



Food and Agriculture  
Organization of the  
United Nations

# TOGETHER, WE CAN PREVENT THE SPREAD OF TROPICAL RACE 4 (TR4)

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

## WHY BANANAS MATTER

**Bananas and plantains** are essential crops around the world for both their economic importance and deep cultural roots.

**BANANAS**  
ARE THE MOST EXPORTED



FRUIT IN THE WORLD

**BANANAS AND PLANTAINS**  
CONTRIBUTE GREATLY



TO FOOD SECURITY

TO INCOME GENERATION

## WORLD TRADE

With some **15 percent** of global production exported, the total trade value of bananas was approximately **USD 7.5 billion in 2018**, making them the **largest traded fruit crop** in terms of production value.

**15%**  **GLOBAL PRODUCTION EXPORTED** 

VALUED AT  
**7.5**  
USD BILLION 

## FOOD SECURITY AND LIVELIHOODS

Grown in **over 135 countries** in the Caribbean, Latin America, Asia, Oceania and Africa, bananas and plantains are staple crops for the **food security** of some **400 million people**.

On average, income from banana and plantain farming accounts for around **75 percent<sup>1</sup>** of total monthly household income for smallholder farmers.



## A TRANSBOUNDARY PEST



*The first objective must be to contain this fungus to its present location.*



*-David Nowell, Plant Production and Protection Officer, FAO*

Tropical race 4 (TR4) is the latest race of the fungus *Fusarium oxysporum* f. sp. *cubense*. It is a soil-borne pathogen that attacks the roots of the banana causing the Banana Fusarium Wilt disease by clogging its vascular system.

Once established in a field, TR4 can cause **complete yield loss.**<sup>2</sup>

More than **80 percent** of global banana production is thought to be based on TR4 susceptible germplasm.

After the first detection in **Asia in the 1970s** of what would later become known as Tropical race 4 and its subsequent spread to Africa in 2013, TR4 arrived in Latin America in 2019—where around **2/3 of the global banana trade** originates.



**1970.**  
ASIA



**2013**  
AFRICA



**2019**  
LATIN AMERICA

<sup>1</sup> Research conducted in ten banana-producing countries by Bioversity.

<sup>2</sup> FAO. 2019. Banana fusarium wilt disease. In: FAO Food Chain Crisis [online]. Rome. [Cited 15 September 2019]. <http://www.fao.org/food-chain-crisis/how-we-work/plant-protection/banana-fusarium-wilt/en/>

### Distribution of Tropical race 4 (TR4) as of January 2020



Source:  
International Plant Protection Convention. 2019. [Cited 5 December 2019]. <https://www.ippc.int/en/>  
ProMusa. 2020. Tropical race 4. [Cited 5 December 2019]. <http://www.promusa.org/Tropical+race+4+-+TR4>

TR4 is recognized as one of the most aggressive and destructive fungi in the history of agriculture and the world's greatest threat to banana production.

Clearly, solutions in the form of **effective resistance** are urgently needed to avoid losses in a diverse array of sectors and communities. Research to breed TR4 tolerant or resistant varieties is being carried out by several institutions, but this takes time.



THE MOST EFFECTIVE APPROACH TO  
**COMBAT**  
 TROPICAL RACE 4



IS THE  
**PREVENTION OF ITS SPREAD**  
 INTO **NON-INFECTED AREAS**

AND  
**IMMEDIATE CONTAINMENT**  
**WHEN IT IS DETECTED**

### **GLOBALLY RECOGNISED TERMS**

#### **DISEASE**

Banana Fusarium Wilt (**Banana FW**)

#### **FUNGUS**

The fungus that causes Banana FW is *Fusarium oxysporum f. sp cubense (Foc)*

#### **RACE OF FUNGUS**

The latest race of the fungus causing Banana Fusarium Wilt in Cavendish cultivars (and many others) is *Fusarium oxysporum f. sp cubense tropical race 4 (Foc TR4)*, also known as **Tropical race 4 (TR4)**



