



Food and Agriculture
Organization of the
United Nations

Fighting banana diseases – the end of Cavendish?

05 February 2014

Gianluca Gondolini

Secretary of the World Banana Forum

Trade and Markets Division

FAO Headquarters, Rome, Italy



**The World
Banana
Forum**



Food and Agriculture
Organization of the
United Nations

What is the World Banana Forum (WBF)?

Multi-stakeholder global platform created to leverage dialogue and cooperation among players in the banana value chain

Mission:

Promote sustainable production and trade

Objective:

Support the adoption of good practices that address environmental, economic and social challenges including value distribution, externalities and negative impacts.



**The World
Banana
Forum**



Why bananas?

- The world's most exported fresh fruit (> US\$ 7 billion/year)
- Essential source of income and employment for hundreds of thousands of rural households in developing countries.
- Serious environmental, economic and social challenges due to:
 - Large monoculture plantations
 - High use of agrochemicals (mostly fertilizers and pesticides)
 - High production costs
 - Impacts on workers and local communities
 - Low market prices

Meeting those complex challenges requires the involvement of all stakeholders of the banana sector worldwide.



**The World
Banana
Forum**



Structure of the WBF and deliverables

- Steering Committee
- Secretariat hosted by the FAO
- Thematic Working Groups:
 1. Sustainable Production Systems and Environmental Impact
 2. Distribution of Value
 3. Labour Rights
- Task Forces: Fundraising, Communication, Fusarium TR4

Some Outputs to date

- Key players working together to set a level playing field;
- Online portal to exchange information on good practices;
- Training workshops and capacity-building projects;
- Collaborative public-private partnerships and field research;
- National and international events to plan joint actions;
- Publication of statistics, analyses and case studies.





Members

The WBF welcomes the participation of any stakeholder from the sector willing to contribute towards a sustainable banana value chain.

- Major banana companies
- Retailers
- Producers and their organizations
- Trade associations and exporter groups
- Civil Society Organizations
- Trade Unions
- Research institutions
- Governmental representatives
- International Organizations
- Public and private donors



**The World
Banana
Forum**



Banana diseases – Case Studies:

- Fusarium wilt Tropical Race 4
(Foc TR4)



