needed.

Pest and disease control

Control disease and pests. Common ones include; *Birds* are controlled by scaring them.

Nematodes- avoid rotation with tobacco, potatoes, sunflower.

Cutworms and termites- aim to have healthy plants by planting with compost manure.

Spraying with pounded leaves from *Gliricidia* trees will control diseases.

Harvesting

Harvest quickly when leaves turn yellow and dropping off before pods start to split. Harvest by cutting the plants with sickles usually in the early and late hours of the day when it is cool.



Threshing and storage

Dry the harvested soybean pods in an open area on a hard floor. Thresh to separate the seed from the pods and dry further before putting in 50kg bags for storage and marketing. Spread the residue back in the field to improve soil fertility.



Tips for best yield

- Cowpeas should not be grown in excessive water conditions or water logged areas.
- Avoid growing cowpeas in clay soils with poor water drainage.
- Practice early land preparation.
- Plant certified and renowned seed varieties.
- Weeding is key for cowpeas production keep fields clean from weeds.
- Plant with correct spacing of seeds.

1. Land preparation

- The previous field where there was cereal crop is recommended for cowpeas (Crop rotation).
- Prepare your land ready for planting in December.
- Make rip lines/basins using hand hoe or oxen to prepare your field.
- Rows should be 45cm apart.
- Basin 35cm length, 15cm width and 15cm depth.
- Apply Compost if the soils are poor (especially in sandy soils).

2. Sowing/planting

Seed rate – plant 5kg/Lima.

Select good seeds without holes or wrinkles for planting. Can be grown as a cover crop or seed

- Plant by 1st week of January and finish the same day.
- Plant 1 seed per station with spacing 15cm between seeds, 2.5cm depth when sowing.
- Should not be intercropped in cereals if grown as seed.
- If intercropped with maize, Cowpeas should be planted at about 4-6 weeks after planting maize ,sorghum or millet at 20cm between rows.



Women picks leaves for vegetable consumption

- (If grown as seed) Plant at least 10m away from other cowpeas varieties.
- In case of drought or disease occurrence leading to poor germination, re-plant within 7 -10 days after germination of the seeds.

Cowpeas production

3. Pest & weed management

Weeds are a serious problem in cowpeas production and if not well managed can provide a home for pests and reduce both the yield and quality of the grain.

- Weed twice with a hoe.
- 1st weeding- is done after 2 weeks from planting.
- 2nd weeding -is done 4-5 weeks from planting.
- Fungal, bacterial and viral disease affect cowpeas. Control measures are;
- Adopt crop rotation to reduce pests.
- Use clean seeds without holes or wrinkles.
- Use a resistant variety.
- Uproot and bury infested plants outside the field.

4. Harvesting and storage

- Harvest when pods are fully mature and dry (when pod turn brown and leaves drop off).



- Harvest cowpeas 2-3 times depending on maturity because pods do not mature at the same time due to staggered flowering periods.
- After harvest thresh pods using a stick, clean cowpeas and separate from chuffs through winnowing.
- Water should not come into contact with cowpeas during harvesting.
- Select out good health and clean cowpeas by grading using hands.
- Pack the graded seed in airtight polythene bags, plastic buckets or bins.
- Store in a cool dry place and inspect to assess presence of pests.
- If you see that your cowpeas have holes, you have a problem and a chemical fumigation may be required. Separate the affected cowpeas from the rest and store again by grading.
- To protect the cowpea grains from pests, add ash or *Gliricidia* leaves.

Benefits of cow peas

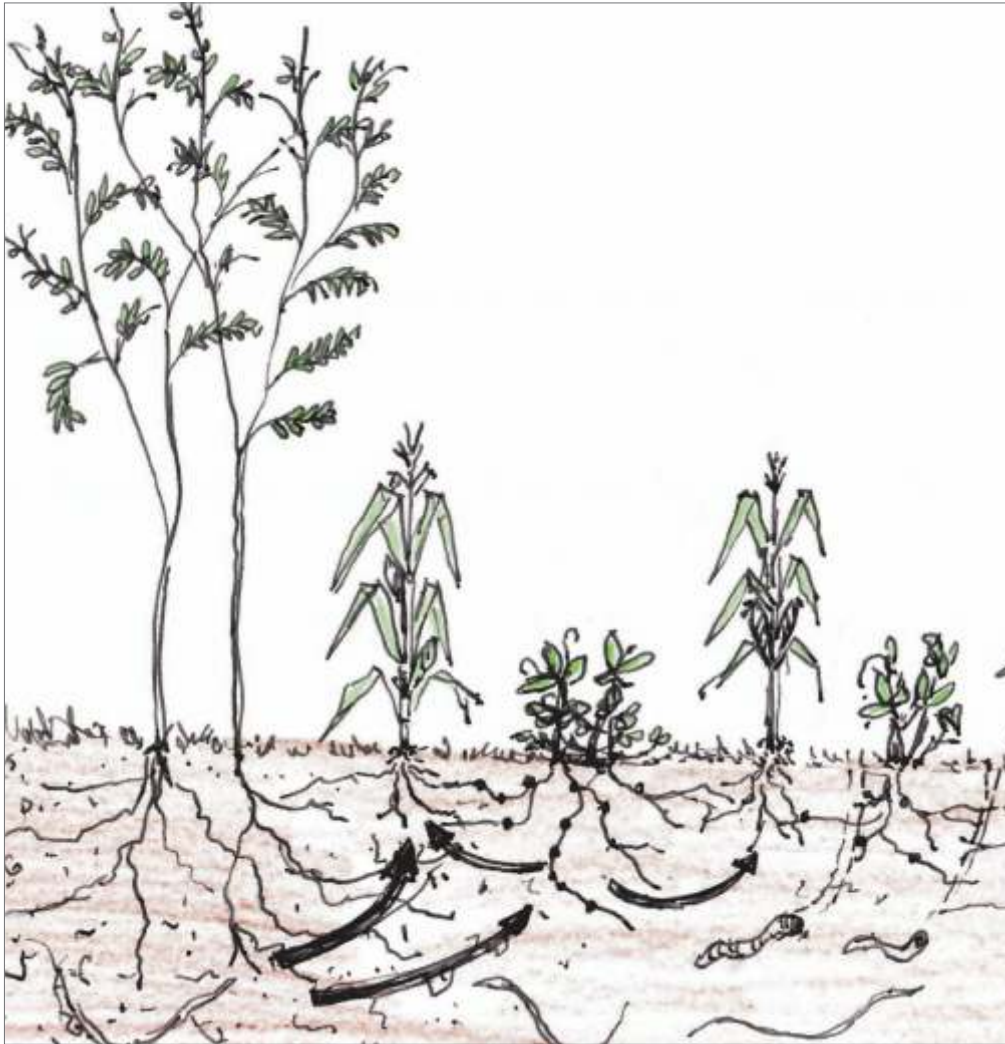
- Good for soils as it fixes nitrogen.
- Nutritious nuts for household use.
- Leaves are a delicious vegetable.



- Used as a cover crop to protect soil from erosion and prevents weeds in the field.
- Sold for cash.

Whilst in storage, ensure that the cowpeas should not come into contact with water.

What is intercropping and why should you do it?



Maize benefiting from nitrogen coming from legumes



What are the benefits of intercropping to a farmer?

Intercropping means cultivating two or more crops on a field at the same time. Here are some of the benefits you may get from intercropping:

- Intercropping provides higher yields because you add the yields for the crops from the intercropped field than cultivating the area with only one crop.
- It saves resources and helps to achieve sustainable agriculture.
- It reduces the risk of total crop loss. If one crop fails due to pest or drought, the other may give you some yield.

Intercropping can involve different planting ratios of two or more crops. For example one row maize to one row beans, or two rows maize to two rows beans.

Improve your diet through intercropping!

Different plants supply different nutrients. For example, maize contains energy in the form of carbohydrates, pumpkin is rich in vitamins and beans or peas provide the protein that is important for a healthy diet.

Other benefits of intercropping

Intercropping helps you to control weeds!

As the soil is covered faster and better, fewer weeds grow when you practice intercropping. Pumpkin is particularly suitable for inter-cropping in maize or sunflower fields, which quickly covers large areas of the soil. Even legumes can help to control weeds. For example runner beans that climb up the corn, quickly shade the ground.

A natural and cheap way of bringing nutrients to your field due to Nitrogen fixation

Fertilizer is an expensive input. Legume crops like cowpea, groundnuts, soybeans or chick peas are able to fix nitrogen from the air into the ground. That nitrogen will be available for other crops such as maize or sunflower which can be grown next to the legume. This will save you time and money.

Select good seed for a better crop

- The easier and sure way to select better rice seed for planting is by "Rice seed sorting".
- Rice seed sorting simply means selecting the best planting seed by using ordinary clean water, salt and raw egg.

Procedure

- Any farmer can do this by looking for a bucket or bowl where fresh clean water is put and stirred with salt. A raw egg floats to the surface in salt water. The ratio could be about 3-5 litres of water for 200grams of salt. The seed is soaked in salt water and stirred gently until good seed goes to sit down to the bottom of the bucket/basin and bad seed remain floating on top.
- Bad seed is removed and destroyed because it does not germinate.
- Good seed is removed separately and cleaned in fresh water in readiness for planting.
- Since SRI uses 80-95% less seed than traditional methods, it's important to make sure that you're using the best seeds possible.

Make SRI nursery for healthy crop

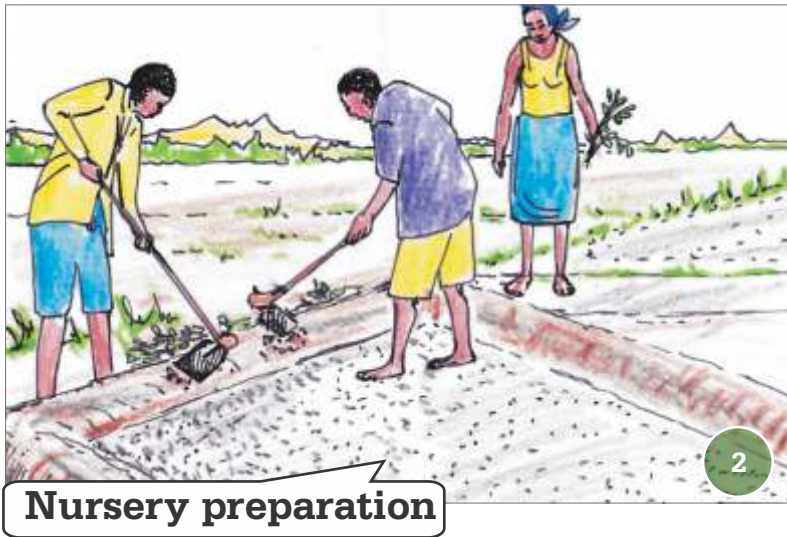
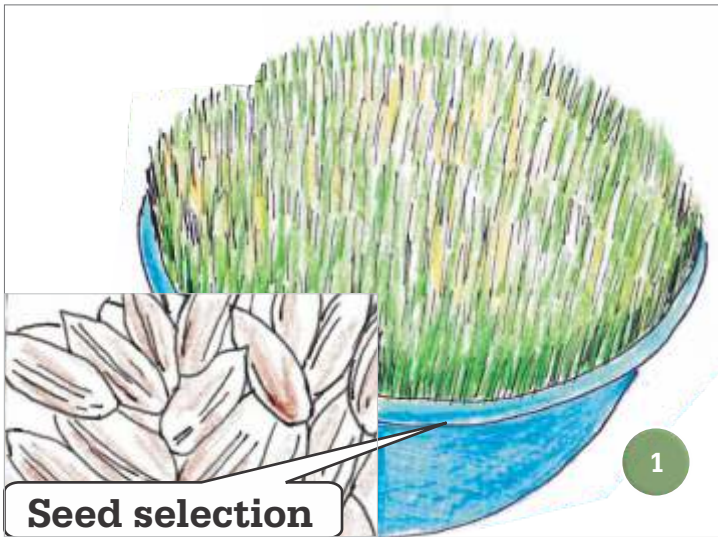
- After sorting the seed, a nursery should be prepared.
- A nursery is a piece of land a farmer uses to grow seedlings.
- A nursery is made in different forms, either on a dish, or raised wooden stand or on a ground, depending on opportunities and challenges existing in selected areas.
- Seedlings are early stage small plants grown for transplanting.
- Transplanting is way a farmer removes Seedlings from nursery to cultivated land.
- Transplanting is at times known as indirect seeding
- Seeds planted directly in the field, from time to time, may not be healthy to have strength to resist damage from floods or strong heat from the sun or sometimes eaten up by pests.
- SRI Nursery encourages increased tillering (branches) that makes out the rice grains for improved quality and higher yields to as much as 8t/ha or beyond.
- Prepare a mixture of soil and organic fertilizer or well-dried fine manure, at a ratio of 1:1 and make a 2-3cm thick seedbed on top of a plastic sheet or banana leaves. The sheet prevents seedling roots from running too deep into the soil at the time of transplanting.
- Transplant seedlings from nursery to the field in an 'L' shape at the age of 8-12 days or having two leaves.

Land should be well prepared

- The nursery should be 1% the size of prepared field.
- For SRI using indirect seeding (transplanting) a field requires 8.5 kg/ha.
- Field preparation requires tilling land, levelling, bunding, organic matter application, mulching, water control and sustainable soil management.
- By using Marker, fields are prepared having wider spacing of one(1) seedling planted per station (hill) and transplanted at a shallow depth (1-2cm) , with stations (hills) 25 x25cm apart.
- Weeding starts 10-12 days after transplanting, and should be repeated for 2-3 times more with the same space of days.
- In summary, farmers need to follow four(4) main practices of SRI as follows;
 - 1) Healthy early crop growth,
 - 2) Reduced closeness between plants,
 - 3) Healthy soils, rich in organic manure, and
 - 4) Wet soil (water) control.
- Rice farmers who are interested in practicing SRI get huge benefits from increased yields and improved grain quality.
- SRI provides resistance to pests, diseases, rain-storms and drought as plants remain healthier .
- SRI, a farmers' sure way to rice farming and high crop yields.

Knowledge is like a Garden: If it is not cultivated, it cannot be harvested (Guinean proverb)

Making SRI nursery



1. Land preparation

- Site selection (flood plains and dambo areas). Areas with enough water and good fertile soils.
- Break hard pans; remove debris, bushes and stumps.
- Level and mark planting stations.



Why should the rice seed that float on water be thrown away?

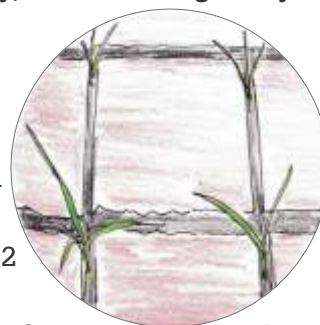
2. Seed treatment

- Use certified seed varieties - Open pollinated varieties (OPVs) are recommended.
- Soak the seed in water. All the seed that will float should be removed and thrown away.
- Leave the remaining seed in water for 24 hours.
- Prepare your nursery bed and add compost at least 2 days before you plant your seed.
- Sow your seed on the nursery within a day after soaking it for 24 hours.

Remember! Quality seed saves your time, money, labour and gives you high yields.

3. Transplanting

- Apply compost manure on the planting spots 1 week before transplanting the seedlings.
- Transplant seedlings at 2 leaf stage usually 8 to 12 days old.
- Make square ripe lines at 25cm X 25cm and 1 to 2 cm deep.
- Transplant seedlings late in the afternoon and when the soils are moist.
- Transplant 1 seedling per station.
- Protect seedling's roots by uprooting with soils on the roots.



4. Weed management

- Weeding should start 10 days after transplanting and should be repeated in 7-10 day intervals.
- Weed using weeders, hand hoes or hand pulling depending on the condition.
- Throw all the weeds on the embankment around the fields.
- Always weed early before weeds flower or grow much.

While avoiding flooded conditions in the rice fields, weeds grow more vigorously, and ideally need to be kept under control at an early stage.

SRI rice production

5. Pest and diseases management

Remember "A weed free field will reduce the attack of pests and diseases on your crop".

- In case of fungal infections on growing rice plants, thin out the affected plants and bury them away from the fields.
- Uproot ratoons (previous rice stalk regeneration).
- Birds are the common pests in rice production. You should always scare away birds.
- Wild animals should be blasted using chilli.

6. Water management

“**Water** is key to growth of rice - regulate water levels in your field”.

- Make an embankment around the field to control water using hand hoes, shovels etc. to block the water.
- Open up when there is excess water on the pads (water logging) to reduce water levels.
- If the pads are dry in cases of dry spells and the field is located near a stream, open the upper part to let water in and close when enough.
- When there is a heavy down fall of rains, open lower part and allow water to go out and close when levels of water are sufficient.

7. Harvesting and storage

- Harvest when rice tassels turn brown usually in May and June.
- Use hand sickles to cut at the bottom of the tillers or stems.
- After cutting the rice, heap it and separate the grain from the tillers using sticks or threshing board.
- Pack the grain in grain bags after winnowing it.
- Store the grains in bags in cool and dry places.
- Protect from rodents (rats and mice).



Advantages of SRI to a farmer

- Low seed rate from 20kg/lima to 2.5kg/lima.
- Increased tillering (Rice stems)- 30 to 50 stems/ plant or more.
- Larger root growth that gives enough water and food to the rice crop.
- Bigger panicles (Heads) 200-300 grains per head or more.
- Quality grainfe-wer unfilled grain, fewer broken when milling, providing farmers with good crop weight for marketing.
- Healthier plants-Resistant to pest, diseases, rain-storms, droughts as crops remain health.
- Higher yields giving farmers high income- Average of 6-8 t/ha even up to 15 t/ha.

Establishment of orange fleshed sweet potato nursery

Making or establishing an orange fleshed sweet potato nursery is as simple as making that for any other common vegetables.



Why do farmers grow sweet potatoes?

Steps to follow

1. **Know the purpose of growing the sweet potatoes** – Before getting to make a nursery, you **MUST** know why you want to grow sweet potatoes. Sweet potatoes are either grown for home consumption or for selling (income generation). Knowing the purpose of growing sweet potatoes will help you to know how much seed you would require, magnitude of labour and other requirements. This will also help you make correct judgment about where to locate the nursery.
2. **Know or already have the source of seed (vines) arranged** – At the time you decide to make a nursery, you should already have known where you will get the seed from. This will reduce panic and anxiety of looking for seed in case you started with a step which could have been done tomorrow or any other time in future. Remember that if you start panicking or show some signs of anxiety you may be forced to start spending money on things that you are supposed to get for free. (Please read step No. 5).
3. **Have knowledge about the seed varieties you want to put on nursery** – This will help you to manage the seed from the time it is put on the nursery up to the last time of its full life on the final field. Issues to do with moisture levels required, threats to pests and diseases, adaptability and other behaviors will have been known earlier to facilitate its good and successful management.
4. **Identification of location of nursery** – A place with good soils which are loose and fertile is vital.

- Areas with forest soils, dambo soils and other with notable signs of being fertile are preferred.
- There **MUST** be a **DEPENDABLE** source of water within a distance of 10 meters to where the nursery will be established to reduce on the labour of watering.
- Make sure the nursery area is by any possible means well protected from damage by livestock, poultry or even cowboys in some cases.

5. Right time for making orange fleshed sweet potato nursery

- Any time during the year is appropriate for making a nursery for orange fleshed sweet potatoes. You should be able to read the times, seasons and activities that are happening around your area.
- The best times to make orange fleshed sweet potato nurseries are those months which you know that other farmers who cultivated the crop are harvesting. This is when there is plenty of seed which is left as crop residues on their fields after harvest. So a good farmer will see an opportunity and take advantage because they know that they would get the vines for free.

6. How to make a nursery for orange fleshed sweet potatoes

– When all the other steps above are done correctly then you are ready to make a nursery.

