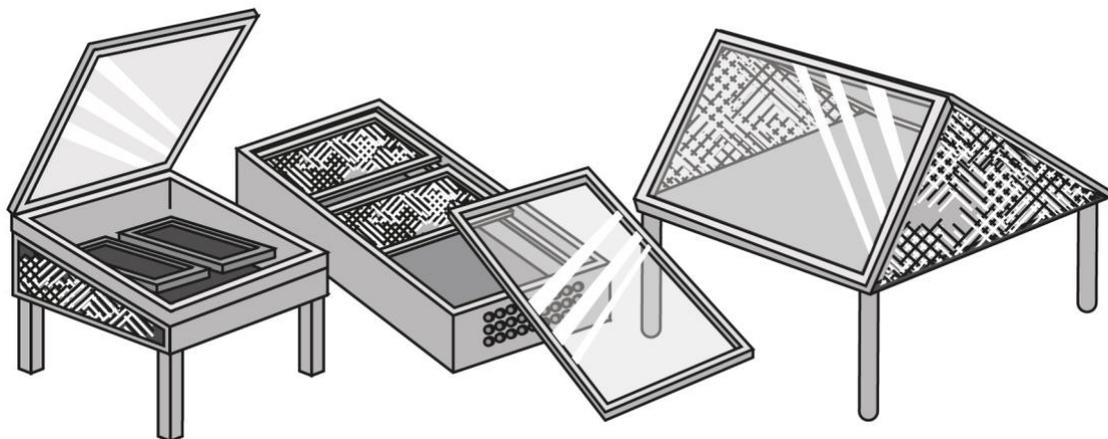
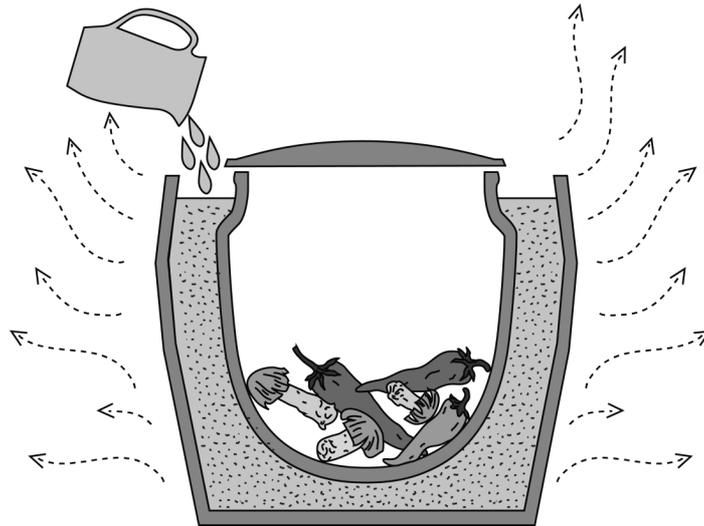


# Sustainable Nutrition Manual Flyer Series

## Food, Water, Agriculture & Environment

### Topic 13: Food Preservation and Storage



Extracts from

SNM Part 1: Healthy Humans



World Food Programme

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## **Accessing the Sustainable Nutrition Manual**

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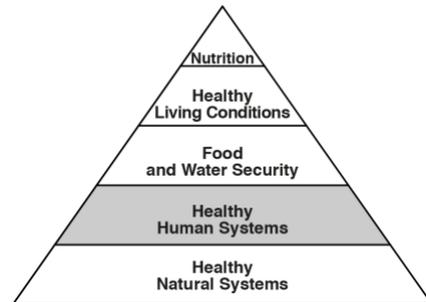
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## Topic 13: Food Preservation and Storage

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When we store food, we need to make sure that it has as many nutrients as possible, and that it is stored safely so it does not make us ill. In Malawi foods are often dried in the sun on a mat on the ground for several days. By the time it has dried out it has lost many of its nutrients. It might also have dirt and stones in it, and often insects and animals have got into it too. There are several ways to avoid these problems and store foods safely and healthily.



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### Storing Foods in the Environment

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If you grow lots of different types of food, you can harvest different things all year long. You will be storing your foods the best way possible – where they are raised! This is better for the nutrient content of the foods, better for spacing out the work of harvesting and it is better for reducing the risk of food shortages.

