TRAINING MANUAL FOR PRODUCTION OF ORANGE FLESHED SWEETPOTATO (OFSP): PLANTING TO HARVESTING

A TRAINING OF TRAINER MANUAL PRODUCED BY THE INTERNATIONAL INSTITUTE OF TROPICAL AGRICULTURE UNDER THE STRENGTHENING NUTRITION IN PRIORITY STAPLES (SNiPS) PROJECT

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Acronyms and Abbreviations

DAP	Days After Planting
DWD	Dry Weight Basis
FAO	Food and Agriculture Organisation of the United Nations
IITA	International Institute of Tropical Agriculture
IPM	Integrated Pest Management
LGA	Local Government Area
MAP	Months After Planting
M.A.S.L.	Metres Above Sea Level
N	Nitrogen
NPK	Nitrogen, Phosphorus, and Potassium
OFSP	Orange-fleshed Sweetpotato
RAE	Retinol Activity Equivalents
RH	Relative Humidity
SP	Sweetpotato
SRs	Storage roots
SSA	Sub-Saharan Africa
ToT	Training of Trainers
USA	United States of America
USAID	United States Agency for International Development
USD	United States Dollar
USDA	United States Department of Agriculture
VAD	Vitamin A Deficiency
WAP	Weeks After Planting

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Executive Summary

Sweetpotato (*Ipomoea batatas*) originated in Central America or north-western South America from where it was introduced to Europe, Africa, Asia and North America in more recent times. Sweetpotato is now cultivated in nearly all parts of the tropics and sub-tropics as well as in the warmer parts of the temperate regions (CIP, 2019). This is because Sweetpotato is a dry-land crop, tolerant to a wide range of edaphic and climatic conditions. It is more tolerant of cold than other tropical root and tuber crops, hence, it can be grown at altitudes as high as 2500 m. China is the highest producer of Sweetpotato in the world, followed by Malawi, Tanzania and Nigeria (FAO, 2023). In more than 100 developing countries (including Nigeria), Sweetpotato is a smallholder crop grown with limited inputs on marginal soils. The yields in these developing countries are therefore far below the average for developed countries. Sweetpotato is a rich source of calories, fibre, micronutrients and vitamins when consumed. Its bio-fortification (as a means of addressing Vitamin A Deficiency (VAD) through nutrition based approach) led to the development and release of Orange Fleshed Sweetpotato (OFSP).

Orange Fleshed Sweetpotato (OFSP), rich in β carotene (pro-vitamin A), is one of the well established and documented bio-fortified crops in Africa. It is the only bio-fortified crop providing up to 100% of daily vitamin A requirements when consumed (Bouis and Saltzman, 2017). Just 125 grams of most OFSP varieties can supply the recommended daily allowance of vitamin for children and non-lactating women (300-700µg RAE). According to Ezeocha, *et al. (*2010), OFSP are naturally bio-fortified with β carotene. Its consumption has been reported to improve vitamin A status in children. It can serve as a feasible long-term food-based strategy for controlling VAD in children in developing countries (van Jaarsveld *et al*., 2005; Korieocha *et al*., 2009). Strengthening the value chain (production, processing, marketing, and consumption) of OFSP in Nigeria is a key opportunity for addressing malnutrition and improving rural livelihoods. Leaves and peels of OFSP can be fed to animals thereby reducing cost of production of such animals. These can generate additional source of income for the farmers.

Guide for session planning

This guide is to help the Trainers develop their session plan for training of farmers on OFSP production practices. Trainers can alter any aspect of the guide to suit each locality where training is carried out so as to accommodate the peculiarity of each environment. The discussion questions should be asked before the main training sessions, while the review questions should be asked before the evaluation is conducted.

