



**WOMEN WHO FARM
AFRICA**

**ORANGE FLESHED
*SWEET POTATO***

Crop Guide



FOREWORD

Vitamin A Deficiency (VAD) is a cause of death of 1 in every 5 children. Orange Fleshed Sweet Potato (OFSP) is a solution that should be accessed by women farmers in order to diversify their household nutrition and fight VAD.

In order to enhance good nutrition among families, women farmers need to employ good agricultural practices and receive crop specific information.

This OFSP crop guide is meant to fulfill the vital requirement of supplementing Vitamin A intake among families.

The information contained in this book guide has been compiled over an OFSP production training series and is appropriate for all categories of farmers. The guide can also be used by extension officers, agricultural training institutions and other development partners.

It is therefore our sincere hope that this information will go a long way in improving Orange Fleshed Sweet Potato Production in Zambia and Africa at large.

Women Who Farm Africa is committed to playing its role in empowering women farmers with information to enhance sustainable food production.

Women Who Farm Africa

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INTRODUCTION

Sweetpotato (*Ipomoea batatas* (L.) Lam, belongs to the family Convolvulacea. It is cultivated as an annual crop for both vines and storage roots. Resource-poor farmers in Zambia predominantly grow sweet potato; Orange Fleshed Sweet Potatoes (OFSP) in particular provides nutritional and health benefits, mainly for women and children under 5 years of age. OFSP contains an antioxidant called beta-carotene, which is very effective at raising blood levels of vitamin A.

Many development organizations have used Sweet potato as a driver to reduce Vitamin A Deficiency (VAD) in children, pregnant women and lactating mothers.

OFSP is a suitable crop for Climate Change adaptation and Food and Nutrition security for the reason that it tolerates stresses such as drought, heat, and can grow in many soil types with relatively low inputs. It also generally produces higher yields and superior gross margins than cereals.

This training manual was developed to address some of the major barriers to OFSP production, utilization and processing.

PICTURE FOCUS



CLIMATIC AND SOIL CONDITIONS

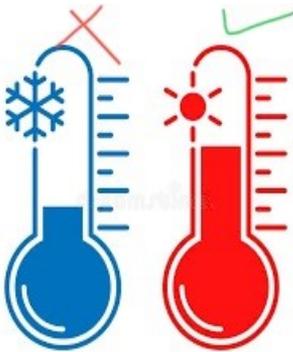
OFSP is highly adaptable and can grow in most agro-ecological zones of Zambia. Temperature, light, rainfall, soil and altitude are the main environmental factors that affect the growth and development of the OFSP plant.

Rainfall

First 40 days, daily water is required.

Above 500mm of rainfall is required per crop cycle.

OFSP is Susceptible to water logging at rooting so planting should be done in good timing.



Temperature

Warm temperatures of 16°C to 25°C for soil temperature and 18°C to 35°C for air temperature are required.

Vines are destroyed by frost.

Soil

Sandy loam well drained soils are the preferred soil type.

Acidic / alkaline soils encourage bacterial infection and must be avoided.

Heavy clay soils hold back root development.



RECOMMENDED VARIETIES

Recommended OFSP varieties found in Zambia are Olympia, Zambezi and Orange Chingovwa. Farmers, especially first time farmers must work hand in hand with agriculture extension officers and agricultural researchers to acquire the desired varieties.

RECORD KEEPING

All farming activities must be kept on written records by the farmer. Keeping records helps the farmer easily determine whether they have made a profit or loss if they are farming for business and also makes planning for the next cycle relatively easy. Check the simple record keeping example below

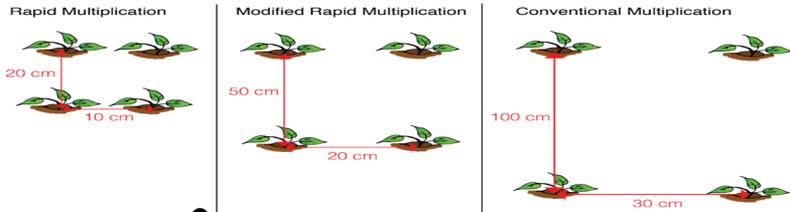
DATE	ACTIVITY	COST	COMMENT
15/ 08/ 2022	VINE PLANTING	0	WELL DONE
16/ 08/2022	LIGHT WATERING	WATER: 25.00	WELL DONE
24/10/2022	RIDGE MAKING	LABOUR: 150.00	DONE
30/10/2022	MANURING	MANURE: 45.00	DONE
.....
.....
.....