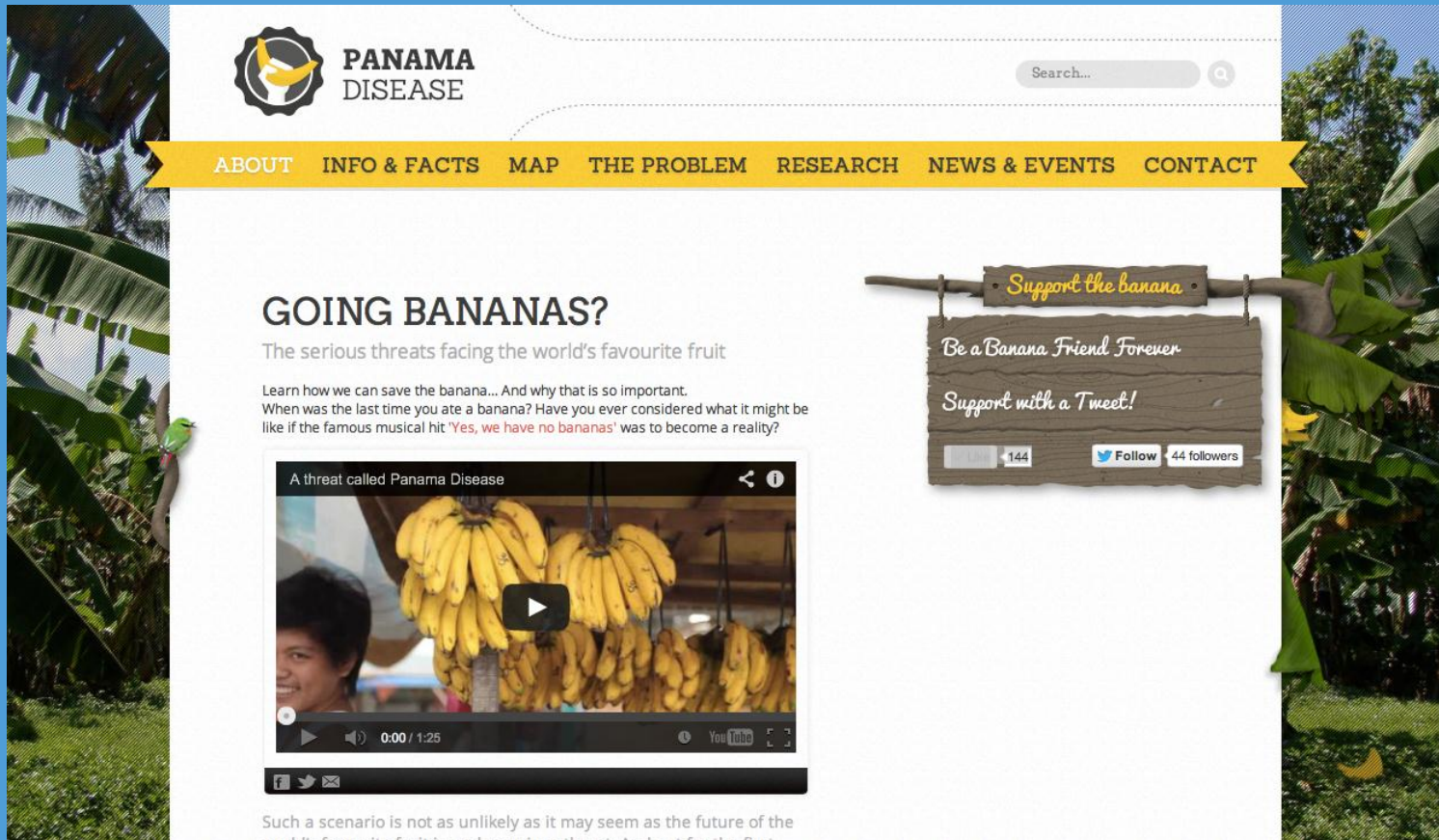
- Black leaf streak
Black Sigatoka



**The World
Banana
Forum**

Fusarium Wilt or Panama Disease

www.panamadisease.org



The screenshot shows the homepage of the Panama Disease website. The header features the 'PANAMA DISEASE' logo, a search bar, and a navigation menu with links: ABOUT, INFO & FACTS, MAP, THE PROBLEM, RESEARCH, NEWS & EVENTS, and CONTACT. The main content area is titled 'GOING BANANAS?' and describes the threats to bananas. It includes a video player with the title 'A threat called Panama Disease' and a social media widget encouraging users to 'Support the banana' and 'Be a Banana Friend Forever'.

PANAMA DISEASE

Search...

ABOUT INFO & FACTS MAP THE PROBLEM RESEARCH NEWS & EVENTS CONTACT

GOING BANANAS?

The serious threats facing the world's favourite fruit

Learn how we can save the banana... And why that is so important.
When was the last time you ate a banana? Have you ever considered what it might be like if the famous musical hit 'Yes, we have no bananas' was to become a reality?

A threat called Panama Disease

Such a scenario is not as unlikely as it may seem as the future of the world's favourite fruit is under serious threat. And not for the first time.

