

# **Information note on the outcomes of the technical consultation on prevention and management of Fusarium wilt disease of banana**

9-10 December 2014, Rome

## **Background**

Fusarium wilt disease, caused by the fungus *Fusarium oxysporum* f.sp. *cubense* (Foc), is among the most destructive diseases of banana. A new race of the fungus known as Tropical Race 4 (TR4) has been affecting severely banana plantations in Southeast Asia and recently it has been reported, for the first time outside Asia, in Mozambique and Jordan.

The TR4 race infects the widely grown Cavendish varieties, which dominate global trade but are also important for domestic markets, as well as some other cultivars used for local consumption and marketing. Once the disease is present in a field it cannot be eradicated effectively. Hence the threat is considered severe for the banana producers in Asia, Africa and Latin America and the Caribbean.

In view of the magnitude of the risks, a global programme is being prepared for the prevention and management of this disease. In this regard a consultation meeting was organized at the headquarters of FAO in Rome, Italy on 9-10<sup>th</sup> December 2014.

The meeting brought together 35 experts from various international and national institutions in Asia, Africa, Near East, Europe and Latin America and Caribbean. The participants discussed current status of the disease, strategies for prevention and management as well as current international efforts and progress worldwide. In addition a draft text was presented for a global programme which aims to strengthen international collaboration and contribute to development of global and regional strategies for prevention and management of the disease.

## **Highlights**

Through 29 presentations and discussions various recommendations were formulated for global, regional and local strategies. Highlighted issues and recommendations included, among others, the importance of the following for prevention and management of the disease:

- Awareness raising at farmer, producer and political level,
- Surveillance, early detection and rapid response,
- Legislation, quarantine measures and role of IPPC and plant protection organizations
- Risk assessment and contingency planning,
- Use of clean planting materials,
- Development and use of resistant varieties,
- Inoculum reduction through appropriate management practices,
- Capacity building and training of technical officers and farm workers,
- Regional and global collaboration,

The meeting emphasized that a global collaboration mechanism is needed to facilitate synergies and exchange of experiences among the countries and institutions at regional and global level,

The proposed programme and framework of the activities were appreciated and welcomed by the participants. The participants strongly supported the proposed programme and indicated their willingness to collaborate with FAO in its further development and implementation.

## Technical Consultation on Prevention and Management of Fusarium Wilt Disease of Banana

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### Agenda

9 December Tuesday	
08.30 – 09.00	Registration
09.00 – 09.40 (Iran room)	<p>1. Opening session</p> <p>Welcome:</p> <p style="text-align: center;"><i>Clayton Campanhola</i> <i>Director, Agricultural Production and Production Division, FAO</i></p> <p>Self introduction: Participants</p> <p>Introduction to the consultation</p> <ul style="list-style-type: none"> <li>- Global programme on prevention and management of Fusarium wilt disease of banana <i>Fazil Dusunceli, Agriculture Officer, AGP, FAO</i></li> </ul>
09.40 – 10.30 (Iran room)	<p>2. Policies and strategies for prevention and management of Fusarium wilt disease of banana</p> <p>Status of Foc TR4 and management strategies:</p> <ul style="list-style-type: none"> <li>- Asia-Pacific: <i>Agustin Molina (Bioversity Int., Philippine), Bob Williams (Department of Primary Industry, NT, Australia)</i></li> <li>- Africa: <i>Altus Viljoen (Stellenbosch Univ.); Eldad Karamura (Bioversity Int), Danny Coyne (IITA)</i></li> <li>- Latin America and Caribbean: <i>Luis Peres Vicente (INISAV, Cuba), Luis Posacangre (Earth University, Costa Rica), Miguel Ditta (EMBRAPA, Brasil),</i></li> <li>- Perspectives of the World Banana Forum (WBF) and its members on prevention and management of Foc TR4 <i>Pascal Liu (World Banana Forum), Luud Clercx (TASTE)</i></li> </ul> <p>Discussions</p>
10.40 – 11.10	Coffee break (and group photo in Atrium)
11.10 – 13.00 (Philippines room)	<p>3. Surveillance, diagnosis and early warning (Philippines room)</p> <ul style="list-style-type: none"> <li>- Recent developments in diagnostics of Foc: practical applications towards disease management <i>Miguel Ditta (EMBRAPA, Brasil), Gerrit Kema (Wageningen University)</i></li> <li>- Role of Plantwise in disease detection and knowledge dissemination <i>Shaun Hobbs, CABI</i></li> </ul> <p>Discussions and recommendations (on item 2 and 3)</p>
13.00 – 14.30	Lunch break
14.30 – 17.30	<p>4. Enhancement of development and implementation of phytosanitary legislation for prevention of Foc</p> <ul style="list-style-type: none"> <li>- Role of IPPC in prevention of introduction and spread of plant pests <i>Craig Fedchock, IPPC secretariat</i></li> <li>- Regional perspectives: <ul style="list-style-type: none"> <li>- Latin America and Caribbean: <i>Carlos R.U. Morales (OIRSA)</i></li> <li>- Africa : <i>Jean G.M.M`Ella (AU-IAPSC))</i></li> <li>- Near East: <i>Mekki Chouibani (NEPPO)</i></li> </ul> </li> </ul> <p>Discussions</p>
15.40 – 16.00	Coffee break