Delivery steps	**Discussion questions**	**Review questions**
1. Introduction (Trainer, Training Assistants, Learners). 2. Purpose of the training 3. Discussion questions 4. Presentation 5. Discussion questions 6. Practical sessions (workshop and field) 7. Group work and presentations 8. Feedback and Evaluation 9. Summarize 10. Review questions 11. Questions and answers	1. What is the source of your planting materials for OFSP? 2. How do you maintain your planting materials during dry season? 3. How do you identify land suitable for OFSP production? 4. How do you harvest and store OFSP roots? 5. What are the challenges in marketing and utilisation of OFSP storage roots? **6.** How do you want to promote the use of OFSP roots among people in your locality?	1. What is the importance of OFSP in human nutrition? 2. What are the likely causes of low productivity in OFSP production and how can they be prevented? 3. What lessons have you learnt and how do you intend to implement them? 4. Which of the new methods learnt in this training do you intend to adopt? 5. What is your projection for the next five years in OFSP production and utilisation?
Recommended training methods	**Activities**	**Materials**
1. Presentation 2. Demonstration 3. Learn by getting involved 4. Individual exercise 5. Group practical session	1. Each participant will set up storage of OFSP roots using dry sand. 2. Each participant should be allowed to prepare cuttings, mark field and plant. **3.** At the end of each activity, give room for questions and answers	1. Storage roots of OFSP 2. Cuttings of OFSP 3. Land prepared with ridges at about 60-75 m apart. 4. Twine, pegs, secateurs, cutlass 5. Buckets, old newspaper, coarse sand and nethouse (if available)

Introduction

There is need for each country to be self-sufficient in food production and be able to export to countries that cannot meet the nutritional needs of her citizens due to natural factors or sudden crises. Also, each country should leverage on comparative advantages for some crops. Nigeria is currently the fourth highest producer of Sweetpotato globally (FAOSTAT, 2023) but can improve further not only in terms of total output but in terms of productivity per land area. Such increased productivity can come from cultivation of improved varieties (with promising higher yields) and adequate agronomic practices (good tillage system, timely planting, proper weeding regime, prompt pest and disease management, timely harvesting and proper storage and marketing).

Of about 88.9 million metric tons of sweetpotato produced globally in 2021 on 7.4m ha, China accounted for about 61.5% while Africa was responsible for about 33.7% of the total production (FAOSTAT, 2023). Nigeria, with production of 3.94 million metric tons harvested from 1.5m ha, accounted for 4.4% of the total world's production (FAOSTAT, 2023). Nigeria is the third highest producer in Africa after Malawi and United Republic of Tanzania and fourth globally (FAOSTAT, 2023). Production of cassava (63.03 m tonnes) and yam (53.38 m tonnes) in Nigeria is far more than that of Sweetpotato though the latter has more potential in terms of nutritional value and ease of production. The crop has comparative short life-cycle on the field and potential for higher dry matter production (Nedunchezhiyan *et al*., 2012), hence, it


Sweet potato storage roots immediately after harvesting

is ranked as the foremost root crop in terms of calorie value. It is also a potential feedstock for bio-ethanol production (Nedunchezhiyan *et al*., 2012). These factors underlying the need for training of farmers in improved cultivation practices to encourage more farmers to produce the crop. Increase in Sweetpotato production in Nigeria in the last 25 years (about 10-fold) has been mainly due to expansion of land used to cultivate the crop and not due to increase in yield per land area. Consequently, the crop yield is still as low as 2.63 tons/ha (FAOSTAT, 2023). The observed low yield can be attributed to use of outdated production techniques and inputs. In most instances, use of unimproved old cultivars and cultivation of Sweetpotato under mixed cropping often done with incompatible crops are the culprits (Ebem *et al*., 2021). Hence, the need for Sweetpotato farmers in Nigeria to adopt the best cultivation methods and use of adequate inputs to increase productivity per land area. But how can the farmers know unless they are told/shown. The recent development and release of OFSP (which has comparative nutritional, production and market advantage over existing conventional Sweetpotato varieties) necessitates the need to publicize the variety among Sweetpotato farmers in Nigeria and train them on the use

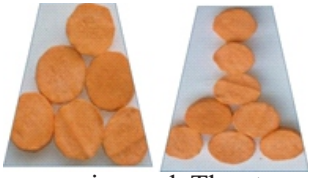
of improved cultivation practices for its production. This manual was therefore put together using simple terms and locally available materials to ensure the farmers are able to understand and adopt the techniques learnt.