### **CLEANING PROCESS TO ENSURE DECONTAMINATION**



**SCRUB**



**WATER RINSE**



**FOOTBATH**



**DISINFECT**



**RECORD**





## HOW DOES IT MOVE?

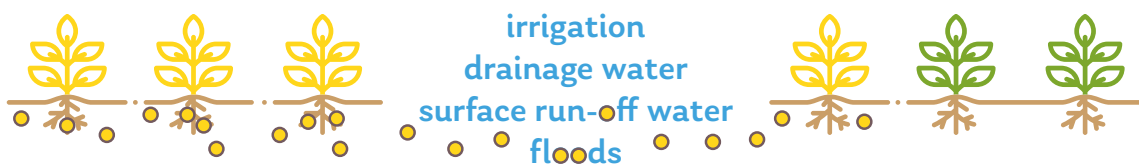
The fungus spreads through infected plant materials and contaminated soil particles attached to items such as farm tools, shoes, clothes, animals and vehicles.

### ANYTHING THAT CAN MOVE SOIL



### CAN CARRY AND SPREAD TR4

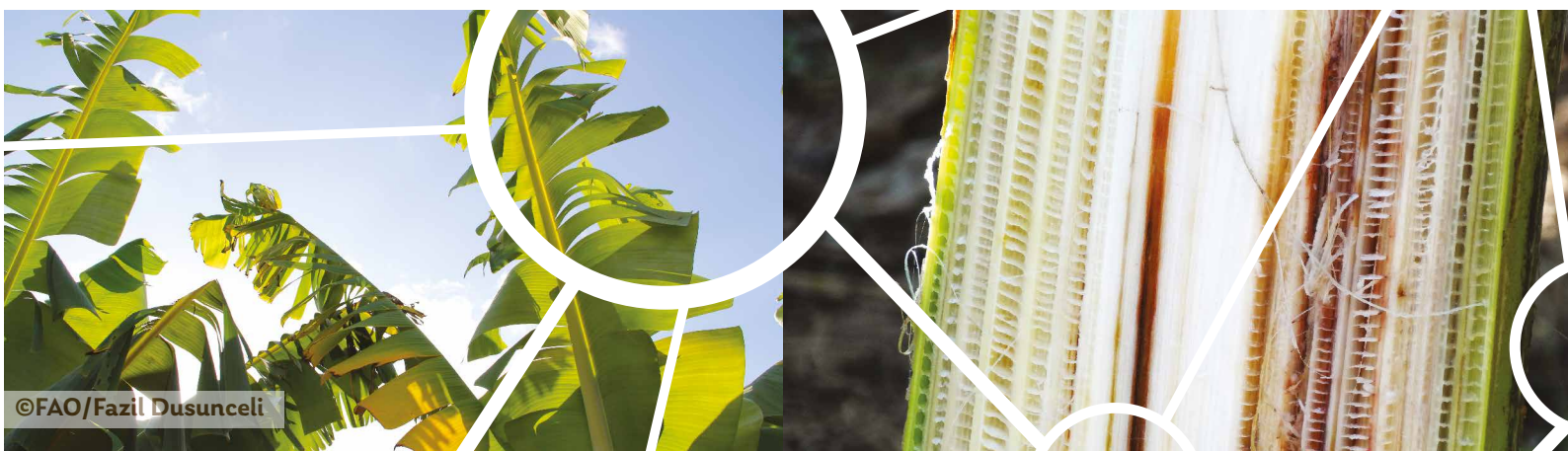
Irrigation and drainage water also play a critical role in its spread. Typhoons and other storms can also carry the TR4 fungus to new plantations. The survival form of the fungus, spores with a thick wall called chlamydo spores, can remain dormant in the soil or on several host plants for decades.



The fungus affects many varieties including Cavendish bananas, which provide around **half of global banana supply and almost all of the bananas exported.**

PROVIDES **H**  **LF** OF GLOBAL SUPPLY

Prevention and phytosanitary measures are the most effective ways of controlling the spread of the fungus. Diversity is also key to prevention of the spread of TR4. **Diversification of crops** and **better use of available genetic resources** are key to building resilience in the long term.