16.00 – 17.30	<p>5. Development and adoption of genetic resistance and integrated management methods and tools for disease management</p> <ul style="list-style-type: none"> <li>- Combatting Foc TR4 expansion with genetic resistance <i>Gerrit H. Kema. Wageningen University</i></li> <li>- Musa improvement against TR4 through selections of somaclonal and natural clonal variations in Asia - Pacific <i>Agustin Molina (Bioversity Int), Chi Ping Chao (TBRI), Yi Ganjun,( GAAS)</i></li> <li>- Holistic approaches for integrated management of Foc <i>Bob Williams, Department of Primary Industry, NT, Australia</i></li> <li>- Improvement of banana and plantains in West and Central Africa <i>Michel N. Keng (CARBAP)</i></li> </ul> <p>Discussions and recommendations</p>
18.00	Cocktail (Aventino room – 8 <sup>th</sup> floor)
10 December Wednesday	
09.00 – 13.00	<p>6. Strengthening capacities for prevention of Foc and its management:</p> <p>National and international efforts and challenges for prevention and management of Foc:</p> <ul style="list-style-type: none"> <li>- Malaysia / TFNet (Yacob Ahmad TFNet)</li> <li>- Philippines (Maria Emilie Fabregar)</li> <li>- Indonesia (Mizu Istianto – Presented by Agustine Molina)</li> <li>- China (Cunwu Zuo)</li> <li>- India (Perumal Munickam)</li> <li>- Mozambique (Serafina Mangana)</li> </ul>
10.30 – 10.50	Coffee break
10.50 – 13.00	<ul style="list-style-type: none"> <li>- Oman (Ali AlAdawi)</li> <li>- Jordan (Setan Al Sarhan)</li> <li>- Costa Rica (Mauricio Guzman Quesada)</li> <li>- Honduras (Jose Luis Maradiaga)</li> <li>- Dominican Republic (Miguel Marrero)</li> <li>- Ecuador (Maria Rodriguez, Wilson Almeida Granja)</li> </ul> <p>Discussions and recommendations</p>
13.00 – 14.00	Lunch break
14.00 – 15.30	<p>7. Enhancing international collaboration for improved governance of Foc at global and regional level</p> <ul style="list-style-type: none"> <li>- Banana production systems in eastern and southern Africa and BARNESA`s role <i>Eldad Karamura (Bioversity Uganda)</i></li> <li>- Bioversity`s global perspective on prevention and management of Foc <i>Stephan Weise, Dietmar Stoian, Agustin Molina, Eldad Karamura, Inge Van den Bergh (Bioversity International)</i></li> <li>- Recent efforts of the FAO on prevention and management of banana Fusarium wilt disease through its decentralized offices network <i>F. Dusunceli, J. M. Mutti, M. Abang, A. Pantoja, V. Lopez, A. Hruska, S.Al-Dobai, S. Sagnia, A. Franken, Y. Piao, M. Dost (FAO)</i></li> </ul> <p>Discussions and recommendations</p>
15.30 – 15.50	Coffee break
15.50 – 17.00	8. Priority actions and the way forward
17.00 – 17.30	<p>Remarks: <i>Stephan Weise, ADG, Bioversity International</i></p> <p>Closing: <i>Dominique Burgeon, Director, TCE</i></p>

