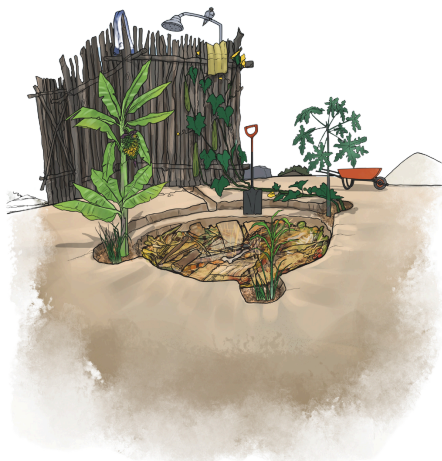
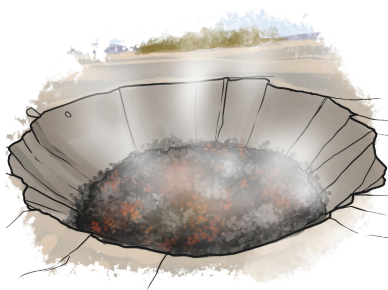


# POSTER SERIES

# USER GUIDE

## MAKING BIOCHAR



Implemented by



In cooperation with



## INTRODUCTION

Welcome to this guide on how to use the exciting series of posters developed by the Namibia Nature Foundation through its partnership with the Knowledge Hub for Organic Agriculture and Agroecology in Southern Africa (KHSA).

KHSA is part of the Knowledge Centre for Organic Agriculture in Africa (KCOA), a collaborative country-led partnership funded by the German Federal Ministry of Economic Cooperation and Development (BMZ) and implemented by the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH and non-governmental organisations across Africa. The KCOA aims to scale up the adoption of agroecological and organic farming practices through five knowledge hubs in Africa. The other hubs are implemented by GIZ with in-country partners in North, West, East and Central Africa.

The Namibia Nature Foundation is an in-country partner of KHSA working on a Multiplier Support Programme (MSP) with 30 lead farmers and trainer in Namibia's Zambezi region. The MSP has adopted a community-based agricultural extension model to cost effectively increase the amount and quality of the organic/agroecological extension support available to small-scale farmers. The programme encompasses production training, mentorship and personal capacity building, among other topics.

## PURPOSE OF POSTER SERIES

The need for this series of posters was identified during the MSP. During trainings, mentoring and discussions with the participants, the potential of the topics of rainwater harvesting, biochar making, fencing and enhanced resilience of rainfed cropping to improve agroecological production in the region became clear. No relevant and contextual knowledge products on these topics existed. The Namibia Nature Foundation has thus developed this series as learning aids for those working with and supporting small-scale farmers in the region. The illustrative format was chosen to bypass literacy issues and the back of each poster provides guidance to the trainer or extension officer on how to use the posters, and key messages that need to be conveyed. The posters should be used alongside practical demonstrations to share and reinforce these practices with small-scale farmers. There are four poster series, each providing detailed information about the topic and acting as a guide to implementing these agricultural practices. The intent is to promote the uptake of practices that will help households be more waterwise, resilient to climate change and food secure.

- o **Mixed alley cropping – 8 posters**
- o **Making biochar – 4 posters**
- o **Water harvesting in pits and trenches – 4 posters**
- o **Fencing – 7 posters.**

## HOW TO USE THE AGROECOLOGY POSTER SERIES

- **Trialling practices:** If you have not tried out the practices yourself, trial them before conducting training with a group of farmers. It will enhance the training significantly if you can talk about your own experience!
- **Choose the order:** Posters of one series do not have a specific order, but can be used in the order most suited to the context and the situation on the ground. The following order of topics is commonly used:

### **a. Mixed alley cropping**

- i. Clearing crop fields
- ii. Row spacing and conservation tillage
- iii. Improving the soil
- iv. Diverse crops planted between tree lines
- v. Provide for a good start of seedlings
- vi. Advantages of mixing crops
- vii. “Green manure”
- viii. The many benefits of pigeon peas.