If you can harvest food all year you do not need to save as much food in storage. Our ancestors preserved some foods, but they also ate what was in season. We can do this, too, by increasing the amount of diversity that we have available around us. (See the calendars for Foods Available by Group and Season in Part 3, Appendix 2.)

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### Preserving Foods for Future Use

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When some foods are plentiful it makes good sense to preserve them for later use or so you can sell them for extra income. We will look at both long-term and short-term food preservation. There are several easy ways to make sure that germs do not spoil our food. There are two topics that we will apply here: Topic 8 on Protecting Nutrition and Topic 9 on Germs.

#### ***Cooling or freezing***

This lowers the temperature of the food, so it is too cold for germs to survive. Most people in Malawi do not have refrigerators or freezers but there are some other ways to keep foods cool for short periods that can be very useful.

#### ***Drying***

Food can be preserved by removing all the water and drying the food out. This is a very good way of preserving foods in Malawi, where we have so much sunshine.

#### ***Pickling***

This method makes sure that germs cannot grow because the food is put in a pickling solution that is high in sugars, salts and / or acid. Some germs can live without any air, but they cannot live in strong solutions of sugar, salt or acid (like vinegar). You need to follow the instructions carefully to have the right balance in your pickling solution and to use very hygienic methods.

If it isn't done right people can get sick from eating the foods. If it is done properly, the foods can still be good for eating for many months, even years.

## ***Canning***

This means heating the food quickly to kill the germs and then sealing the food inside jars or cans, so no other germs can get in. There are a few businesses in Malawi using this method. To can foods at home you need to be extremely careful. If it is appropriate for your situation, ask for more information from your District Food and Nutrition officer.

However, you choose to preserve your food you must remember to WASH! Remember that Water, Sanitation and Hygiene reduces the chances of germs growing in your food. Check your food carefully and use the best food safety practices every day to prevent food from getting spoiled.

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## **Short Term Storage**

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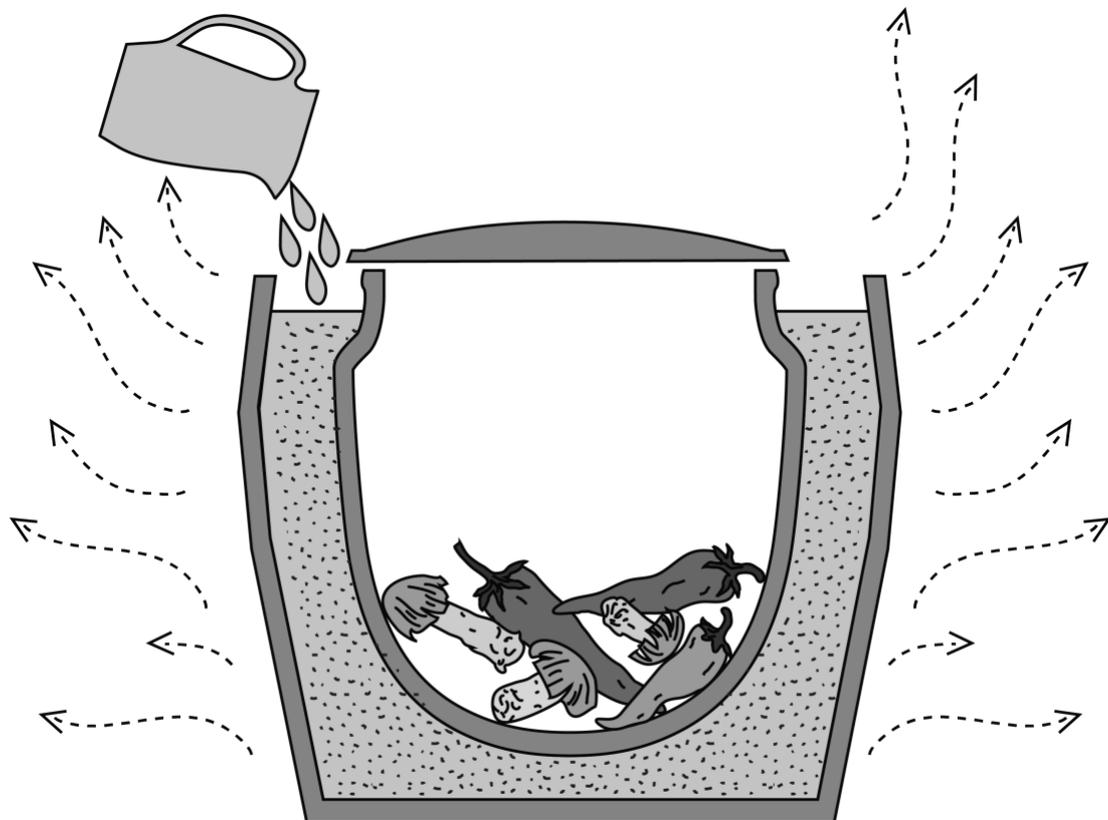
### ***Insulated basket cooler***