Objective

The main objective of putting this training manual together is to equip trainers with the information needed to educate farmers in Nigeria on the availability, nutritional, production and market potentials of OFSP as well as improved agronomic practices that can enhance its yield thereby boosting their productivity and increasing their profit margin. This will in turn improve the livelihoods of the farmers. Also, the manual was put together in a form to enable the farmers adopt the techniques learnt without difficulties. Hence, this easy-to-follow training manual was developed using simple terms and adequate pictures to enable farmers learn fast and adequately. In this manual, we are able to show how to use net house, net tunnel (the type that can be constructed locally) and Triple-S technology for rapid multiplication of quality vines of OFSP. Also, improved methods of root production, disease identification and management and varietal identification are articulated in this document.

Uses of Orange Fleshed Sweetpotato

Roots of Orange Fleshed Sweetpotato are rich in carbohydrates and Vitamin A and the leaves are rich in protein. It can therefore supply more edible energy to its consumers than crops such as wheat, rice and cassava with a considerable amount of Vitamin A precursor. Its fresh roots can be eaten after boiling,



baking, roasting, frying etc as a main meal. The storage roots can also be processed into flour (which can be used to prepare different snacks), noodles, natural colourants, candy and chips. The chips are highly cherished by children and are also a good snack for adults, hence, its promotion will greatly enhance the nutrition of the populace in areas where OFSP is cultivated and utilised.

The leaves can be processed into animal feed, hence, it is a good component of mixed farming system prevalent in most parts of Nigeria where OFSP is cultivated. The vines may be fed to livestock directly or after some level of processing. Also, peels of OFSP can be fed to livestock.

Brief botany of orange fleshed Sweetpotato plant

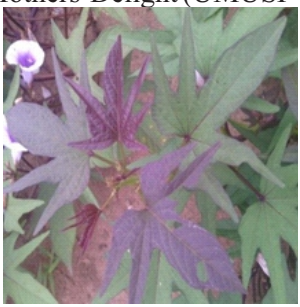
Orange fleshed sweetpotato like other varieties of sweetpotato is normally grown as an annual though it is a vine-like perennial herb. It has trailing or twining stems that contain latex in all its parts. The stems (3-10 mm in diameter) can be prostrate or ascending with internodes varying from 2 to 20 cm long. The underground storage organs of OFSP are storage roots (SRs) like that of cassava. Roots destined to become thickened (usually 5-10) are structurally different from ordinary fibrous roots at the early stage.

Classification, Identification and Selection of Orange Fleshed Sweetpotato Varieties

Basis for classification of Orange fleshed Sweetpotato cultivars

1. Root texture after cooking
2. Colour of the storage root skin
3. Shape of the storage roots
4. Shape of leaves
5. Depth of rooting
6. Time of maturity

Figure 1: Variation in storage root size and shape of Orange Fleshed Sweetpotato Mothers' Delight (UMUSP-3)



Solo Gold (UMUSPO/4) OFSP (Afuape *et al*., 2018)

King J (UMUSP-1) OFSP

Figure 2: Variation for leaf shape of orange fleshed sweetpotato

Varietal selection

Currently in Nigeria, there are three varieties of OFSP (Table 1). Proper varietal selection can be based on the location of the farm. This is because the performance of crops is influenced by their environment. Summarized in Table 1 are the varieties that are well adapted to different agro-ecological zones in Nigeria which can help farmers make suitable decision in this regard.