Support the banana

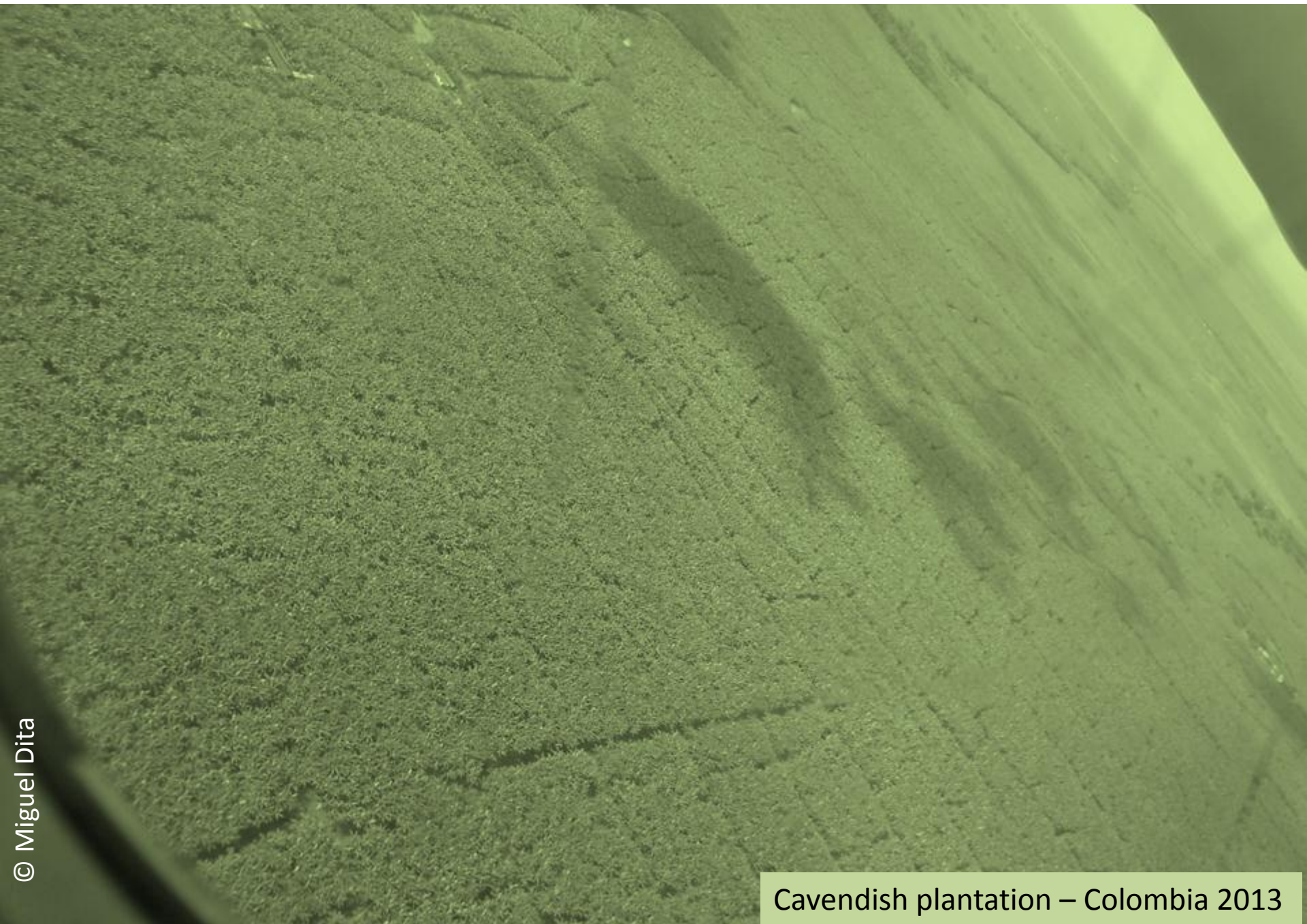
Be a Banana Friend Forever

Support with a Tweet!