The basket cooler uses exactly the same method as the insulated basket cooker / cooler (page 67), but you put in cold foods or drinks, and the insulation keeps everything cool for a few hours. These are great for field trips or long days away from home.

### ***Root cellar***

For roots, tubers and starchy fruits like bananas and plantains the traditional method of digging a pit in the earth and smearing it with clay, for cool, dry storage works well. (Some people design this right into their home, from the start.)

### ***An evaporation cooler***



These are perfect for keeping fruits and vegetables fresh for several days. Water is added into clean sand that is between two clay pots and as the water evaporates out, the pots become cool. If you do not have pots, you can use any container or cloth that allows for evaporation. Be creative!

To make the cooler, a medium-sized clay pot is put inside a larger clay pot. Sand and water are put in the space between the pots.

Food is put in the central, smaller pot. A cover is put over the central pot to protect the food and keep it clean, but the outer pot needs to be left open to help the evaporation. As the wet sand evaporates it takes some of the heat away from the pots, just as when we sweat to cool off our bodies!

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## Long Term Storage

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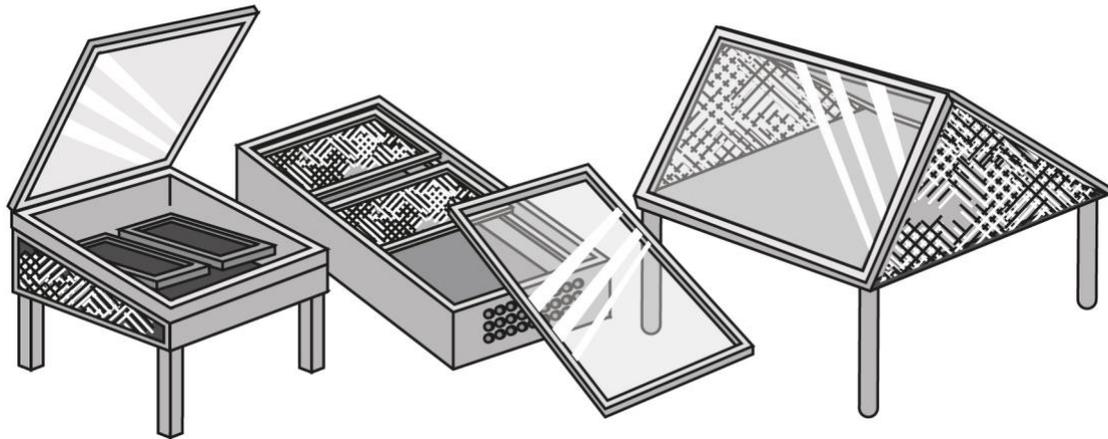
### ***Solar drying***

Solar drying is an easy, fast way to preserve food. It keeps the food clean and because it dries quickly, preserves more nutrients than foods dried in the open on the ground. When solar dried food is stored properly it can be saved for months.

Solar driers work by trapping the heat of the sun in a container with air flowing through the food to remove moisture. If there were no airflow the food would cook, like a solar cooker. There are many designs for solar dryers, but they all work similarly.