### **b. Water harvesting in pits and trenches**

- i. Store water and nutrients underground in organic matter
- ii. Types of water pits
- iii. Roof run-off trenches
- iv. Household garden benefitting from run-off water.

### **c. Making biochar**

- i. Preparations for making biochar
- ii. How to burn biochar
- iii. Charging biochar
- iv. Biochar added to the deep litter in livestock shelter.

### **d. Fencing**

- i. Traditional fences are easily damaged by termites and rot
- ii. Challenges of using mesh wire
- iii. Improved fences from plant materials
- iv. Maintaining a living fence
- v. Prepare poles for strong wire fences
- vi. Stretching wire for strong fences
- vii. Filling wire fences with different materials.

### **Additional information:**

There is additional information on the back of the posters. This will make it easier for you to prepare for the presentation and can help you to share relevant information with the specific target group. Key messages are points that are important to mention when presenting the poster.

It is possible to show the front of the poster to the participants and check on the back if all key messages are mentioned. When more familiar with the content, the posters can be placed on the ground so that everyone can see them well. Recall any of your own experiences with the topic you are presenting and refer to your own experience where possible and applicable.

## GENERAL TIPS FOR USING POSTERS FOR SHARING KNOWLEDGE

- **Preparation:** Familiarise yourself with the content of the posters before the training session. This ensures that you can confidently explain the information to participants and answer any questions that arise. It might be helpful to practice by explaining the poster to a friend or relative first.
- **Introduction:** When introducing the posters, explain their relevance to the topic being discussed. Briefly outline what each poster covers and how it will contribute to the participants' understanding. Each group will need a different introduction, depending on their knowledge, experience and education.
- **Visual focus:** Use the posters as a visual aid during your presentation. Refer to specific sections or elements on the posters as you describe related topics.
- **Interactive discussion:** Encourage interaction with the posters by inviting participants to ask questions, share insights or make observations based on the information presented. This fosters engagement and allows participants to actively contribute to the learning process.
- **Hands-on activities:** Incorporate hands-on activities that involve the posters, such as group discussions or practical demonstrations of what is described on the posters (e.g. making biochar, making a shower pit, etc.). This allows participants to apply the information from the posters in a practical context.
- **Visual reinforcement:** Use the posters to reinforce key concepts or important points throughout the training session. Point to relevant sections on the posters as you emphasise specific ideas.
- **Breakdown complex concepts:** Use the posters to visually break down complex concepts or processes into simple steps. Use the illustrations on the posters to simplify the information and make it easier for participants to understand.
- **Summarise:** Use the posters to summarise key takeaways or learning objectives at the end of the training session.
- **Accessibility:** Ensure that the posters are easily visible to all participants. Position the posters in a central location and point clearly to draw attention to specific areas as needed.