## WHAT IS THE TR4 GLOBAL NETWORK?

 **The TR4GN is both a knowledge hub and a platform for stakeholder collaboration**

FAO and the World Banana Forum host the TR4 Global Network (TR4GN) as a knowledge hub for awareness and prevention of the spread of the disease.

**The TR4GN is a neutral convener.** It:

- Creates the basis for inclusive and open collaboration among stakeholders, for the benefit of all.
- Fosters information sharing and better understanding about TR4, with inputs from World Banana Forum members, governments, the academy, and the banana industry.
- Acts as a catalyst for materials, findings, and events that are relevant for the common fight against TR4.
- Facilitates the creation of partnerships at the local and regional level by bringing visibility to industry stakeholders' work on TR4.
- Is the reference point for awareness-raising and capacity development materials to promote prevention and control of TR4.

TR4GN is built upon two dedicated tools for the sharing of content: a **dynamic website** and a **newsletter**.

Supporting this process is the TR4 Task Force, formed by a group of experts from different countries and sectors ranging from governments to private sector, from civil society organizations to research institutions.

Anyone who is interested in banana production and its sustainability around the world can access the content available on the website. Users can also **join the exchange**, by sharing information, data and materials with the facilitators.





## MEASURES BEING TAKEN



*Currently there are no effective cures for TR4... only prevention*

Once TR4 is in the soil, there are no effective treatments, chemicals or otherwise. Fungicides and soil fumigants are not efficient in controlling or eradicating TR4 from infested soil.



**FUNGICIDES** and **SOIL FUMIGANTS** are **NOT EFFICIENT**  
IN CONTROLLING OR ERADICATING TR4 FROM INFESTED SOIL

TR4 is a soil pathogen. Promotion of biodiversity in healthy soils as defence line to weaken the impact of TR4 is an interesting hypothesis, but needs to be proven.

Enforcing strict biosecurity measures as well as early detection, rapid destruction of infected banana plants and on-farm restrictions, are the only way to manage and contain the disease.

Support is needed for disease management and containment in affected countries. **International collaboration and local action are essential.**

**SUPPORT  
IS NEEDED  
FOR DISEASE  
MANAGEMENT**



**INTERNATIONAL  
COLLABORATION  
AND LOCAL ACTION  
ARE ESSENTIAL**

**BANANAS AND PLANTAINS SUSTAIN OUR WORLD'S COMMUNITIES  
IN SO MANY WAYS AND HELP US ACHIEVE #ZEROHUNGER**



## BANANAS SUSTAIN OUR WORLD'S COMMUNITIES IN SO MANY WAYS AND HELP US ACHIEVE #ZEROHUNGER

The continued spread of TR4 would be devastating for the communities who rely on bananas for their livelihoods, but also sad for those who simply enjoy eating them.

The global food and agriculture system will need to undergo profound change if we are to nourish the 820 million people who are hungry today and the additional 2 billion people expected to be undernourished by 2050.

Bananas and plantains are critical to food security and livelihoods of around 400 million people.

Investments in agriculture, including in innovation in the banana sector, are crucial to increasing the capacity for agricultural productivity and sustainable food production systems necessary to achieve **#ZeroHunger**.

If we don't act quickly and effectively, we risk the long term viability of these important crops.

**By working together, we can prevent the spread of TR4.**

### Become part of the TR4 Global Network!

To learn more or to access resources, subscribe to our **newsletter** or visit our **website**:

**TR4GN@fao.org** | **www.fao.org/TR4GN**

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:

**www.fao.org/world-banana-forum**

World Banana Forum Secretariat  
Trade and Markets Division

Food and Agriculture Organization of the United Nations  
Viale delle Terme di Caracalla  
00153 Rome, Italy

**WBF@fao.org** | **www.fao.org/wbf** | **@FAOwbf**



*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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