### ***To make a solar dryer you'll need the following:***

- **A container to hold the sun's heat.** The container could be as small as a bucket or as large as a room! It could be made of plywood, bamboo, woven baskets, brick, mud, metal, etc. It has to be something that you can put holes in for ventilation, or something that already has holes in. Use your imagination!
- **A clear plastic or glass lid.** This allows the sun in but keeps insects and dirt out. Some people use netting as a cover, but this only keeps insects out and it does not trap the heat, so the drying takes longer.
- **Dark inside.** Black or dark colours absorb heat and keep the container hotter for longer. Some natural dyes can work but think about the smell of whatever you use as it could affect the taste of the food being dried. Most importantly, make sure it is not poisonous!
- **Airflow.** If you raise the temperature inside the container it quickly draws the moisture out of the food and this hot, moist air needs somewhere to go or the food will cook. Vents on each side of the container will allow moist air to leave and new dry air to enter. Hot air rises, so put air vents low on one side and high on the other side. If the moisture forms water droplets on the lid and starts dripping back onto the food, you will need to adapt your design with more air holes or put less food into the dryer at once.
- **Food racks.** Racks are needed to hold the food in the dryer so that the air can move around the food as much as possible. Racks can be made of reed mats, screening, bamboo or any other material that can hold the food, that will not rust and will allow air to move around the food.



**A box dryer is great for home use** and for moving around easily from place to place to avoid rain and shade. You can put wheels on the bottom and handles on the outside for even better mobility. If you do not need to move it around you can put legs on it to make it easier to access the food and keep the food further off the ground.

**An old tin bucket is perfect** for a small solar dryer. Add a few small holes on either side for ventilation. Make a clear lid and a rack that fits inside, and you have a very simple small solar drier!

**A tandala can be adapted easily.** A *tandala* is a traditional dish-drying rack in Malawi made with four poles with sticks tied across them to hold dishes.

- Make a clear plastic cover in the shape of a tent. If you do not have clear plastic you can use screening, cloth or other coloured plastic. Cloth will not let the sunlight in, but it can still trap some heat and keep the dust and animals away.
- Use a woven mat as a rack.
- Lastly, add screening to cover the ends of the tent. If you do not have screening use the same material, you used to make the tent cover.

### ***Drying grains, legumes and oilseeds***

Seeds can be dried whole, de-husked or shelled to get them ready for storage, depending on the species and your needs. Separate out any spoiled seeds and only preserve the good ones. The solar dryer helps increase the strength of the heat, which dries the foods quickly and kills any germs or insects hiding in the food.

### ***Drying fruits, vegetables and tubers***

These have more water in them when they are harvested and often need more care and additional processing before they are dried. Each species is different and whole books are written just on drying. These general tips will get you started:

- **Select produce that is just ripe and still firm.** For example, if you use over-ripe fruits the high sugar content can turn them black (such as tomatoes from the vegetable group or mangoes from the fruit group).
- **Start with clean food, water, people and working areas.** These should be without dirt, dust, flies, insects or animals. Clean the produce according to its species. Most will need to be washed in clean water. Some can be scrubbed, especially if you are going to eat roots and tubers, others may need to be peeled.
- **There are nutrients in the skins so think before you peel!** Some foods dry better when they are peeled like papayas, mangos, bananas, pumpkins, onions, cassava, and yams. Other foods are better dried with the peels on, like tomatoes, carrots, eggplant, apples, gooseberries, sweet and Irish potatoes.

### ***Slice foods before drying them***

The size of the slices will depend on what the food is. Some foods dry well whole, such as small tubers, berries, small onions, dark green leaves, herbs and cloves of garlic.

- Foods should be cut to about the same size, so they take the same amount of time to dry. Large pieces dry more slowly. Firm, hard foods like pumpkin, roots or tubers can be grated to help them dry quickly.
- The more water in the food the more it shrinks when it dries. Tomatoes and melons need to be sliced thickly (1-2 cm) since they have a lot of water. They will dry to about half the original size, or even less. Moist fruits and fruit vegetables should be sliced about 1-2 cm thick to allow for shrinkage.
- Some foods, like bananas, apples and tubers, turn brown when cut. They stay white if you dip them in citrus juice (lemon, lime, orange, grapefruit, etc.) or in honey before drying.
- Leaves and herbs can be dried then crumbled or powdered after they are dry.
- Onions, potatoes, pumpkins, carrots and other soup vegetables can all be cut into small pieces before drying and then combined to make 'instant' soup mixes, camping meals, or ready-mixed flavouring packets.