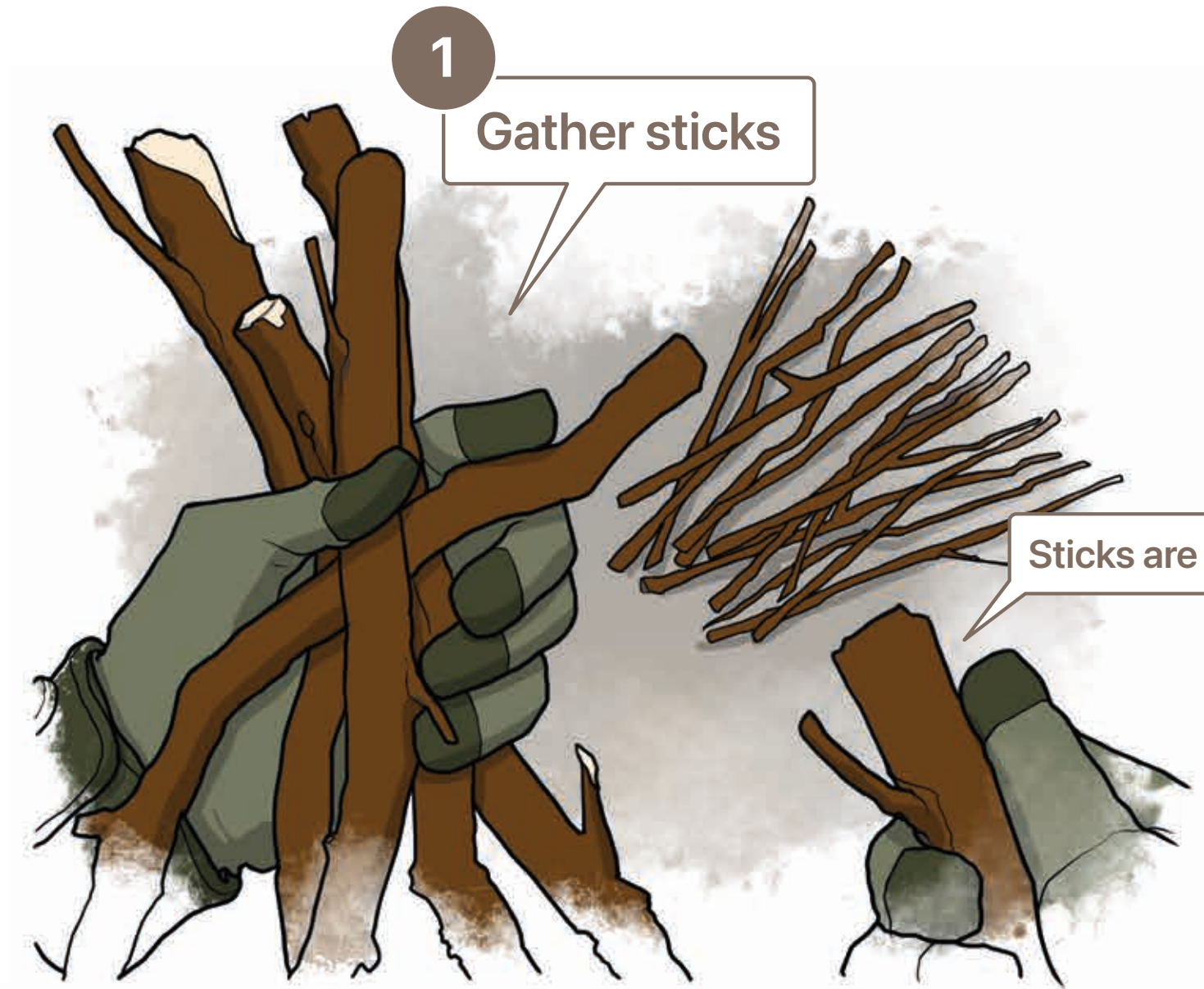


# Preparations for making biochar

1

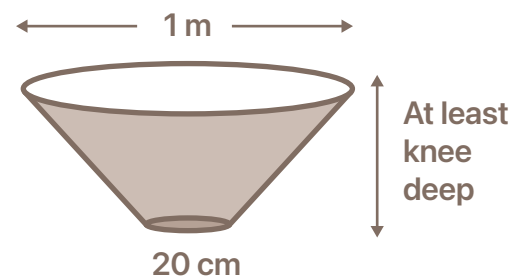
Gather sticks

Sticks are thumb thick



2

Dig cone shaped hole



3

Place some sticks in hole and light small fire



# Preparations for making biochar

## Additional information to share

Biochar is different from ordinary charcoal used for cooking fires.

Only thin branches and sticks are used – not the thick wood needed for charcoal.

The wood is burnt in a pit in such a way that very little oxygen reaches the fire. This prevents the wood from burning to ashes.

Always make sure that the area where you are making biochar is cleared to prevent wildfires.

Collect a big heap of sticks the thickness of your thumb.






Prepare enough of all the ingredients and place them close to the hole so you can reach everything easily and quickly – wood, water or sand, buckets, a spade or metal pole.

Try to wear closed shoes and clothes that are made from cotton to protect you from skin burns that can come from flying sparks. Long sleeves and trousers can protect you better from the heat of the fire than short sleeves, trousers and skirts.