Table 1: Characteristics of existing orange fleshed sweetpotato varieties in Nigeria

Variety Name	**Original Name**	**National Code**	**Outstanding Characteristics/Potential Yields**	**Agro-Ecological Zones**
UMUSP 1/ King J	NRSP/05/022	NGIB-12-6	High beta carotene, high dry matter, high root yield and resistant to SPVD (63.63 t/ha)	Rainforest and Northern Guinea Savanna
UMUSP 3/ Mothers' Delight	CIP 440293	NGIB-13-8	High carotene content and high yield (56.4 t/ha)	Guinea and Sudan Savanna
UMUSPO/4 Solo-Gold	A027	NGIB-18-9	High root carotenoid content, high root yield, resistant to Sweetpotato virus disease and high dry matter content, (26.8 t/ha), matures in 3-4 months	Rain forest, Guinea and Sudan Savanna.

Planting materials

Orange fleshed sweetpotato is usually propagated from vine cuttings though setts (about 20-50 g) prepared from robust, healthy SRs can also be used. The setts should be planted only at about 3cm

soil depth. However, propagation of OFSP using setts derived from SRs is not always recommended because it usually results in very low yield. Vine cuttings give rise to plants free from soil-borne diseases and SRs of more uniform size and shape.

The use of vine cuttings also allows total consumption of all the harvested SRs without reserving some for planting. Vine cuttings from the stem apex are preferred to those from the middle and basal portions of the stem. The use of middle and basal vine cuttings for propagation leads to little decrease in expected yield. Vine cuttings collected from young plants are liable to produce higher yields than vine cuttings from old plants. Though a vine length of about 30 cm is recommended for planting (CIP, 2019), the SR yield tends to increase with increase in the length of vine cutting. Sources of vine cuttings for planting the new field include nursery plots, sprouts from storage roots and vines from plots established earlier in the season (successive planting).

Rapid Multiplication of Quality Vines of Orange Fleshed Sweetpotato

Commercial propagation of OFSP can be achieved through the use of cuttings from mature vines on growing plants. The OFSP can be propagated by cutting, rooting, and subsequent planting of the rooted vine cuttings directly into the field. Cut a vine of about 30-40 cm from healthy plants with some length above node, remove all leaves in the lower 10 cm, and place in water. Change the water every 3-5 days. Roots will appear after 2-3 weeks and it will be ready for transplanting. Ensure you leave a few leaves and about 5 buds on each vine when cutting so that the plant can continue to photosynthesise and grow.

Taking off the majority of leaves is important to keep the plant from drying out due to evapotranspiration. Leaving a few leaves on the top ensures the plant's ability to do photosynthesis. The SR of OFSP is anatomically different from a normal root in the sense that it has the capacity to produce buds and sprouts on the root skin. Hence, it can be used for propagation, just like yam tubers. When starting a small farm, the SRs of OFSP can be planted or induced to produce new vines. The new plant can be produced by directly planting the whole SRs (either harvested from farmer's field or bought in the market) in the soil which will produce roots and develop new vines rapidly. The SRs that are yet to bud should be placed horizontally in the soil and covered halfway up with soil. After sprouting at about 2-3 weeks after planting (WAP), when the SRs start to produce tiny vines, cover the rest of the root with topsoil but ensure the tip with the shoots is exposed. The SRs that have started sprouting may be cut into two or more setts depending on the size of the SR with each having at least one sprout and planted separately. Small SRs can be selected at harvest and stored in a dry, cool and well-ventilated place as planting materials for the following season. The SRs of OFSP can also be left in the ground throughout the dry season, either intentionally or due to inability to recover all the storage roots during harvesting. They will sprout at the onset of the rainy season and vines can be collected from such for propagation. This is due to the good in-ground storability potential of SRs of OFSP just like yam tubers and SRs of some cassava varieties. This potential of OFSP can therefore be tapped into to ensure availability of planting materials at the beginning of new planting season. However, dependence on such new plants from previously established fields for vine cuttings may not be reliable due to some uncertainties such as fire incidence during dry season, destruction by pests (most especially rodents), mix up of varieties etc. Therefore, farmers need to adopt some strategies that will ensure the **timely availability** of **quality** planting materials of **desirable varieties** in **required quantity**. This calls for good knowledge of simple but improved technologies that farmers can adopt for the economic production of vines of OFSP. To achieve this, use of net house, net tunnel and Triple-S technology for rapid multiplication of quality vines of OFSP are discussed below.