### ***Put the foods on the rack***

Put the same sized pieces of food on one tray so that all the food on the tray is finished at the same time. You can have several types of food at once, or only one type of food in the dryer, but you do not want moisture from one food to get into a food that is almost dry.

### ***Drying times will vary***

The more water content a food has the longer it will take to dry. The strength of the sun will vary but if it is hotter and drier the drying will be quicker. Breezy weather is generally quicker than still air. With this in mind you can expect:

- 2-3 days drying for dense or moist items like mangoes, bananas, tomatoes or apples. You will still be able to bend the fruits when they are done.
- 1-2 days for onions, papayas, peppers and mushrooms
- 1 day or less for green vegetables / herbs. They can sometimes be done in just a few hours. Leaves will be crisp and crumbly when they are dry.
- To test if the food is well dried, put the dried food in a plastic bag. If no moisture collects in the bag after a few hours, they are probably dry.
- Enjoy now or store away for the future, they can last for several months to years.

### ***Storage containers***

**Pack dried foods in clean, airtight packaging** so that moisture, germs and insects cannot get in. Reused clean glass jars, covered clay pots, sacks, plastic containers, zip-lock bags, or food packaging like used bread bags. Make sure that whatever you choose is clean and closes.

For dried vegetables, teas, or spices paper bags or 'breathable' containers work well. A '*chikwatu*' container made of tree leaves and natural string fibres, hung from the ceiling or a shelf, is a great traditional solution and very sustainable (if people keep planting trees!).

## Part 1, Topic 13: **Food Preservation and Storage**

**Keep your dried food in a cool, dry place.** These foods last over a year when dried and stored properly! Check your food stores regularly to make sure there is no moisture forming on the glass or plastic, no insects or any other signs that the food is being damaged or disturbed.

**First in, first out.** Always use the oldest items in storage first to reduce the chance of food loss.

**Use surplus foods to make some extra income.** There may be a lot of money to be made! Look in shops for ideas: herbal teas, spices, soup mixes, dried fruits, pumpkin seeds, pickled mangoes, condiments, fruits juices, etc. Malawians do not make many of these so there are opportunities there.

We need to start being creative with our products and concentrate on quality. Nearly all the products on our shelves could come from local producers. Buy Malawian whenever you can!



Are you preserving and storing enough food? Are you doing it well?  
Could you do it better?



Note on your map the different places where food is stored (the maize store, the kitchen, a root cellar etc.)

Your Notes:

Part 1, Topic 13: **Food Preservation and Storage**

Your Notes:

Part 1, Topic 13: **Food Preservation and Storage**

Your Notes:

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# Overview of the Sustainable Nutrition Manual

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## Food, Water, Agriculture & Environment

### **Purpose**

This manual is for people who eat, grow or buy food and who want to improve their lives, their community and the environment that they live in. It has been written for, and by, people living in Malawi. It will show you how to eat and live better and guide you in designing a sustainable future. The manual aims to show that by thinking differently and thinking sustainably you can improve your health, diet, lifestyle and surroundings easily and cheaply and gain an understanding of the term Sustainable Nutrition.

Use the ideas in this manual and you will be able to:

- Improve your diet and health
- Save money that was spent on food, medicines and chemicals
- Double or triple yields and harvests (or even more!)
- Reduce the amount of watering in your gardens and orchards
- Reduce the amount of work done on your land and in your home
- Have healthier plants and animals
- Reduce infertile and unproductive areas of land
- Use free resources to improve soil and water in your area

### **Part 1 - Healthy Humans**

is about the human body and nutrition. You will also learn about food choices and the benefits of diversity in diet. It has lots of useful ideas to improve life and many delicious recipes and suggestions for tasty, healthy meals.

### **Part 2 - Healthy Environments**

is about natural systems and sustainability. You will learn about the Nature Cycle and the Water Cycle and natural sustainable systems. You will be introduced to Permaculture ideas and gain an understanding of the benefits of diversity in Nature.

### **Part 3 - Healthy Designs**

is about designing for sustainable living. This book brings parts 1 and 2 together and guides you to make a personalised plan for Sustainable Nutrition. This book is practical to design everything on your land. There is lots of information in the appendices about foods of Malawi and other resources that will be useful as your design develops.

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