- Use a good strong hole to clear and dig the soils right at the nursery making area.
- Break the big soil clods into much smaller particles suitable for sowing the vines to allow easy passage of water and growth of roots.
- You can either make what is referred to as a sunken nursery bed or a raised nursery bed depending on your choice and considering the presence of moisture in the soils where the nursery is located.



What is the right time for making orange fleshed sweet potato nursery?

Orange fleshed sweet potatoes are rich in Vitamin A, which provides the much needed boost to the immune system and helps prevent serious conditions like early onset of blindness. The recommended varieties in Zambia include Olympia, Orange Chingovwa, Zambezi and Kokota.



Which of the recommended varieties have you or someone you know grown before? What is the suitable variety in your area?

1. Land preparation and selection

- Soil should be sandy or sandy loam well drained and deep fertile.
- Sweet potatoes should be planted in normal ridges and not in very big ones or mounds to improve harvest for tubers. But if interest is primarily production of vines, planting on flat land may also be done.
- Prepare raised ridges of 30 – 40 cm high 60cm wide in well drained soils.
- Avoid very big and wide ridges at all cost.
- Plant 2 rows of sweet potato vines on top of the ridge.
- Add compost in the planting areas and bury before planting the vines recommended.
- Land should not have been planted of sweet potatoes during the previous season.

2. Planting and spacing

- Seed crop under irrigation should be planted between July and August to make vines available by December. Also raise your nurseries after harvesting for you to have enough disease free vines.
- Plant orange sweet potatoes using healthy vines from health plants.
- Get the first 3 buds of the fresh tip of the vines.

- Plant your sweet potato early between 15th November and 15th December.
- Make sure you remove leaves from your vines before planting for better results.
- Top 30cm of the vine should be selected for planting and vines must be 15-20 cm long.
- Plant in rows at 75cm between ridges and 25 cm between stations.
- Plant the vines upright, at least 3 - 4 buds inside the soil.
- Sweet potatoes can be planted around the crop fields to act as firebreaks.

3. Pest and weed management

- Weed four weeks after planting and then weed occasionally or continuously to avoid emergency of diseases and to improve yields.
- There are not many major potato diseases in Zambia. However mosaic virus is common. Destroy infested plants to control this disease. Other Common diseases are potatoes sculf, white blister, fungal leaf rot and stem rot. For control refer to pest and diseases management chapter.

4. Harvesting and storage

- Harvest 3 – 4months after planting the vines.
- Harvest when leaves start turning yellowish and dropping off.
- Use a hand hoe to dig the tubers.
- Handle carefully when digging to avoid bruising the sweet potatoes.
- After digging, shake off the excess dirt and do not wash the tubers.
- Store at a low temperature and high humidity.

The crop does well especially when grown during the rainy season with evenly distributed rainfall and warm conditions. For good growth and higher yields, cassava requires loose, light textured and well drained soils with a balanced amount of nutrients. Under such conditions, yields can go up to 30-40 tonnes/ha. The recommended varieties (local and improved) include Bangweulu, Nalumino, Kapumba, Mweru, Tanganyika and Kapolombo. These improved varieties are high yielding, with high starch.

Advantages of growing Cassava

Below are some of the advantages for growing cassava:

- is drought tolerant,
- grow well in sandy or sandy-loam well drained deep fertile soils,
- can be grown without fertilizer,
- produces high yields per unit area, and
- Each part of the cassava plant is valuable to the farmer. The leaves may be consumed as a vegetable, or cooked as a soup ingredient or dried and fed



- to livestock as a protein feed supplement. The stem is used for plant propagation and grafting. The roots are eaten by humans and processed into flour.

Site selection

- Select good site with loose soils for easy root penetration.
- Cassava grows poorly in clay soils.
- Compacted soils result in water logging and can lead to rotting of roots

Land preparation

- Land preparation improves soil structure, eases planting, facilitates root penetration, increases microbial activities and helps in weed control.
- Cassava is commonly planted on mounds in Chinsali and Serenje, flat land or ridges in Eastern Province.
- Mounds should be 30cm to 60cm high. Space varies from 0.6m to 2m.
- Ridges should be 30cm high while between ridges vary from 80 to 100 cm.



Cassava production



High yielding cassava field. Food secure family even in drought years

Selection of cuttings for planting

Healthy cuttings from disease and pest free plants should be selected.

- Select cuttings from plants between 8 and 18 months old for better yields.
- Use thick mature cuttings. Thin stems have less nutrients and moisture and produce weak sprouts, few and small roots.
- Use 20-30cm cuttings with 5-7 nodes for increased chances of sprouting. Long cuttings give higher yields than short cuttings.

Planting

- Vertical planting. This involves placing two-thirds of the cutting into the soil.
- Cuttings planted vertically sprout quicker, produce more bigger tubers than cuttings planted at an angle.
- Planting should be done as early as possible just before or after the rains begin. When planted early, cuttings sprout, establish well and receive sufficient moisture and able to withstand pest and diseases later in the season. Delayed planting leads to reduced yields.
- Planting spacing between plants depends mainly on variety. 1m long and 1m wide spacing for branching type and 1m long and 0.5m wide for non-branching type.

Weed management

Early weeding prevents weeds from competing with the crop for nutrients, light and space.

- Cassava is susceptible to weed competition in the first 3 to 4 months. This reduces canopy development and root bulking. When canopies do not provide enough cover, weed problem become severe.
- Early branching varieties develop canopies which reduces weed growth.
- When weeds are not properly managed, yield reduction of 40% in early branching varieties and 70% in late branching varieties are experienced.

Harvesting and storage

Harvesting of cassava can be done throughout the year once the roots reach maturity.

- When planted on the onset of the rains, it should be ready for harvesting from 12 to 36 months after planting. However, the harvest time is 16 months after planting but the quality will decline because some roots become more fibrous after 16 months.

Cassava production

- The right time for harvesting varies according to time of planting, variety, climate and soil factor and market condition.
- Harvesting cassava in the dry season presents a challenge as most of the cuttings go to waste.
- After harvesting, healthy stems should be tied in bundles and stored upright in a pit under a shed for 1-3 months. Water should be sprinkled regularly to keep the pit moist.

Disease and Pest Control in Cassava

Major diseases that attack cassava

- Root rot.
- African Cassava Mosaic Disease.
- Cassava Anthracnose Disease.
- Cassava Bacterial Blight.

Symptoms of disease attack

- Wilting.
- Defoliation.
- Distortion of leaves.
- Reduced plant growth.
- Significant yield loss.

Control of diseases

- Planting disease free cuttings.
- Use of resistant varieties.
- Removing and destroying diseased plants.

Common pests in Cassava

- Mealy bugs.

- Green Mite.
- Termites.
- Grasshoppers.

Symptoms of pest attacks

- Yellowing and falling of leaves starting from the base.
- Cabbage-like effect to the growing point.
- Yellowish spots on leaves.
- Leaves die and drop.
- Stunted growth.
- Build up of mould on the leaf surface due to mealy bug excrement.

Control of pests

- Planting resistant varieties.
- Early planting is recommended to allow the crop to gain vigour.
- Biological control.
- Do not plant infested planting materials.
- Clearly pest infected plants should be uprooted and burned.



One plant harvest


Weeds are like thieves!

What do you understand by the term “Weeds are like thieves”?

- Weeds are like thieves because they steal light, food and water from your crops.
- They steal space so that your crops do not have enough room to grow well.
- They attract bad insects and diseases that can affect your crops. This often leads to poor crops, poor yields and poverty for you.
- The longer you leave them, the harder they become to control.

So always control weeds in your field before they steal your yield!



 How can you control weeds?

How to manage weeds - Managing weeds by hand, soil cover and crops

- Conservation farming methods reduce weeds on your field.
- Weed your field regularly to avoid weeds producing seeds which may become a seedbank for the following seasons.
- Practise crop rotation. This will control weeds like witch-weed (Karoyi).
- Use green manure or leave crop residues



Cover crop

as mulch inside your field after harvest. These will hinder weeds that may germinate when the rains come.

- Use cover crops between your rows of crop that will suppress weeds in your field. Good cover crops are: pumpkins, sweet potatoes, cowpeas, velvet beans, lablab, tephrosia or sunn hemp.
- Intercropping also helps to cover the soil and smother weeds that grow between your rows of the main crop. Choose a crop that spreads quickly and produces a lot of vegetation. Legumes, pumpkins and sweet potatoes are a good choice.

If you practice these weed management methods, you will never have to use expensive herbicides, which are not recommended by COMACO.



What are the benefits of good weeding?

Culture practices in weed management

If you control weeds properly in your fields, you will get the following benefits immediately:

- Your crops will be healthy and have a better chance to withstand pests, diseases and dry spells.
- You will be assured of increased yields.
- Your family will attain food security and more income!

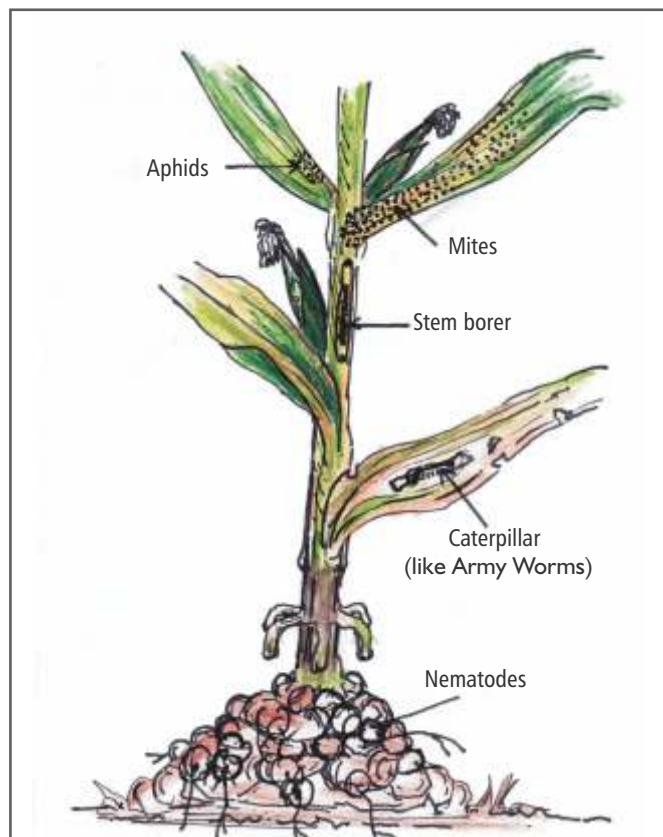


Weeding by hand



What kind of damage is caused by insects, mites, nematodes and mammals?

Pest damage on crops is commonly caused by insects, mites, nematodes and mammals.



Insect damage is usually easy to identify:

1. Leaves with holes or missing parts are damages caused by caterpillars e.g. army worm, stalk borers.
2. Curled leaves are caused by aphids sucking sap.
3. Rotten fruits are as a result of being damaged by insect larvae or fruit flies .

Mites are very small and not easy to see with the naked eye. Spider mites, however, weave a typical tissue on attacked plant parts that is easily detected. Infested plants, leaves and fruit turn yellowish.

Nematodes are also very small and not easy to see

with the naked eye. They mostly attack plant roots resulting in yellowish plants that wither and die.

Animals like elephants, monkeys or rodents, and birds such as sparrows, starlings and crows can also damage crops.



Do you know which pathogens cause diseases on your crops? What kind of damage is caused by fungi, bacteria and viruses?

Most **crop diseases** are caused by fungi, bacteria or viruses.

Fungi cause most of the plant diseases; e.g. spotting, cankering, blighting, wilting, scabbing and rotting on different plant parts. Fungi can cause parts of plants or the entire plant to wither and die.

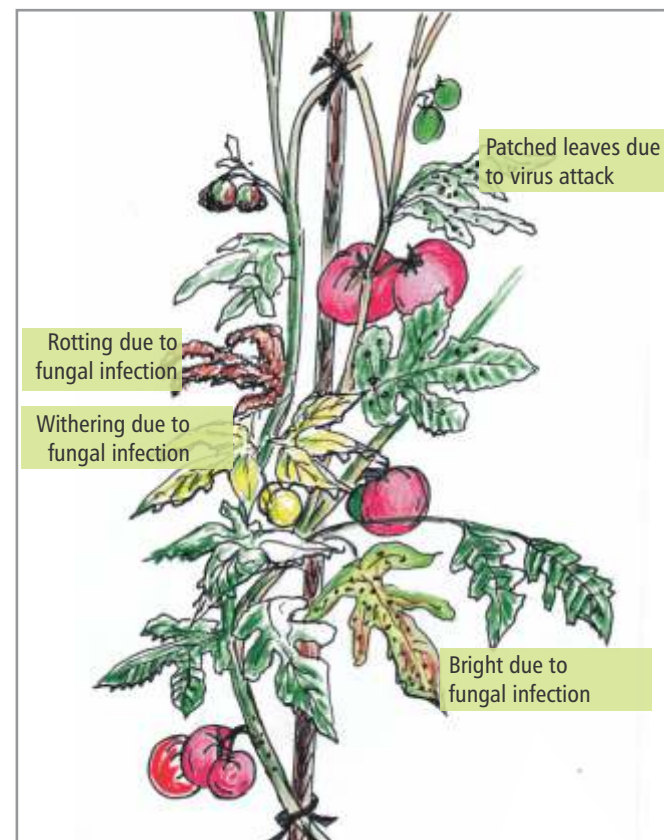
Bacterial infections result plant starting to rot. It causes early death of the plant.

Viruses mostly cause leaves and other green plant parts to change in colour. Light green or yellow patches appear in affected leaves resulting in a general reduction in the growth and vigour of the plant.

Before managing any particular pest or disease, you should know how it behaves in relation to the concerned crop.

Monitoring improves your knowledge on pest and disease development and helps you to manage them well.

Walk along a zigzag route through the field and collect random plant



Sustainable crop pest management



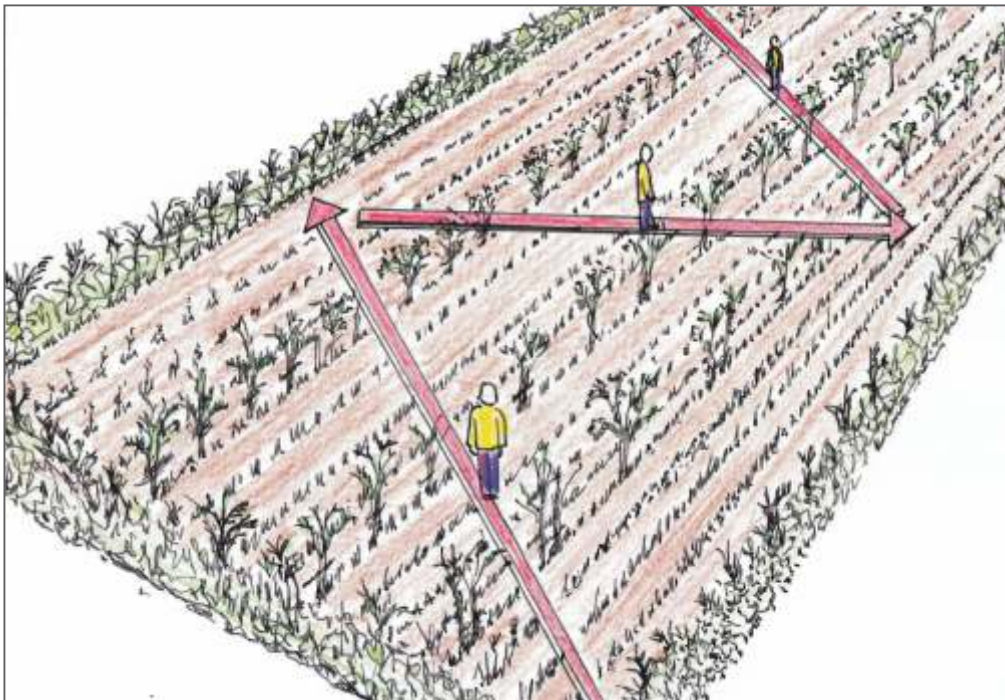
How many times per week, per month do you check or monitor pests and diseases in your field?

samples for analysis.

Monitoring of pests in your field

How to do zigzag route

- Check every plant along your way and record the number of affected plants.
- Find out which pests or diseases are present in your field.



- Control or consult extension experts when too many plants are affected.

Different approaches for pest and disease management

The pesticide approach	The sustainable approach
Approach may prove efficient if the choice of the pesticide, its dosage, the timing of the application and the application mode are correct.	requires minimal extra cost only.
But as a farmer you may not have access to synthetic pesticides.	is easy to prepare and apply.
Or the pesticides may not be affordable and too expensive for you.	is effective under local conditions.
Pesticides also hold some risks during storage and application.	is safe to handle as no poison involved.
The impact of application may be high in the short term. But over an entire cropping period it may be null, because the pesticide killed the natural enemies too and thus encouraged unhindered re-development of the pest.	has minimal or no negative effect on other organisms, on water, soil, air and agricultural products.
Pesticides can also lose efficiency, if the application of the substance is not regulated and pests develop resistance.	

COMACO recommends the sustainable approach to pest and disease management.

A three step approach: The sustainable way

A sustainable or organic pest and disease management can be seen as a three-step approach. Each step builds the foundation for the next one.

The aim is to optimize the 1st and 2nd step practices that encourage natural self-control of pest and disease pathogens, and to minimize the direct control measures.

As an organic farmer, you should put a lot of attention into prevention of spreading and multiplication of pests and diseases through proper crop management. This helps them to minimize costly direct control measures.

The 3 steps in the pest and disease management toolbox



1st step: soil and crop management

Proper soil and crop management

You must aim at improving plant health and preventing introduction and spread of pests and diseases by applying multiple practices such as:

A healthy crop can withstand pests. Healthy soils = healthy crops = No pests

- continuously improving soil fertility to encourage strong and vigorous growth of the plants;
- ensuring proper soil preparation to promote rapid development of the crop;
- choose good varieties that are tolerant or resistant to the prevalent pests and diseases, and do well under local conditions;
- using disease and pest free planting materials to avoid introduction of new pests and diseases to the field;
- maintaining a planned crop rotation to limit build-up of pests and diseases found in the soil;
- ensuring timely planting and growing different crops simultaneously to reduce coincidence of the crop with pests and diseases; and
- applying good crop management including pruning, shade management and timely harvesting to hinder development of pests and diseases.



A three step approach: The sustainable way

2nd step: habitat management

Promotion of natural control mechanisms

Pests have natural enemies such as ladybird beetles, hunter and web builder spiders, brown earwings, wasps, praying mantis, dragonflies, ants, honeybees or birds.

These natural enemies can be considered friends of the farmer. Natural enemies can be attracted and kept around and within the crop fields by;

- plant hedges around fields to attract natural enemies like *Gliricidia*,
- improve field hygiene by timely weeding to remove alternative hosts,
- destroy or properly dispose of infected plants, and
- clean tools used on infected plants.



3rd step: direct control

Minimizing negative impact

Serious situations may require direct measures to prevent economic crop losses. These measures will only be fully effective, if the practices in the 1st and 2nd steps were and are well applied.

Approved or homemade insecticides and fungicides of biological origin such as plant extracts and plant oils are used to control specific pests and diseases.