Do you have records of
your previous farming
activities?

VINE MULTIPLICATION

Vines are multiplied using different densities depending on the intended use and the scale at which they will be needed. Densities are either Rapid Multiplication, Modified Rapid Multiplication and Conventional Multiplication.

Planting Densities



Loosen the soil; mix with compost manure/ humus-rich soil at 10-15cm depth near a water source at least 4 weeks to planting of the nursery.

Narrow beds of 1.2 m wide should be made with walkways in between them. The beds should be 10-15 m long and 20 - 50cm high.

Well selected vines are planted at a good depth where one node of the cutting is placed into the soil.

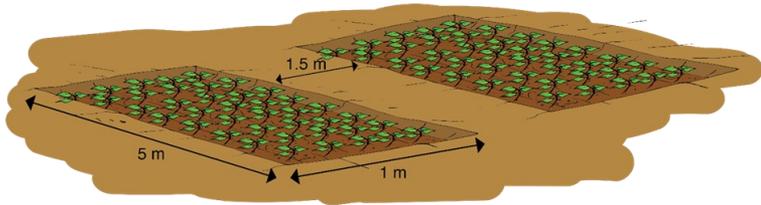
Light watering should be done to moisten the soil so that it provides conducive establishment conditions. Farmers may also lightly water the vines prior to planting and water after planting.

Labels with the date of planting and variety type should be placed for easy follow-ups and subsequent activity scheduling especially where nursery expansion is required.



Example of a **layout** of a nursery bed after planting.

Measure a 1 by 5 metres piece of land equivalent to the length of ½ by 2½ pieces of Chitenge materials.

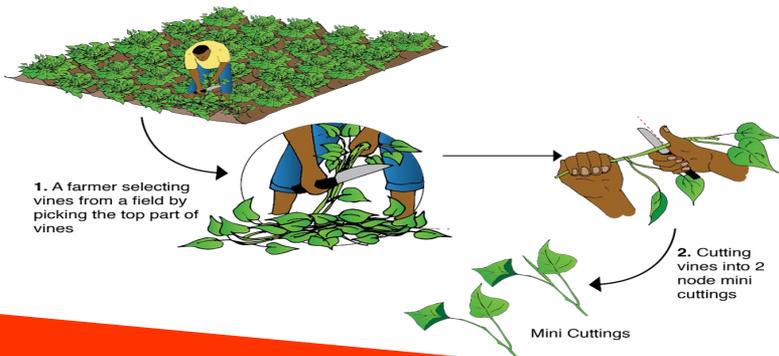


A fence can be built around the nursery to protect the plants from livestock.



The vines should be **harvested** for replanting into the field after 2 to 3 months . Harvesting should be done early in the morning or in the evening to avoid drying of vines.

Keep vines under the shed, avoid squeezing vines when packing and transport them in the cool hours of the day when there is need.



Land Preparation

Land preparation for field production of OFSP involves Site Selection, preparing ridges, burying manure in the ridges .

Site Selection

Use a flat land free of stumps and rocks. In the event that you use a slope, the orientation of the ridges should be against the slope and not with the slope.

Ridges are recommended because they provide more room for the growth of roots and ease harvesting.