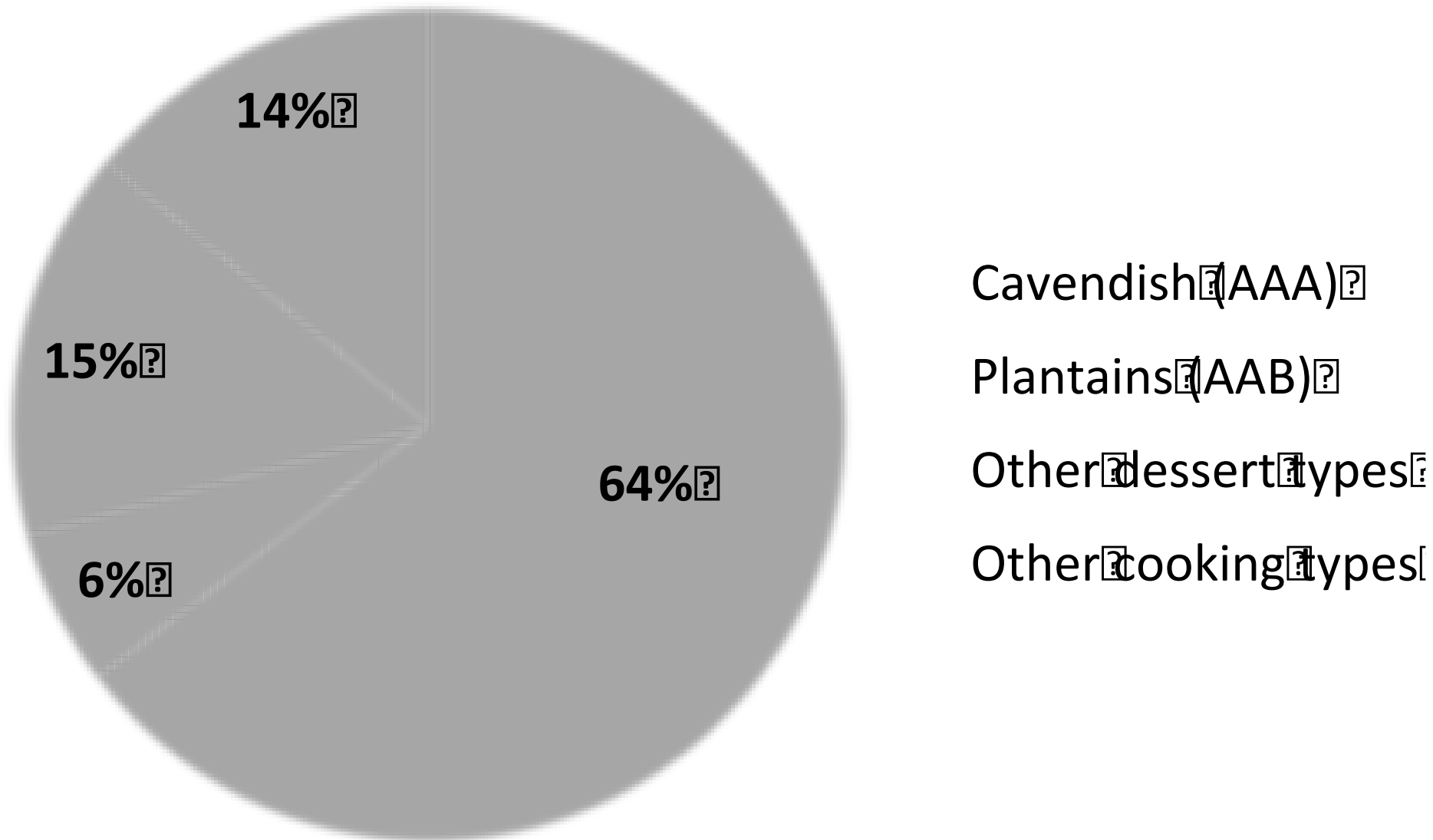
Like 144 Follow 44 followers



The current banana industry is 'Cavendish' Ocean



Cavendish varieties comprises 41% of all bananas grown worldwide and > 60 % in Top 10 producing countries



Fusarium Wilt of Banana: Global distribution



This map represents the FOC distribution for illustrative purposes only and it is not based on scientific research or to be taken as an official reference.

Source: www.pananmadisease.org/en/map

By the 1960s, 'Gros Michel' had been replaced in export production by cultivars of the Cavendish subgroup