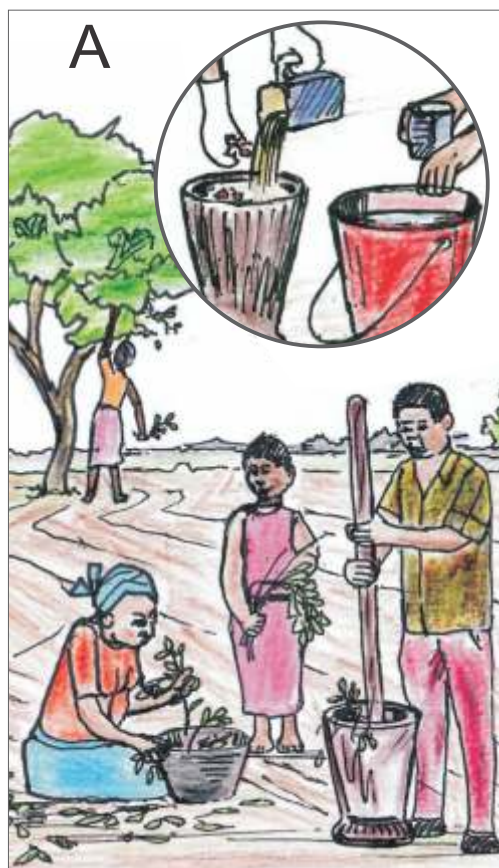
Extracts of African plants known to have insecticidal properties:

- Neem (*Azadirachta indica*): Against many insect pests.
- Solanum (*Nthuma* or *Ntuntulwa*): Against many insect pests.
- Pyrethrum (*Chrysanthemum cinerarifolium*): Against most insects and mites.



A three step approach: The sustainable way

- *Tephrosia vogelii* (*Ububa*): Against caterpillars, mites.
- Chili (*Capsicum frutescens*): Against many insect pests.
- Tobacco (*Nicotiana spp.*): Against all insects and mites (very toxic for humans).
- Mexican and African marigold (*Tagetes spp.*): Repellent effects against insect pests, effects against nematodes.
- Garlic (*Allium sativum*): Anti-feedant for insect pests.
- *Gliricidia*: Against weevils, army worms.

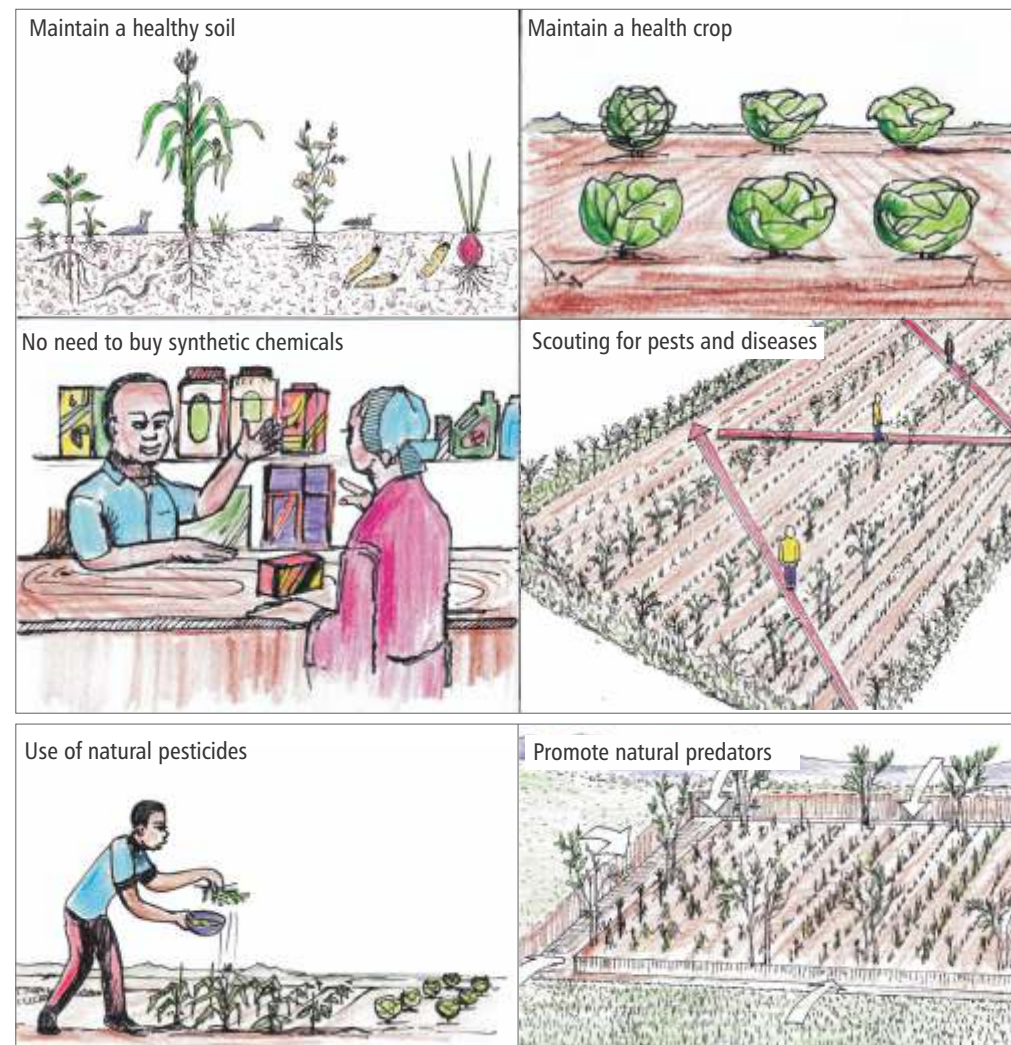


Preparation of biological pesticides



How to prepare a plant leaf extract

Summary: Activities of a sustainable pest and disease management



1. Planting date



Why is it important to know and keep the dates of planting?

You should keep the planting dates of your crops because this will help you remember when you should start harvesting. The harvesting time from the planting time differ from crop to crop. Harvesting time is also determined by crop type and variety maturity period.

2. Timing

You should know when to start harvesting to avoid possible losses through bad timing. e.g. soybeans (Henon and Safari) varieties have a tendency of splitting open due to sunshine and shatter the grain all over the field, if farmers harvest late.

3. Maturity – ready for harvesting

If a crop is not fully matured, it can also cause losses. Quality will be compromised. For example, if soybeans is still green when harvested, it will shrink and will not attain the required yellow colour. Equally groundnuts will shrink if harvested before they fully mature. This also applies to maize.

4. Moisture content

Farmers should harvest crop which is 12.5% and less in moisture content.

5. Harvesting and storage of crops

a. Maize

- Remove the dry cobs from the stocks in the field.
- Store the cobs in a dry, cool and well ventilated granary to allow more moisture loss.
- Only shell maize when it is fully dried up.
- Remove trash from the grain and pack grain in 50kg bags. This is ready for the market. Fumigate with *Gliricidia* leaves, the bags meant for consumption.

b. Soybeans

1. Check on one station if the crop is ready for harvesting.
2. Cut off the dried soya stems leaving down the root system to allow for the breaking of the nodules to fix nitrogen in the soil.
3. Heap the stems on a tent, concrete or hard surface.
4. Hit gently the stems with sticks to remove grain from the covers.
5. Collect the grain together and remove trash.
6. Pack the clean grain in 50kg bags. Your soya is ready for sale.

c. Groundnuts

1. Check if crop is ready for harvesting.
2. Dig the groundnuts and heap them facing upwards for further drying process.
3. When fully dry remove the pods.
4. Pack in dry and cool granary for consumption.
5. Pack the pods in either 50 or 90kg bags for sale.

Cultivation Record

Instruction: As a farmer, fill in this form each year for each field/crop to track your activities at the farm

Farmer's Name: _____ Producer Group: _____
 Cooperative: _____ Chiefdom: _____
 Plot Number/Name: _____ Plot Size: _____
 Crop Name (like Groundnuts): _____ Variety: _____
 Previous crop: _____

Activity:	Record of activity:
Tillage method <i>(For example Basins or Ripping)</i>	
Tillage time <i>(Date started land preparation)</i>	
Planting date	
Compost/manure type	
Compost/manure time of application	
Compost/manure amount	
Weeding method	
Weeding time	
Gliricidia present <i>(How old is Gliricidia)</i>	
Name of Pest	
When the pest was noticed	
Method used to control the pest	
Date of pest control	
Harvest date	
Yield	
Price reached	

Establishing and managing *Gliricidia* nurseries

A tree nursery is an area where young plants are germinated and are cared for until they are ready for transplanting in the desired field.

Steps to producing quality seedlings



Producer group members helping each other

- 1. State the purpose you need the trees for.** For example trees can be grown for:
 - Increasing fertility of depleted soil in your field.
 - Providing fuel wood near home.
 - Supporting a live fence around your garden or plot that repels insects.
- 2. Determine the number of trees you will need**
 - From the purpose you can calculate the number of trees needed.
 - For example, start with 500 *Gliricidia* plants enough for 1 lima.
- 3. Select a suitable nursery site**
 - Your nursery must have a reliable source of water nearby and the soil must be well drained, flat or with a gentle slope.
 - Protect the site from strong winds and stray animals by making a fence.
 - The site can be in your 'dimba' garden or behind your house.

4. Determine size of your nursery

The size of the nursery depends on the number of seedlings to be raised.

a. Group nurseries

- In group nurseries farmers of one or more producer groups or a sub group within the producer group decide to make one nursery.
- Add the tree requirements for every member to get the total number of seedlings required.

b. Individual nursery

- A single farmer decides to own a nursery.

c. Nursery size

- 1lima field = 1 bed of 1.0m x 2.5m.

This will accommodate 500 potted seedlings.

- 20 farmers of a producer group will require 10,000 seedlings, a nursery area of 3.0 square meters x 20 farmers = 60 square metres. This nursery space includes 0.5m passages between beds of for weeding and watering.
- This is equivalent to 10m x 6m of bed space and passage.



Seedlings ready for planting if 20cm high or more

Establishing and taking care of the nursery

1. Soils needed

- Collect top soil from the nearby bush, dig with a hoe up to 10cm only.
- Use the top soils to mix with compost and fill your polythene pots.
- Add soil from an old stand of *Gliricidia* to the pot mixture to introduce the nitrogen fixing organisms and encourage good nutrient uptake.
- Add some sand to this mixture to enable easy passage of water.

2. Manure

- Use compost manure or well decomposed animal manure to mix with the forest soil.

3. Mixing of the potting media

- 2 shovels of soil from *Gliricidia* stand for every 500 pots.
- Using plastic (polythene) pots is important for a good establishment of the



Save money and turn your field like this

seedlings, as it maintains more moisture and supports a good root development.

4. Treating of seed before sowing

- Soak *Gliricidia* seed in cold water for 12-24 hours. Remove all the seeds that will be seen floating.

5. Sowing of seed

- Sow 1 seed directly in the pot with soil up to 2-3cm.
- Seeds can also be sown in a flat bed and later transferred into the plastic (polythene) pots by pricking when the seedlings have 2 leaves.

6. Labour required for the nursery

- In group nurseries, set a day when everyone will participate in the planting.
- Divide the group and make shifts for taking care of the nursery after planting.

Managing *Gliricidia* nursery

1. Watering

Before germination, water at least once a day to maintain soil moisture. However, avoid water logging to prevent diseases.

2. Provide shade

- After sowing, direct sunlight will dry up the soil and reduce germination success.
- Cover the seedbed with a shading material, such as grass, to retain moisture after sowing.
- Remove the shade when germination starts. Seedlings require maximum light for better growth.



3. Weeding

Do not allow weeds to grow together with seedlings. Remove them by hand pulling.

4. Root pruning

- Potted *Gliricidia* seedlings raised on the ground require shifting regularly to avoid roots penetrating in the soil.
- Clip off overgrown roots with a scissors or knife. Seedlings established directly in raised beds do not require root pruning. *Gliricidia* seedlings grow very fast and are ready for transplanting after 6 to 8 weeks.

5. Hardening

Two weeks before transplanting, get seedlings accustomed to harsh field conditions. This is done by:

- Reducing water supply by watering only when stress is observed in the seedlings.
- Pruning the roots.

Do not establish your nursery under a permanent shade.



Calendar of activities in managing *Gliricidia* fields



MONTHS	YEAR1	YEAR2	YEAR 3 ONWARDS	NOTES TO THE TABLE
October	1. Sow <i>Gliricidia</i> seed in the nursery	7. Apply compost in basins	9. Prune trees to 50cm; remove fresh leaves and apply in basins	<ol style="list-style-type: none"> 1. Sow seeds in protected areas. 2. Watering, weeding, root pruning is needed. 3. Transplant in wet field , during cool day. Plant in rows 5m apart; 1m within rows/between plants. 4. Remove weeds as they appear with hoes; mulching helps reduce weeds. 5. Plant root crop around field/weeding around. 6. Remove crop carefully without breaking the trees. 7. Apply 2 handfuls of compost in the basis and then some soil. 8. Plant the crop 1 week after applying <i>Gliricidia</i> and manure. 9. 1st Pruning- Cut back the trees to 50cm after two years from planting (See Year 3). 10. 2nd Pruning- Cut back coppices after 4-6 weeks; apply the leaves to the crop as top dressing and cover the leaves with soil <p>NB. Replant after 25 years.</p>
November	2. Care for nursery; select and prepare field	8. Apply compost in basins/Plant crop	10. Prune, remove and apply fresh leaves in basins/rip lines; bury with compost and soil	
December	3. Transplant <i>Gliricidia</i> seedlings in selected field ; intercrop with groundnut/soybeans; NOT in maize field	8. Plant crop-soybeans/groundnut or other crop	8. Plant crop-maize or other	
January	4. Remove weeds in field	4. Remove weeds	10. Prune and apply coppices/weeding	
February	5. Remove weeds	5. Remove weeds	4. Remove weeds	
March	6. Construct fire break	5. Construct fire break	5. Construct fire break	
April-Sept	7. Harvest crop/rip field or make basins/ Report livestock interference to the chief	6. Harvest crop/Land preparation/protect from livestock	6. Harvest crop/Land preparation/protect from livestock	



What is vegetable gardening?

It is easy to get relish (ndiyo) from the garden for the family. This does not need a lot of labour.

- A small piece of land behind my house or in the *dimba*.
- Water used in the kitchen, or a well in the *dimba* near the vegetable bed for at least three months.

How to make a vegetable garden

Step 1: Bed layout

It is useful to layout your garden in beds. You can keep on improving the soil fertility in the beds with organic matter, compost, mulch and manure. You can stop your soil from getting too hard by not walking on the beds and only walking on the pathways. The beds also make it easier to plan crop rotation.

Step 2: Digging the beds

Long narrow beds are good because you can reach to the middle of the bed from either side without walking on it. These beds are usually 1 meter or one spade length wide. You can make them as long as you want too.



Step 3: Planting system

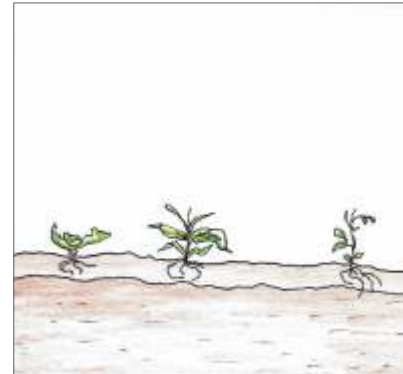
In one place, you should plant different crops every year. If you plant the same crops every year in the same place, the nutrients in the soil get used up very quickly. By planting a variety of crops different nutrients are used and the soil remains healthy for longer.

Step 4: Where to lay your bed

If the ground is sloping, make your beds across the slope. In this way, the paths and trenches will catch run-off water when it rains.

Crop rotation and inter-cropping is critical:

- Good gardeners always grow a variety of crops.
- Leafy crops, like spinach, are rotated with root crops, like carrots, and nitrogen fixing crops like beans.
- Medicinal and insect repelling plants are intercropped with food crops.
- Unused or fallow plots in your garden should be mulched or covered with grass, leaves, stover, manure etc., so that it becomes fertile and good for future cultivation



Thin top soil results

- Small unhealthy plants
- More insects
- More disease

Reason: soil is unhealthy



Deep top soil with compost

- Large plants with more fruit,
- Less insect pests, less pesticides
- Less disease
- More income

Reason: soil is healthy, able to feed the plant

Vegetable calendar



The calendar below shows different types of crops and when they can be grown in the year.

JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
Cabbage (1)	Cabbage (1)	Cabbage	Cabbage	Cabbage	Cabbage	Cabbage	Cabbage	Cabbage	Cabbage	Cabbage	Cabbage
Cauliflower	Cauliflower	Cauliflower	Cauliflower	Cauliflower	Cauliflower	Spinach	Spinach	Spinach	Carrot	Spinach	Carrot (1)
Carrot (1)	Carrot (1)	Chinese-Cabbage	Chinese-Cabbage	Chinese-Cabbage	Chinese-Cabbage	Carrot	Carrot	Carrot	Radish	Carrot	Radish
Radish	Radish	Beetroot	Beetroot	Beetroot	Beetroot				Tomato		Tomato (1)
Tomato (1)	Tomato (1)	Radish	Radish	Radish	Radish	Tomato (1)	Beans	Tomato	Green pepper	Tomato	Squash
Potato (1)	Potato (1)	Beans			Tomato(1)	Chinese-Cabbage		Egg plant	Squash	Radish	Potato
Okra	Okra	Egg plant	Green pepper	Green pepper	Lettuce	Beetroot	Cucumber	Cucumber	Okra	Green pepper	Okra
Lettuce	Lettuce	Potato(1)			Spinach	Radish	Squash	Squash	Lettuce	Cucumber	Lettuce
Chinese-Cabbage	Chinese-Cabbage	Okra	Lettuce	Lettuce	Carrot	Potato	Okra	muskmelon	Onion	Squash	Onion(2)
Onion(2)		Lettuce	Spinach	Spinach			Muskmelon	Okra	Beans	Lettuce	Beans
Beans	Beans	Carrot	Carrot	Carrot	Peas		Lettuce	Lettuce	Eggplant	Chinese-Cabbage	Pumpkin
Green pepper	Green pepper	Onion	Onion	Onion	Potato		Chinese-Cabbage	Chinese-Cabbage	Cucumber	Onion (1)	Green pepper
Cucumber(1)	Cucumber(1)	Peas	Peas	Peas			Beetroot	Beetroot	Potato	Beans	Cucumber
		Tomato	Egg Plant	Egg Plant			Egg plant	Radish		Egg Plant	
		Green pepper	Potato	Potato			Green Pepper			Potato	
		Cucumber(1)	Cucumber				Pumpkin	Green Pepper		Pumpkin	
							Potato	Pumpkin		Okra	
							Watermelon	Potato			
								Watermelon			

Key:

1 = requires greater attention

1. Crop residues are vital for your farming success



What can happen to your field without crop residues?

Without crop residues in your field, this happens ...

- Your soils become less fertile leading to lower yields and less money for your family.
- Your soils will be washed away by water or blown away by wind.
- Soils in your field will dry up and harden. This will not support plant growth when there is prolonged dry spell.
- Soils in your field will get hot and kill living organisms in the soils. It is important to have living organisms in the soils for the health of your crops.
- Weeds grow easily posing stiff competition to your crops which will have fewer nutrients for their growth. Increased weed growth leads to high labour demand for weeding. This will increase the cost of farming leading to less profit.



.... So why burn the crop residues or let your animals eat them?

2. Stop fires, save soils -what you can do

- Put a fire break around your field.
- Plant 2 lines of sweet potatoes around your field. As you harvest your potatoes in May or June, you will be developing a fire break around your field.
- Undertake fire-prevention campaigns in your village. These campaigns are being spearheaded by your royal highness, headperson and cooperative executive committee members.
- Use buckets to trap mice. Stop digging and burning fields and farmland to kill mice.
- Set up a neighbourhood watch group that raises a red flag to warn fellow group members of bush fires and assist in putting out fires.

