



Food and Agriculture
Organization of the
United Nations

PREVENTING THE SPREAD AND INTRODUCTION OF TROPICAL RACE 4 DISEASE

TR4 GLOBAL NETWORK
- *an initiative of the World Banana Forum* -

QUICK GUIDE FOR TRAVELLERS

This quick guide, targeting occasional and regular travellers to or from banana and plantain production areas, aims to raise awareness and provide direction on preventing the spread of a highly virulent pathogen known as **Tropical race 4 (TR4)** of the fungus *Fusarium oxysporum* f. sp. *cubense* (Foc). TR4 is the cause of Banana Fusarium Wilt disease ([FAO, 2020](#)).

This document is derived from the FAO publication done in cooperation with the CIAT-Bioversity Alliance and the International Institute of Tropical Agriculture (IITA) named “Preventing the spread and introduction of banana fusarium wilt disease Tropical race 4 (TR4) Guide for travelers”.

BACKGROUND

Banana and plantain are important crops for food security. They ensure the livelihoods of approximately 400 million people who depend on them either as a staple food or as a source of income, particularly in Asia, Africa, Latin America and the Caribbean.

Fusarium wilt of banana or plantain is a key example of crop devastation by a plant disease. The disease almost brought the banana export industry to a halt in the 20th century when the popular banana variety Gros Michel was devastated in Central America by Tropical race 1. The sector was saved by the introduction of the resistant Cavendish variety. However, Cavendish bananas are now succumbing to a new, highly aggressive strain of the Fusarium: TR4.

TR4 threatens almost all banana and plantain producers, posing the greatest risks to countries producing Cavendish bananas in monoculture plantations in Asia, Africa, the Near East, Latin America and the Caribbean. Once established in a banana or plantain plantation, the fungus can survive in the soil and in alternative host plants for decades.

THE FUNGUS

The fungus, Foc, is soil-borne and infects banana and plantain plants through the roots. As it gradually grows within the plants, it blocks the vascular tissues, resulting in complete wilting and death of the infected plants. Once established in a field, 100 percent yield losses are possible, if not contained.

The fungus spreads through the movement of infested soil particles or plant tissues. At farm and local level, transportation of infested plants, irrigation water, floods, shoes, vehicle tires and farm tools play a prominent role in the spread of TR4. Long-distance spread can take place through the movement of infected planting materials or contaminated soil particles attached to items, such as shoes, clothes, farm tools and vehicles.

The most cost-effective management approach is the exclusion and prevention of TR4's spread. Thus, precautions taken by travellers and visitors are critical in preventing the spread of the disease into new areas.

TRAVEL AND FARM VISITS AS PATHWAYS FOR SPREAD

The global banana and plantain supply depend on production by smallholder farmers, medium-sized producers and local or international companies. Work-related travels by staff of these entities represent a high risk for the inadvertent introduction and spread of the disease into areas and countries where it is not yet present. In addition, regular or occasional travellers commuting between these producing countries are considered potential pathways for the unintended spread of TR4 and other pests and diseases.

Therefore, it is critical to apply effective phytosanitary measures to avoid spread and introduction of this pathogen into disease-free areas. Entrance into infested farms should be avoided and restricted as much as possible, and farms should take all required phytosanitary measures.

RECOMMENDATIONS

Regular and occasional travellers and local or international visitors should:

- avoid visiting farms in areas where TR4 has been reported, unless absolutely necessary; and
- not transport any live plant parts, “souvenirs” or any other items made of banana plants.

Farmers, professionals, technicians and employees visiting disease-free banana and plantain farms in areas where TR4 infestation has been recorded should:

- pre-arrange visits and seek permission before approaching banana and plantain farms;
- allow time for disinfection procedures in daily itinerary;
- follow the instructions of the farm managers and phytosanitary regulations thoroughly;
- not bring in or take out of the farms any item that might be contaminated and that may be a potential vector for transmission of TR4;
- not collect, transport or take out of the farm any soil or any plant parts without the permission and under the supervision of a plant protection officer, closely observing the quarantine procedures and regulations established by local authorities and by the International Plant Protection Convention (IPPC) (FAO and IPPC, 2019);

- use specific boots to be worn only in the farm to be visited from the entry point, disinfect them at entry, exit and while passing through different zones of the farm by walking through footbaths filled with disinfectants;
- leave the boots at the farm at the exit when departing; and
- avoid contact and potential cross contamination while changing footwear.

The followings are specific additional recommendations for visiting farms infested with TR4 for obligatory and work-related reasons:

- Arrange the entire visit with the guidance of an official plant protection specialist and farm biosecurity persons in charge.
- Do not bring in a vehicle from outside. If this is unavoidable, the vehicle tires, their surroundings, and the vehicle's external surfaces and floors should be washed thoroughly and disinfected with a pressurized spray of disinfectants at entry and exit. The vehicles should not move out of the roads in the farm and avoid moving into the fields.
- Wear a specific set of boots and clothes, ideally overall protective clothing, to be worn only in the infested farm.
- Use plastic disposable sheeting if anything is to be placed on the soil.
- Do not enter personal belongings such as backpacks camera cases into the plantation.
- Do not enter plots where TR4 infection has been observed.
- Disinfect boots upon entrance and exit and when moving between different zones of the farm, by thoroughly removing all soil and walking through the footbaths placed at crossing points.
- Use decontamination area on the farm border for changing, cleaning and disinfecting boots at entry and exit.
- When leaving the farm, leave the used boots at the farm and wash the external personal clothing used, including hats, before leaving the area / country.
- Do not take any plant materials outside infested farms without official permission.
- Upon exit, leave behind any tools used in the visited farm. If you used expensive specialized equipment that cannot be left behind or disposed of, disinfect it thoroughly.
- Avoid travel to non-TR4-infested banana production areas directly after visiting an infested farm, and always shower before leaving the country.

Strict compliance with these recommendations is necessary to minimize the risk of TR4 spread.

If any plant is suspected to be infected with TR4, notify the relevant national or regional plant protection organizations (<https://www.ippc.int/en/countries/all/contactpoints/>).

The above recommendations were formulated by a group of scientists working on bananas and plant health at FAO, Bioversity International, the International Institute of Tropical Agriculture (IITA), the World Banana Forum and the IPPC secretariat. While every effort has been made to ensure that the recommendations are based on the latest scientific knowledge available, neither the scientists nor the organizations accept any responsibility for the consequences that may arise from the use of this guide.

REFERENCES

FAO, 2020. Preventing the spread and introduction of banana fusarium wilt disease Tropical race 4 (TR4): Guide for travelers. Rome.

FAO and IPPC, 2019. Adopted Standards (ISPMs). In: Standard Setting [online]. Rome. [Cited 18 October 2019]. <https://www.ippc.int/en/core-activities/standards-setting/ispm/>

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The **TR4GN** is jointly facilitated by the World Banana Forum Secretariat - hosted by FAO's Trade and Markets Division - and by FAO's Plant Production and Protection Division.

To discover the benefits of becoming a member of the World Banana Forum and to take an active role towards a sustainable banana sector, please visit:

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If you think you may have seen soil, water or plant material entering or exiting the farm, or if you have any questions, contact the phytosanitary authorities!



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