

2 Getting ready for sweetpotato production

2.1 Varieties

Farmers are always on the look out for new varieties with better characteristics, such as a higher yield potential, good root characteristics (determined by shape, flesh colour, dry matter content, nutritional value etc), appreciable tolerance to major pests and diseases, drought tolerance, a better taste, a higher market price, the ability to produce enough planting material, long in-ground storability, and with a shorter period to harvest. But can we expect breeders to produce a super variety like that? The fact is that a short duration variety automatically has a relatively lower yield potential, and often high yielding varieties lose on taste. Besides, each variety performs differently under different situations, depending on location-specific and seasonal conditions, highlighting the importance of varieties being tested with farmers under different agro-ecological zones so that farmers can select those most likely to perform well in their specific locations. Farmers must therefore bear these conflicts in mind in order to choose varieties that fit and perform best under their prevailing farming conditions.

2.1.1 What to consider in variety selection

The following aspects could be considered in selecting a variety:

- desired characteristics of the crop and produce
- availability of planting material
- (prediction of) market demand at the time of harvest.

In order to determine the suitability of a new variety under their prevailing field conditions, farmers should conduct small-scale field and market trials to compare the characteristics of the new varieties with varieties they know well.

2.2 Planting material

The main requirements for obtaining a healthy crop (which is the only way to sustain good yields) is to maintain a fertile soil and use healthy planting material. To achieve this, we have to implement cultivation practices both adequately and in time for the specific growth stages of the crop. A healthy crop is better able to compensate for damage particularly if resistant to pests and diseases, enhancing its chances of producing a satisfactory yield for the farmers.

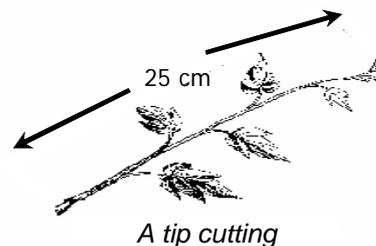
2.2.1 Selection of healthy planting material

Selection of healthy planting material is based on the following:

- Visual selection of vigorous mother plants to ensure they are free of any symptoms of pest and disease attack
- Positive selection (select cuttings from plants with proven performance, e.g. good yields, drought tolerance, tasty and/or marketable roots etc.)

Healthy planting material can be selected by visually identifying healthy, vigorous mother plants, free of pest and disease symptoms. A second method for planting material selection, called positive selection, emphasises the use of cuttings from plants that produced a high yield. The selected cuttings are then likely to be of a vigorous clone and free of viruses, and therefore chances of virus transmission to the next generation through the planting material are reduced. Ideally a combination of both these methods is used.

The top 25-35 cm of the vine is the best part to be used as planting material. This part most easily recovers from cutting and planting shock, and establishes faster than the lower parts of the vine. In addition, the tip is more likely to be free of sweetpotato weevil pupae, larvae and eggs and stemborer eggs.



2.2.2. Dry season preservation of planting material

In areas where there is a prolonged dry season, planting material is usually unavailable at the on-set of the rains. This is because the vines usually die off during the dry season or are eaten by livestock. Farmers then have to wait for vines emerging from leftover roots after the on-set of the rains before they can plant. In order to ensure availability of planting materials at the start of the rains, dry season preservation is necessary. This requires an organised selection of planting material during the final harvest.

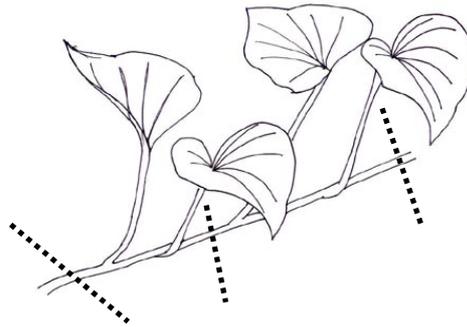
Dry season preservation of planting materials can be done by planting vines in swampy areas, under shade (trees or bananas) or near homesteads where planting materials can be easily looked after. To ensure good quality planting material there is a need for good care of the nursery.