3. Uncontrolled cattle grazing can destroy your soils and Gliricidia...how do you stop it?

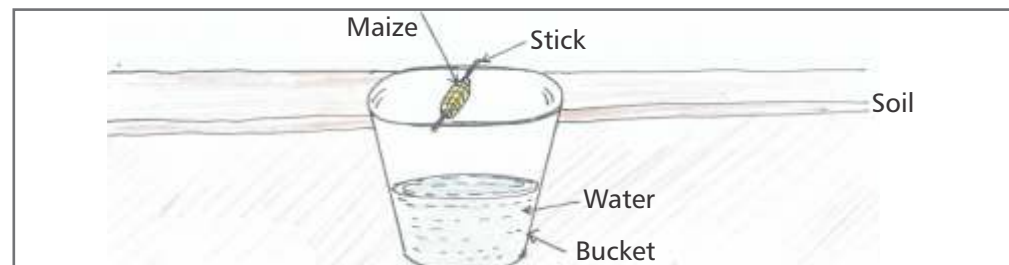
- Producer group leaders with cooperative leaders meet with chiefs and request for help to stop free-range grazing of animals.
- Engage village headmen to enforce decisions from the chiefs to punish those who break rules.
- Make rules and penalties clear.
- Carry out anti-animal grazing awareness campaigns throughout your village on why free grazing is harmful to soils.
- Set up neighbourhood watch groups to guard against free-range animal grazing and report violators to cooperative leaders and royal highnesses.
- Employ elderly persons to herd animals. Animals usually herded by children often cause a lot of damage to crop residues.

Some livestock rules

- Livestock are not allowed to graze without a person to herd them.
- No grazing in other people's field.
- No burning of a field.

Penalties (from paramount Chief Mpezeni)

- Violations of cattle grazing of other people's field results in payment of animals from cattle, goats depending of gravity.
- Burning of someone's field results in payment of cattle to the chief.
- The owner of the field is paid compensation according to the chief's judgment or headman.



Livelihood Needs and Best Skills



Chapter 28 Livelihood calendar

ACTIVITY	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER	JANUARY	FEBRUARY	MARCH
Crop Seed Storage for your Seed Banks Chapter 29: Page 63				█								
Managing your Seeds at the Farm Chapter 30: Page 64					█							
Collecting and Handling your Agroforestry Tree Seeds Chapter 31: Page 65					█							
Seed collection and handling Chapter 31: Page 66					█							
Village Chickens production Chapter 32: Page 67	█											
Beekeeping activities Chapter 33: Page 70				█				█				█



What you should know about Seed!

Every farmer should be concerned about planting the right type of seed. The quality of seed you use determines the quality and the yields of your crops. For good yield, you are encouraged to use certified seed, as well as using recommended crop management practices.

Seed is the part of a plant that you can use for growing crops, for example:

- Vines in sweet potatoes.
- Stem cuttings in Cassava.
- Tubers in Irish potatoes.
- Certified 'grain' in all other crops.

In crops such as maize, rice, groundnuts or soybeans, the grain becomes seed only after it has been inspected at all stages of production by the authorised government inspectors. Certified seed of any type follows a set standard in its process of multiplication, such as the registration of seed growers, inspection of fields and use of the right type of variety.



Why don't we sow our grain, from our own harvest?

Benefits of certified seed

- Provides higher yields.
- Produces healthier crops.

- Can be recycled for up to 4 farming seasons (this depends on the crop and variety).

Where can you as a farmer access seed?

- Your cooperative seed bank is an easy and cheap source for your seed. Visit your cooperative shop or any of your cooperative leaders for more information.
- Other sources are commercial seed suppliers.

Benefits of the Cooperative Seed Bank

- Enough and quality seed is made available and affordable to the farmer.
- Helps the farmer to plan for the season.
- Enables sustainable seed supply.

How to access seed loans from the Cooperative

- You must be an active member of a producer group.
- You must have paid joining fee.
- You must be practicing conservation agriculture.
- You must register for a seed loan for the season.
- You must pay back the loan at an agreed percentage rate of your harvested grain.



Chapter 30 Managing seed loans



How much seed can I receive from my cooperative?

Your cooperative gets certified seed from COMACO. It can give you a seed loan enough to plant 1 *lima* of your field as start up. Remember this seed is given to you on loan basis. You are normally asked to sign a grower's contract for this seed, where you agree to grow the seed and pay back to the cooperative in form of seed at 30% interest.

You have the responsibility to grow and manage the crop. Use the skills you acquired during your producer group training session for producing the crop and also using your own experience and observations.



Why do I need to pay back the loan? And how much seed do I have to pay back?

Table showing how much seed you have to pay back as loan

Quantity of seed loan (Kgs)	Quantity of seed loan to be paid to cooperative (Kgs)	Who receives seed loan
10	13	The crop should be shelled and well graded. Give to your senior lead farmer in your area
15	20	
20	26	
30	39	

How to become a seed grower for the cooperative

Your cooperative is involved in seed multiplication to improve the quality of your crops and for you to obtain high yields. Cooperatives get basic seed for multiplication from COMACO. The multiplied seed is sold or distributed on loan to farmers so that they avoid using low quality recycled 'seed'.

Below are the steps for seed multiplication by seed grower.

1. Your cooperative identifies farmers, and you can be one of them, to grow and multiply seed, among the requirements from government. The cooperative identifies paid up members that are hardworking, honest and attend group meetings and training regularly.
2. The identified farmers are helped by the cooperative, in collaboration with COMACO, to register with the relevant government body called Seed Control and Certification Institute (SCCI).
3. The registered farmer is then trained by COMACO and SCCI on how to grow and to take care of seed.
4. The farmer grows and manages the seed according to the requirements as trained, harvests and takes care of the seed by packaging in the right bags and storing it in well secured and dry places.
5. The cooperative buys from you the harvested seed. Remember to pay back the seed loan to your cooperative as agreed in the contract.

The cooperative stock the seed in the cooperative shop at the depot or distributes it to its farmers on loan. It can also sell excess certified seed to COMACO for redistribution to other chiefdoms or to commercial seed suppliers as a business.

Collecting and handling your agroforestry tree seeds

Tree seed collection steps



Where do you collect your seeds for planting?

1. Plan for seed collection

- Know the seed type to be collected e.g., *Gliricidia sepium* seed
- Determine the quantities that you need.
- You can collect seeds from either a seed orchard or from the wild (bush).
- Make the necessary arrangements, which include:
 - ✓ Transport arrangements, - bicycles, ox-cart etc
 - ✓ Suitability of the harvesting bags and tools,
 - ✓ Drying facilities,- slab, shed depot, etc
 - ✓ labour force - number of worker.

All these depend on the size of the project.



What is the right time to harvest seed?

2. Harvest at the right time

- Harvest seed only when it is mature.
- For species like *Gliricidia*, pick mature pods just before they split.
- You can tell that the fruits are mature when the colour of the fruit changes - fleshy fruits change from green to their respective ripe colour.



How can you tell if the seed is mature ?

- **Caution:** If collection is delayed, the seed may be attacked by insects and diseases and lose quality.



3. Seed collection and handling

Harvesting methods

- Handpick from the tree while standing on the ground.
- Prune some branches and pick the seed.
- Shaking trees and pick seed from the ground - spread a mat, sheet of plastic or cloth on the ground before shaking.
- Use of sticks to beat/pull down fruits or branches for hand picking.

Processing and handling of seed

- Dry pods in the sun for 2-3 days and then rub across a coarse wire mesh through to collect the seed.
- Widdowing- separate good seed from impurities, diseased or partly eaten seed, chaff and insects.
- Sorting- separates desired seed from bad seed. Also removes diseased, broken, partly eaten seed and soil or stones from the seed.

Collecting and handling your agroforestry tree seeds

Tree seed handling

1. Processing of harvested seed

- Dry seed in the sun after winnowing and sorting for 2-3 days before storage. This reduces moisture content of the seed.
- The lower the moisture of seed, the longer it can be stored.
- Normally, seed with a moisture content of 10% or less will maintain high viability for several years, if stored correctly.
- Dry on raised beds to help air circulation, and shade the beds from strong sunlight.

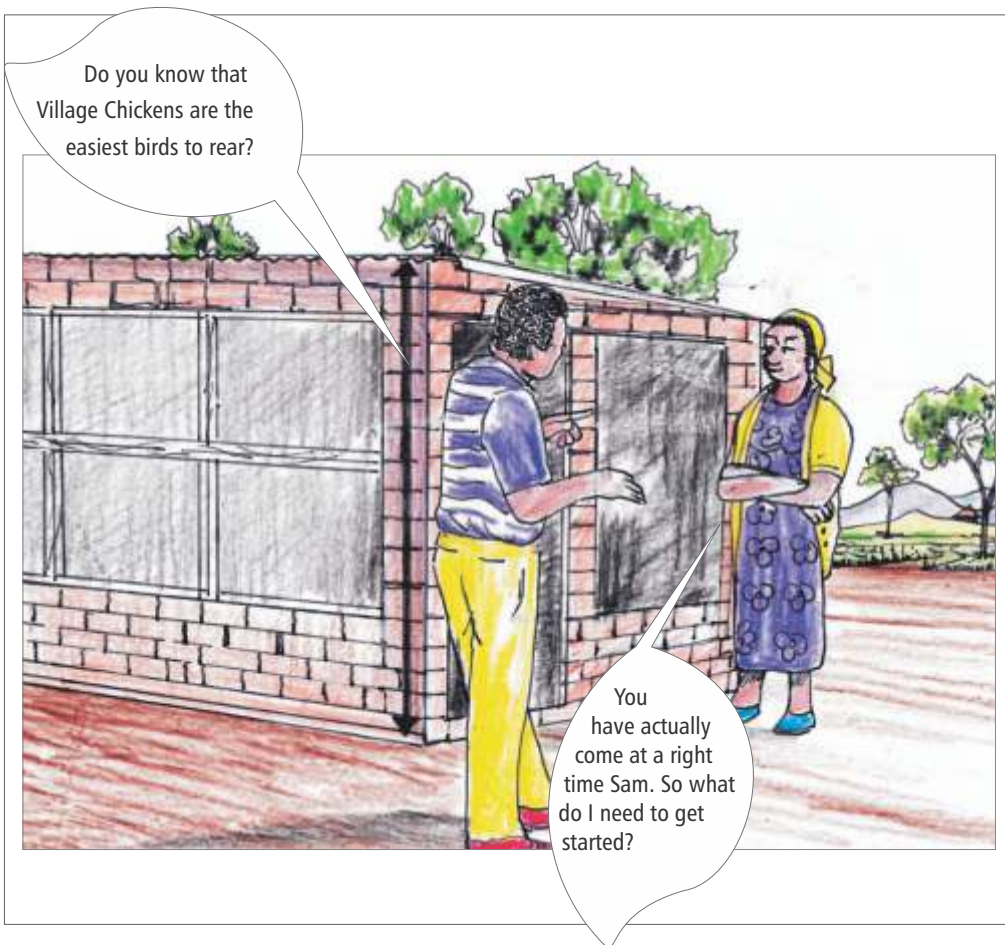
2. Store seed correctly

- Store in a cool place such as a calabash placed in a grass thatched house.
- Don't collect immature seed.
- Store only well dried seed (has been dried for over 3 days) to reduce moisture content.
- Should not be stored more than one year, because the rate of germination will decrease.
- No damaged seed during extraction, to reduce fungal attack.
- Don't store seed with pests or diseases.
- Avoid exposing seed to the atmosphere and direct sunlight during storage, which promotes growth of the seed.
- Some seed can be stored for a long time without losing viability this is called Orthodox seed.
- Keep seed in cool, dry places in dark and airtight containers (such as plastic or glass bottles with screw-tight lids, or hermetically - sealed foil sachets).

3. Label seed properly

- Write the species name, origin or collection source, collection date, producer.
- stored in dry place before planting.





For high poultry production, more income, less diseases and for your family to prosper do the following:

1. Get chicks from households within vaccinated areas.
2. Use a proper poultry house following either of the two steps below;
 - (a) Un burnt bricks with iron sheets.
 - (b) a mud compacted poultry for the poultry house thatched with grass
 Measurements for both: at least 4m by 3m by 2m high to accommodate 70-100 birds.

3. Give your chickens (maize bran with sunflower cake, green vegetable) twice a day- morning and late in the afternoon. Remember Moringa powdered leaves is good for your village chickens.
4. Provide plenty fresh clean water daily to your chickens in the morning and late in the afternoon in clean drinking containers.
5. Give Newcastle and fowl pox vaccine to your birds. 1st vaccination in March, 2nd vaccination in July and the 3rd vaccination in November.
6. Separate chicks from mother hen when they are at least 4-6 months old.

For laying hens

- Nest baskets or boxes should be provided within the poultry house or outside the main poultry house as long as they are strong enough to protect your hens from wild cats, snakes, honey badgers and monitor lizards.
- Keep only those eggs which are not more than 2 weeks old in the nest basket for better hatching results and check whether the chick inside the egg is developing at 4 and 7 days of brooding using a small torch and plain paper in a dark room with the help of your local cooperative leaders (Candling).



Newcastle disease in poultry

What is Newcastle disease?

Newcastle disease is a fast spreading poultry disease caused by a very small living organism called virus. The most affected birds are chickens, turkeys and ostriches.

Elephant dung, chili or chemical fertilizers **CANNOT** prevent or treat Newcastle disease in chickens. Pounded Moringa leaves can prevent and treat diarrhoea in birds but not Newcastle. To keep your birds safe from this disease you **MUST** vaccinate each of your birds. See your lead farmer or your cooperative leaders for vaccines.



How Newcastle is spread

There is no medicine which can treat Newcastle disease. Make sure you vaccinate!

- Germs can be passed to a chicken from another bird, through faeces or the air.
- Other animals can bring germs to a chicken if they had contact with another sick bird.
- Germs can sit on the outside or inside of eggs, and then be passed to a chicken.

- Vehicles that have been at a farm with sick birds can take germs or viruses with them to your farm.
- The remains of a bird that died from the disease still has germs on them! If the remains are not properly disposed of, they can pass germs to healthy birds.
- Humans that have been in contact with sick birds can pass germs onto healthy birds. This is why it is so important to wash your hands regularly when handling birds, eggs, chicken food, and chicken manure, and after cleaning chicken houses.
- Poor housing promotes breeding ground in the spread of Newcastle disease and other poultry diseases.



Disease and parasite management in local chickens

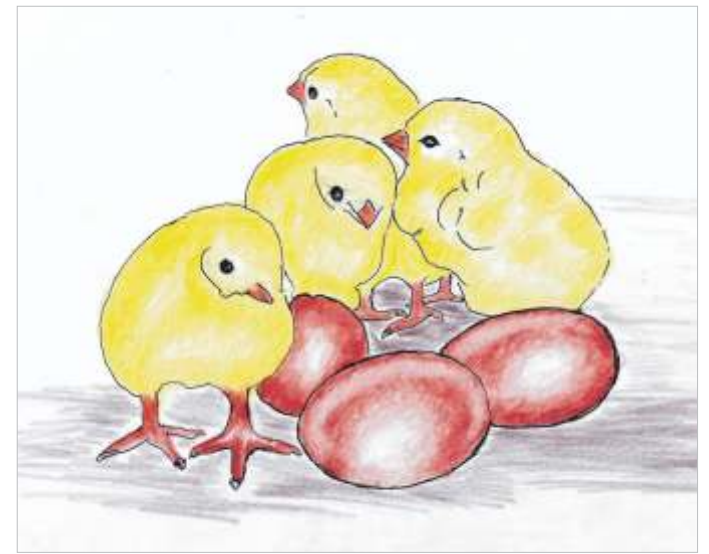


Sick and dying bird

Did you know that?

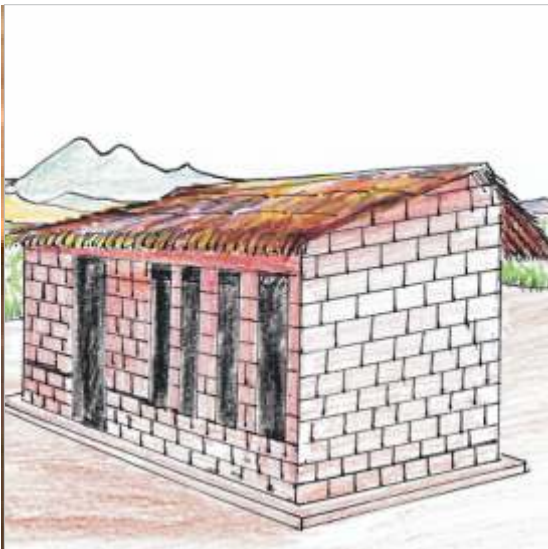
- Whenever village chickens are cross bred, with birds from other flocks, their body size and their immune system improve?
- Termites and maggots are a very good source of proteins for our village chickens.
- You can have 95% to 100 % of your chicken eggs hatched when ducks are used for incubation.

Remove barks from poles used for making a roof for your poultry house to prevent fleas, ticks and mite from breeding



How to prevent Newcastle Disease

- Separate all sick birds from the healthy ones.
- Do not eat any chicken that has died out of any disease or bitten by a snake, bury them instead.
- Avoid introducing any new village chicken to your old flock before they are proven healthy.
- Do not use any unproven method to prevent or treat your chickens such as using chemical fertilizers, chili or elephant dung. Seek guidance from your nearest local cooperative, principal lead farmer or veterinary officer.
- Avoid keeping village chickens with other birds like ducks, guinea fowls, turkeys in one poultry house.





Why keep bees? For honey! For money!

1. More money in your pocket by selling honey and beeswax.
2. Its cheap! You do not need fertilizer or seed and other inputs.
3. Its safe and easy. You only need to have a hive and you will be harvesting twice in a year.
4. Bees help in the pollination of crops like soybeans, beans, sunflower etc. COMACO buys good quality honey at good prices – putting cash in your hand.



How much money can I make from keeping bees?

One hive is able to produce an average of 20kg per season. If the price of comb honey is K10 per kg, you can make K200 per hive. So if you have 10 hives, you can make K2000 every season.



I need a beehive. Where can I get one?

- COMACO supplies special modern beehives. You get more honey from this COMACO hive

than the traditional hives. The hives can last up to 20 years.

- Buy a beehive from your nearest FSC (Farmer Support Center). Contact the Principal Lead Farmer or Regional Coordinator in your area to join the beekeeping group and access the beehives from COMACO.

Where can I put my beehives? Bee yard!

- Place the beehives in the forest where the bees will collect nectar and pollen from the trees. The common trees bees collect nectar from are Kamphoni (Nyanja) or Musamba (Bemba), Mpundu, Masau, Mtondo, etc.
- Bees also need water so place your beehives within 500m to a source of water.
- Do not put the hives in the middle of the village, near a school or clinic as the bees can sting people.



Bee keeping



How can I attract the bees into the hive?

1. Melt your beeswax in a pot or tin so that it becomes liquid.
2. Then drip it on the top bars following the line to make the strip (see the pictures). This strips or foundation wax on top bars you have made is what the bees will follow when making the combs in the hive.

Foundation wax! Making strip of wax on the topbar by following a line.



How do I hang a Beehive?

- COMACO hives are hanged very high at 3 – 5 meters above the ground. Use the rope to pull the hive up the tree.
- The importance of hanging the hive very high is that it increases the chances of the bees entering the hive. It also protects the hives from fire and theft of your honey.
- Hang hive on the flat, straight tree branch with rope.



COMACO buying quality honey from farmers!

When can I harvest honey from the Beehive?

- Only the mentor from COMACO Cooperative will harvest honey from the hives for you. COMACO will provide clean plastic buckets for storing honey.
- Honey is harvested in between April and June as the first season. The second harvest is in September/ October in the valley and November/ December on the plateau.

Managing your beehives

How can my bees make more honey?

Good apiary management practices

1. Plant trees that the bees can get nectar and pollen from if your forests are under threat of deforestation. Plant *Gliricidia sepium* in your field and (Masau trees, Citrus trees (orange) around the apiary. COMACO provides free seeds for *Gliricidia*.
2. Provide water at the apiary. Get an old bucket/ container or calabash and put water. You can put twigs and leaves for the bees to be landing as they drink the water.
3. Feed the bees during critical times of the year. Feeding bees during times when flowers in the trees are scarce will give the bees enough energy to work and produce more honey. If you do not feed them during such periods, they will die of hunger. Usually bees would leave the hive in search of better places where they can find enough food and water.



