Production of Sweet Potatoes as a Commercial Crop in Zimbabwe

(Edited By: Shadreck Gwari. Freelance Consultant Agribusiness November 2020. shadiegwari@gmail.com +263773253035)

Introduction

Over the years the production of Sweet potatoes (*Ipomoea batatas)* as a commercial crop in Zimbabwe has been increasing due to its numerous advantages as compared to other root and tuber crops. The crop has minimal input requirements yet yields highly. Sweet potatoes store well and can be a famine reserve crop especially with the increased effects of climate change being currently experienced in Zimbabwe. The water requirements of the crop are minimal compared to cereals, which is the main source of carbohydrates in the local diet.

The government of Zimbabwe and some local NGOs are therefore promoting the production of root and tuber crops, especially sweet potatoes, to complement the nation's carbohydrate requirements. Post-harvest handling, processing and marketing are also key as farmers should be enlightened on best methods to achieve quality and gain maximum value of the crop.

Through shows, trainings and field days around the country, farmers are being educated on the need to use tissue cultured planting materials that is free of pests and diseases, especially viruses for these reduce yields of the crop. The country has also seen an active use of Biotechnology as an important tool by local universities, private companies and research Institutions in improving agricultural productivity of sweet potatoes.

SWEET POTATO PRODUCTION – Sweet Potatoes are generally an easy crop to farm due to their low capital intensity and applicability on small tracts of land. There are two broad categories of sweet Potatoes which are as follows:

- The staple type with white flesh and white or purple skin has a high starch and dry matter content.
- The desert flesh and orange skin with a high sugar and beta-carotene content. Commonly three distinct types of sweet potato available for commercial production include.

1) Orange/ copper skin with orange flesh e.g. Beauregard, Hernandez, Beerwah Gold, NC-3, LO-323, Centennial, Darby and Jewel. Zimbabwean orange cultivators such as Beauregard have long, cylindrical to heavy elliptic tubers. They have high beta-carotene content and are fairly quick growers. It may become too big with long growing period.
2) White/cream skin with white/cream flesh colour, has a high yield and a good storage life. It can produce good yield in a relatively short growing period (4

months) which is important for cold regions. It produces some long, curved sweet potatoes, especially in sandy soils.

3) Red/Purple skin with cream white flesh e.g.: Northern Star, Red Abundance, Rojo Blanco.
   Kodow is a very attractive and tasty cultivator when cooked also with a pointed oval tuber. Its tips break of very easily. It requires growing periods of 5 months to produce a good yield.

Selection of a variety to grow should be based on market demand. Varieties are assessed on a number of parameters, including root shape and uniformity, marketable yield, skin and flesh attractiveness and plant vigour.

Climatic Requirements

Temperature

Because sweet potatoes are of a tropical origin, they adapt well to warm climates and grow best during summer. Sweet potatoes are cold sensitive and should not be planted until a danger of frost is past. The optimum temperature to achieve the best growth of sweet potatoes is between 21 and 29 degrees, although they can tolerate low temperatures as low as 18 degree Celsius and as high as 3 degrees Celsius. Storage roots are sensitive to changes in soil temperatures, depending on the stage of root development.

Soil Requirements

Site Selection and Soil

A well-drained sandy loam is preferred, and heavy clay soils should be avoided as they can retard root development, resulting in growth cracks and poor root shape. Lighter soils are more easily washed from the roots at harvest time. Wet season green manure crop with sterile forage sorghum is recommended and should be thoroughly incorporated and decomposed by planting time. Soil pH should be adjusted to about 6.0 by applying lime or dolomite. Rates of 240kg and 400 kg/ha respectively will raise the pH by 0.1 of a unit. The soil should be deep ripped and then disk cultivate to break up any large clods and provide loose soil for hilling of beds. A yearly soil test is

recommended to assess soil properties, pH and nutrients levels before ground preparation.

Propagation

Sweet Potatoes are propagated from sprouts or from slips (vine cuttings); sprouts are preferred. Sprouts are grown from plant stock selected for its appearance, freedom from disease and off-types. Approximately 75kg of planting stock sweet potatoes are needed to produce enough sprouts to plant one hectare.

Cutting Collection

Tip cuttings of about 30 to 40 cm long with approximately eight nodes are collected from the nursery bed, or the last established planting. Tip cutting should be taken from crops that are old enough to provide material without excessive damage. Avoid “back cuts” as these will have variable maturity and result in significant yield reduction. The lower leaves should be cut away as tearing these off may damage the nodes that will produce the roots. Cuttings can be left under a moist cloth in the shade for a couple of days to promote nodal rooting before planting in the field. At the recommended plant spacing, 330 cuttings are required for a 100m row.

