

Tissue Culture Banana Farming in Kenya



Bananas are one of the most popular fruits on earth. In Kenya, the fruit is expansively cultivated for income generation and as a staple food by various local communities. However, the main predicament with banana farming in Kenya is that they are easily affected by diseases that

reduce the yield and lead to sustenance and profit loss to the farmer. Diseases and pests that affect banana farming in Kenya include Fusarium Wilt and Sigatoka, weevils and nematodes, and bacterial infections such as bacterial Xanthomonas Wilt (BXW). Additionally, viruses such as banana streak and banana bunchy top disease cause diseases to bananas.

To advance economic development and agriculture in Kenya, it is important to take on farming technologies that involve providing planting materials that are disease free, mature faster, have better yield, and are safe for human consumption. Tissue culture bananas grow faster and give higher yields as compared to traditional bananas and meet the above-mentioned requirements. Tissue culture technique involves generating plants from stems, leaves or roots in sterilized conditions and can be produced in plentiful quantities. The distribution of TC bananas plantlets that are virus indexed is available at commercial levels by organizations such as Aberdare Technologies Limited (ATL). The technique is also beneficial in helping plants such as bananas that do not generate seeds to reproduce.

As earlier mentioned, prevalent viral diseases affect banana farming, and Tissue culture is being used by Kenyan researchers to produce disease resistant materials. The cultured plants are genetically uniform, high-yielding and are free from diseases. This directly improves the economic benefit per unit area of land.

In the late 90's, with the introduction of TC bananas, research institutes were the only source of TC bananas and there was no stable supply in the country. This limited supply made TC banana plantlets too expensive which made farmers stick to getting suckers from the parent plant to propagate the crop. However, with the entrance of partners such as Africa Harvest (AH) and suppliers such as ATL, banana farming got a new meaning. Intervention by AH and Kenya Agricultural Research Institute (KARI) has made banana farming so popular that the government launched the National Banana Development Strategy to see the growth of the industry. Income from TC bananas is even expected to reach 20 billion in 2016 if it extends to all the areas within prospective.

Development of Tissue Culture bananas

After generation under sterile conditions in a laboratory for some weeks, the banana plantlets are hardened in a greenhouse for six weeks. Notably, tissue culture speeds up the multiplication process drastically and up to 2000 healthy bananas can be produced from a single shoot through the method. Conventional bananas, on the other hand, produce ten suckers in 6 months. Also, TC bananas produce fruits in 340 days as compared to 420 days for ordinary bananas. Additionally, the average hectare yield for TC bananas is 30-40 tonnes that are twice the yield for traditional breeds.

How to grow TC bananas

The farm has to have the right conditions for the growth of bananas. Bananas do well from a sea level of 1800M with a minimum rainfall of 1000mm per year which is pertinent during flowering. Farmers in low rainfall areas should ensure that irrigation is done throughout. Soils should be fertile and well drained to avoid water logging. After these conditions are met, the farmer should get the plantlets from any ATL nursery. Half a month before planting, pits measuring 3feet x 3feet x 3feet should be prepared. Subsoil and topsoil should be separated, and then 40 kg of well rotten manure should be mixed with the topsoil along with 200g of fertilizer and 15g of the recommended nematicide. The banana hole should be filled with the mixture, and the plantlets should be planted

30 cm deep in the whole, and the soil should then be firmed. For crops under irrigation, 40 litres should be used initially then 20 litres, three times a week.

Dry mulches should be used to retain moisture while heavy banana stems should be supported to avoid damage. Old diseased leaves should be removed while de-leafing is important to ensure healthy growth. Harvesting begins after 15-18 months, and a light shiny appearance means that the banana is ready for harvest. Harvesting should be delicate to avoid bruising of the bananas. The bananas should be temporarily stored in a cool, dry place and should be wrapped in banana leaves or grass to avoid bruising. If for export, they should be washed using a disinfectant and might require branding.

TC Main Varieties

FHIA 17

The taste is very similar to matoke and it has been quickly accepted as a cooking variety and secondary as a dessert type. With its high resistance to diseases, infestations and a lower cost of production as compared to local varieties, FHIA 17 is one of the most famous TC varieties.

Attributes of the FHIA 17 variety

The plant has a high level of resistance to Black Sigatoka disease

A strong root system makes it withstand winds of moderate speed

Large bunch sizes as compared to local varieties

The plant grows well in most soils

Tolerant to borer weevil

Why Agro Processers and consumers prefer it

Easy to peel and oozes very little latex

The fruit cooks very easily

Has a good texture and flavour when it is boiled

Excellent for Agro processors (banana chips)

GRAND NAIN

Characteristics

It is a high yielding Cavendish variety.

The plant grows to a height of 6.5 to 7.5 Feet.

The bunches can be harvested within eleven to twelve months from the date of planting the tissue culture plants

Each bunch will be having 10 to 12 hands with 175 to 225 number of fruits.

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Have long cylindrical fruits, with less curvature.

Attractive yellowish green color at maturity

It is internationally acceptable, both as fresh fruit and in processed form.

The pulp to peel ratio is more and highly suitable for processing.

William Variety

The pseudostem of Williams has dark brown, black or red streaks.

The rachis is only partly instead of fully clothed, with a long naked section of rachis and a crowded cluster of leaf-like bracts right above the male bud and very small neutral flowers just below the fruit.

The color of the bract internal face is yellowish. Male flowers are whitish with yellow tips.

Fruits are 15-23 cm long, slightly curved, and about 5 times as long as broad. Their apex is more bottlenecked than for other Cavendish clones, especially before full maturity. Like other Cavendish, they have a tuft of dead floral relicts at the tip.

Reaction to pests and diseases

'Williams' is highly susceptible to [black leaf streak](#) and to *Mycosphaerella* leaf speckle.

It is resistant to [Fusarium wilt](#) race 1, but susceptible to race 4.

It was found to be susceptible to [Radopholus similis](#).

'Williams' is susceptible to *Banana bunchy top virus*.

Fruits are less susceptible to cigar end rot.

Reaction to abiotic stress

Williams' has good tolerance to wind.

While it is not especially cold tolerant, 'Williams' can grow in cooler environments.

Low temperatures can induce choking in 'Williams'.

Williams seems less sensitive to water stress than 'Grande Naine'.

Conclusion

In 2006, only 5 % of banana acreage was under tissue culture cultivation, and the number is expected to rise to 40% in 2016 as projected by Africa Harvest. Kenya's relatively stable economy and all year round growing season holds great potential for the local and export markets. TC bananas have helped Kenya increase production when new sources are especially required. Only four percent of banana exports originate from Africa while one-third of the plantlets is grown in the continent. This disparity could be an excellent opportunity for agents and farmers who can supply their fruits to bigger markets.