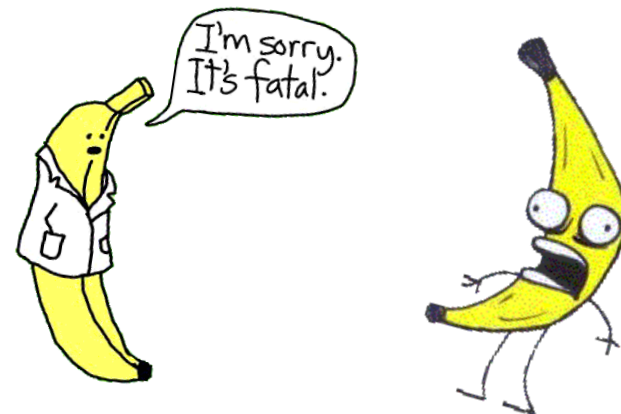
© Miguel Dita



© Miguel Dita



© Miguel Dita



'Gros Michel' learns his fate

Fusarium Wilt : Symptoms



Foc dissemination in the field – Soil-borne disease

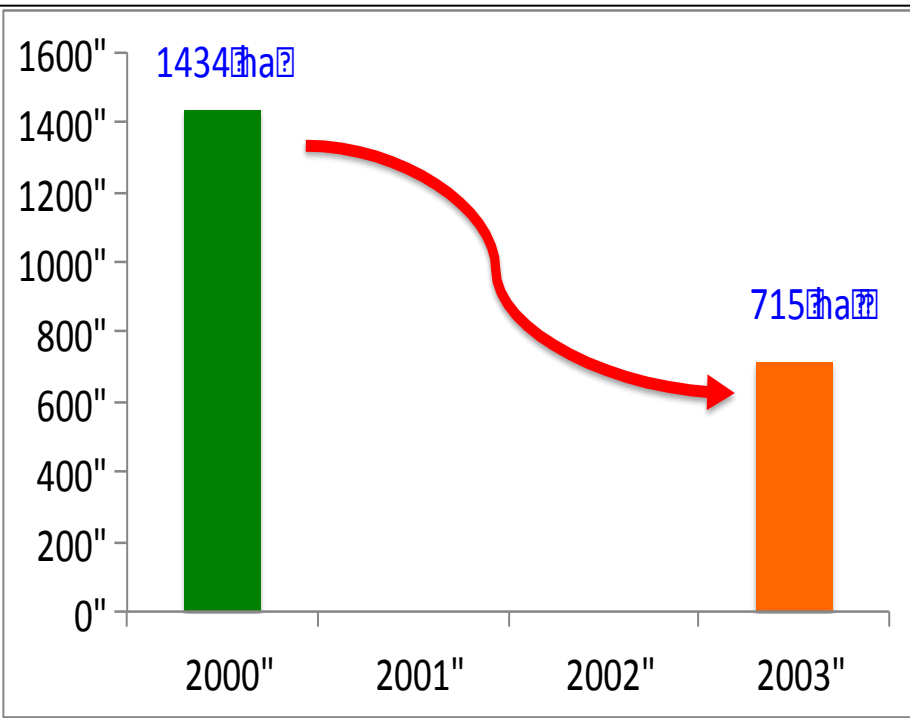


According to Horticulture Plant Protection Department (2007) reported that epidemic rates of Foc race 4 in Sumatra and other provinces -
reach 100 km/year



Impact of Foc TR4 in Asia: A global threat

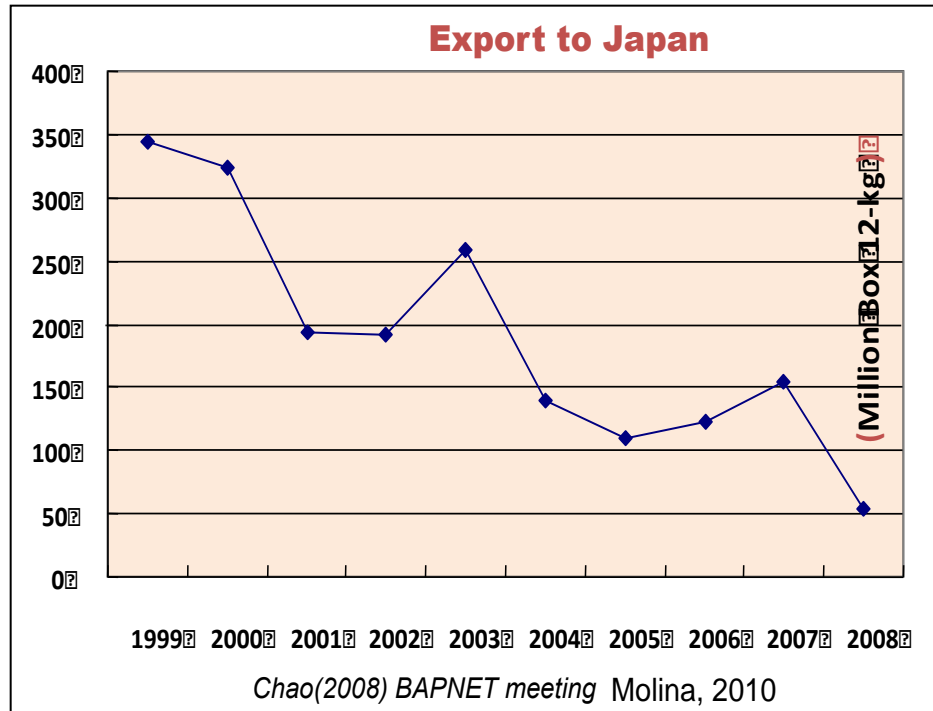
PRODUCTION AREA Indonesia



West Sumatra

(Horticulture Processing and Marketing Department, 2005)

MARKET EFFECTS Taiwan



New entries: Jordan and Mozambique

Jordan:

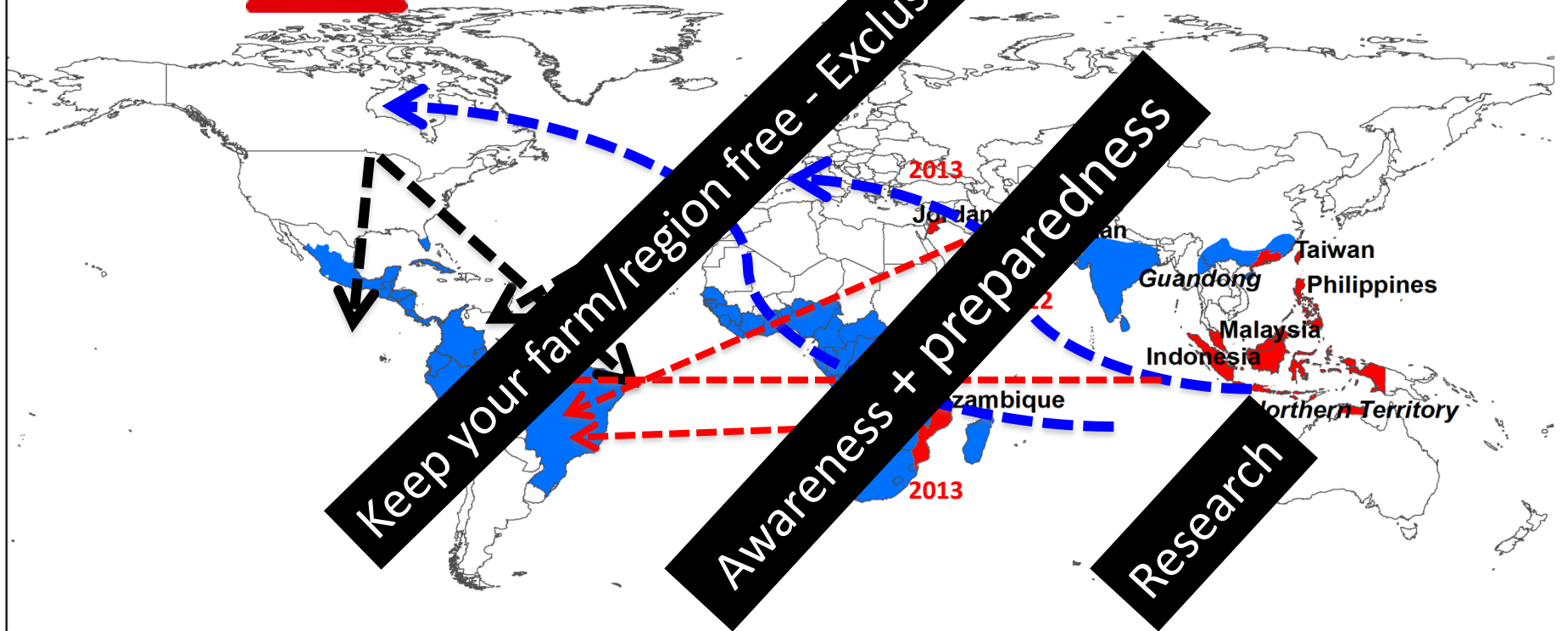
- 2006 first disease symptoms
- 1,500 ha Cavendish
- 80% affected
- No solution
- Origin?



Fusarium wilt of banana: Global distribution

Three urgent Actions

N



Under evaluation for Foc TR4



TR4



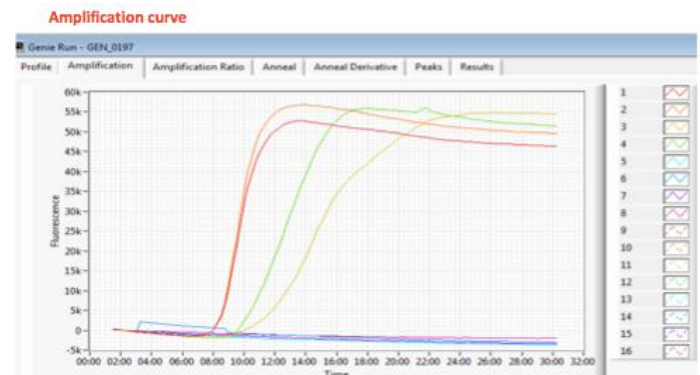
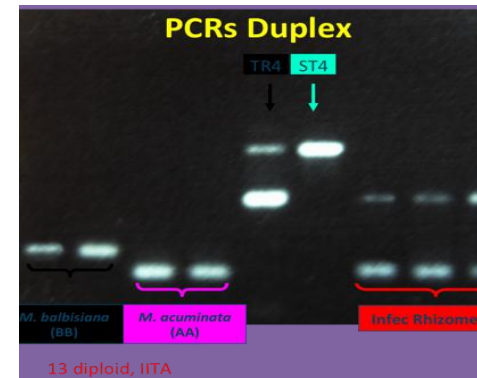
Race 1 and 2

0 1.950 3.900 7.800 11.700 15.600 km

This map represents the FOC distribution for illustrative purposes only and it is not based on scientific research or to be taken as an official reference.