Spacing

The distance between one ridge top to the other should be 1m

The average height of the ridges should be 45cm

1. Good arable flat fertile land



2. Waterlogged land



3. Rocky and hilly land

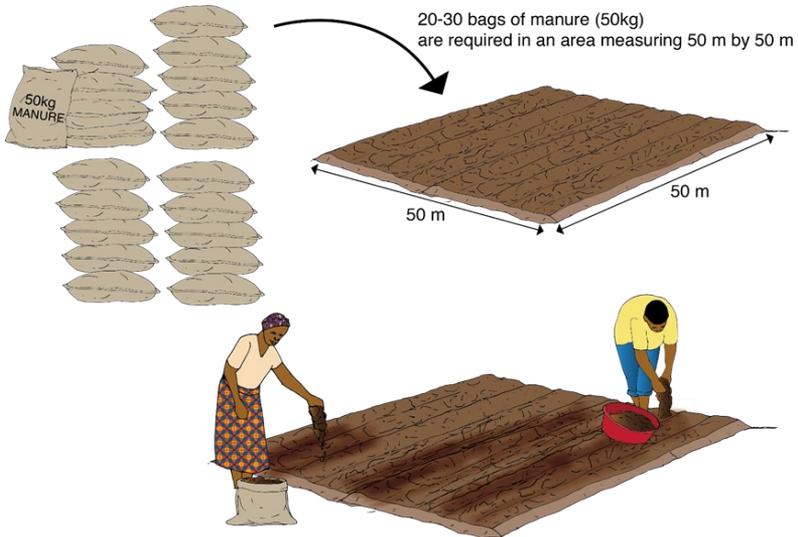


Fertilization

Fertilizers derived from animal matter, human excreta or vegetable matter (compost, manure) can be applied. Manures should be applied 3 to 4 weeks before planting.

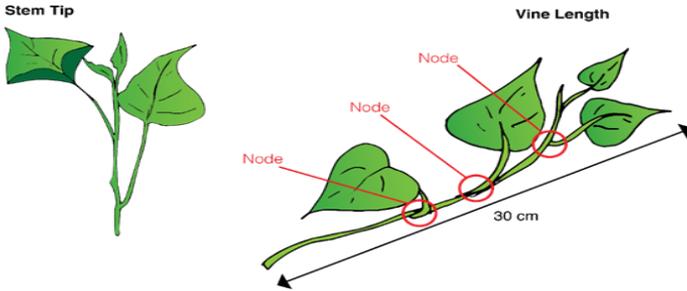
Sweet Potato requires 1000 to 1500 kg/Lima of well-decomposed kraal manure, which should be broadcasted well into ridges during land preparation at three to four weeks before planting.

Potassium (K) is the most important nutrient for OFSP and can be found in ash, so adding fire ash to the soil can as well help prevent potassium deficiency.



Can you explain why we use ridges?

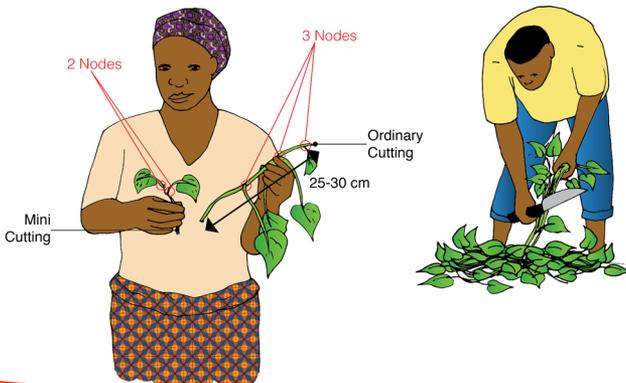
PLANTING MATERIAL



Planting material of sweet potatoes are called vines. It is at planting material selection that one can choose to plant any OFSP variety. A farmer who does not multiply his or her own vines should obtain them from reliable sources, i.e. vine multipliers who have good control of quality and maintain pure varieties.

The age of the mother crop is an important factor. The mother crop should be 2-3 months old. Vines from 2-3 months old crop are more vigorous and comparatively free from weevils. The vines should be free from pests and diseases .

Vines should not be dry at planting for good plant establishment.



PLANTING

The planting operation involves pushing the lower parts of the vine cuttings into the soil, such that they are nearly horizontal.

Spacing between vines on the ridge should be 25-30cm, and this would result into a total population of 8,333 vine cuttings per Lima (Or 33,333 cuttings per Hectare).

