TECHNICAL INNOVATION FACTSHEET

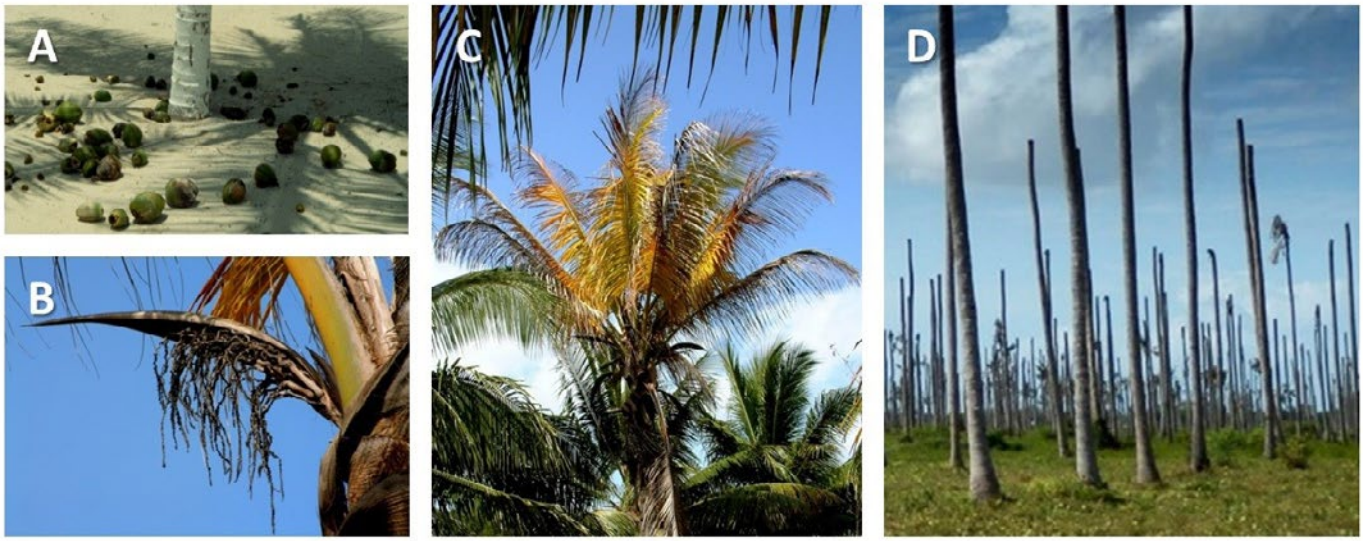
# COCONUT LY RESISTANCE SCREENING AND DISEASE MANAGEMENT

## The use of lethal yellowing resistant germplasm as a basis for the disease management

■ THE PROBLEM ADDRESSED

## Lethal yellowing: a great threat to the coconut value chain in many countries

Lethal yellowing is a disease that has killed millions of coconut palms in several countries in the Americas affecting coconut farmers and industry, and its spread is threatening several other countries (Myrie *et al.*, 2019). Effective management of this disease requires resistant germplasm. Fortunately in Jamaica and Mexico, the identification of some resistant genotypes was obtained (Yankey *et al.*, 2018). However further screening is needed of both introduced and local materials to avoid the risk linked to the use of homogeneous germplasm. The screening has to be done in the field exposing palms to insect vectors, a process that takes very long. Replacing susceptible coconut palms with resistant ones is the only long-time sustainable strategy for the coconut industries in several countries.




• Symptoms of lethal yellowing: nut drop (A), inflorescence necrosis (B), leaf yellowing (C) and loss of foliage leaving the bare trunk (CICY)


• Countries where lethal yellowing has been reported in America and the Caribbean (highlighted in yellow)

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■ THE PRACTICE/INNOVATION PROPOSED BY TROPICSAFE.