Nethouse

Nethouse (Figure 3) is a structure that can be used for propagation of OFSP vines. Nethouses can be constructed using locally available materials. It is widely used as propagation structure in tropical areas, where there is no need for air conditioning of the structure. The roof can be covered by shade net. The structure can be erected under a tree to provide shade thereby keeping the house cool. The netting material allows the free flow of air, minimizes build-up of temperature inside the nethouse, and reduces radiation levels by about 15%. The porous nature of the net helps it to withstand strong winds without much damage (Talekar *et al*., 2003). Its size depends on the need of each farmer. Cuttings or SRs of OFSP are planted in pots or in the soil where the structure is built, and watering is done regularly to ensure good sprouting and growth of the vines. According to Talekar *et al*. (2003), nethouses should be located at an elevated and well-drained area and durable quality 32-mesh nylon netting that is uniformly weaved should be used. The authors stated further that the nethouse should be kept clean and tightly sealed at all times. It is recommended that crop rotation system be adopted in nethouses to reduce pest and disease problems. The SRs and/or vine cuttings of OFSP should be planted in the nethouse with adequate spacing to ensure easy access to the plants.

Figure 3: A typical nethouse

(Source: https://www.slideshare.net/kuttubaveesh/plant-propagation-structures-in-plant-nurseryppt)

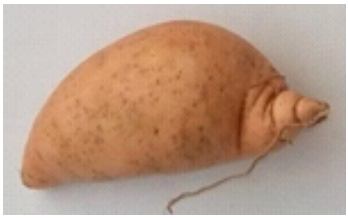
Net tunnel

Farmers who cannot afford the high cost of net houses may use net tunnels to produce OFSP vines. Net tunnels are constructed and maintained the same way as net houses. It is good to relocate net tunnels each season to avoid build-up of soil-borne pathogens and pests.

Figure 4: Pictorial view of typical net tunnels
Source:https://www.bing.com/images/search?q=net+tunnel&qpvt=net+tunnel&form=IQFRML&first=1

Triple-S technology

Storing in Sand and Sprouting (Triple S) is a technology based on knowledge gathered over time in the cultivation of root and tuber crops. Yam tubers, cocoyam corms and cormels, and Sweetpotato storage roots (SRs) not harvested at maturity but rather left in the soil throughout the dry season will sprout to give rise to new plants the following rainy season when the condition is favourable for such. Based on this attribute of the crops, the triple-s technology can be used to propagate them. The technology, though seems simple, is a good way to ensure there are enough planting materials for generating and multiplication of OFSP vines shortly before the commencement of new planting season. This will also



ensure varietal integrity in the sense that a farmer can keep good SRs of each variety separately during the dry season and use them to generate vines for each variety the following season. It will also reduce the cost of weeding and watering nursery throughout the dry season. The SRs are stored in sand in a cool dry place over the dry season and planted about 6-8 weeks (in the nursery) before intended date of planting on the field so that it will sprout and produce vines shortly before the planting date (Stathers *et al*,. 2017). Planting of the SRs 10 cm deep in the soil and watering them for about 10 weeks can enhance vines production (Namanda *et al*., 2013).