Start with a small fire made with twigs and grass at the bottom of the pit.

Do not walk away from the fire because you need to feed it regularly with the next layer of wood.

## KEY MESSAGES

-  Biochar is produced from thin branches and sticks that should not be used for cooking or making charcoal
-  Controlling the air for burning prevents the wood from burning to ashes
-  One can use a cone-shaped hole in the ground to achieve this control of air flow and reduction of oxygen
-  Start with a small fire made with grass and twigs
-  Then add a thin even layer of sticks every time you see ash forming on the wood until the hole is filled





# How to burn biochar

1

Wait for wood to show thin layer of ash



2

Add wood in thin even layers - one stick thick at a time



3

When the pit is full, quench fire with water or sand







# How to burn biochar

## Additional information to share

1. Start with a small fire made with twigs and grass.
2. Then add the first layer of wood, the thickness of one stick.
3. Adding more wood has to be done at the right time to make sure that the coal does not burn into ash.
4. Watch the wood to see when a thin layer of ash is forming on the wood.
5. Add wood in single layers and do not pile it over each other.
6. Always watch for the ash to form before adding another layer of wood.
7. When the pit is full and you see ash forming again, quench or kill the fire.
8. You can use water or if you do not have enough water, use sand. This takes away the air and prevents the wood burning to ash.
9. When using water quickly pour over enough water to completely kill all the flames and coals.
10. Water is beneficial, because it opens the pores for more air and space in the biochar and takes out all the oils that are still in the wood.
11. When using sand make sure that you quickly cover the whole area, using buckets. Cover the top of the wood with a layer of sand at least one hand thick. If you have some water you can pour it over the sand. You can use moist sand for this purpose.

## KEY MESSAGES

-  Watch the fire to see when ash is forming on the wood
-  Then add wood in a single even layer
-  Repeat this until the hole is full
-  When the hole is full, use water or sand to quench or kill the fire quickly and completely