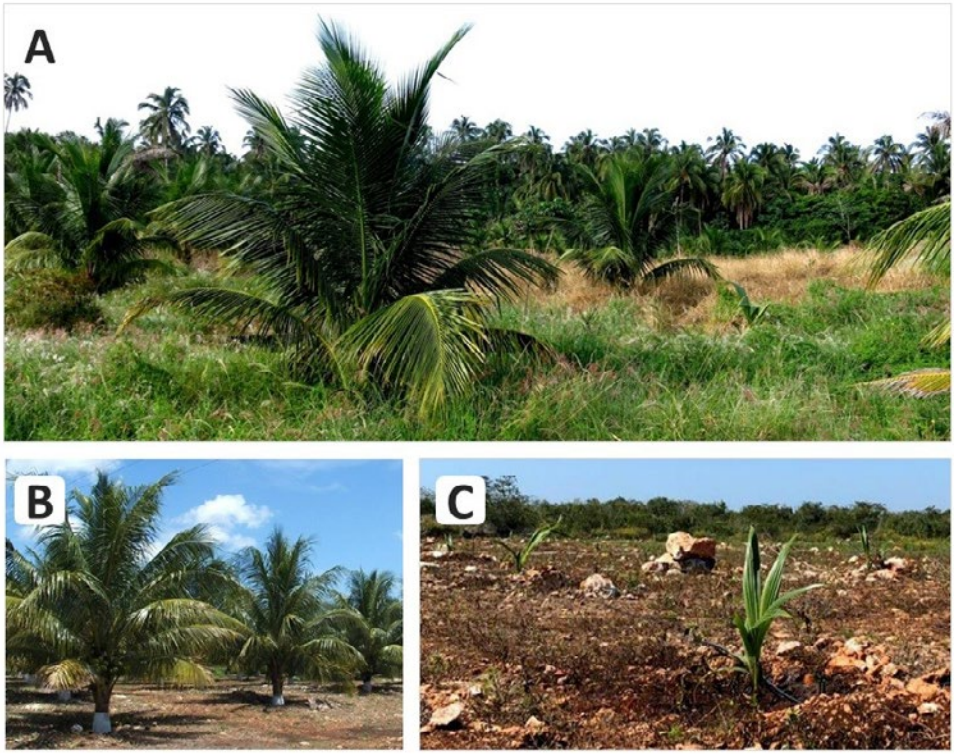
# Lethal yellowing resistance screening and germplasm transfer to other countries

To develop advanced Integrated Pest Management and new management strategies for lethal yellowing the use of resistant germplasm and therefore the resistance screening are a basic activities carried out in the project. The transfer of lethal yellowing-resistant coconut plantlets to other participating countries is also part of the project to help reducing environmental disease impact. This practice is helping to reduce the use of chemicals for insect vector control to prevent the pathogen spreading, and also generates knowledge about germplasm susceptibility under different environments. The lethal yellowing-resistance screening and germplasm exchange activities can also be the basis for the implementation of a permanent system for screening, production and exchange of lethal yellowing-resistant germplasm for coconut-producing countries in selected geographic areas.

■ HOW IS TROPICSAFE IMPLEMENTING IT?

# Establishment of trials and shipment of plantlets

Screening of lethal yellowing-resistance is implemented by field testing coconut materials of interest in Mexico, these are Brazilian Green Dwarf, Yucatan Green Dwarf, and Alto Saladita, the first one was introduced to Mexico recently and the other two are local ecotypes. Two trials are monitored in Ojoshal, Tabasco established before the project started, and in Ticul, Yucatan that consists of two sections one established before the project started and another established as part of the project. The coconuts planted are exposed to insect vectors that are in the environment and in both sites some coconut and other palm species died. These and insects resulted positive to lethal yellowing phytoplasmas by PCR assays (Córdova *et al.*, 2014). To facilitate the pathogen detection a new PCR methodology was developed (qPCR). Finally, lethal yellowing-resistant germplasm produced *in vitro* is provided in small quantity to Jamaica and Cuba partners to establish trials to test them locally.




• Trials to test the susceptibility of different coconut varieties to lethal yellowing in: (A) Ojoshal, Tabasco; and (B) Chum Copte I and (C) Chum Copte II in Ticul, Yucatán Mexico, (CICY)

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■ HOW IS IT WORKING?