Outputs and activities of the global programme on Fusarium wilt disease of banana

<b>GOAL</b>	Contribute to global food security and improvement of livelihood resilience through the prevention and management of Foc and sustainable production of bananas					
<b>OUTCOMES</b>	Outcome 1. Improved prevention of spread of Foc TR4 into banana-growing countries and regions			Outcome 2. Improved preparedness and integrated management of Foc TR4 at field level		Outcome 3. Enhanced Int. synergy and collaboration
<b>OUTPUTS</b>	<b>OUTPUT 1</b> Policies and strategies improved and awareness level enhanced at all levels for improved prevention	<b>OUTPUT 2</b> Surveillance, early detection and monitoring approaches and systems improved	<b>OUTPUT 3</b> Risks assessed, and plant health-related legislation and phytosanitary practices enhanced	<b>OUTPUT 4</b> Capacities strengthened for improved preparedness and prevention	<b>OUTPUT 5</b> Integrated management strategies improved and implemented to reduce disease impact and pathogen spread	<b>OUTPUT 6</b> Regional and international interaction, collaboration and information sharing enhanced
<b>ACTIVITIE</b>	<p>1.1. Advocacy and awareness-raising among decision makers and farmer communities</p> <p>1.2. Strengthen national crop and disease management strategies and plans</p> <p>1.3. Support coordination among stakeholders through participatory processes for development and implementation of contingency</p>	<p>2.1 Provide policy and technical support for national and regional surveillance and monitoring mechanisms</p> <p>2.2 Strengthening national and regional disease surveillance and diagnostic capacities</p> <p>2.3 Conduct national and regional surveys for Foc TR4 in affected countries and high-risk areas</p>	<p>3.1. Map the distribution and assess the potential impact of Fusarium wilt disease to global banana production</p> <p>3.2. Assess the status of national phytosanitary legislation and identify needs for improvement</p> <p>3.3. Improve and introduce legislation for the movement of disease-free planting materials</p> <p>3.4. Support government efforts to implement effective plant health legislation and phytosanitary standards</p>	<p>4.1. Support national authorities to develop, implement and sustain practices that prevent introduction of Foc TR4 onto farms</p> <p>4.2. Strengthen human resources capacity of national institutions in disease prevention and management</p> <p>4.3. Introduce Foc TR4 training programmes for farmers and farm workers in prevention and management of Foc/</p> <p>4.4. Strengthening of infrastructure of national institutions in disease surveillance, prevention and management</p>	<p>5.1. Identify, select and disseminate Foc TR4-resistant banana varieties</p> <p>5.2. Promote the use of Foc TR4-resistant bananas in collaboration with national programmes through seed campaigns and field demonstrations</p> <p>5.3. Promote integrated disease management practices to prevent spread and limit damage caused by Foc TR4 to banana plantations</p>	<p>6.1. Organize national and regional conferences, technical workshops and meetings</p> <p>6.2. Promote international collaboration and networking to manage Foc TR4 globally</p> <p>6.3. Support technical field studies and consultations for management of Foc TR4 at field level</p> <p>6.4. Facilitate knowledge sharing and dissemination</p>

## **Outcome 1. Improved prevention of spread of Foc TR4 into banana-growing countries and regions**

### **Output 1. Policies and strategies improved and awareness level enhanced at all levels for improved prevention**

#### *Activity 1.1. Advocacy and awareness-raising among decision makers and farmer communities*

- Hold awareness-raising meetings for high-level policy-makers, technical decision-makers and farmer communities at national level to inform them of Foc TR4, including its current status, impacts and actions needed for prevention and management, giving also due attention to other locally important diseases such as bacterial wilt, bunchy top disease and black Sigatoka.
- Prepare awareness and information material regarding identification, impact status, risks in affected countries and countries at risk to address audiences in their language and by considering their production systems.
- Carry out web-based advocacy and promotion of good agricultural practices to prevent the introduction and spread of Foc and other important banana pathogens.