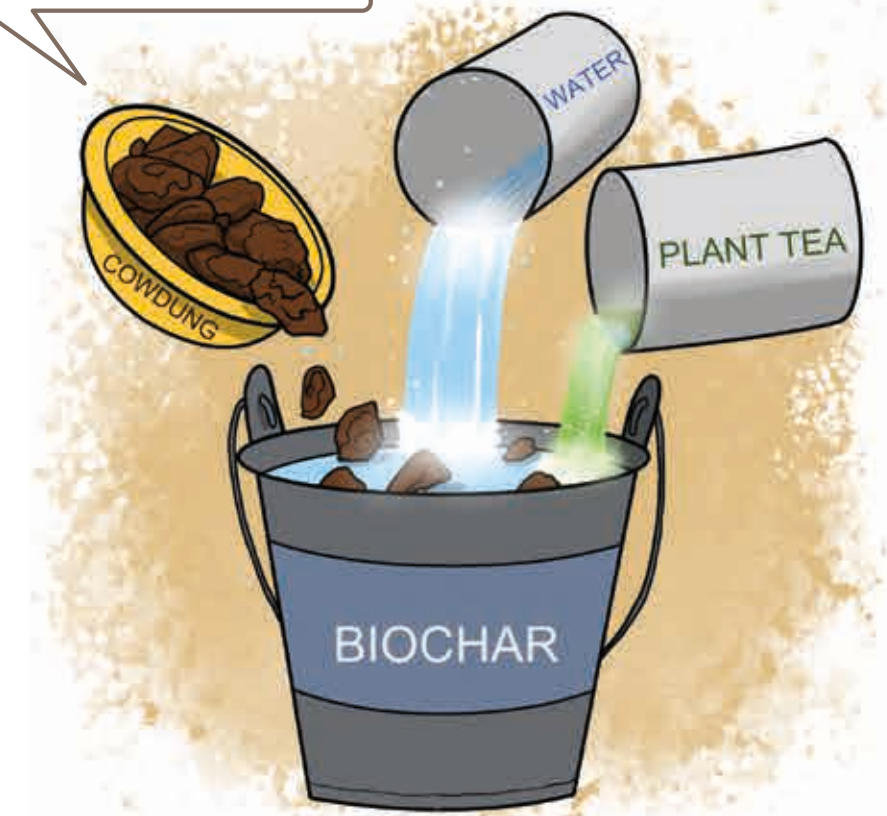
# Charging biochar

A house for microbes,  
nutrients and water



Add biochar to compost  
to charge the biochar

Mix manure, water and plant  
tea to quick charge biochar











# Charging biochar

## Additional information to share

1. Before the biochar is added to soil it must be "charged" i.e., filled with water, nutrients and microbes – life is added to the dead carbon, and it becomes alive.
2. If the biochar is directly added to soil after burning it, it sucks up nutrients and water from the soil and takes it away from plants that need these.
3. Biochar itself does not break down easily – it can stay in the soil for hundreds of years. It therefore only needs to be added once. However, one can add more over time as it becomes available.
4. Let the biochar and surrounding sand cool down before taking out the biochar.
5. Depending on how you will use it further, the pieces of biochar can be ground to smaller pieces by using a mortar and pestle or a pole and a bucket. It can be left as is to break up further when turned in compost or trampled by animals.
6. The easiest way to charge biochar is by adding it to a compost heap. A guideline for how much biochar to use is: Add up to 2 parts biochar for every 1 part of manure. This way it can take up nutrients, water and microorganisms. When one turns the compost, the bigger pieces of biochar break into smaller pieces – reducing the need to pound the biochar.
7. It is also possible to charge biochar by mixing it with fresh manure, urine, sour milk, plant tea or whey and some molasse to feed the microbes. If not all of these are available they can be left out. Daily turning adds oxygen and helps the microbes to multiply. After 5 days the biochar can be added to soil.

## KEY MESSAGES

-  Biochar is like a sponge with lots of holes in it
-  Biochar does not decompose easily and stays in the ground for hundreds of years
-  If one wants to use the biochar to improve the soil, it first needs to be charged with nutrients, beneficial microbes and water. This is how it becomes part of the lifecycle
-  Do not simply add the biochar to the ground. Biochar absorbs nutrients and microbes from the soil that the plants need to grow
-  It can store water and nutrients for a very long time, preventing evaporation and draining of water and nutrients into deeper soil layers
-  Biochar can simply be added to compost to charge it