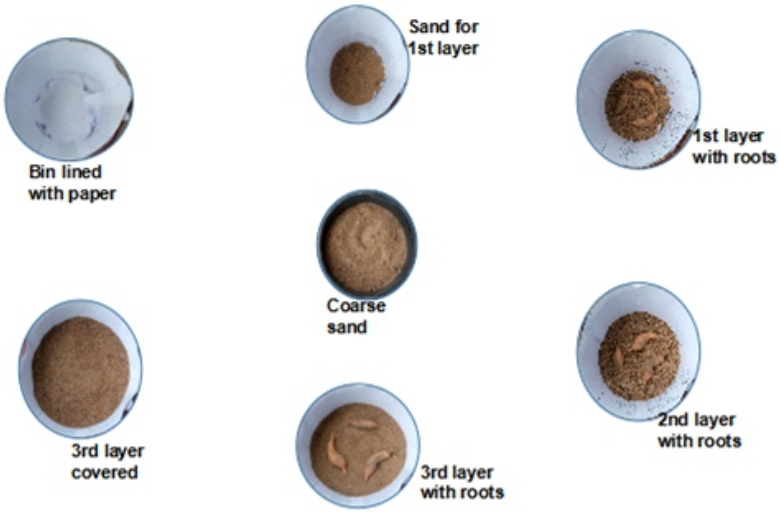


Figure 5: Storage of orange fleshed Sweetpotato roots in dry sand

Production of Sweetpotato storage roots

Successful production of Sweetpotato roots requires attending to issues timely and adequately using appropriate tools.

Site Selection

Orange Fleshed Sweetpotato grows best at temperatures above 24°C while growth is severely retarded when temperatures fall below 10°C. As a sun-loving crop, OFSP performs best where the light intensity is relatively high. Short-day conditions promote the formation of SRs while long days favour vegetative growth (vine development) at the expense of the SRs. The annual rainfall requirement for OFSP ranges between 750 and 1000 mm with about 500 mm falling during the growing season. Due to the fact that OFSP cannot withstand waterlogging, it grows best on well-drained, deep and moderately fertile sandy-loam soils. It is also sensitive to alkaline and saline soils, hence, soil with pH of 5.6 to 6.6 is preferred for its cultivation. All these should therefore be taken into consideration while selecting site for Sweetpotato cultivation in any agro-ecological zone of Nigeria.

Land preparation for Orange Fleshed Sweetpotato production

Good land preparation usually promotes fast sprouting and crop establishment. It also minimizes weed competition. Orange Fleshed Sweetpotato can be grown on ridges, mounds, and flat land like cassava and yam. However, cultivation of OFSP on mounds and ridges gives higher yield than when grown on flat land. Planting on ridges is the most universally recommended method and the higher the ridge (up to a ridge height of 36 cm), the greater the yield. Orange Fleshed Sweetpotato should not be replanted on the same plot nor new field next to the old fields to prevent movement of pests and diseases from an old field to a new crop.

Planting date

Planting should be timed such that the crop matures towards the end of the rainy season. It is possible to grow OFSP twice in a year most especially in the humid tropics depending on the maturity period of the variety cultivated. However, planting should be done after rain is well established at each location i.e. when rainfall amount is $\geq$ 100 mm per month. Therefore, no blanket recommendation can be made in terms of planting date, rather, the decision on planting date should be based on maturity period of the selected variety, location (agro-ecology) and period of stability of rainfall. However, OFSP can be produced under irrigation during dry season. The clay content of the soil to be used for cultivation under irrigation should be moderate to high to ensure good water retention. Highly sandy soil will encourage leaching thereby increasing water demand which will reduce profitability of the business. (Trainers should practice with the farmers how to test for soil clay content by forming some of the soil particles into a ball). Depending on the farm size and water source,

equipment such as watering can, drip irrigation lines, sprinkler, pumping machine etc are needed for irrigation. There is also need for water tanks, buckets, shovel, digger and plumbing tools to ensure good irrigation practice.

Spacing

Vines of OFSP should be planted using intra-row spacing of 25-30 cm along ridges made 60-75 cm apart. When mounds are used, 2-5 vine cuttings may be planted per mound depending on size of the mounds. Cultivars with trailing stems should be planted wider apart than those with semi-trailing stems. As plant population increases, there is a decrease in number, mean weight and yield of SRs per plant. You can control average size of the root more easily by adjusting intra-row spacing than by inter-row spacing.