# Lethal yellowing screening and germplasm exchange

In the periphery of the Ojoshal trial in Tabasco, phytoplasma detection in weed species and in *Haplaxius crudus* adults and nymphs was obtained, but no losses of coconut plants within the trial have occurred. In Ticul in Chum Copte I site there have been three losses of coconut palms (0.5%) in which the lethal yellowing phytoplasma was detected; no losses in Chum Copte II site, just starting, were observed. Hybrid germplasm shipment to other countries with both parents resistant to lethal yellowing in Mexico as reported by Zizumbo *et al*. (2008) was carried out with materials produced by micropropagation in CICY. A batch of 60 plantlets was sent to Coconut Industry Board (CIB) in Jamaica. A batch of 200 plantlets was sent later to Instituto de Fruticultura Tropical (IIFT), the batch was carried to Cuba also training the personal there for the acclimatization of the plantlets. Larger batches will be sent within the next three months to both countries. The screening of coconut germplasm for lethal yellowing-resistance is very advantageous since it allows to have the most effective component for Integrated Pest Management application. Also it is important that screening continues by testing new genotypes to increase diversity, which is relevant for plants to deal with pathogens and for differentiation of products since some coconut varieties are more useful for water production and other for oil production or other purposes. Moreover the germplasm exchange allows its testing under the recipient country conditions and generate more knowledge about the genotype performances.

• Coconut palms of Yucatan Green Dwart variety that developed symptoms, were PCR positive to lethal yellowing and died within 2018 in Chum Copte I in Yucatan, Mexico

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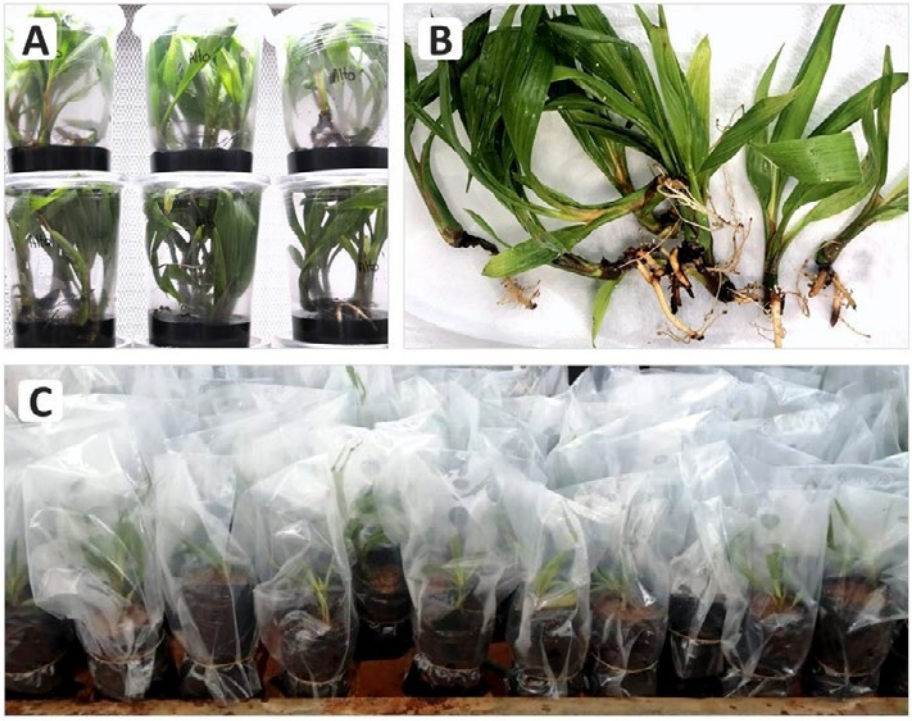


• Plantlets produced *in vitro* of lethal yellowing-resistant coconut prepared at CICY in Mexico for shipment (A) and after arrival at destination at CIB in Jamaica (B) and IIFT in Cuba (C)

**KEY WORDS**

Coconut, lethal yellowing, resistance, disease management

**FURTHER INFORMATION**

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