Food that you can feed your bees

- a. Sugar solution- mix $\frac{1}{2}$ cup of sugar and $\frac{1}{2}$ cup of water, 1 cup of sugar and $\frac{1}{2}$ cup of water). The sugar that is given to bees is not to make honey but to help them when there are no flowers. You can start feeding the bees after 4 weeks of harvesting honey when there are no flowers. Sugar solution must be fed to bees not more than five days as it gets bad. When the flowers start, feeding with sugar should stop.

Another feeding 2:1 (1 cup of sugar and $\frac{1}{2}$ cup of water) which is also important is feeding the bees for 20 days from 5th to 25th February (to stimulate queen – 'nina wanzimu asebenze') so that the bees population increases and ready to be collecting nectar when the flowers start in March and make more honey.

- b. Maize bran (gaga), cassava flour. Put the maize bran in an open container on top of a stand at the place with sugar solution bottle where other animals cannot reach to eat the food.

What problems will I face as I keep bees and how to solve them?

- a. Low occupation of hives by bees: The best time of applying beeswax is between March and May. Another time is between August and October. You can also change the area where you have hanged the hives and the hive is not getting occupied.
- b. Ants: When you hang the beehive, it should not lean to the nearest trees or grasses as this acts as bridges for the ants to reach your hive.
- c. Pesticides: Pesticides kill your bees as they visit cotton crop to collect nectar. Hang the hives in the forest and far away from cotton fields to save your bees.
- d. Fire: Do not lose your hives to fire, prepare yourself by making a firebreak and clearing the apiary.
- e. Theft/ vandalism: If thieves steal your honey or damage your beehive, report to the mentor, Principal Lead Farmer and COMACO Office. This is a serious offence and they will be taken to the police.

GOOD LEADERSHIP & PRACTICES NEEDED



Chapter 34

Leadership Calendar

ACTIVITY	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER	JANUARY	FEBRUARY	MARCH
Working in a producer group Chapter 35: Page 75												
Knowing about your cooperative Chapter 37: Page 78												
Poacher and charcoal manufacturer transformation Chapter 38: Page 81												
Your natural resources Chapter 39: Page 82												
Village Community Conservation Plan, what is it? Chapter 40: Page 84												

These activities build necessary organization for your cooperative to serve your needs and the protection of your natural resources. You have every right to demand your leaders follow the schedule and report back through the

producer group chairperson. You are encouraged to attend CCA/CCP awareness meetings to contribute your ideas and support.





 From the pictures above, which is the better way of working? Why?

Working as a group has a number of benefits to the group and its members. The benefits include the following:

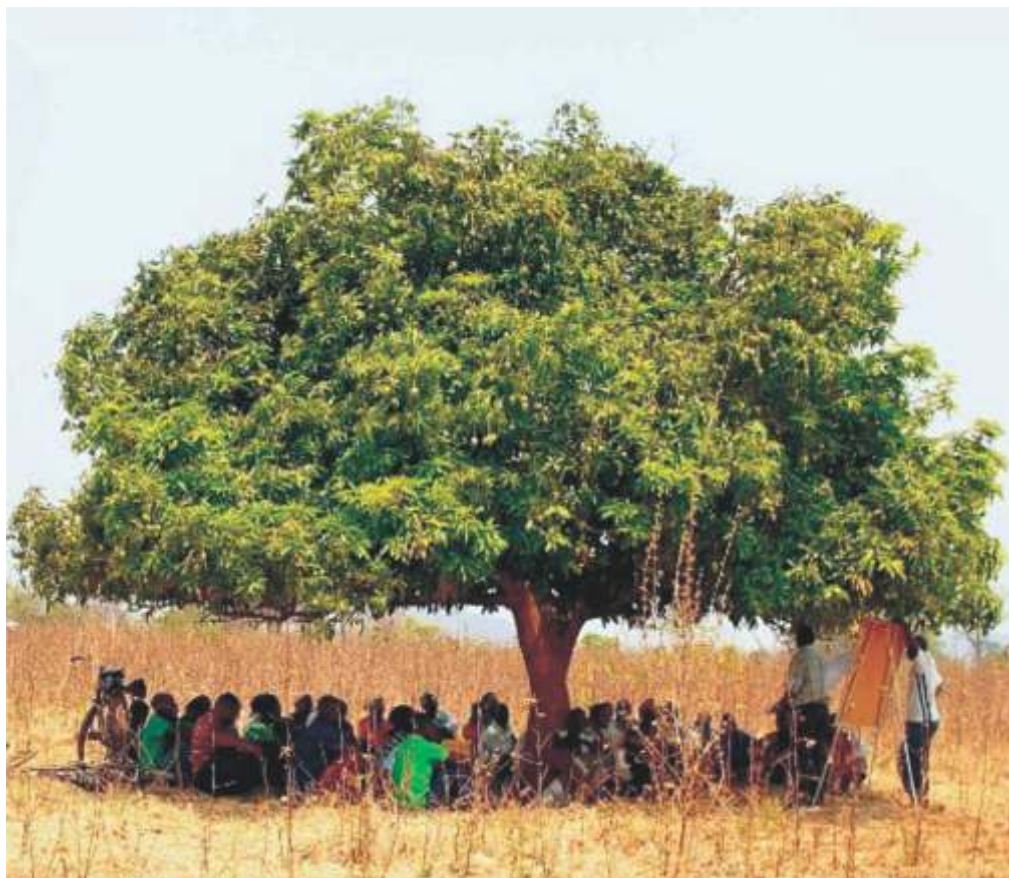
- As a member you are able to access services such as training, markets and inputs (e.g seeds) easily.
- There is an opportunity for sharing common problems and finding answers together.
- Farmers are able to learn from one another to know what works and what doesn't.
- Various costs can be shared, like helping with watering *Gliricidia* seedlings or contributing to the cost of a treadle pump.

- In a group it's easy to put resources together and achieve greater things.
- It is easy for the group to lobby for any desired services from your cooperative and government, local authorities, traditional chiefs and other well-wishers.
- It is easy for the group to agree on common goals such as conservation.
- A group has better negotiation power to influence community thinking.

How can one become a producer group member?

STEP 1: Visit your local leaders (e.g., headmen, lead farmers, producer group leaders) to learn more about COMACO and how to join.

Working in a producer group



Producer group members meet listen to the radio, learn and share ideas'

Step 2: Register as a group member by signing a registration form and the conservation pledge form with the lead farmer or producer group leader farmer in the area.

Step 3: Pay the joining fee (membership fee) for the cooperative.

Step 4: Attend trainings and meetings regularly as organized by your group or the cooperative.

To further your training in conservation farming skills, conservation awareness, livelihood skills, etc.

How can you make your group to succeed?

- Attend group meetings regularly and actively participate in the discussions.
- Participate in the election of your group leaders and stand for leadership positions.
- Support the leaders that have been elected in the executive positions.
- Take collective responsibility in ensuring that all agreed group responsibilities are fulfilled.
- Renew your membership every year.
- Pay for your shares at the cooperative. This is your investment in the cooperative.
- Encourage women participation and leadership.

For your group to succeed...

- The group should have clear vision and goals shared to all the members,
- Make and follow your own by-Laws:- These may include,
 - ✓ planning meeting days and times and what to do with absentees who don't give reasons for being absent,
 - ✓ adhering to farm calendar, and
 - ✓ discuss how to deal with disciplinary issues and contribute to the success of your Community Conservation Plan (CCP) and Community Conservation Area (CCA).
- Leaders and all members must be honest, committed and transparent.
- Hold regular meetings to;
 - ✓ listen to the Farm Talk radio programs weekly,
 - ✓ review agreed action points, and
 - ✓ help members to follow the farm calendar.
- Interact with other groups during field days, to share best practices.
- Organise yourself around income generating activities, such as group bulking of produce, grading of produce, group savings, village chicken rearing and/ or beekeeping.



COMACO produces a weekly radio programme called FARM TALK, to reach out to hundreds of families. The radio programme is produced in, Chinyanja in COMACO East and in Chibemba for COMACO west.

1. FARM TALK is aired three times per week at 14:00-15:00 hours; on Wednesday. 11:00-12:00 hours; and on Friday in COMACO West. In COMACO East, the program is also aired in the evening at 20:00-21:00 hours.
2. All information is based on the COMACO farm calendar found in your Better Life Book and gives you activities that you must carry out at every given period of time. Usually, this information comes a week or two before it is supposed to be carried out. In this way, you always have time to do whatever you hear on the program.

A. Method of listening to the Radio Farm Talk

3. Two or three producer groups have been allocated one solar wind up radio controlled by a lead farmer. These are called COMACO radios.
4. On the days when the program is being aired, your lead farmer will take the radio to a central place where you will have agreed to meet. You must all gather in time so that you do not miss the programme.
5. When you meet early, you will have time to make sure that your radio is fully charged. You can also discuss other things that may be important for

your group. Where a group has no COMACO radio, you should use your own radio.

6. When the programme starts, you must all be quiet and listen to the program attentively. Where possible, please take notes of every important point that you hear. After listening to the programme together, you as members must discuss the important points that you have heard in the programme.
7. After discussing, you must write down the important activities that you have heard. This is called an Action Plan. After that you must decide when you should carry them out according to what you have heard.
8. Because of this way of learning through the radio, the moto of FARM TALK is:

Listen, Discuss and Act!

B. Radio for teaching

1. COMACO also uses Mp3 Lifeplayers to teach farmers special lessons and skills .
2. The MP3 Lifeplayer is a special machine that has a radio so you can listen to FARM TALK with other members of your group. However, it also has a recording and playback facility. As a result, you can record yourselves or record the program and playback at another time most suitable to you.
3. COMACO has used the MP3 Lifeplayers for imparting knowledge on leadership, agriculture, conservation and many other issues, especially to COMACO cooperatives.



What lessons did you learn when you last listened to a radio programme on farming?
Who were the speakers? Did you recognise anyone of them?

4. Every COMACO solar wind up radio or MP3 Lifeplayer comes with instruction manual. The person responsible for the safe-keeping of this machine must therefore follow the instructions carefully. This is because he or she is only a caretaker. The radio or MP 3 Lifeplayer belongs to the whole group.

Note: if you have an important solution to a problem, send an sms to +260 962416432/+260976510131 and Farm talk staff will call you back.



Members at a meeting electing board members

Why is a producer group cooperative necessary in your area?

COMACO is helping communities form legally recognized institutions called producer group cooperatives to better serve farmers with their needs.



Why are producer group cooperatives important?
Why should you be a member of such a cooperative?

When you work with the right partner, such as COMACO, your cooperative will bring a number of benefits to you and your community. Here are some of the services cooperatives, if well led and organized can provide:

- access to markets through trading arrangements with such partners as COMACO for a range of commodities such as soybeans, groundnuts, honey, maize, moringa, vegetables. etc,
- training on improved commodity production skills in ways that make your

commodities more valuable to markets, like growing them in a more sustainable manner without chemicals,

- ongoing commitment by its members to conserve their natural resources and keep the environment productive and safe to live in, and
- the trust of other organizations including the government to partner and be able to win grants to do community oriented projects such as provision of boreholes for clean water, dams, grinding mills, etc, and bring development to the area.

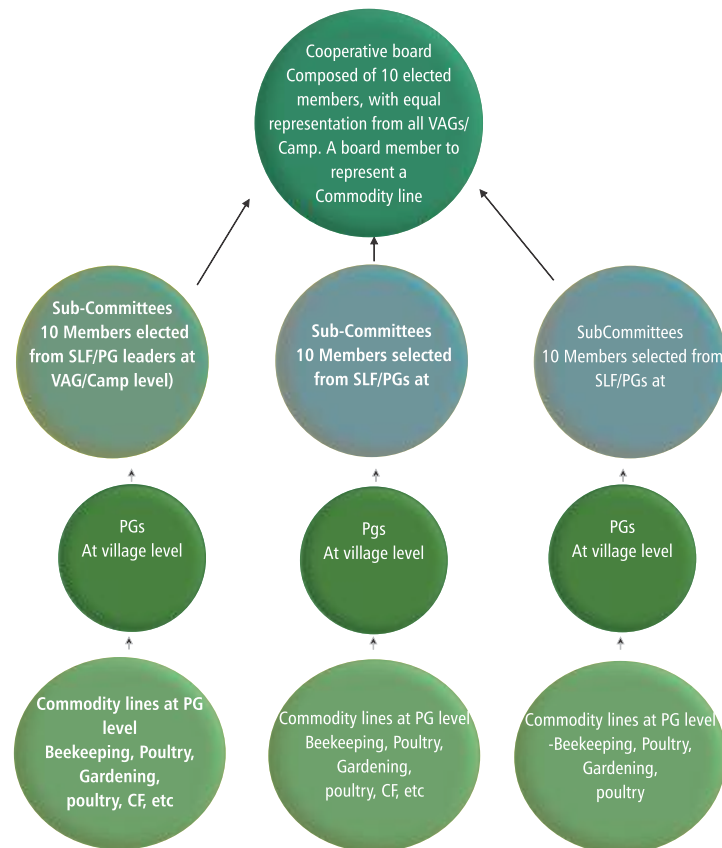
How producer groups organize themselves into a cooperative

- Your producer group, located within a given agricultural camp area or a Village Area Group (VAG), together with all other producer groups in your chiefdom makes up your multi-purpose cooperative. Each Producer Group should have a group leader, secretary or trainer and if necessary a bookkeeper.
- To improve the leadership and range of farmer services at the Camp or VAG level, it is recommended that all producer group leaders and senior lead farmers at a VAG/Camp level meet to elect 10 sub-committee members. These should be composed of a chairperson, a vice chairperson, secretary, vice secretary, treasurer and 5 other members. The purpose of this subcommittee is to help coordinate and oversee the production and bulking of commodities for market, training of producer group members in improved production technologies, oversee farmer compliance to the Community Conservation Plan, and elect members that will sit on the Cooperative Board.
- You as a registered member of your producer group, should align yourself to one or more commodity lines. Examples of commodity lines are:
 - ✓ Beekeeping,
 - ✓ Gardening,
 - ✓ Poultry,
 - ✓ Crop production, and
 - ✓ Saving groups.

Knowing about your cooperative

The sub-committee for your VAG/Camp area provides leadership to help promote the success and active participation by farmers in these commodity lines.

- Elected leaders at camp/VAG level and the Producer Group leaders meet at a general meeting to elect the cooperative board. Nominations for positions at cooperative level depend on the elected leaders from the camps/VAGs. For instance, all chairpersons from the camps/VAGs contest for the chairmanship of the cooperative board. If you were elected as a leader of a sub-committee, then you have a great opportunity to be a member of the cooperative board.



- Usually a camp extension officer from the ministry of agriculture supervises the elections at cooperative level during the general meeting.
- The elected board then drafts the by-laws to govern the cooperative.
- The cooperative may decide, and it is highly recommended, to establish a committee to provide oversight for various functions of the cooperative. The members will include members of the Cooperative board but may also invite or request non-board members to join the committee to add their expertise.
- Your participation in the producer group elections, commodity group, subcommittee elections is very important because your vote can make a difference to your cooperative.
- The cooperative board ensures that the cooperative is registered with the Registrar of Societies in the Ministry of Commerce and Trade.
- Cooperatives have principal lead farmers as the principal extension leaders at chieftom level and they also act as compliance officers.
- The cooperative must also have a business wing managed by a Business Manager and a Book keeper to take care of the financial records for the cooperative.



Members learn new things through interactions with others

Knowing about your cooperative

When do cooperative leaders meet?

The by-laws of a registered multi-purpose cooperative society provide for meetings, which might be held monthly, quarterly, semi-annual or on an annual basis. There are basically three types of meetings, namely: Ordinary executive board meeting; annual general meeting; and extraordinary or special general meeting.



Why are cooperative meetings important? What would happen if members of a cooperative never met at all?

1. How do you participate in these meetings?

- Your producer group leaders will represent you during the general meetings.
- They will share your ideas to the general meeting to be considered for action.
- Attend your producer group meetings to hear the report from the general meeting.

2. Why these general board meetings are important

- It is an opportunity for electing leaders to retain good performing leaders or change them to bring in other people who could serve you better.
- It is a platform to share your challenges and find solutions for everyone.
- A time to hear the progress on cooperative funded projects and what other future projects are being planned.
- They provide you chance to influence these future plans.

3. What your cooperative can do for you

- Can provide loans.
- Help to market crop of members.
- Provide training and support



Meetings are opportunities for important discussions;

- Members learn new things through interactions with others.
- Increases participation in decision making.
- Reinforces cooperative member ownership and democratic values.
- Means of communication among cooperative board members and also between cooperative board members and general membership.

Poacher and charcoal manufacturer transformation

The Zambian government has given special attention to wildlife, because of the value it brings to the country. Many visitors come into the country as tourists, to see the animals. They pay a lot of money. Others pay money to hunt authorized animals in the game management areas. When people kill these animals without a license, it is called poaching. Poaching is a very serious offence. When one is arrested for poaching, they are put in jail for many years.

Why is poaching bad in your community?

- It's a bad habit that takes away revenue meant for development in your community.
- Many residents especially the children will not know the species in your community.
- Wildlife will completely disappear in your community.
- Balance of nature will be disturbed in your area.

In the same manner charcoal making deprives the area of natural tree canopy and would result in soil erosion, poor soils, climate change leading to your community becoming vulnerable to hunger and poverty. COMACO can help you become a better citizen who can teach others to protect your resources such as wildlife and trees. Trees if cut and used for charcoal can make your community poor as you will start looking for more land for farming. So think twice and consider changing. COMACO can help you change!

How can you stop poaching or making charcoal in your community?

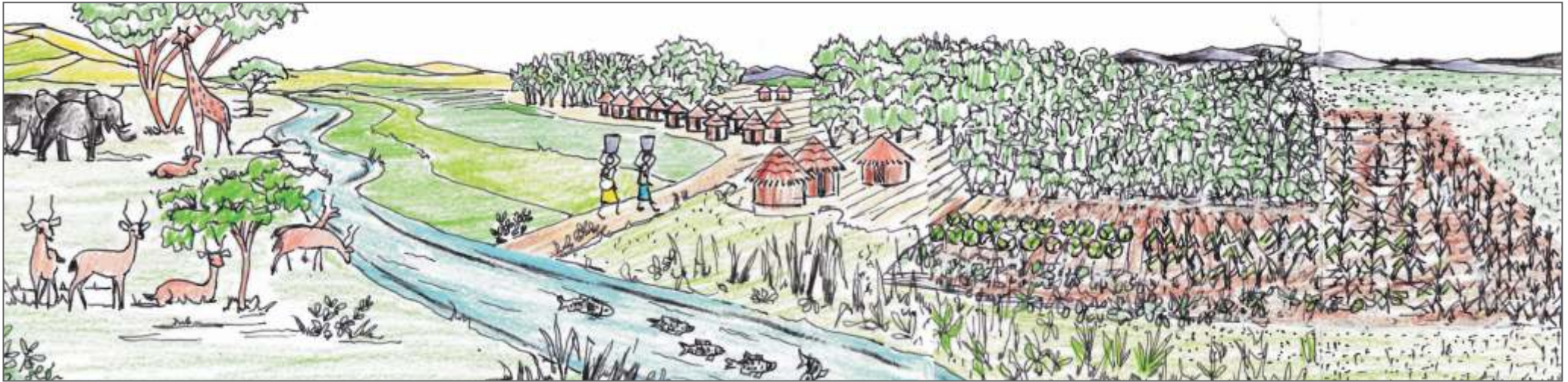
- You can surrender your gun to COMACO Lead Farmer in your area who will hand-over to the cooperative.
- The cooperative will help you by training you and provide necessary livelihood you will take for the rest of your life.
- The cooperatives have experience on how best you can become a better citizen who will help others as well to change others for the better.



- You can choose any livelihood suitable for you from the range the cooperatives offer. These include; gardening, carpentry, bricklaying, poultry production and many more that could bring decent income to your family.
- Poaching is bad as you might be arrested and jailed, putting your family in more problems as you will be in jail for years.
- Charcoal making too can lead you to prison and would make your family suffer.