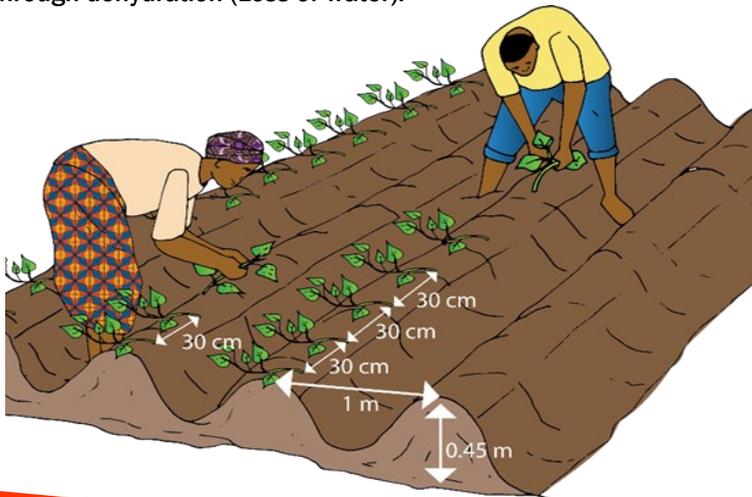
It is important to have sufficient planting materials by the onset of the rains to achieve a set target.

Planting time is the period in which local conditions such as rainfall and temperature permit normal plant growth. OFSP can be planted at any time so long as there is no frost and there is sufficient moisture in the soil.

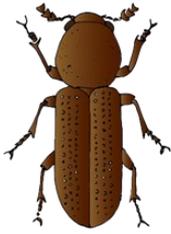
The recommended planting time for OFSP is at the onset of the normal to above normal rains. It is best to plant OFSP early in the rainy season so that it has the entire rainy season to grow.

Late planting in the growing season may expose the crop to insufficient rainfall and weevil damage. Weevil damage reduces both yield and quality of storage roots especially during dry spells.

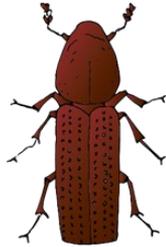
Farmers should monitor the weather in order to plant timely: When rains are highly predictable to avoid loss of planted vines through dehydration (Loss of water).



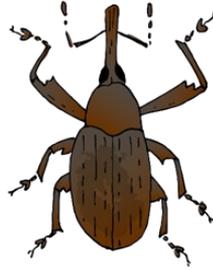
COMMON PESTS AND DISEASES



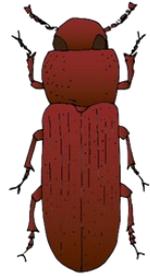
Lesser Grain Borer



Larger Grain Borer



Weevil

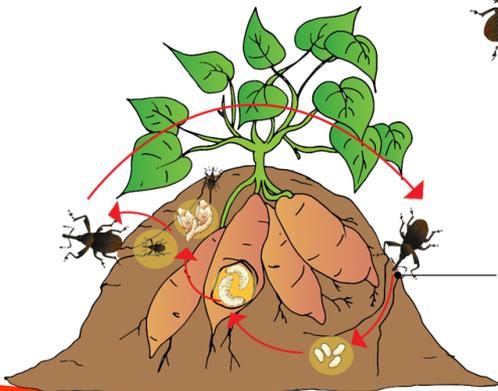
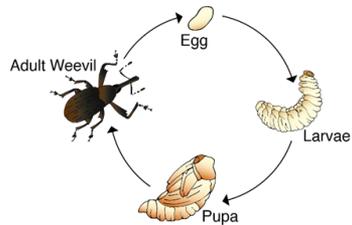


Red Flour Beetle

The weevil is the chief pest of OFSP



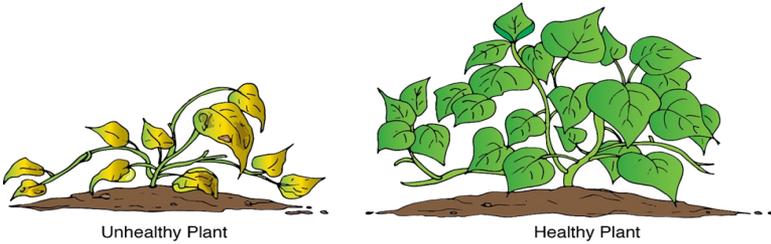
How does it damage the Crop?
The most damaging stage of weevils is the larvae stage. The larvae mainly attack stems and roots, although they may also feed on leaves. Adult weevils lay their eggs in the bases of vines and in exposed roots. The larva stage is the most destructive stage.