- Good nursery management includes establishing planting material nurseries in clean areas (not next to an old or existing sweetpotato plot) and not re-using nurseries
- Careful selection of planting material by checking vines for weevil damage or disease symptoms
- Select vine tips, rather than middle or base parts of vines. The top 25 – 35 cm of the vine is best for planting. The vine base is more likely to contain weevil eggs, pupae and larvae. The tips also have the advantage that they recover easily from the shock of being cut and planted and grow faster than lower vine parts

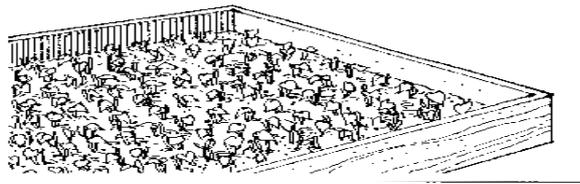
Wandering livestock are often attracted to, and then cause serious damage to sweetpotato crops and nurseries, during the dry season when other vegetation is in short supply. If possible, planting material nurseries should be protected from livestock damage by fencing them with thorns or other materials. The tethering or enclosing of goats and pigs helps reduce the risk of damage.

2.2.3 Rapid multiplication of planting material

Rapid multiplication is a technique used for overcoming the problem of otherwise low multiplication rates of vegetatively propagated crops such as sweetpotato and cassava. This technique is necessary in order to ensure adequate availability of planting material at the beginning of the planting season. Through this technique, planting material that is in short supply is increased rapidly, to ensure timely planting in the field. Only healthy, disease and pest-free vines from a two to three month old crop are used for multiplication. Since vine production is the main goal, the whole vine of the plant is utilised. The vine is cut into pieces called “mini” vine cuttings using sharp knives or secateurs to ensure clean cuts. Each piece should have one to three nodes (the bump at which the leaves branch off) depending on the portion of the vine from which it is cut.



A nursery bed is prepared with loose soil, mixed with compost or animal manure. The small cuttings are planted at very high density, only 10-20 cms apart, with at least one node buried under the soil. The nursery bed must be watered two or more times a day, particularly in the first few days, so that the surface never becomes dry. After two to four weeks the vines are ready for harvesting and planting.



A nursery bed

Clean planting material cuttings can also be produced from storage roots in a nursery bed. Healthy storage roots are selected from plants that produced a high yield, and planted in a nursery bed away from other sweetpotato crops. When the vines have grown long enough, they are cut at the stem base and planted directly in the field.

If large quantities of cuttings (vines) are needed, rapid multiplication should be done as described below:

- a) Vines growing from healthy storage roots in a nursery bed are cut when they have reached a length of about 30 cm.
- b) Each vine is cut up into cuttings of two or three nodes, the length of the vine section will depend on the number of nodes and the variety. A leaf should be kept on each cutting. The tip of the vine does not need to be discarded unless the tip is very thin. Single node cuttings may be used when the soil is constantly moist, but in situations where the soil dries out very quickly it is best to use cuttings of two to three nodes in length.
- c) A nursery bed is prepared with a mixture of loose, humus-rich soil, decomposed organic compost and kitchen ash. The cuttings are planted at a high density in the nursery bed with at least one node buried under the soil. The site selected for rapid multiplication of planting material should have fertile, easy to work, well drained soils and be near a water source. Light irrigation should be applied prior to planting.
- d) The nursery bed should be regularly watered to prevent it becoming dry especially during the first five days after planting in hot and dry environments. The nursery bed can be lightly shaded with a small grass structure to protect it from excessive loss of moisture.



Nursery bed showing planting distances for “mini” vine cuttings

- e) The cuttings should be planted upright with at least one node positioned under the soil, at a spacing of 20 cm between rows and 10 cm intra-row (50 cuttings per m²). Shallow planting should be avoided as it can lead to the vine cuttings becoming exposed after watering.

- f) After two to four weeks the cuttings will have developed enough roots and should be ready for transplanting. If the crop is going to be grown where the cuttings were originally planted, there is no need for transplanting. Growth rates can be increased by using a nitrogen fertiliser broadcast throughout the nursery bed. If the cuttings are to be removed from the nursery bed this must be done carefully to avoid damaging their roots. Transplanting should be done in the morning or in the late afternoon to avoid excessive evaporation, wilting and transplanting shock.

