RTB Report

Scaling up multiplication of banana and plantain planting material

Juan Manuel Pardo[a], Juan Camilo Montoya[b], Wilmer J. Cuellar[a]

[a] Virology and Crop protection, International Center for Tropical Agriculture (CIAT), AA 6713, Cali, Colombia

[b] Asomusaceas.

D E C E M B E R 2 0 1 9

RESEARCH PROGRAM ON Roots, Tubers and Bananas

CGIAR

CIP INTERNATIONAL POTATO CENTER

Bioversity International

CIAT

cirad AGRICULTURAL RESEARCH FOR DEVELOPMENT

IITA

Deliverable #16948

RTB-BA3.3.2.5

Scaling up multiplication of banana and plantain planting material

Juan Manuel Pardo, Juan Camilo Montoya, Wilmer J. Cuellar

(CIAT, CGIAR Research Program on Roots Tubers and Bananas)

Cluster	RTB-BA3.3.2.5 Global and regional Frameworks, tools, strategies and practices to arrest the spread of wilts into new areas and recover banana productivity in areas already affected by wilts from bacteria and *Fusarium* in banana.
Activity/Product	RTB-BA3.3.2.5
Output	Morphological and molecular characterization of Moko/FOC isolates
Type	Report
Deliverable	16948. Scaling up multiplication of banana and plantain isease-free planting material
Description	Moko disease is a persistent problem in Colombia, by using registered quality planting material and accelerated propagation of it by using a thermal chamber, we aim to control the spread of the diseases in the Valled del Cauca department of Colombia.

Contents

Abstract

This deliverable is a part of the project “Desarrollo de tecnologías innovadoras para el manejo integrado de plagas y enfermedades limitantes de plátano y banano en el Valle del Cauca” funded by the Colombian Government with a grant belonging to ‘Fondo de Regalias’.

Our goal was to produce banana and plantain disease-free planting material to sow an area of 144 ha, using thermal chamber technology to accelerate the propagation of the planting material. A thermal chamber of 68 m2 was built in the headquarters of the farmer association ASOMUSACEAS, located in Caicedonia, Valle del Cauca. Such chamber had the capacity of host 2000 plantain/banana corms of 2 kilograms each. Every 2 months each corm produced 6000 new banana and plantain sprouts, on average. After this time the ‘sprouts’ (colinos) star the rooting process in a nursery fr the period of one month. After this time, the plants should are planted in a ‘mother plants’ field to guarantee the quality of the plant produced and the corm source for a next round of propagation in the thermal chamber.

The nursery built in ASOMUSACEAS, as part of this project, has a capacity of hosting 12,000 plantlets ready to be distributed by our Asomusaceas partners.

Introduction

The implementation of the thermal chamber technology and a pilot nursery, was set with the goal to produce enough plating material to cover 144 hectares, with registered disease-free seed (as validated by the NPPO of Colombia, ICA). To achieve this goal we had to considered several factors.

As a starting point, we had to obtain the registration of the nursery, by ICA (Instituto Colombiano Agropecuario). This was achieved early in the project (see ICA resolution number 3180 of 2009). The resolution stated ''by means of which the requirements and procedures of the production of fruit propagation material in the national territory are established". It was necessary that the nursery had a batch of mother plants, supplying of quality corms to the thermal chamber. This field of mother plants plot had also to be registered by ICA, which was essential for obtaining the registration of the nursery (ICA, 2009).

The 'mother plants' plot had been selected for their yield (bunch weight), vigor of the plants, phytosanitary status and certainty of the homogeneity variety to avoid mixtures of varieties (Bhende et al., 2016). These favorable characteristics are that farmers must also have to preserve after receiving the planting material. The planting material propagated in a thermal chamber and then delivered to the farmers can be used as the initial source of seed, or as mother plants. Only those plants of known origin continue the process of induction of suckers to obtain additional planting material. This measures minimize the entry of pests and diseases to the farmers land (Álvarez el al., 2013). It is important to indicate that in Valle del Cauca, most farmers grow plantains in association with coffe, and therefore the plantain density per ha is ca. 800 plants/ha.