Importance of diagnostic tools

- First set made available 140 years after first report
- 2008 for FOC TR1 and 2010 for FOC TR4 (Wageningen University)
- Available Soil, water and plants
- 6 hours with PCR
- 15 minutes with Lamp



Lamp

Risk assessment, capacity-building and preparedness for Foc TR4 in LAC

Bioversity,
MUSALAC
&
National Plant
Health
Organizations



A Contingency Plan for Foc TR4 - Latin American and the Caribbean

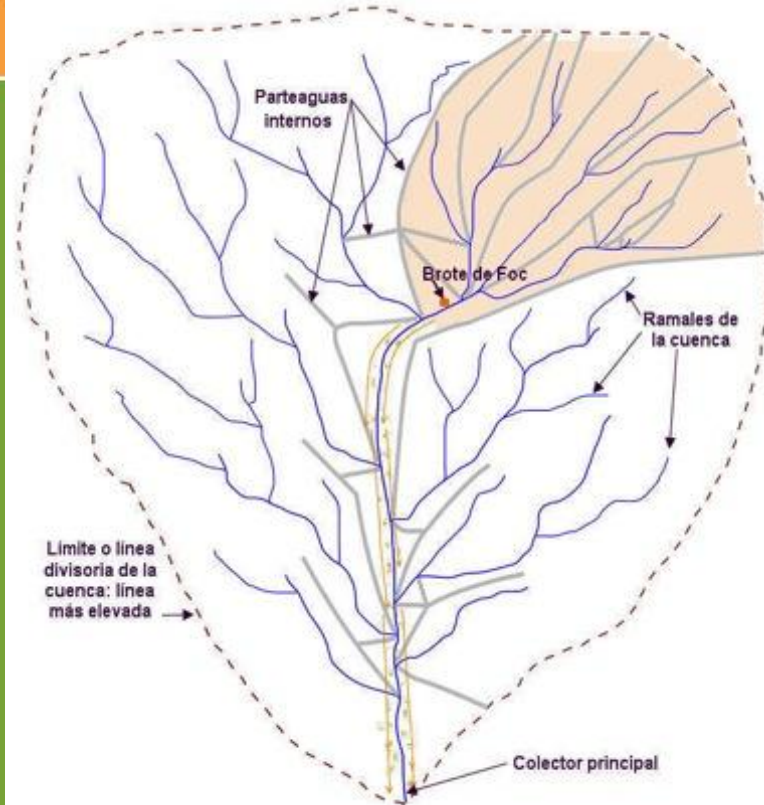
ORGANISMO INTERNACIONAL REGIONAL DE SANIDAD AGROPECUARIA
OIRSA

Plan de contingencia ante un
brote de la raza 4 tropical de
Fusarium oxysporum f. sp.
cubense

En un país de la región del OIRSA



Elaborado por:
Miguel Ángel Dita Rodríguez
Plutarco Elías Echegoyén Ramos
y
Luis Fernando Pérez Vicente



Is eradication of TR4 possible?

- Good farming practices,
- Biotic, abiotic factors
- Biofumigation
 - Verticillium
 - Rhizoctonia
 - Fusarium oxysporum
 - Nematodes
- Chemicals
 - Fungicides
 - Anti-fungals



Resistance is the first best management option



Banana cultivars reported with resistance to Foc TR4

Variety	Resistance	Market	Sources
FHIA 01	R	Seeded	Walduck & Daly 2007 Bingzhi et al. 2004
FHIA 02	R	Seeded	Bingzhi et al. 2004
FHIA 18	R	Good	Walduck & Daly 2007 Bingzhi et al. 2004
FHIA 25	R	Poor	Walduck & Daly 2007 Bingzhi et al. 2004
Pisan Jai Buya	R	NA	Walduck & Daly 2007 Bingzhi et al. 2004
*GCTV 119	MR	Good	Walduck & Daly 2007 Bingzhi et al. 2004 Molina 2011
GCTV 218	MR	Good	Molina, 2011
<i>M. accuminata malaccensis</i> **	R	Seeded	Walduck & Daly 2007
ABB varieties (Saba, Tanduk)	R	NA	Molina - unpublished



* There are many GCTV, produced by TBRI, Taiwan, which are continuously replaced for new somaclons with some resistance levels

**Some *M.a. malaccensis* are susceptibles

Enhancing plant health and resistance through soil management

TR4

Control

pH 5



pH 6



Photos taken 4 weeks after inoculation

Integrated approach for Foc disease management and improved productivity

TC plants + indigenous endophytes



Use of Beneficial Microbial Diversity

"Biotized"/bio-fortified healthy plants acclimatized
Fitness increased



Use of tailored fertilization based on organic amendments (Biochar, manures, compost) and beneficial soil microbes