Your natural resources (trees, wildlife, water and soil)



What natural resources can you see in the picture?

- Health and safety of your land is critical to your survival and the survival of future generations.
- Develop rules and regulations for the protection of soils and forests through **Community Conservation Plans** to keep the land safe.
- Enforce these plans through active and committed leadership by chiefs, headmen and headwomen, as well as other leaders in the community.
- Engage members of the community through producer group meetings, cooperative leaders meetings, and regular consultations with traditional leaders to maintain an active and on-going effort to strengthen community commitment to abide by the Community Conservation Plan.

Ways we can protect natural resources

- Control land clearing by practicing conservation farming to keep farm soils healthy.



Which of these natural resources are found in your community?

- Control bush fires by educating children not to start fires and if fires are required, to ensure they are controlled and limited to only the required area.
- Stop charcoal production – it is a destructive, wasteful way to use trees, better to learn other skills to earn income.
- Engage community leaders to form a **conservation task force** to monitor community compliance to the conservation plan.
- Adopt conservation farming by all farmers and especially agroforestry and compost to maintain healthy soils.

Remember... land is sacred. It should not to be wasted or destroyed. It will feed you and care for your needs if you care for it. Once destroyed, you leave your children with a terrible fate of hopelessness and sadness. It is your responsibility as an individual, family and community not to let this happen.



Which natural resource does a farmer often use or work with?

Your natural resources (trees, wildlife, water & soil)



One of the many forests protected by COMACO communities

It's time to stop destroying our forests

Trees should have rights and we as their caretakers should protect these rights so that trees have a chance to keep our land healthy and rich with the many benefits they provide.

Everyone in the community will need to think of forests as a gift from God to be kept for future generations and used wisely but not destroyed

With good community conservation plans and good leaders to implement them – we can keep our forests safe.



What benefits do we get from the forest?

How to manage our forests

As a subcommittee to our cooperative, we have **Community Forestry Management Groups** (CFMGs), which are recognized by our local chiefs and even the Government's Forestry Department. Through the CFMGs, there are legal opportunities for actual ownership of forests. This offers exciting ways to own forests to improve their protection and gain increased benefits from them.

Roles and responsibilities of CFMGs

- To work as a sub-committee of the COMACO Cooperative for assisting the community to manage, protect and benefit from its forest resources,
- To manage the forests and **Community Conservation Areas** (CCAs) within the chiefdom. These are areas set aside for conservation by the community. Community Conservation Plans are developed, signed by chiefs and civic leaders, to help direct and manage these protected areas,
- To educate and train communities on forest regulations,
- To monitor activities and compliance of regulations governing the CCAs,
- To identify and support forest-related activities such as bee-keeping, mushroom collecting, fire-management control, and use of funds that may be derived from the sale of carbon credits, and
- To supervise the work of volunteer community forestry guard.



Benefits from well managed Community Forests and CCAs

- CFMGs have the potential of earning money by reducing the rate that trees are cut in their area through the sale of carbon credits, which depends on effective management and protection of forests.
- People living around these forests can get benefits from:
 - ✓ Honey through bee-keeping, which can be a useful source of added income and food,
 - ✓ Collection and sale of wild mushrooms, caterpillars and wild fruits like Musuku and other fruits, and
 - ✓ Wildlife if species can recover and offer opportunities of game ranching for meat and tourism.

What is this Village Conservation Plan?

- It's a document developed at village level by the members of the village.
- It is a layout of the village showing its land use and how the natural resources are conserved.
- It shows the dos and don'ts by the people in the village.
- Will help save land and natural resources in your area for future generation benefit.
- It should be part of our culture to conserve natural resources at village level.

Who makes this plan?

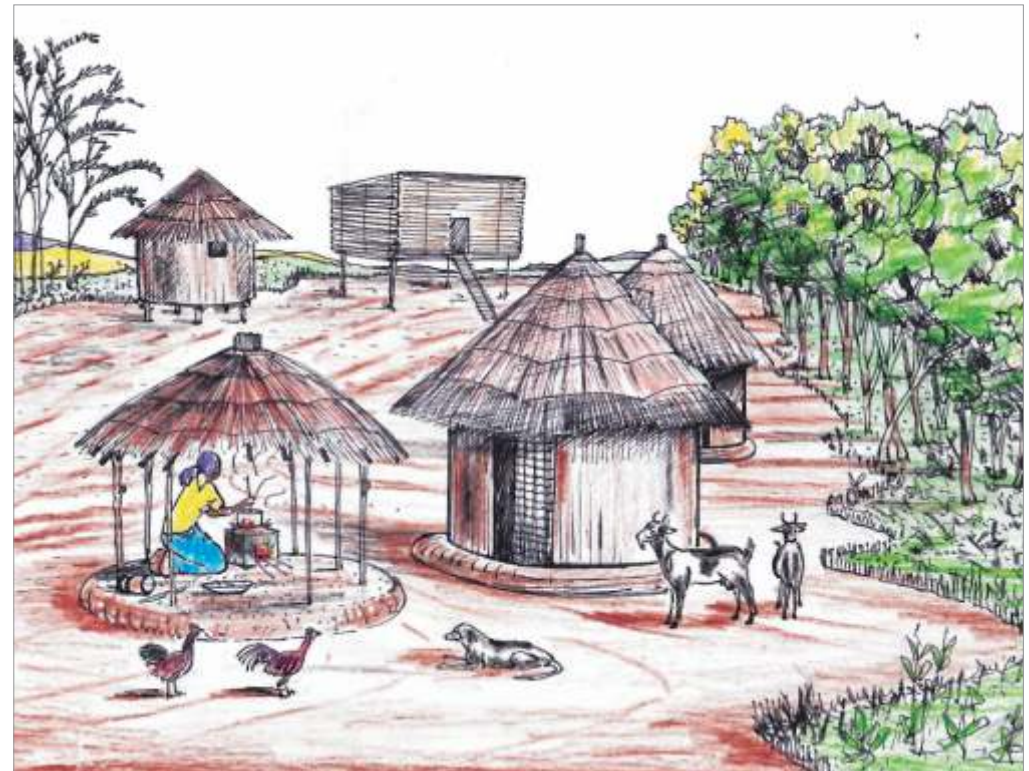
You as a member of the village need to contribute your ideas to the development of this plan. It needs your help to make it succeed.

How do members of a village come up with a village conservation plan?

Members of a village are required to contribute ideas during a conservation plan formulation meeting, called upon by the village headman. Your ideas and those of others are compiled into a list of rules, dos and don'ts, which are then submitted to the area Induna and later to the Chief. The headman keeps this in the village records as a reference for the members.

Major points to follow:

- Set aside a natural woodlot or plant *Gliricidia sepium* near your home.
- Keep the crop residues in the field that has been planted with *Gliricidia*.
- Do not set up fires in the nearby bush or green zone.
- Consult your Induna or village headman in your village to protect a nearby bush to encourage the re-growth of shrubs or bush that will contribute the forest protection.
- Always use conservation tillage using ripping or basins and compost as fertilizer.



- Do not farm along river banks and streams.
- Prepare food on an energy saving cook stove with *Gliricidia* twigs.
- Always attend meetings for Community Conservation Plan in your area.
- Listen to the COMACO farm talk for more lessons on conservation of natural resources around your area.
- Take care of the soils, trees and wildlife so that you can utilize them carefully.
- Take care of your livestock so that they do not graze on your *Gliricidia* and crop residue in your field.
- Encourage natural fallow in your old fields so that they can regenerate and become forests. Every member of the village needs to abide to the rules in the Community Conservation Plan.



What are the three mistakes that farmers make that keep them poor and hungry?

Three mistakes that keep farmers poor & hungry

- Clearing trees and damaging soils with wrong farming practices. Remember, trees and healthy soils give food, water and income.
- Failure to build a community of honest, hard-working leaders and smart rules to protect the land for everyone. Remember, land is a shared resource and requires cooperation and commitment by all to protect it from greed, misuse, and waste.
- Having families too large to properly feed and educate. Remember, plan a family size you can support, not a large family that ends up poor with little or no future.

In short, think of nature (trees, soils, water, wild animals etc) as a shared resource of high value, but only if we all work together to protect it so we can use it wisely, and not destroy it.



What can farmers do to avoid these mistakes?

- Keep soils healthy by using compost, agroforestry, minimum tillage, crop rotation, and crop residue to reduce soil erosion and retain nutrients to the soil.
- Use off-cuts from agroforestry for fuel wood.
- Keep nearby forests safe from unnecessary clearing and burning.
- Avoid dangerous and expensive chemical farming inputs.

- Be an active member of your farmer group and cooperative.
- Elect capable and committed leaders.
- Encourage your chief to lead by example and enforce conservation rules.
- Help each other learn by sharing lessons and best practices.
- Listen to COMACO Farm Talk on the radio.
- Study your Better Life Book.

Solutions we need and opportunities we have

It is known that farming has many challenges and hardships. COMACO offers solutions by:

- teaching how to plan;
- advising what soils need in order to feed crops for better yields;
- guiding how to produce quality seeds and diversifying crops; and
- ways to overcome crop pests and bad weather, and much more.

Learning is a continuous process that happens at every farming cycle by applying lessons and experiences from one year to another. As we gain knowledge each year, the results, the rewards are more food and better profits. To succeed, continue the learning process, make the right changes in farming and then you will be able to care better for your family. COMACO affords the chance to learn and become better farmers.

Short cuts that can harm the soil, such as chemical inputs are NOT a solution. Such inputs increase your costs and can eventually reduce the family income.. In short, COMACO teaches farmers to farm with Nature, because Nature does it best with lower costs.

What opportunities are available by continuing to work with COMACO?

- Available market that offer best prices for the commodities.
- More food and better nutrition to keep the families healthy.
- Knowledge to make the right decisions without spoiling the land.
- Increased income and food security that gets your farmers through difficult years.



Carbon occurs in the atmosphere, primarily as Carbon Dioxide (CO₂). Various human activities add to the total amount of CO₂ in the atmosphere. The increase of CO₂ in the atmosphere acts as a blanket that warms the earth's surface, making our planet warmer, resulting in what is called Global warming. Global warming results in climate change. Through Climate Smart Agriculture (CSA) and creation of Community Conservation Areas (CCAs), farmers and communities can help reduce these effects. In return, they will be rewarded with revenue through carbon markets.

Through Climate Smart Agriculture (CSA) and creation of Community Conservation Areas (CCAs), farmers and communities can help reduce these effects.



Carbon markets pay communities to reduce deforestation because trees absorb CO₂ from the air. Carbon markets also pay farmers to keep carbon in the soil by avoiding fires that burn crop residues,

preventing livestock from eating crop residues, and using fertilizer trees like *Gliricidia* that retain carbon in the soil.

To participate in these markets requires communities to prove their adoption of these practices and that their efforts are contributing to reduced CO₂ into the air.

COMACO provides a service to farmers to monitor and account for the reduced carbon dioxide emissions they are contributing in order to transact carbon market on their behalf.

Key points to remember to earn carbon revenue

1. Do not burn crop residues in the farm plot.
2. Do not let cattle and/or goats eat crop residues on the farm plot.
3. Plant and take very good care of *Gliricidia* trees in the farm plots.
4. Make compost and apply in the farm plots.
5. Do not till the farm plot but just make pot holes on planting stations or use rip plough to reduce soil disturbance.
6. Do not cut down trees for firewood or charcoal making, instead use *Gliricidia* twigs.
7. Manage the forests using Community Conservation Plans.
8. Cook meals using the rocket stove.

Can my community earn extra income from our conservation efforts?

The Answer is YES!! from Carbon Markets Rewards

COMACO has taught me how to improve and keep my soils fertile and healthy. Can I be rewarded for those efforts in addition to COMACO's market and competitive price?



Gliricidia helps me find firewood right from my farm so I do not have to cut down wild, native trees. Is there a way I can be rewarded for growing Gliricidia?

Carbon markets for conservation

We have seen our environment changing. Wildlife, forests disappear, rivers drying and damaged soils. Lets support our chief to create conservation areas to protect our environment.

The Free, Prior, and Informed Consent Process to Earn Forest Carbon Market Rewards

We are ready to protect our environment lets support our chiefs to create community conservation areas and community conservation plans to control unplanned clearing of forest for settlements.



There are many benefits COMACO will help develop: honey, mushrooms, wildlife, sustainable timber harvests, even tourism, but one way is through CARBON markets. Under the COMACO carbon marketing efforts, we need to follow these steps to earn your carbon revenues



Chief convene meeting of headmen/women to agree on conservation plan / area



Convene village meeting to understand conservation plan/and its relationship to carbon



Give ideas, express concerns over support of conservation plan and Carbon benefits



Discuss at village level ideas for benefit sharing and ways to safeguard needs



Attend public meeting to review issues and the favoured benefit sharing approach



Vote at village level adoption for the carbon plan to proceed to proceed

Carbon markets for conservation

For COMACO to help you grow your carbon market and assist with the technical reporting required to to sale your carbon credits, your community needs to approve COMACO to undertake this role. Consent is required using the process below...



Listen to COMACO farm talk on climate change and climate smart agriculture



Attend meetings with lead farmers to understand Carbon market and ask questions



Attend cooperative public meeting to review all issues and bring up concerns



Through these meetings, contribute ideas and document results to help build an agreement between COMACO and your community



Convene cooperative meeting with COMACO staff to finalize ideas for benefit sharing



Participate in voting on consent for Carbon markets to proceed

Farmers use wood for cooking. In most cases women and children walk long distances to look for fuel wood. In most cases they cut and carry big logs and wood bundles on their head. In this way, time is lost and the forests are depleted of trees in the long run.

COMACO is supporting a simple but effective method of cooking using 'rocket' cook stoves that:

- Use fuel wood efficiently.
- Reduces household expenditures for firewood in urban areas 50%-80%.
- Lowers overall greenhouse gas.

From this...



...to this

- Reducing the time spent by women and girls on gathering firewood, freeing up time for their preferred activities, including for attending schools, health clinics and small-scale income earning activities.



Facts on the COMACO cookstove

- Reducing demand on natural forest in and around agricultural landscapes by making efficient the combustion of small diameter twigs, branches and crop residues that are not suitable for three stone fire cooking.
- Reducing the incidence of child pneumonia which is amongst the largest cause of infant mortality in Africa, caused mostly by biomass smoke exposure in poorly ventilated spaces.
- Women cooking over an open fire have exposure to pollutants the equivalent of smoking two packs of unfiltered cigarettes per day.

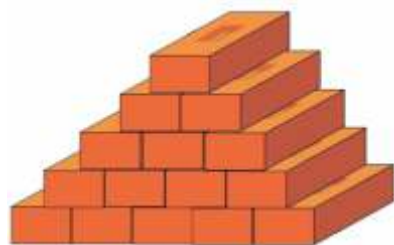


COMACO Stove in Use

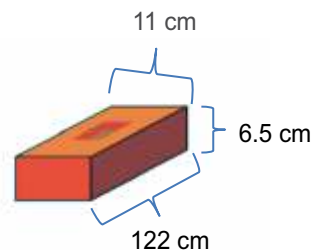
How to make a good COMACO cookstove

What you need to work well

15 bricks moulded from a COMACO brick mould



Brick measurements:



- A) 3 litres each of anthill soil, fresh manure and water
- B) Any container to hold water
- C) A pot or bowl to mix materials
- D) A flat tool like an axe or hoe to spread material

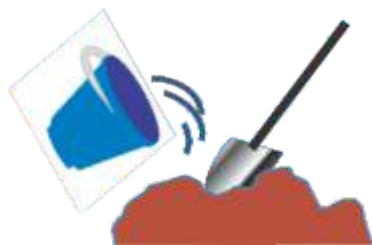


An open half-walled kitchen



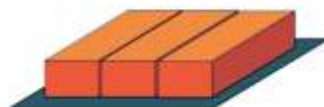
Step 1

Mix all the materials together on the ground



Step 2

Lay 3 bricks together length wise in your kitchen



Step 3

Remove the brick in the centre to create space where heat can build up



Step 4

Place the brick you removed and one half brick across the back. Apply 1 cm mortar. Layer 1 is complete.



Step 5

Lay another 3 full bricks and 1 half brick. Apply 1 cm mortar. Layer 2 is complete.



Step 6

Lay 3 full bricks and 1 half brick. At the front, place a full brick. Fill in the spaces on either side with 2 quarter bricks.



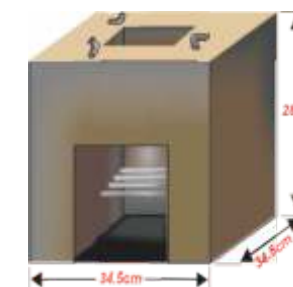
Step 7

Lay another 4 full bricks. Each brick should cover a corner and part of another brick. This helps keep the cookstove stable.



Step 8

Plaster the cookstove. The cookstove is complete!



Your COMACO rocket stove can be with you for a lifetime

1. Keep your stove dry

- Maintain a well thatched and water-proof roof for kitchen.
- Properly place stove so that it remains dry.
- Protect from standing water.



2. Repair all CRACKS as they occur

- Keep spare bricks to make big repairs fast.
- Loosened bricks can cause further damage: repair them.
- Take pride in your stove's appearance!
- Smearing mud or mortar is easy to use to fix small cracks.

3. Always use small diameter dry wood (2-3 fingers wide)

- Do not force large pieces of wood into the fire.
- Keep wood from scraping and damaging bricks and mortar.
- Dry wood pieces against warm back and sides of stove before use.



4. Do not overload stove

- If stove mouth is blocked with wood it can't breathe.
- Always use dry wood so there is more heat from less fuel.
- Create a small concentrated fire with 3 sticks.

5. Take care of stove components

- Protect your stove parts.
- Teach all users, even children, proper use of the fire (small dry wood is enough).
- Remove ash from the stove regularly.

6. Use parts properly

- Stick shelf should only be a little finger's length inside stove.
- It should not be pushed all the way in or it blocks air to fire.
- Use other end of stick shelf if end in fire wears out
- Keep metal parts dry when not in use.

LIFE SKILLS AND YOUR FAMILY



Chapter 44 Family planning



What problem do you see in the picture below?

- Are we seeing these problems in our community?
- What is the root cause?
- What is the solution?
- What can we do to avoid the situation?

- Share your problems with your fellow producer group members. Reduces risks of hunger and poverty.
- Members of the producer group should listen and participate on radio programmes to share their experience on family planning.



What do you see in the picture?

Can this happen in your community? What can we do about it?



Why natural resources need family planning too



How can you make family planning work for you?

- Keep boys and girls in school.
- Respect your marriage, communicate as husband and wife and care for your children's need. It improves the healthy and nutrition of your children.
- Visit the nearest health facility as a couple to learn on family planning methods. Ensures better chance of giving your children better education.
- Parents teach your children about sex education. Helps mothers stay healthy.
- Better able to plan resources around your family. Plan your resources around your family.

Solutions that need your help to make it happen

- Community support for family planning can reduce pressure on natural resources that provide fuel wood, shelter and food such as honey, wild fruits and mushrooms.
- Community awareness campaigns through the cooperatives and traditional leaders.
- Traditional leaders to pass laws that will stop child marriage, early pregnancies.
- Church leaders should discuss the benefits of family planning.

Health and Family Planning

Family planning can help you choose when to start a family. It can help with your sexual health and about lifestyle. But young people should wait until they are adults before they start having babies.

There are a number of family planning methods. Always consult your local clinic/hospital.



Which of the available family planning methods do you know? Why should we plan our families?

Plan your family - it makes it easier to afford food and school for your whole family.

Space your children at least 2 years apart. This will mean:

- Each child gets to nurse longer and grow stronger.
- Mother can become strong again. She will have a healthier second child!



Examples of family planning methods

1. Hormonal contraception Hormonal (Chemical) Methods



Contain small amounts of natural substances which stop egg production.