Adult Weevil entering crack in a ridge

CROP PROTECTION

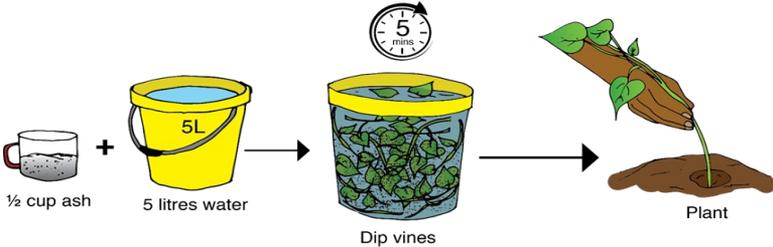
The OFSP field has to be well managed in order to ensure a healthy and quality harvest.



Use Clean Planting Material

A good way to protect the crops in the field is by using clean plant material.

Planting material should be disinfected. This can be done by dipping vines in a mix of $\frac{1}{2}$ -cup ash in 5 litres of water for 5 minutes on the planting day just before planting.

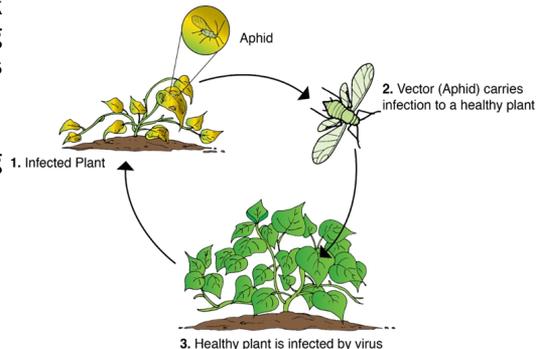


Remove Diseased Plants

Get rid of diseased plants to avoid vectors carrying diseases, bacteria, fungi or viruses from one plant to the other.

Farmers should look out for the following signs and symptoms in diseased plants.

- stunting
- Leaf narrowing and distortion
- Vein clearing
- Discoloration

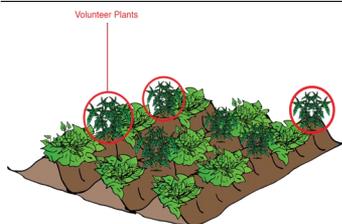


RECOMMENDED MANAGEMENT PRACTICES

Farmers should integrate as many as possible the following good field management practices.: Field sanitation& hilling up, weeding, using clean planting materials free of pests ,early harvesting , Crop rotation, Barrier crops , Mulching and flooding.

Field Sanitation & Hilling Up

Ensure the field is clean at all times.Hilling up refers to the covering of cracked ridges and exposed roots with fresh soil to reduce damage by weevils.



Weeding

Get rid of unwanted plants in the Sweet Potato field. This can be done by hand or using a hand hoe.

1. Weeding by hand picking

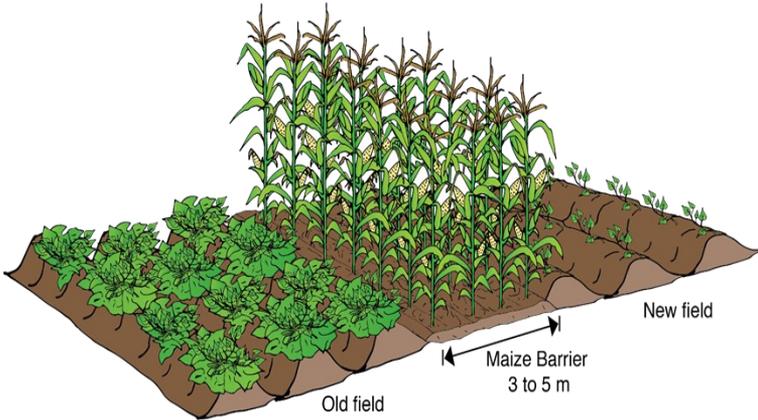


2. Weeding with a hand hoe



Use of Barrier Crops

cassava, maize, bananas or sorghum can be used in strips at least 3-5m wide between existing Sweet Potato fields and your newly planted field.