Figure 6: Newly prepared land for cultivation of OFSP

Figure 7: Vine cuttings of OFSP (King J)

Planting

Insert the vine cutting into the soil at an angle, allowing half to two-thirds of its length (having 3-5 nodes) to be in the soil, then cover up the portion of the vine in the ground with soil. Planting of the vines can be done manually using simple tools such as cutlass and hoe. If available, you can use single-row or multiple row transplanters.

Figure 8: Planting of vine cuttings of OFSP

Weed Management

Weeding in OFSP cultivation is very critical in the first two months of growth. Subsequently, the vines cover the ground and smother the weeds. To minimize weed invasion, land preparation should be timely and thoroughly carried out. Plan your operations in such a way that planting is done immediately after land preparation. Use of pre-emergence herbicide (Pre-H) (e.g. Atrazine-Metolachlor or Prometryn-alachlo or Lagon) may delay weed invasion for about 4 to 8 weeks depending on prevailing conditions and types of weeds on the field. As a result of this, you may not weed the sweetpotato plots at all, or you weed manually only once about 4 to 8 WAP. If planting is delayed after land preparation and some weeds already emerged on the field, apply post-emergence herbicide (Post-H) first before applying the Pre-H. Use Post-H with glyphosate as the active ingredient for fields where grasses and sedges are prevalent or paraquat (alternatively, glufosinate of ammonia) where you have more broad-leaved weeds. All herbicide applications should be carried out before planting except when storage roots are used as planting materials. Once the land is covered by the vines of OFSP, most especially the trailing varieties, you may only rogue once in a while till harvesting.

Fertilizer rate and time of application

Orange Fleshed Sweetpotato responds well to fertilizer particularly when the soil is depleted of nutrients. The type of fertilizer and rate of application depend on soil fertility level, soil type, variety cultivated and the environment. Hence, it is advisable to determine the nutrient status of the soil prior to fertilizer application. Application of excessive nitrogen will lead to much vine growth and delayed bulking of SRs, hence, fertiliser application should be based on soil test results. The fertilizer is best applied in two splits, first at or immediately after planting and the second application about one month later. Use of manure (plant or animal residues) to improve the fertility of OFSP field is a common practice among traditional farmers.

Growth phases in Orange Fleshed Sweetpotato lifecycle on the field

There are five phases in the growth cycle of OFSP (https://www.plantgardener.com/potato-growing-stages/) but their respective duration varies with cultivar and with environmental conditions prevailing in each locality.

Stage 1: The sprouting stage
Stage 2: The vegetative stage
Stage 3: Underground storage root Initiation
Stage 4: Storage root enlargement
Stage 5: Storage root dormancy

Management of pests and diseases in orange-fleshed sweetpotato production

1. Black rot disease of OFSP caused by *Ceratocystis fimbriata* is both field and storage disease.

Figure 9: Pictorial view of storage roots of Orange Fleshed Sweetpotato infected by black rot disease
Source:https://www.bing.com/images/search?view=detailV2&ccid=kl%2f%2fNsSJ&id

2. Sweetpotato weevil (*Cylas* spp) which is a global insect pest of Sweetpotato.

Figure 10: Pictorial view of Sweetpotato weevil (adult and larvae)
Source: https://www.bing.com/images/search?q=Sweetpotato%20weevil%20larva&qs=n&form=QBIR&sp=-1&lq=0&pq=Sweetpotato%20