#### *Activity 1.2. Develop and strengthen national crop and disease management strategies and plans*

- Provide policy support for coordination among national and regional institutions for prevention and management of Foc TR4, and for implementing national and regional contingency plans should it be introduced into new areas.
- Develop tools and guides for development of national, regional and farm level policies and strategic plans
- Organize policy-makers' meetings to assess institutional settings and coordination arrangements for preparation and implementation of national and regional strategies and contingency plans.
- Assess and strengthen the ability of countries at risk to prepare for and respond to Foc TR4 incursions.
- With national and regional policy maker platforms, develop mechanisms for networking and information sharing among institutions.

#### *Activity 1.3. Support coordination among stakeholders through participatory processes for the development and implementation of contingency plans*

- Collect information on agro-ecological systems, agricultural landscapes, social vulnerability, and political and administrative structures of banana-growing countries.
- Organize national and regional meetings for development of the most appropriate policy options, strategies and actions needed for risk reduction, prevention and control of Foc TR4 through development of contingency plans considering also other important banana diseases such as bacterial wilt, bunchy top disease and black sigatoka.
- Support countries in implementing contingency plans through capacity building, infrastructure development, regulatory support and information and knowledge systems.
- Review and update contingency plans based on the existing status of the disease, as well as the latest information from field surveys and global analyses.
- When necessary, carry out required rapid response operations in collaboration with national authorities.

### **Output 2. Surveillance, early detection and monitoring approaches and systems improved**

#### *Activity 2.1. Provide technical support for national and regional surveillance and monitoring mechanisms*

- Hold national and regional meetings to assess the status and coordinate future surveillance systems (i.e. regularity, units carrying out surveys, methodology, information sharing, responsibilities, limitations and constraints).
- Provide technical and policy support to agree with national authorities on:
  - The most appropriate structure for the establishment of sustainable and coordinated multi-institutional surveillance and monitoring teams;
  - National focal point(s) or approach(es) to ensure quality of national survey data and its transmission to concerned parties nationally and internationally;

- The type and level of survey information to be officially shared and exchanged regionally or internationally considering national and international regulations; and
- Long-term surveillance and monitoring programmes and identification of lead institutions.
- Coordinate targeted surveillance arrangements for the early detection of Foc TR4 and other important banana pest and pathogens, identifying a national focal point to coordinate national activities in context of the Programme.
- Facilitate the strengthening of national and regional networks for disease surveillance and monitoring, diagnosis and international information sharing.

*Activity 2.2. Strengthening national and regional disease surveillance and diagnostic capacities*

- Assess national surveillance material, infrastructure and human capacities.
- Strengthen regional epidemiological surveillance systems by:
  - Conducting regional workshops to harmonize surveillance protocols, survey work plans, national responsibilities and compilation of available information in banana-growing areas.
  - Providing the necessary field survey support equipment to surveillance teams.
- Train relevant national staff on field surveys and disease diagnostics, based on protocols developed in the Asia/Pacific.
- Develop a Plant Health Toolbox
- that provides detailed, web-based diagnostic information to assist with the rapid identification of Foc TR4, as well as other important banana pathogens for accurate diagnosis in the event of an unwanted incursion.

*Activity 2.3. Conduct national and regional surveys for Foc TR4 in affected countries and high-risk areas*

- Conduct targeted surveillance to detect and combat incursions of Foc TR4 and other important banana pathogens supported by appropriate diagnostics.
- Collect additional information during surveys such as the variety affected, other pests and diseases present, production systems, planting history and soil characteristics based on protocols developed in the Asia/Pacific.
- Introduce tools such as web, mobile and remote sensing tools to detect and report early incursions of Foc TR4 into banana-producing regions, considering also national and regional regulations.
- Establish an information dissemination system to issue recommendations on disease status and recommended actions for prevention and control of any outbreaks addressed to relevant stakeholders.