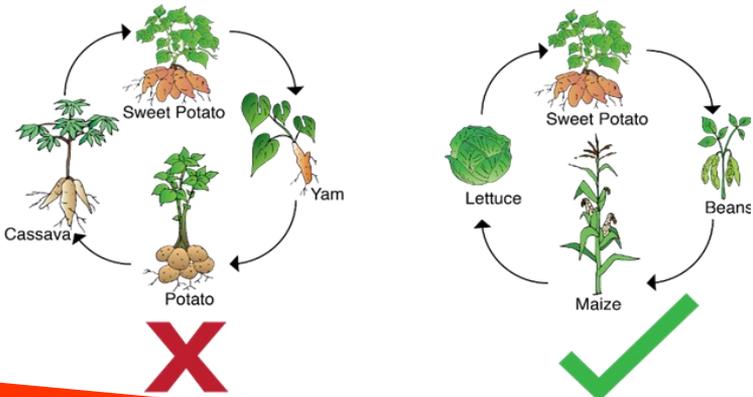


Crop Rotation

Crop rotation helps prevent the build-up of weed populations and reduction of field pests and diseases.

In crop rotations, OFSP should never follow roots (Cassava, Yams) or tuber (Irish Potato) crops, because these have almost similar nutrient requirements.

In a proper crop rotation, OFSP can follow either cereal such as maize, sorghum, rice, finger millet or legumes such as beans, cowpeas, soybeans and sesame.



HARVESTING

When should OFSP be harvested?

OFSP has no specific time of maturity. It continues to grow as long as **environmental conditions remain favorable**. The harvest time is determined by expected root size. This implies that OFSP should be harvested when the bulk of roots have reached the **desired size for consumption or marketability**.

In some varieties, harvesting can be done within 3-4 months while late maturing varieties may take as long as 6 months. Olympia variety is ready for harvest by the 5th Month with a potential yield of 6,250.00 kg/Lima with good management practices.

Normally harvesting OFSP takes place around April, May, June, and July depending also on the time of planting. Piece meal harvesting is done, where roots are removed from the plant while small ones are left to continue bulking.

What are the indicators of maturity in OFSP?

Indications of maturity include; yellowing of leaves, drying of vines, releasing of Sap from mature roots and cracking of ridges though this could also be due to moisture stress or soil related issues.

During harvest, avoid bruising the roots as this would lower their market value by making the roots prone to pathogen infection in the end and lead to root rots.

Delayed harvesting encourages weevil infestation and mole attacks.



Expected yield and size from one OFSP root Under favourable conditions.

OFSP harvested using the hand hoe



Heaps of OFSP in the field after harvesting

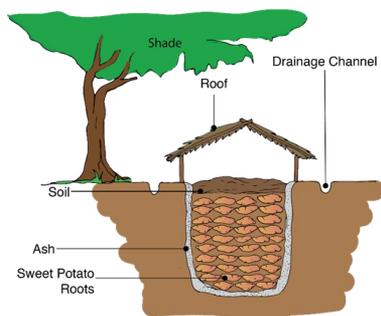
Each day's harvest must be moved from the field to a nearby shed for grading.



OFSP must be graded after harvesting to determine which size is suitable for the market, home consumption and particular post harvest processes.

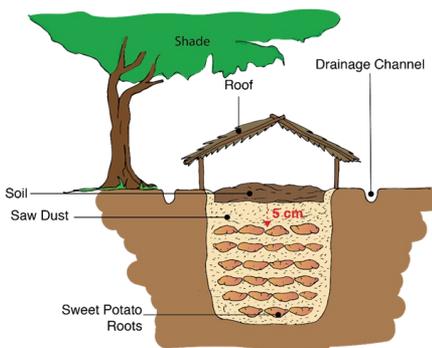
POST HARVEST PRACTICES - Storage

Post harvest practices address issues of handling and storage after harvest. They are critical to reducing losses, to maintain quality, preserve nutrient content and earn higher prices at the market.