# Biochar added to deep litter in livestock shelter

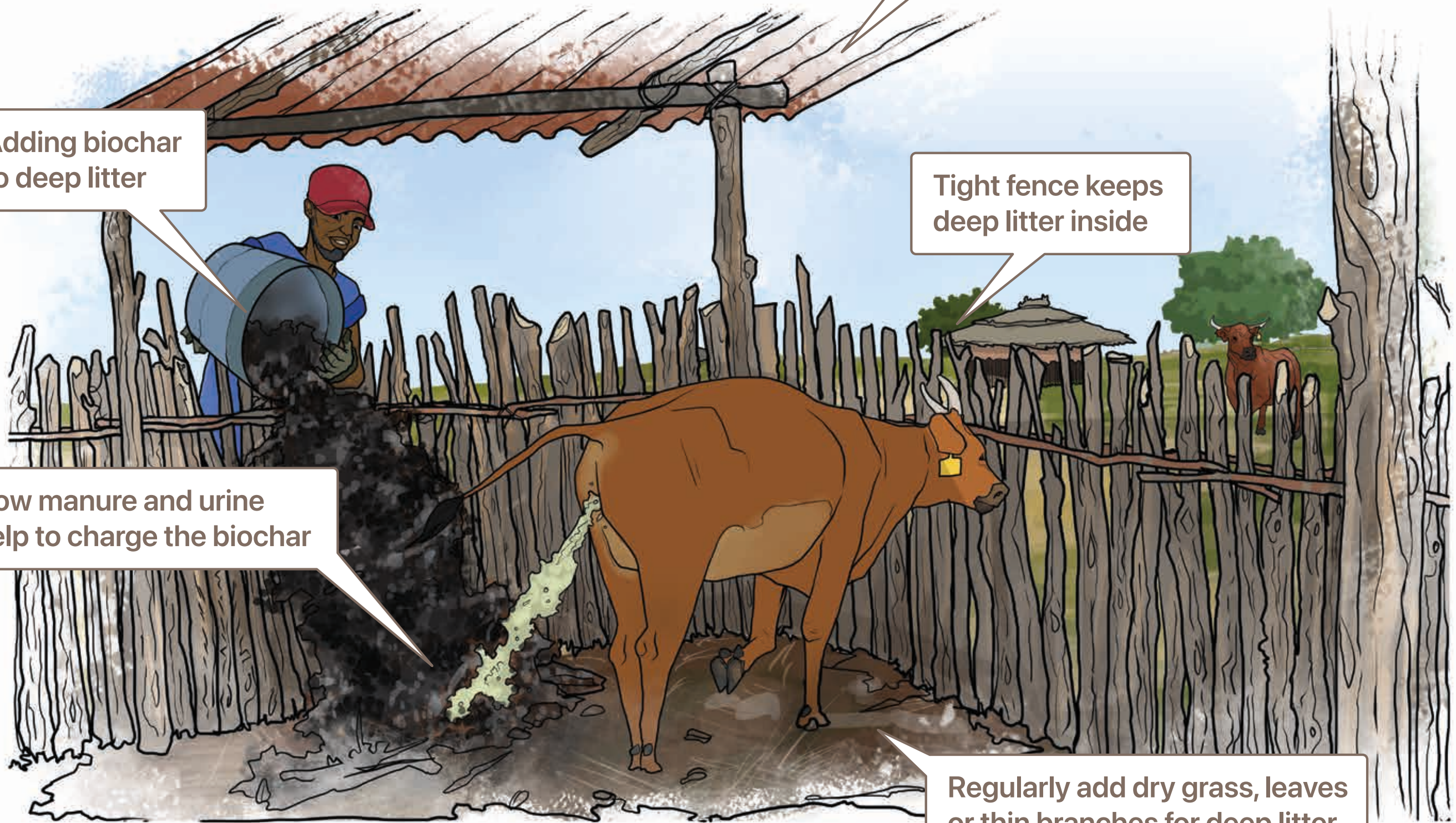
Roof protecting the deep litter from sun and rain

Adding biochar to deep litter

Tight fence keeps deep litter inside

Cow manure and urine help to charge the biochar

Regularly add dry grass, leaves or thin branches for deep litter





# Biochar added to deep litter in livestock shelter

## Additional information to share

Another way of charging biochar is to add it to the deep litter bedding of livestock shelters. Here it can soak up urine and the hooves of the animals can break up the bigger pieces.




When the layer of deep litter in the animal shelter is half a meter or more deep, it is taken out and piled with more plant materials and water into a heap for composting.

One can also use biochar to make a urinal for people. Place some biochar into a bucket with a lid and urinate into the bucket. Close the lid when not using it. Add more biochar as the bucket fills up. The biochar soaks up urine and there is less smell. When the bucket is full (or daily, as you prefer) empty the bucket onto your compost heap and cover with plant materials. This is an excellent and cheap source of nitrogen for your garden. Fresh urine is sterile and does not contain pathogens.

Seedling mix with 30 - 50% charged biochar helps to maintain moist conditions for emerging seeds.

Burning "waste" plant material or wood without making biochar from it is like throwing away money.

## KEY MESSAGES

-  Adding biochar to the deep litter in a livestock shelter has many benefits:
  - It saves work to pound it, because the animal hooves break up the char
  - Nutrients and microbes from the dung and moisture from the urine are added at the same time, charging the biochar
  - Animals move the litter around, adding valuable oxygen
  - The char soaks up water, leaving the surface dry and clean for the animals
-  One can make a bucket urinal for people to add nitrogen to biochar
-  Especially sandy soils can become more drought resilient when they are amended with biochar