**Output 3. Risk assessed, and plant health-related legislation and phytosanitary practices enhanced**

*Activity 3.1. Update mapping of the distribution and assess the potential impact of Fusarium wilt disease to global banana production*

- Assess the global distribution of races of Foc and map current distribution of Foc TR4 and other important banana pathogens and pests in Asia-Pacific, Africa, the Latin America, the Caribbean and the Middle East.
  - Assess banana production systems and agricultural practices in countries affected and at risk of Foc TR4.
  - Assess status and performance of major banana varieties against Foc TR4
- Review trade routes, political and social connections, business associations and the movement of migrant workers between Foc TR4-affected and non-affected countries.
  - Assess the potential risks posed to banana production areas by Foc TR4 by considering the sources of risk (entrance points), their consequences (establishment and spread) and the likelihood that those consequences may occur (review the risks) based on international standards.
- Identify and disseminate measures to minimize the risks of Foc to national and regional banana production, and improve response to incursion by pre-emptive planning also considering other important pests and diseases of banana
  - Determine key countries and regions

- Institute measures and practices to minimise risks and reduce impact if incursions happen

*Activity 3.2. Assess the status of national phytosanitary legislation and identify needs for improvement*

- Undertake baseline assessments on the current status of national and regional phytosanitary legislation in relation to Foc TR4 in countries at high risk using international standards and tools developed through International Plant Protection Convention and in collaboration with National and Regional Plant Protection Organizations.

*Activity 3.3. Improve and introduce legislation to prevent movement of infected planting materials*

- Organize national and regional meetings to assess country situations in terms of the status of systems available, production of clean planting material, multiplication and distribution of resistant varieties, coordination and information exchange within countries and regions.
- Assess and improve existing legislation on the movement of banana plants and parts thereof nationally, regionally and internationally, and strengthen border interception capabilities.
- Support development and implementation of legislation and phytosanitary regulations that would prevent the introduction of plants and other risky materials from affected countries.
- Harmonise legislation and regulations on Foc and other important banana diseases between countries, regions and internationally.
- Adopt systems and mechanisms for the efficient and effective distribution, communication and uptake of information on plant health.
- Monitor and strengthen the integrity of the plant health systems.

*Activity 3.4. Support government efforts to implement effective plant health legislation and phytosanitary standards*

- Organize workshops to identify the support needed by countries at high risk of Foc TR4 in designing and implementing legislation.
- Adopt phytosanitary legislation, regulations and approaches where possible within the framework of the International Plant Protection Convention.
- Establish an integrated national and regional approach to plant health training and awareness supported by research.
- Support introduction and implementation of the international standards related to plant health for surveillance, prevention and management of Foc TR4.

## **Outcome 2. Improved preparedness and integrated management of Foc TR4 at field level**

### **Output 4. Capacities strengthened for improved preparedness and prevention**

*Activity 4.1. Support national authorities to develop, implement and sustain practices that prevent the introduction of Foc TR4 onto farms*

- Increase vigilance of government institutions regarding Foc TR4 by providing data on its economic and social impacts as well as those of other important diseases such as bacterial wilt and BBTV in countries where they are present.
- Identify and strengthen entrance and transmission points with higher risks of becoming paths for introducing plants or other materials which are potential carriers of destructive banana pathogens
- Develop and distribute posters, brochures and information material about diseases at border points, enterprises and producer organizations.
- Training and capacity building at national institutions on the use of clean certified planting materials:
  - Promote and allow banana and plantain propagation materials from countries where Foc TR4 and other destructive plant pathogens are present, only to enter through intermediate quarantine stations.
  - Promote use of tissue culture plantlets and only if accompanied by a certificate of pathogen-indexing.
- Develop fact sheets and guidelines, and organise farmer field schools for sharing methods to prevent and manage Foc TR4 on-farm.

*Activity 4.2. Strengthen human resources capacity of national institutions in disease prevention and management*

- Train technical personnel on the entrance paths of Foc TR4 and other destructive diseases such as bacterial wilt, BBTV and black Sigatoka.
- Train plant protection officers and extensionists, production technicians and state services to identify Foc TR4 and banana Fusarium wilt, its biology, epidemiology, prevention and management
- Prepare technical material and protocols on early detection, containment and eradication of plants diagnosed as infected with Foc.
- *Activity 4.3. Introduce training programmes for farmers and farm workers in prevention and management of Foc* Train producers and farmers through field-based programmes such as farmer field schools and demonstrations for:
  - Detection and containment of Foc TR4
  - Use of disease free tissue culture based planting materials
  - Selection and use of superior banana varieties with disease resistance
  - Proper sanitation of vehicles, shoes and field equipment
  - Eradication of banana plants affected by Foc and highly destructive banana diseases
  - Farm management practices that minimizes spread of the disease
- Involve national and regional institutions with mandates to control pests and diseases in training programmes.