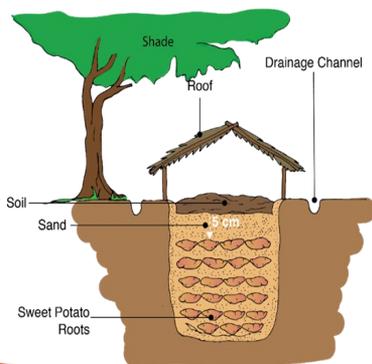


Pit Storage: Dig a pit of 0.5 x 0.5 m. Line the bottom of the pit with clean dry grass or dry sticks. Pack cured and ash treated roots in the pit up to 15cm from the upper ground level. Cover lightly with dry grass and top soil. Finally, cover with a mat or any metal sheet to keep away rainy water in case of rains

Saw dust heap: At the corner of a storage house, place a layer of sawdust of about 10 cm thick. Place cured and ash treated roots on the sawdust and cover with about 5 cm of sawdust.

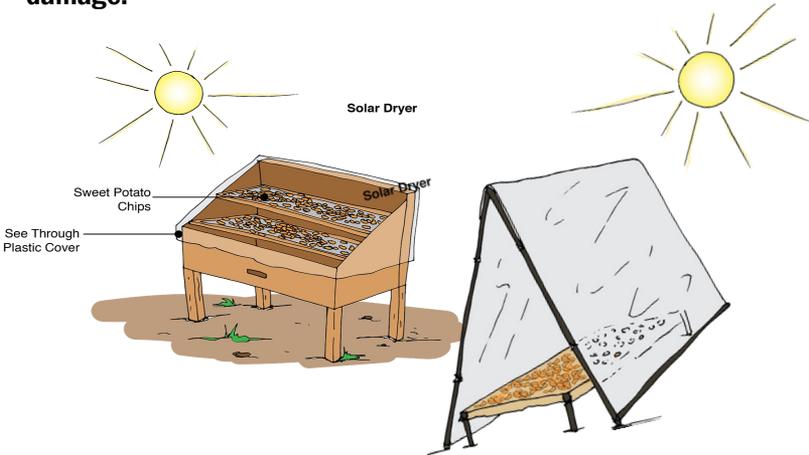


Storage in Sand: Get a clean and dry polythene container that can accommodate the quantity of roots available. Line it with either a dry newspaper or grass at the bottom. Put a layer of sand followed by a layer of OFSP roots. Continue this process until the container is filled with a final layer of sand. The container can then be protected from moisture getting to the roots by covering it. The container can then be placed in a cool dry place



POST HARVEST PRACTICES - Handling

Make *Insemwa* (dried sweet potato): Freshly sliced or wedged OFSP chips can be parboiled for 5 minutes or more then dried under a shed to reduce likelihood of infestation and insect's damage.



Enjoy the nutritional value of OFSP by making different products from its puree. Follow Women Who Farm Africa on social media for more recipes.

1. Wash sweet potatoes with clean water



2. Peel sweet potatoes



3. Boiling/cooling



4. Smashing



5. Put smashed sweet potatoes on a plate



6. Products such as fritters can be made from the puree



ACKNOWLEDGEMENTS

Women Who Farm Africa thanks the women farmers for their willingness and commitment to improving their farming practices: A very encouraging attitude in the fight against hunger.

Utmost gratitude goes to the lead trainers Sibajene Mueda and Serah Champo for delivering quality expert knowledge to the women farmers and is also grateful to all individuals that supported the project in various capacities.

Sincere gratitude also goes to Harvest Plus Zambia for providing the women with printed learning materials during the project.

Special thanks goes to the Alliance for Science for funding this undertaking that is meant to build the capacity of women farmers of providing nutritious food and ending hunger for their families.

Thank you for joining in our slogan: Keep Calm! African Women will Feed the World!

Literature Consulted

Harvest Plus Zambia Brochures.
Orange Fleshed Sweet Potato Farmer Manual, ZARI/ MOA.



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