Considering all of this, within the period of the project we produced enough planting material to feed 144 hectares. In collaboration with ASOMUSACEAS we carry out periodic monitoring of the farms receiving planting material produced in the thermal chamber. The farms that are under monitoring and that can be visited by the project supervision are the following: La Daniela, La Tribuna, La Coqueta, La Sonora, El Rocío, La Euclivia, Miraflores, Los Alamos, Alto Bonito, San Isidro, El Bosque, Villa Melani. Data collected, is currently being used to calculate the impact of the technology in the production of this crop.

Methodology

Corms, weighing between 1 and 2 kg, are used as seed in the thermal chamber. The initial corms are produced in plots known as 'mother plants', obtained from seed developed *in vitro* or from plants selected for high bunch weight. The corms are first disinfected in a solution of insecticide + fungicide, and then subjected to the technique of accelerated reproduction of seed or planting material I a thermal chamber. This technique inhibits the growth of the apical buds and at the same time induces lateral buds to sprout.

When shoots in the thermal chamber are 10 days old, they are extracted from the main corm. They are then immediately planted in black plastic bags containing Canadian sphagnum peat. The nursery we have built keep the bags containing the shoots isolated form the ground.

Results

Inventory of plants produced during the year 2019.

Seed produced until March 2018 in Asomusáceas	Seed produced at CIAT during 2019	Seed produced at Asomusáceas during 2019	Inventory of field suckers of plants from thermal chamber during 2019 (Asomusáceas monitoring in Caicedonia)	
27599	2742	6106	19781	
			56228	**Total plants**
			66.93809524	**Hectare equivalent (2.37x5.01) 842 plants/ha**
			82797	**suckers generated at March 2019 based on the production of March 2018 (in one year 3 suckers of a plant in the field)**

165.5	**Total hectares**

For more information about the protocols, pictures and general information please click in the following link to check the donor report: https://cgiar-my.sharepoint.com/:b:/g/personal/j_m_pardo_cgiar_org/EaTW8ZvSuBBMmeoCiHGqPEYBGc_x6gO8uZSsFiPJ7WJP6g?e=fIBNa0

References

- ICA . INSTITUTO COLOMBIANO AGROPECUARIO. 2009. Resolución 3180 de (2009). Por la cual se establecen los requisitos y procedimientos para la producción y distribución de material de propagación de frutales en el territorio nacional y se dictan otras disposiciones. Bogotá, Colombia
- Bhende, S. S., & Kurien, S. 2016. Sucker production in banana. Journal of Tropical Agriculture, 53(2), 97-106.
- Álvarez, E., Ceballos, G., Gañán, L., Rodríguez, D., González, S., & Pantoja, A. 2013. Producción de material de siembra limpio en el manejo de las enfermedades limitantes del plátano. Centro Internacional de Agricultura Tropical (CIAT). Publicación CIAT, (384).

RESEARCH PROGRAM ON Roots, Tubers and Bananas

CGIAR

The CGIAR Research Program on Roots, Tubers and Bananas (RTB) is a partnership collaboration led by the International Potato Center implemented jointly with Bioversity International, the International Center for Tropical Agriculture (CIAT), the International Institute of Tropical Agriculture (IITA), and the Centre de Coopération Internationale en Recherche Agronomique pour le Développement (CIRAD), that includes a growing number of research and development partners. RTB brings together research on its mandate crops: bananas and plantains, cassava, potato, sweetpotato, yams, and minor roots and tubers, to improve nutrition and food security and foster greater gender equity especially among some of the world's poorest and most vulnerable populations.

www.rtb.cgiar.org

LED BY CIP INTERNATIONAL POTATO CENTER A CGIAR RESEARCH CENTER

Bioversity International

CIAT International Center for Tropical Agriculture Since 1967 Science to cultivate change

cirad AGRICULTURAL RESEARCH FOR DEVELOPMENT

IITA Transforming African Agriculture