Using hormonal methods

- Woman control the method.
- Does not interfere with sex.

Birth Control Pills

- Can be stopped any time without a health care provider.
- CAN cause side effects such as high blood pressure and blood clots.

Injections

- Only need to get injection every few months.
- Has similar side effects to pills.

Implants

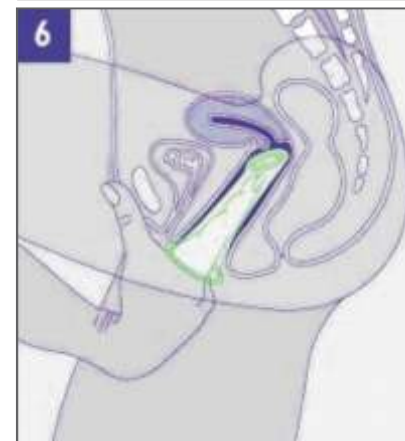
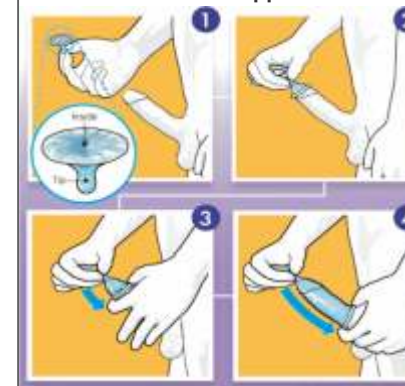
- Work well and last a long time.
- Must be inserted and later removed by health care worker.

These methods DO NOT PREVENT the spread of HIV/AIDS!

2. Barrier methods

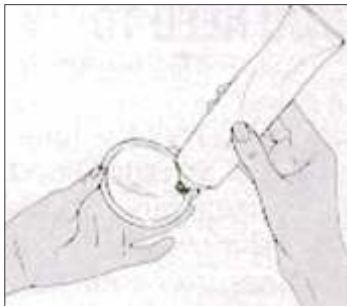


How Condoms work Application

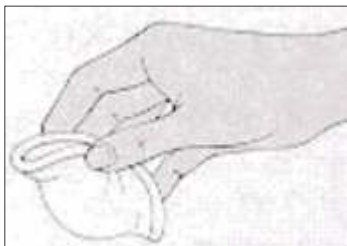


These methods PREVENT the spread of HIV/AIDS!

3. Chemical methods Spermicides & Diaphragms



◀ Putting spermicide on the diaphragm.



◀ Bend or squeeze diaphragm before inserting it.



◀ Inserting diaphragm.

- Re-usable with care.
- Work better when used with spermicide.
- **REDUCES** but doesn't prevent HIV transmission.
- Must stay in for 6 hours after sex.
- Must take care not to damage!
- **NOT AS EFFECTIVE** as condoms.

4. Natural Family Planning methods Withdrawal

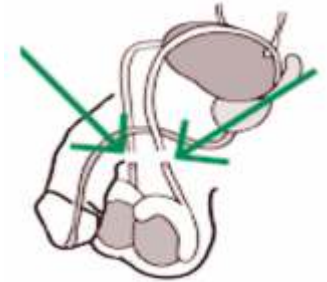


- When the man feels closed to ejaculating, he should withdraw from the woman and ejaculate outside her body, well away from her genitals.
- If he has ejaculated recently, he should urinate and wipe the tip of his penis before having intercourse.
- **ONLY** useful if both partners fully agree!
- **NOT AS EFFECTIVE** as other methods and doesn't prevent HIV!

5. Permanent Contraception: Sterilization

Vasectomy

- Permanent contraception for men. Through a small incision in the scrotum, the tubes that carries sperm to the penis are blocked by cutting and tying it closed.
- Has few side effects, enhances enjoyment of sex, man shows family responsibility.



Female Sterilization

- Permanent contraception for women.
- Through a small incision in the belly, the tubes that carry the egg to the uterus are blocked by cutting and tying it closed.
- Has few side effects, enhances enjoyment of sex, nothing to remember!



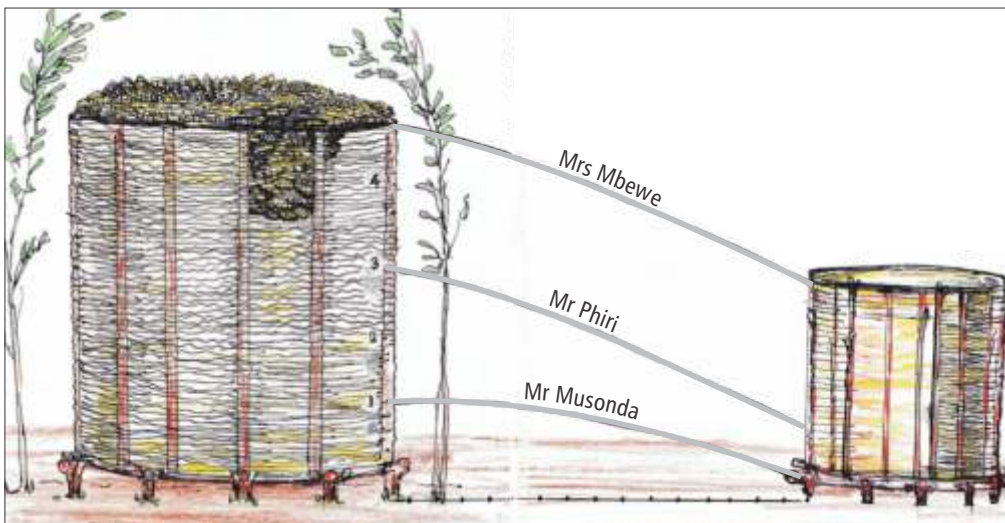
Family planning works together when wife and husbands work together.

Why family budgeting



What is the importance of family budgeting?

Family budgeting teaches members of the family the value of money and food. It also helps to guide families to make the right decisions on how to spend money to stay out of poverty so family needs are met. This provides young family members the experience of learning not to waste food or money.



Discussion:
 What do you see in the diagram?
 Do you have this problem in your area?
 What is the cause of this problem?
 What can be done to avoid this problem?

Suggested ways to improve family income & food

- Crop diversification.
- Dry season gardening.
- Livestock rearing.

- Family planning.
- Practice conservation agriculture.
- Use quality seeds.
- Plan how much food to grow for your family.
- Cultivate your field using COMACO recommended farming methods.
- Grow vegetables.

Study the table below and learn about planning for your family needs and staying out of poverty.

Comparison of food and nutrient requirements per year for a large and a small family

Item	Family of 6 members		Family of 3 members		Comments
	Quantity	Amount	Quantity	Amount	
Maize	22 bags	1320.00	13 bags	780.00	The difference in family cost make larger families more likely to suffer.
Beans	50kgs	700.00	30kgs	450.00	
Vegetables		440.00		220.00	
Chicken	12	300.00	6	150.00	
Total		2,760.00		1,600.00	

Note: The larger family has to work much harder to have enough food for the whole year and more likely to suffer from hunger if income is too limited.

Comparison of household budgets for a large and a small family per year

	Family of 6 members	Family of 3 members	Comments
Total Income	1500.00	1500.00	Obtained from sale of farm produce & piece work.
Expenses			
Relish	1440.00	720.00	The larger Family cannot meet basic needs but the smaller family can.
School Fees	450.00	210.00	
Shoes/Clothing	90.00	40.00	
Seed	70.00	70.00	
Total Expenditure	2050.00	1040.00	
Profit/Loss	(550.00)	460.00	

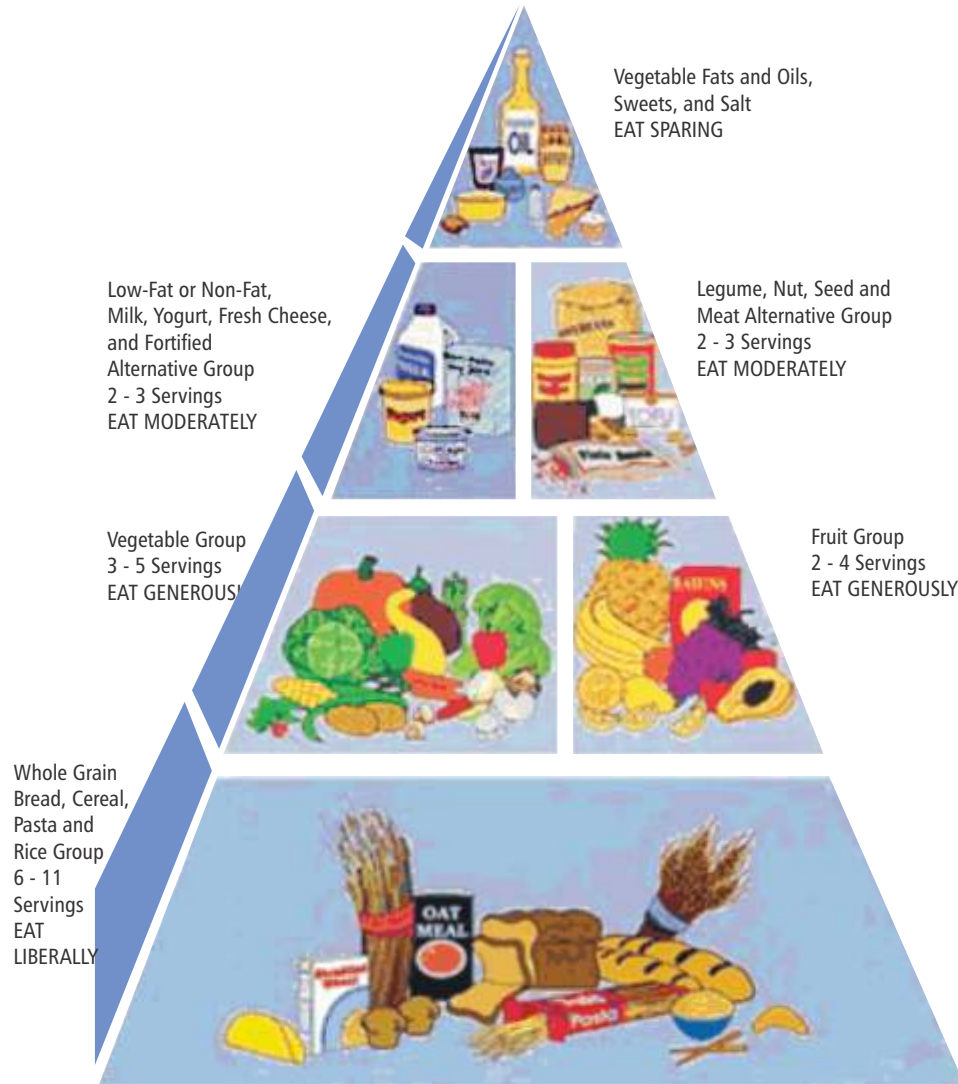


Are you planning for the future of your family?

Chapter 46

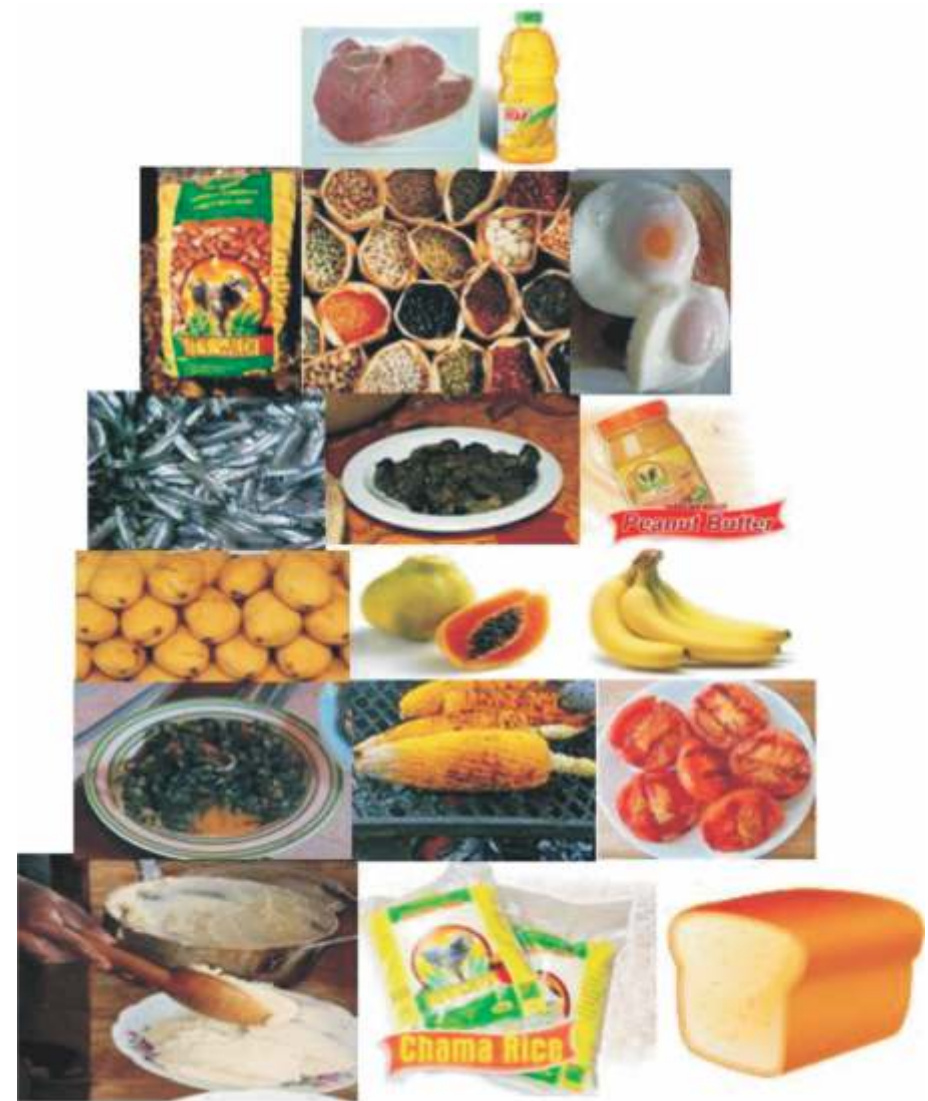
Balanced meal

Creating a healthy diet from local foods



The Classic "Food Pyramid"- Suggests we base our diet on grains, but also get veggies, protein and some fats

Where do Zambian traditional foods fit?



A "Zambian" food pyramid!

Creating a healthy diet from local foods



Healthy Tips!

Fruit and vegetables that are dark colored are more nutritious than pale ones!

Vegetable fats (like those in beans and corn) are more healthy than fats found in meats (like the fat on t-bone!)

What MAKES a balanced meal?

All 3 foods: starch, protein, vegetable!!

- More than just starch! Nshima alone is NOT a balanced meal!

Daily sources of protein

- **Beans**, ground nuts, egg and milk.
- Meat, chicken, kapenta and mopane worms (vinkubala).

Daily sources of fruit or vegetable

- Pumpkin leaf, tomatoes, onions, squash, mangos and papaya, banana.

WHY eat a balanced meal

Children need protein to grow healthy brains, internal organs and muscles

- There's 4 **TIMES** as much protein in beans as there is in nshima! Roasted ground nuts have 12 times the protein of nshima!

Kids need fruit and vegetables which have vitamins and minerals needed for:

- Good eyesight (Vit A – in pumpkin, squash and sweet potatoes, carrots).
- Healthy teeth (Vit C, in tomatoes).
- Strong bones (Calcium, in dark green leaves).

Men AND Women need these too!

- Folic acid, found in dark green leafy vegetables, prevents spinal birth defects.
- **EXTRA** calcium, protein and fats are needed to make healthy breast milk for growing babies.
- Iodine, found in fish and iodine-treated salt, helps reduce mental retardation of babies and gives adults healthy thyroids glands – the gland that controls our energy levels!

Creating a healthy diet from local foods

Group



Men

Nutritional Needs

Two mixed meals every day and some snacks. They can get enough energy from a few large meals and from bulky foods. Heavy work like farming and cutting wood may increase needs.



Women

At least two mixed meals every day and some snacks. They can get enough energy from a few large meals and from bulky foods. Women doing heavy field work will need extra protein with extra starch.



Nursing Pregnant

If they are pregnant or nursing, women need as much food as men - especially if they are also doing hard physical work like farming. Women need much more iron, calcium, protein and folate when they are pregnant or nursing.



Elderly

At least two and maybe more meals each day as they may not eat much at each meal. They need less starch than young people but about the same amount of protein and vegetables. Old people may need soft food because of mouth pain and lost teeth.

Nutritional Needs

At least two large mixed meals and some snacks each day. Boys need a lot of energy. Girls need plenty of iron and calcium. Pregnant teen girls are still growing so they need more food than pregnant adult women.

School-age children need at least two to three mixed meals **WITH PROTEIN** and some snacks each day. Fruit and vegetable is essential!

Children one to five years old need breast milk until they are at least two years old. They need at least three mixed meals and two snacks each day. They cannot eat large bulky meals. They **MUST** have protein to prevent liver damage, and a mixed diet for essential vitamins and minerals!

Babies six to 12 months old need breast milk at least 8-10 times per day. They need small meals, three to five times a day. Babies under six months of age need only breast milk at least ten times each day.

Group



Teens



School Kids



Kids 1 - 5 yrs



Babies

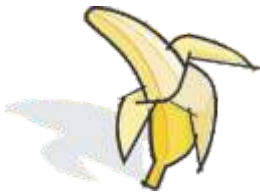
Creating a healthy diet from local foods

Healthy tips!



- Boiling takes vitamins out of food and puts them into the water! If you boil veggies, use the water for soup or porridge, or drink it for a healthy boost after it cools! Rather than boiling food in lots of water, try putting on the lid, and steaming foods in just a little water.

- Roller meal is healthier than breakfast meal because it has more fibre and protein! Brown rice is healthier than white rice for the same reasons!



- Eat fruit and vegetables raw to get the full food value, but be sure that you've washed the dirt off with pure water.



- Ground nuts are best for you if roasted as soon as they are dry after harvest.



- Make healthy tea out of many herbs such as lemon grass, mint or wild basil! These are easy to grow and will last a long time.

- Honey is healthier than cane sugar!



Food habits that are BAD for you!

- Too much salt causes heart disease and high blood pressure. If the food tastes salty – IT'S TOO MUCH!!



- Too much fat or oil not only makes you fat, it increases your risk of heart attack. Choose vegetable fats, like corn oil, & don't eat the fat from meats like T-bone or chicken skin.



- Fried foods are high in fat and less healthy than foods which are roasted or boiled. Use the smallest amount of oil possible for good health!! You're a better host if you serve healthy food! If you can see the oil on the plate, you've used TOO MUCH!



- Too much sugar is also bad, as it causes tooth decay and weight gain without healthy nutrients! Save it as a rare treat!

- Never eat meat raw – it can have bacteria and worm eggs!

- Do NOT give honey to babies under age 6 months – it can have tiny amounts of botulism toxin that won't hurt the rest of us, but can hurt the baby!



Eating a balanced diet of healthy foods is especially important for people living with HIV!!



Chapter 47 Teenage pregnancy: our problem to solve



What is teenage pregnancy?

Teenage pregnancy is when a girl between the ages of 13 and 19 years old is pregnant. This is sad and very disturbing because the girl is supposed to be in school and is still growing physically and emotionally.



Why do teenagers become pregnant?

- peer pressure from friends and sometimes parents,
- parents do not talk to their children about the dangers of early pregnancy,



- lack of information/education from parents,
- alcohol abuse,
- rape/sexual abuse,
- poverty, and
- to avoid pregnancy they get inappropriate information from young friends.

The effects/ consequences of teenage pregnancy



- loss of school/education time,
- risk of child birth complications,
- perpetuate poverty in the family/community/country,
- limits educational development in the family,
- loss of personal freedom,
- teen fathers generally end up with less total schooling than those who

- become fathers later in life,
- children of teens are at greater risk of failing as adults,
- Girls born of teen parents are at increased risk of becoming teen mothers too, and greater risk of contracting HIV and family breakdown.