Seedbed Production of Cuttings

This involves the propagation of cuttings from harvested roots which are placed together in a seedbed. This is an alternative method of producing plant material which requires less labour but does sacrifice a percentage of marketable roots.

Planting Cuttings

Cuttings should be planted at an about 45 degrees angle into heaps as this promotes good, even root development. Half of the cutting or three to four nodes should be buried at a spacing of 30cm between plants. Mechanical planters are available and used on a large scale planting but manual planting is widely practiced. This can be as easy as pushing the cutting into the heap with a forked stick. The labour requirement for hand planting is estimated a 32h/ha. Cuttings need to be watered at or immediately after planting. Plantings should be scheduled to allow for progressive fortnightly harvest over the desired production period.

Sprout Production

Sprouts are produced from the conditioned roots in cold frames, heated beds, or field beds of clean sand or fumigated sandy soils. Conditioned roots are covered by more soil sand, though not too much. Four or five weeks are needed to develop strong plants if the soil in the plant has been kept at 23 to 26 degree Celsius. Six to eight weeks may be needed if roots have not been “pre conditioned” Adequate moisture is especially critical to germination of the sprouts and proper root formation on the sprouts.

Panting the Sprouts

Sprouts should be taken from the plant beds when 6 to 10 leaves and a strong root system have developed on each one. They are set out into the field as early as possible when the soil has warmed and the risk of frost or a cold weather period has passed. Plants should be spaced 30-38 cm apart in rows that are 1m apart. This requires approximately 14 520 plants per hectare. Management of water is critical to avoid transplant shock.

Soil Preparation

Bed Formation

Sweet potato is grown on raised beds or mounds. This provides the developing roots with loose, friable soil to expand to their potential size and shape without restriction. It allows adequate drainage and provides easy harvesting with a mechanical digger. Mounds should be approximately 30 cm high and 40 cm wide at the base. The main consideration is that developing roots remain under the soil within the heaps. If using a mechanical digger at harvest time it is important to match width of the mound with the width of the digger mouth. Spacing the mounds at 1.5 to 2.0m apart (depending on the tractor width) with a roadway every six rows allows access for boom spray. Mounds are formed using hilling disks, and the base fertiliser can be incorporated during this operation.

Planting Period

Planting time is mainly determined by the climate of a location. Sweet potato plants are damaged by light frost and the plants require high temperatures for a period of 4-5 months to yield well. In areas with mild frost, mid-November to mid-December is the best time to plant, and usually the crops get ready for harvest from April to May. Mid November to be the beginning of December is recommended areas with heavy frost and with, harvesting taking place from April to May. It's common to plant from January to March in frost free areas so that the growing season extends through winter. Cold spells during winter can be a risk depending on the climate of the specific area. In very hot areas, planting should be avoided from November to middle of February as storage root formation is reduced by high temperatures.

Spacing

Optimum plant density on cultivar, but is usually around 40 000 plants per hectare. Rows may vary from 1 to 1.25m apart, in row spacing is usually 25 to 30 cm.

Seeding Rate

The number of cuttings required to plant 1ha varies between 30000 and 60000, depending on the specific spacing used.

Fertilisation

The recommended fertiliser rate for sweet potato is based on the crop removal figures. Research (Nutrition monitoring trial, 1992) has shown that this recommendation will produce high yields when used in conjunction with yearly soil nutrient testing and petiole sap nutrient monitoring. Estimated crop removal in KG per ha is:

- 100 kg Nitrogen (N)
- 90 kg Phosphorus (P)
- 200 Kg Potassium (K)
- 200kg Calcium (Ca)

All the phosphorous may be applied in the basal along with 50kg of N and 50kg of K. The remaining 50kg N and 150kg K should be divided into two side dressing at 4 to 6 weeks and at 10 to twelve weeks from planting. Some calcium will be supplied by the lime or dolomite used to adjust the soil pH and any additional calcium will be supplied by the lime or dolomite used to adjust the soil pH, and any additional calcium may be applied in the basal gypsum. Petiole sap nutrient monitoring is advisable so that the desired nutrient levels for different growth phases can be checked. Any trace elements deficiency would be detected by regular petiole testing, but generally two foliar applications around the time of side dressing should maintain adequate levels. Sprays should include zinc, copper, manganese, iron and boron. A comprehensive 5:15:12 compound fertiliser can cater for the nutrient requirements.