3. Sweetpotato mosaic virus disease

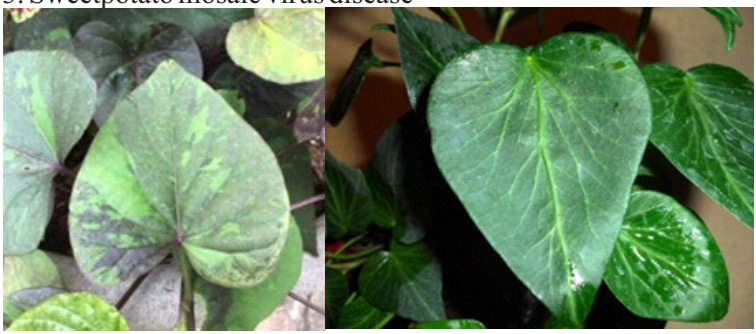


Figure 11: Leaves of sweetpotato plants infected with mosaic virus disease
Source:https://www.bing.com/images/search?q=sweet+potato+mosaic+virus+disease&id

According to (Onwueme, 1977), other pests and diseases include:
4. Fusarium wilt or stem rot caused by *Fusarium oxysporum* f. *Batatis*
5. Scurf caused by *Monilochaetes infuscans*
6. Feathery mottle complex
7. Internal cork disease
8. Leaf spot

9. Sting nematode, root lesion nematode and root knot nematode
10. Beetle (*Euscepes* spp.)
11. Vine borer which is the larva stage of the moth *Omphisa anastomosalis*.
12. Hawk moth (*Herse convolvuli*)

Good management practices are required to prevent infestation and infection by these pests and diseases, respectively. Insecticides can also be used but this should be highly minimized and should be after proper consultation with experts. Viral diseases are better prevented either through cultural practices or the cultivation of resistant varieties.

Harvesting

The yield of OFSP is determined by the length of the growing period, rainfall pattern during the growth phase, cultural practices utilised, soil fertility, the variety cultivated and some other factors. Orange Fleshed Sweetpotato can be harvested at 3-6 months after planting depending on the variety and the environmental conditions under which it is grown. Sometimes, leaf senescence signifies readiness for harvesting of OFSP. With experience, you can watch for the appearance of cracks at the soil surface just like for other root and tuber crops which is an indication that there are sizeable SRs beneath, ready for harvesting. Harvest timely and avoid early harvesting which can reduce the yield. Also, delayed harvesting renders the SRs roots fibrous, unpalatable and exposes them to attack by weevils, rats and rots (Onwueme, 1977; Lebot, 2009). Harvest when a reasonable number of the SRs are mature. To know if the SRs are mature, the sap exuded by them, when cut, does not readily turn dark (Onwueme, 1977). To meet up with market demand over a period of time, cultivate varieties with different maturity periods or plant sequentially. This may also enhance the profitability of the business because you will always have SRs to sell at all times. This way you can sell some of the produce when the market price is high.

Ensure that the SRs are free of surface wounds and bruises during harvesting to ensure long storage life and good market value. Ensure you thoroughly remove all bits of roots and vines of OFSP from the field. This is because the leftovers will sprout readily when the condition is favourable which may pose a serious problem for other crops planted on the same plot in the subsequent season.

Curing and Storage

Curing of SRs should commence immediately after harvesting to promote rapid healing of the wounds and bruises sustained during harvesting and transportation. Curing increases the toughness of the skin of SR (periderm); minimizes infection of the roots by microbes and makes them more resistant to wounding during subsequent handling. Curing occurs naturally in most parts of the humid tropics where the prevailing temperature and RH conditions are very close to those recommended for curing (exposure of SRs to 27-30°C and 80-90% for about 4 to 7 days) (Onwueme, 1977, Lebot, 2009). Hence, curing is done under ambient conditions in Nigeria for about 4-5 days. The cured roots should then be stored in a cool room with good aeration. The SRs can be stored in the ground until when needed or stored in underground pits covered with grass or by use of dry coarse sand as illustrated earlier. You can also store the roots on platforms or in baskets.

Annexes

To produce high quality planting materials that are true to type, each farmer should adopt documentation and labelling of their fields so that the purity of the varieties can be maintained. Also, isolation gap should be kept between plots used to multiply different varieties to avoid contamination most especially when the varieties look alike to an extent. This will ensure the planting materials produced command high price.

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