Care/ cultural management practices of rapid multiplication nursery beds

- Irrigate two times a day (early morning and late afternoon) with a watering can. Ensure that the beds do not become dry, especially during the first five days after planting. Watering is not necessary when it is raining. Avoid waterlogged conditions due to excessive watering.
- Periodically maintain the nursery beds – remove any weeds by hand.
- Eliminate diseased plants by roguing them out.
- Recover with soil any cuttings which get exposed in the process of watering.
- Place a label against each bed stating the variety and date of planting.
- Under very hot and dry conditions, erect shade over the nursery beds. Remove the shade when the first leaves start developing. Avoid keeping the nursery beds in heavy shade for more than two weeks, to prevent etiolation.
- Ensure that farm animals, such as goats and pigs, do not have access to the nursery site.

Harvest of the sweetpotato cuttings

Cut apical portions of vines (25 - 30 cm long) 5 cm above the soil level, leaving some nodes on the remaining stems, in order to ensure further production of cuttings from the axillary buds. The procedure of cutting vines above the soil surface ensures a 98% chance of selecting weevil-free plants.

It is possible to produce a second set of cuttings from the nursery bed a few weeks after the first cuttings have been transplanted if the nursery bed is well maintained.

2.2.4 Vine storage

Planting of sweetpotato cuttings is preferably done as soon as possible after they are cut and selected. However, this may not always be possible, for instance when it is too hot and the sunshine is too bright, when the field is not ready yet, when vine cuttings are to be sold or transported, or because of other constraints. Vine cuttings can be kept for a maximum of seven days. In order to preserve the food reserves in the stem of the cuttings, most of the leaves on the cuttings should be removed, leaving a few leaves at the tip. Then the cuttings should be tied in bundles with their bases covered with a wet cloth or sack. The bundles must be kept in a cool, moist and shady place. During the storage period, roots may develop at the base of the cuttings. The cuttings should then be carefully planted with the roots.



A bundle of sweetpotato cuttings with lower leaves removed and a damp sack around the base for temporary storage in a cool shady place while awaiting planting

2.2.5 Sources of planting material

In areas where rainfall occurs throughout the year, farmers may be able to obtain most or all of their planting material from a mature sweetpotato crop. Where there is a prolonged dry season, such crops may have been harvested or the vegetation died back and farmers may have to wait for vines from volunteer plants (which have developed from roots which were left in the field during the previous season's harvest). This practice is likely to result in increased pest and disease infestation compared to those using planting materials produced in a clean nursery bed.

During research trials in north-eastern Uganda where there is a prolonged dry season, farmers stated that they felt planting material produced from swamp nurseries as opposed to tree or homestead nurseries or volunteer plants were the least likely to be infested by weevils. Swamp nurseries are raised beds in swampy areas where the soil is moist throughout the dry season, they are often used for vegetable production. They are often found at some distance from other cropped fields, and as long as they are protected from damage by livestock can be a source of good quality vines at planting time.

Homestead nurseries are areas near the house, where they can be watered usually with waste water from the kitchen. Tree nurseries are those located under trees, where the shade partially protects them from drying out. Farmers have observed that both of these can become infested with weevils because the weevils move from old sweetpotato fields to the nurseries for survival during the prolonged dry season. However if farmers do not use weevil-infested vines and do not plant their nurseries too close to old sweetpotato fields and/or nurseries, and find new, clean sites for the nurseries every season the chances of weevil and other pest and disease infestation are greatly reduced.

Volunteer plants tend to be infested by weevils because they grow in old sweetpotato fields, which generally contain weevils living on storage roots and vines left over from the previous season. The perceptions of the farmers involved in the studies of advantages and disadvantages of different sources of planting material in north-eastern Uganda are outlined below:

| Planting material source | Advantages | Disadvantages |
|---------------------------------|---|--|
| Homestead nurseries | Healthier cuttings Good establishment in fields | Damage by domestic animals |
| Volunteer plants | Little labour required More drought tolerant | More millipede & disease damage A mix of varieties is obtained |
| Swamp nurseries | Less weevil infested Mature earlier Fast & good establishment in fields | Higher labour requirements Damage by domestic animals Vine theft possibility |
| Tree nurseries | Retain moisture | Vines often poorly established/ weak Do not establish as well in fields Shortage of trees |
| Bought vines | Available for earlier planting | High cost of vines and transport A mix of varieties is obtained |