What are the possible solutions to teenage pregnancy?

- abstinence with great encouragements from parents,
- churches/religious teaching can play a role,
- sex education in schools can help,
- parents should keep an eye on their children with strict rules, and
- families as a group should fight early pregnancy.

Parents/churches/schools/communities must make an effort to ensure the above are enforced in order to reduce teenage pregnancies.

Reasons for girls to re-enter school after pregnancy

1. Everyone has a right to education.
2. It will increase women's literacy levels.
3. It will empower women to look after their families.
4. It will bridge the gender gap in education.
5. It will give chance to women to contribute to national development.
6. Re-entered girls can counsel other girls and deter them from getting pregnant.
7. Some girls are victims of rape and should not suffer for criminal actions committed by other people.

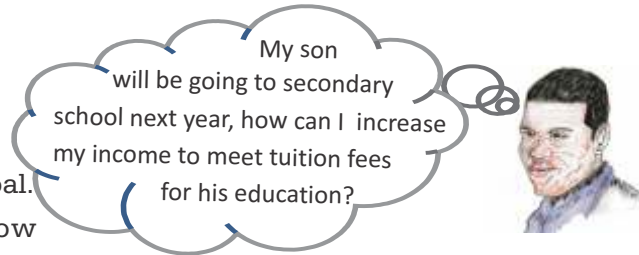
MAKING THE MOST OF YOUR MONEY




Planning means thinking carefully about what you want to achieve and carefully organizing activities so that you achieve a desired goal.


Why is planning important?

- It helps you set a clear goal.
- It helps you to know whether or not you are making progress towards your goal.
- It increases your chances of succeeding in what you want to do.
- It shows clear direction or steps to reach your goal.
- It helps you to make decisions that lead towards your goal.



 Think of situations when you have been involved in planning, what were you planning for?

Farmers are always thinking about ways and means of improving their farming so that they get bigger yields and more money for their households. So they are involved in planning for the future.

 Discuss planning in farming, what do you plan for?

Examples of planning...

Here are examples of planning a farmer might think of:

- Planning for farming inputs – **farming inputs plan.**
- Planning how you are going to sell your crop or poultry products? – **marketing plan.**
- Planning your family – **family planning.**
- Planning for your farm labour needs – **labour force plan.**

- Planning for your business – **business plan.**
- Planning how to spend your money – **finance plan or budget.**

Involving your family

Because planning is so important, always include your husband, wife and children during planning process. Your family will help offer solutions to challenges.



How to make a plan?

There are five important questions you should consider when making a plan. These are:

- Why am I making this plan? In answering this question you will be stating your goal. Every plan should have a goal. This must be clear.
- What do I want to achieve? In answering this, you will list activities that need to be done in order to achieve your goal.
- Who will do these activities? Here you will share roles among members of the family or outside in case labour needs to be hired.

Good planning & budgeting



- When will these activities be done? In answering this question, you will look at the Farm Calendar and organize activities in their correct order.
- Where will the activities take place? Here you will specify areas where each and every activity will be done from.

Planning table

No.	Why?	What?	Who?	When?	Where?
1					
2					
3					
4					

Some plans may need resources to make them “work” or “happen.” The resources could be financial, material, time, or human. This now brings about the idea of budgeting or developing a plan to spend or invest resources.



What is likely to happen if a farmer does not plan properly for the farming season?

Some farmers do not make plans. They do not think ahead of time to prevent problems. They do not know how well their farming will perform in the future. Good planning can take care of all these matters.

Family budgeting

Why is family budgeting important?

As a farmer, you work hard throughout the year in order to make money for your family. Therefore, your hard-earned money must be spent wisely. Family budgeting helps you bring your family members together to prepare a spending plan of your hard-earned money.



Discuss the benefits of budgeting?



Here are some benefits of budgeting:

- It gives direction on how to spend your hard-earned money.
- It helps you to prioritize your expenses, that is, it helps you to spend money where it matters most.
- It helps you keep away from debts especially when you spend within your income no matter how small it is.
- It protects your money from wasteful expenses.

Good planning & budgeting

Budgeting



Budgeting is the process of making a plan of how to spend your money. This spending plan is called a budget. Making this spending plan allows you to determine in advance whether you will have enough money to do the things you need to do or would like to do.

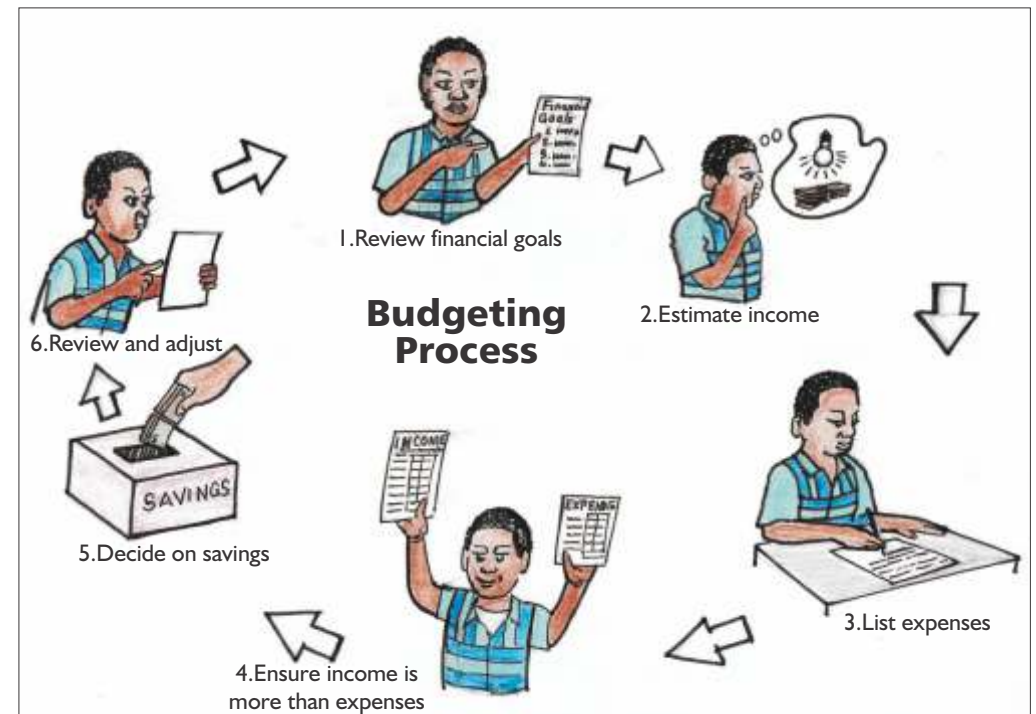
Budgeting is simply balancing your expenses with your income. If they don't balance and you spend more than you make, you will have a problem.

There are various steps involved in budgeting. The three most important ones are as follows:

- Add up your income.
- Estimate expenses.
- Find out the difference.

How to make a budget

1. Review your financial goals: It is important to have realistic financial goals.
2. Estimate amount of income by source: In order to determine your expected income and expenditure you have 2 options: a) estimation or b) you monitor your income and expenditures over a time period to estimate future income and expenditures.
3. List all expenses: Classify all expenditures and income sources into main categories (e.g. food, transportation, airtime ...) and add the amount for all categories.

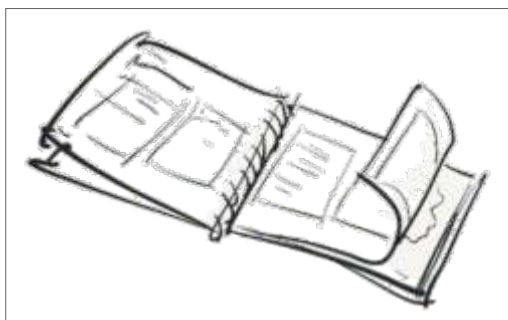


4. Ensure that expenses are less than income: You can add up the total income and the total expenditure. Then deduct the expenditure from the income. If the difference is positive, you can use that money to save or pay off debts. If it is negative you have to review your planned expenditures.
5. Decide how much you can save.
6. Review and adjust accordingly. Review your budget and make sure that it allows you and your family to achieve your financial goals.

Record keeping

Take the following records

- costs.
- harvest or yield.
- surplus.
- profit.



Many people do not write down how much money comes in and how much money goes out of their business. Therefore they do not really know how much money they are earning. Record keeping is important because you cannot keep everything in your head. People are forgetful by nature.

Don't walk in the Dark

If you don't know how your business is doing, you can't make good decisions. It's like walking in the dark - you can easily fall over! For example, you might be taking too much money out of the business without knowing it.

Keeping business records is a way to remember what has happened, and to get an overview. It can show whether you're following your plan, and help you make good business decisions.

Keeping records can be done in many different ways. The important thing is to find a way which works for you. It should not take too much time, or be too difficult. Keeping records should be a help.

Tools for records-keeping

Record-keeping tools are critical to a successful business and should be put in place before the business is launched. These tools help to ensure that documents are stored safely and methodologically. Each type of document should be stored separately, for example:

- Daily sales record
- Credit sales

- Receipt book
- Cashbook
- Profit and loss. statement (income statement)
- Cash flow statements
- Fixed assets registration
- Stock taking



Profit and loss

A Profit and Loss Statement helps you to calculate if your business is making a profit or is losing money. Every business should do a Profit and Loss Statement at the end of every financial year.

You can also calculate your profit and loss every month, after three months, or after six months. The more often you calculate your profit and loss, the sooner you will be aware if your business has problems. Then you can do something about the problems before it is too late.

A profit and loss calculation is simply balancing your income (Money in) with your expenses (Money out).

Farmers = entrepreneurs

Farming is a business, so the profit has to be calculated

Money in	-	Money out	=	Profit or Loss
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Profit - means that there is more money coming in than is going out.

Loss - means that you spend more money on producing or buying your products than money you earn by selling the goods

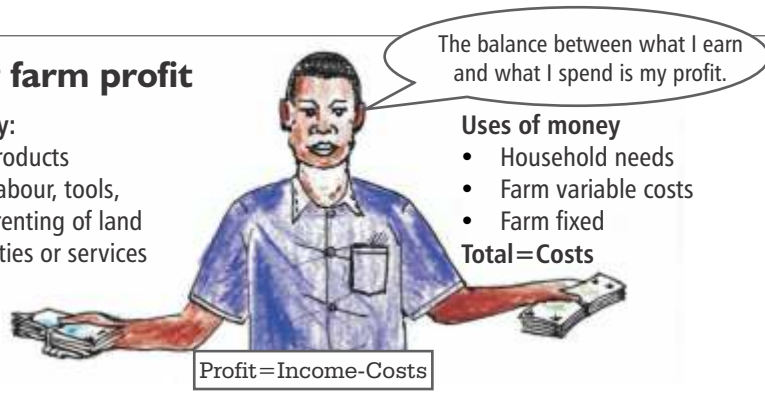
Basic business tools for farmers and entrepreneurs

Calculating farm profit

Sources of money:

- Selling farm products
- Hiring out of labour, tools, machinery or renting of land
- Off-farm activities or services

Total = Income



Business guidelines – making your life better

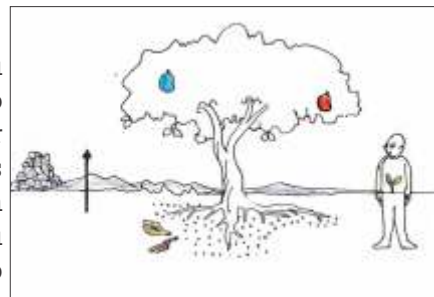


What is a business? What makes something a business?

All businesses provide something that others want to pay for. As a farmer, you have a business because you produce and sell. Other businesses produce things, for example by growing fruits or making furniture out of timber. Another type of business provides a service which others need, like building a house or grinding grain into flour.

Trees and Business

A tree starts from a small seed. If you choose a good seed and a proper place to plant it, it can grow into a healthy tree over time. In a similar way, a business starts from an idea like better ways to farm without spending more money than you need to. This is what COMACO is to help you to do in order to become a better farmer.



A tree must have water to survive. The roots draw up the water from the soil, so the branches can be healthy and grow. A business must have to survive. Money can come from different sources, like your own pocket from selling of crops or livestock or loans, and can be used for things like stock, cash or tools.

Create a business plan

A business plan is a description of your business ideas, and how you plan to start your business.

- It can help you to think ahead and avoid unpleasant surprises.
- It can help you decide if you need a loan.
- It can help you see what needs to be done, and when.
- It can help you decide whether your business idea is good enough to spend time and money on, or you should search for a better idea.
- It's a good way to explain your business idea to others. For example, if you want to apply for a micro-loan, you must have a business plan.

Overview of the Business Plan

What product or service will your business provide?

Who will be your customers?

Why will your customers buy from your business, rather than from your competitors?

Will you plan ahead in days, weeks or months?

What important equipment and supplies will be needed, and what will it cost?

What is your best guess of the total sales and expenses each period?

How much money is needed to start the business and keep it running until it makes a profit?

Who is going to provide this money?

Who is starting the business, and what skills do they have which should enable them to succeed?

If you can answer all these questions, you have a good plan for starting your business!

Explaining to others

Because an important use of your business plan is to show it to others, you should take care to explain things in a way that is easy to understand for others. Remember that things which are obvious to you might be new to the person you're explaining it to. It's good to explain your choices. For example, instead of just saying that the location of your business is important, it's more convincing to explain that the location is important because people don't want to walk far to buy a specific product.





A savings and internal lending communities (SILC) is a self-selected group of people, who pool their money into a fund, from which members can borrow. The money is paid back with interest, causing the fund to grow.

Key principles of SILCs

- The basic principle of SILC is that a group of self-selected people come together to form a SILC and save money. The saved money becomes the source of loan capital from which the group members can borrow. The main purpose of a SILC is to provide savings and simple loan and insurance facilities to community members who do not have access to formal sector

financial services (banks), either because the services are not available or because they do not have enough resources to access them.

- SILCs are self-managing made up of friends or members of a producer group.
- SILC groups should have between 15 and 25 members and can be your own producer group.
- SILCs are made up by a General Assembly and a Management Committee.
- SILCs agree on a set of rules, or a Constitution, to guide their activities.
- SILCs meet on a regular basis, at intervals that they select.
- All transactions are carried out at meetings of SILC members, to ensure transparency and accountability.
- SILC members meet regularly and contribute to a SILC fund in the form of a fixed minimum sum.

For more information about SILCs as well as how to set up a SILC, contact your COMACO coordinator.

Good examples of how SILC can help bring solutions to our farmers

1. SILC members buying goats as a family investment. The goats also help improve on family nutrition and income when they are slaughtered for food or sold.
2. Some are improving their houses by building brick moulded houses, roofed with iron sheets. These last long and reduce risks of fire and leaking of the roof during rainy season.
3. Many are starting various businesses from the saved money, such as tailoring, trading in vegetables like tomatoes, rape, potatoes.

Source: <https://www.crs.org/our-work-overseas/research-publications/facilitating-savings-and-internal-lending-communities>

Saving means putting money aside from what you earn today for future use or needs. As a farmer you earn money from sale of crops, goat chickens, vegetable etc and from this you can put aside some amounts for future use.

The saved money can be used later for:

- Constructing a house.
- Buying a bicycle, motorbike or even a motor vehicle or ox-cart.
- Paying school fees.
- As capital for small businesses.
- Providing food for your family including your aging parents.

How do you save?

- By joining a SILC group, you can save some money for future use.
- If your earnings grow big then you can consider opening a savings account with a bank.
- Decide on a small amount that you can be taking to the group or the bank regularly whenever you receive an earning.
- As a family, husband and wife, agree on a target of how much to save every month, say a K50 per month. Agree not to use this money for other purposes until your goal is reached.
- Teach this to your children.
- Who knows, your wife may face a serious healthy problem that will need money, or your child will be accepted at a college or university and you will need money.



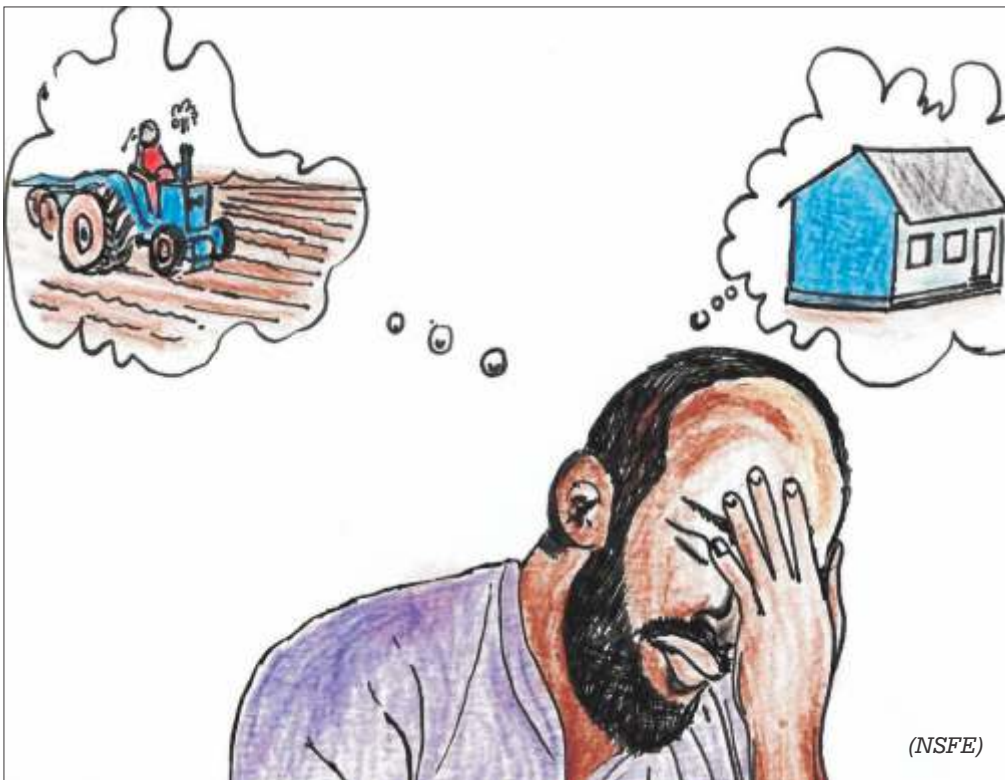
Chapter 52 Loans

Imagine desperately needing money to construct a house, pay for children's school fees or buy farming equipment and finding that there is nowhere to obtain money from. The option may be to take a loan.

Watch out for unexpected fees: Ask your lender carefully about fees connected with drawing up loan documents, or other costs



Have you ever been in a situation where you desperately need money? What was the situation and how did you solve the situation?



(NSFE)

A loan is an amount of money that an individual borrows.

The most common source for borrowing money is a licensed financial institution such as a bank. Other sources include another person or a group of persons.

A loan can be granted to an individual, community or group. A loan is usually for a specific time frame which can be a number of days, weeks, month or years.

The person or organization taking the loan initially receives an amount of money from the one providing the loan and then agrees to pay it back, in regular instalments.

Getting a loan – tips:

- The first loan is always the hardest to get.
- Be sure to understand the terms of a loan. For example: Will the interest rate change, or is it fixed?
- Always ask the lender to explain any unclear terms. If a lender's attitude is bad, go elsewhere.
- Watch out for unexpected fees.
- Always try to negotiate a lower interest rate. Compare a deal offered by a lender with those of other competitors.
- Never offer an essential item as security.
- Do not take more than one loan. Too many loans become a burden.

Advantages of Loans	Disadvantages of Loans
Access to more money than can be saved.	Loans are expensive because of the interest rate.
Access to money when needed for emergencies.	Loans mostly require collateral.
Take advantages of investment opportunities.	The requirement of group membership in the case of a group loan.
Helps to solve an immediate problem.	



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