Propagation of Disease-Cleaned Suckers

Solution Holder is **John Derera** and can be contacted through **j.derera@cgiar.org**

Summary

Farmers in Africa depend on natural vegetative regeneration mechanisms of banana and plantain for the supply of planting materials but these are often contaminated by pests and diseases than undermine productivity and lifespan. Suckers are traded on local markets which forms an important source of income for farmers. Sword suckers are lateral shoots with thin leaves and a pseudostem length of 80 to 120 cm, which naturally develop at the flowering stage. Their macro-propagation is based upon the removal of the apical dominance to stimulate additional sprouting of suckers. It involves simple techniques that can supply large quantities of disease- and pest-free seedlings at affordable prices, including planting material from earlier released high-yielding hybrid varieties.

Technical Description

Macro-propagation of suckers can be classified into two categories: field-based techniques relying, based on decapitation, and detached corm techniques conducted in beds. The complete and false decapitation techniques involve stimulating lateral production of sucker buds by destroying the meristematic corm and triggering accelerated sprouting. Using partial decapitation, a small hole is made in the pseudostem through which the meristem is destroyed. The foliage remains physiologically active for about three months thereafter. Using complete decapitation, the pseudostem is cut down, destroying the meristem. Detached corm techniques involve excised buds or plants resulting from stem fragments. A higher number of seedlings and greater growth uniformity is achieved by the detached corm technique than from pseudostem decapitation, and plantlets obtained from corms are less prone to stress once established in the field. It is very important that the starting material for macro-propagation is free of pests and diseases.

Uses

To increase banana production, farmers should have access to affordable, high-quality vegetative seedlings that are free of pests and diseases. For all methods of macro-propagation, knives must be cleaned with boiled water to avoid disease transmission. The detached corm technique requires that hardened sprouts are used.

Composition

Convenient dimensions of a propagation chamber are 1.5 m wide, 5 m long and 1 m high. It should be covered by transparent polyethylene and be at least 50% shaded. Plastic covers must be fitted to ensure high humidity and temperature. These chambers are filled with a mixture of soil; composted manure; and sawdust, coffee husk, rice husks, oil palm fiber or cocoa fiber at a ratio of 6:3:1. The substrate must be steam-sterilized by placing it on top of a metal drum containing boiling water.

Means of application

The technique of false decapitation starts by making a square incision of 5 cm wide at 20 cm from the ground level up to the middle of the pseudostem using a 6-month-old plant, killing the active meristem. Angle the bottom side of the hole slightly downwards so water and plant sap collect in the hole to further kill the meristem. Decapitated plants are left for at least one month to allow sprouting. For complete decapitation the apical dominance is removed by cutting down a 6-month-old plant to the ground level and excising the middle 5 cm of the softer meristem leaving the harder corm intact. The cut stem should be covered with soil to promote sprouting. Within three weeks, four to seven suckers will emerge. Suckers with three to four leaves are detached by pulling them from the pseudostem and transplanted to the field. For macro-propagation using the detached corm technique, the source material are healthy suckers collected between flowering and harvest. Roots are cut from suckers and washed before peeling leaf sheaths. The whole corm is then sanitized by submerging it in boiling water for 30-40 minutes (or fungicide for 20 minutes. Corms are scarified by making a shallow incision at the top and then left to air dry for 24 hours. Whole corms are planted in the weaning chamber at 30 cm distance, or the corm is split into 2 or 3 fragments or buds are excised in pieces of 50-100 g that are planted at 10 cm distance, and are covered with 2 cm of sawdust.

Agroecologies	Highlands, Humid forest, Moist savanna.
Regions	Africa South of Sahara.
Developed in Countries	Cameroon, Zambia, Uganda, Togo, Tanzania, South Sudan, Somalia, Rwanda, Nigeria, Mali, Malawi, Kenya, Ivory Coast, Ghana, Ethiopia, Democratic Republic of the Congo, Burundi, Burkina Faso, Benin.
Available in	Cameroon, Zambia, Uganda, Togo, Tanzania, South Sudan, Somalia, Rwanda, Nigeria, Mali, Malawi, Kenya, Ivory Coast, Ghana, Ethiopia, Democratic Republic of the Congo, Burundi, Burkina Faso, Benin.
Solution Forms	Input Supply.

Solution Applications	Vegetative propagation.
Agricultural Commodities	Banana/Plantain.
Target Beneficiaries	Small-scale farmers, Commercial farmers.

Commercialization

Commercialization Category

Commercially available

Startup Requirements

The key actions and processes for successfully multiplying planting materials are: 1) Where the macro-propagation units and nurseries will be set up and a timeline of the set up, 2) How the materials and resources for macro-propagation units will be mobilised, 3) How and who will carry out the different activities involved in setting up and maintaining the macro-propagation units and nurseries, 4) How the planting material will be shared/ distributed, and 5) How the unit will be financially and environmentally sustained.

Production Costs

Macro-propagation via pseudostem decapitation and detached corm techniques are easy to learn and inexpensive to establish. Propagation through decapitation costs about US $0.30 per 100 plantlets every four months. Building chambers that can hold 8,000 plantlets costs about US $2,300. The cost of constructing a shade house that can hold 2,500 plantlets is about $340.

Customer Segmentation

This technology can be used by lead farmers, extension workers and other agricultural service providers to propagate planting material at lower cost and within a short period of time.

Potential Profitability

Plantlets propagated via the decapitation method are sold at US $ 0.5 whereas larger ones from detached corm method are sold at US $ 1. A study in South-Kivu DR Congo shows that macro-propagation of plantain using semi-cylindrical tunnels with manure in the substrate that produces 850 to 1,100 plantlets per cycle can achieve a net profit between US $725 and $1,050 per cycle.

Licensing Requirements

Multiplication of banana and plantain through macro-propagation methods is not subject to regulatory approval in most countries but voluntary certification of nurseries for adherence to plant health standards may be in place.

Innovation as Public Good

Macro-propagation techniques are disseminated as a Public Good.

Solution Images

Institutions

Accompanying Solutions

Improved Varieties of Plantain for Tropical Lowlands

Improved Varieties of Banana for the African Highlands