*Activity 4.4. Strengthen infrastructure capacity of national institutions in disease surveillance, prevention and management and tissue culture propagation materials production*

- Provide support for strengthening of infrastructure of national institutions to design and execute projects and activities in planning, surveillance, disease prevention and disease management in the sectors of
  - research
  - plant protection,
  - extension and
  - seed production
  - planning

**Output 5. Integrated management strategies improved and implemented to reduce disease impact and pathogen spread**

*Activity 5.1. Identify, select and disseminate Foc TR4-resistant banana varieties*

- Prepare guidelines and conduct workshops on the identification, selection and evaluation of banana varieties against Foc TR4.
- Field selection and testing of popular banana varieties for resistance to Foc TR4 in affected countries.
- Provide training in banana tissue culture and the development, selection and deployment of tolerant/banana somaclones for disease resistance,
- Disseminate disease-free and Foc TR4-resistant banana varieties for evaluation in countries at risk.
- Identify and promote certified tissue culture laboratories for the production of banana plants free of banana pathogens and pests.

*Activity 5.2. Promote the use of Foc TR4-resistant bananas in collaboration with national programmes through field demonstrations*

- Facilitate the evaluation of Musa germplasm for resistance/immunity to Foc TR4 in countries where the disease is present.
- Develop information lists of banana varieties resistant and susceptible to all races of Foc.
- Develop guidelines and mechanisms of sharing and evaluating Foc TR4-resistant banana plants developed by mutation breeding (somaclonal variation, mutagenesis), traditional breeding and genetic modification.
- Promote Foc TR4-resistant varieties by means of field demonstration plots and information sharing (farmer days, brochures).
- Advocate the use of clean planting materials by involving producers and industry in the regulation process

*Activity 5.3. Develop and promote integrated disease management practices to prevent spread and limit damage caused by Foc TR4 to banana plantations*

- Introduce on-farm sanitary and phytosanitary practices to prevent the introduction (warning signs, vehicle and foot baths) and spread (early identification, destruction and burning of diseased plants) of Foc TR4 in farmer fields.
- Provide scientifically sound recommendations to farmers to improve soil health and suppress banana Fusarium wilt by means of soil amendments, biological control and crop rotation, depending on production systems and the level and extent of field infestation.
- Where possible, develop quarantine zones between Foc TR4-affected and non-affected areas within and between regions in infected countries.
- Restrict the movement of soil, appliances, vehicles and field equipment from quarantine areas for use in non-Foc TR4 infested fields.
- Introduce proper sanitary practices and signs at farm entrances, and control the movement of visitors and field workers.

**Outcome 3. Enhanced international collaboration and synergy among the institutions and initiatives working for the improvement of the banana sector**

**Output 6. Regional and international interaction, coordination and information sharing enhanced**

*Activity 6.1. Organize national and regional conferences, technical workshops and meetings*

- Organize regional consultations, workshops and experience sharing events
- Publish issues that need public attention through appropriate means.

*Activity 6.2. Promote international coordination and networking to manage Foc TR4 globally*

- Exchange scientific information, dissemination of publications and work programmes between regions and internationally
- Sharing and dissemination of knowledge and programme activities through web-based forums, also linking and collaborating with existing information resources
- Organize international technical workshops to facilitate knowledge exchange and collaboration.
- Develop and promote policy and technical guidance on prevention and management of the disease to assist countries develop their national and regional strategies.

*Activity 6.3. Support technical field visits and consultations for field management of Foc TR4*

- Identify local and international experts in the diagnosis and field management of Foc TR4
- Enable bilateral technical visits on field management for prevention and management of the disease.
- Provide technical advice and guidance to producers with regard to on-farm biosecurity and developing risk mitigation measures.