Healthy plants are established on healthy soil



Soil health oriented practices
And crop integrated management

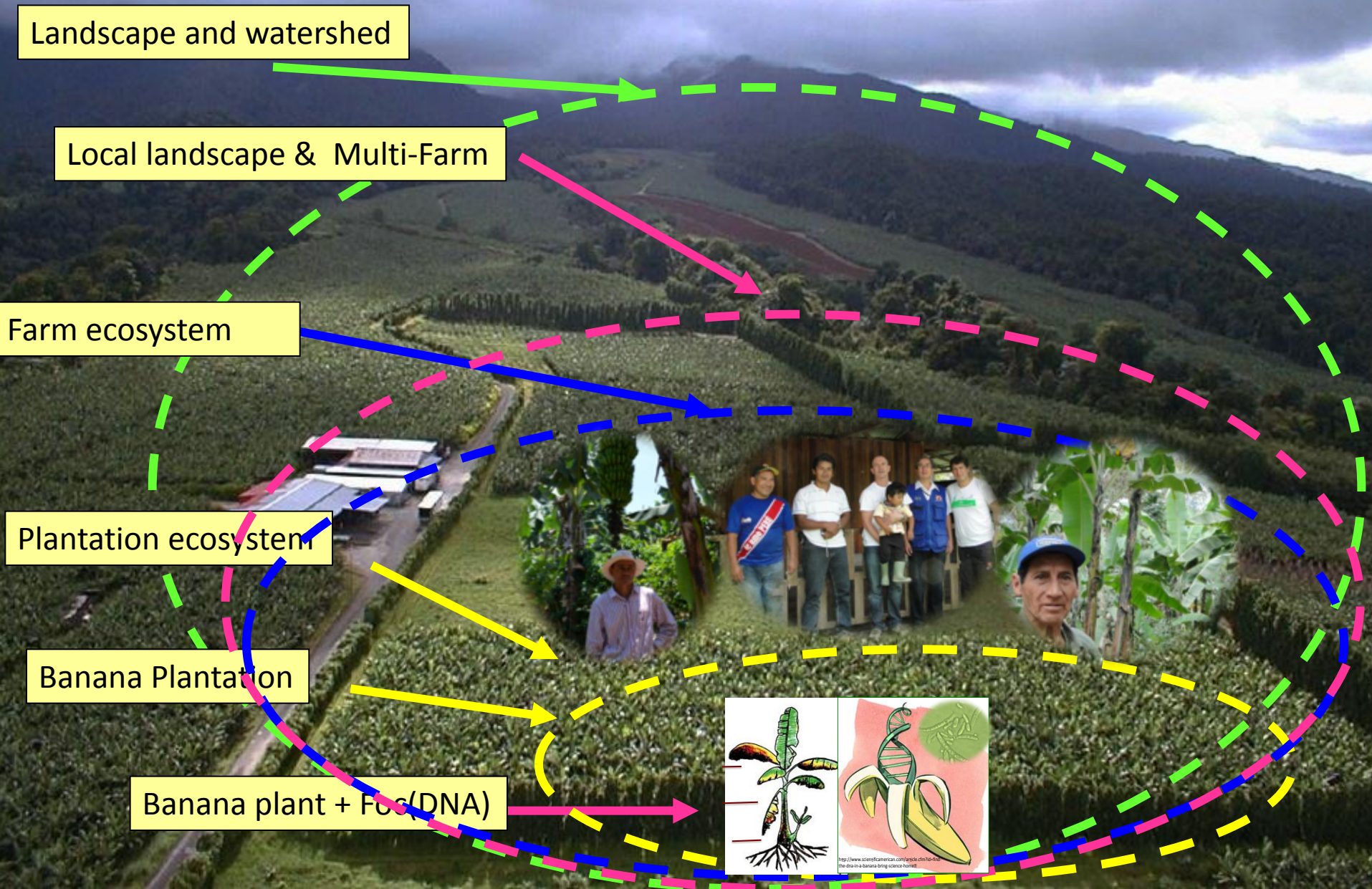
Sustainable production of banana from high value, but Foc- susceptible varieties

Integrated crop and Watershed management

Generating a toolbox of practices based on agro-biodiversity
for sustainable management of Foc in banana

Adapted from Staver 2011

Photo –ENDURE Guadalupe



Is there hope for Fusarium wilt in banana?

- **Immediate:** Rapid diagnostics, quarantine measures
- **Short-term:** Concerted Action Plan, anaerobic soil disinfestation, early warning systems, good farming practices, agro-diversification
- **Long-term:** Varietal resistance
- No control measures are currently available

Will Cavendish bananas survive?





Food and Agriculture
Organization of the
United Nations

Task Force on Fusarium Tropical Race 4

The Task Force was created in December 2013.

Actual members are:

- Chiquita
- Dole
- Taste
- WBF Secretariat
- FAO Plant Protection Division
- Wageningen University and Research Centre
- Bioversity International
- CIRAD

CALL FOR ACTION CIRCULATED

All interested organizations are welcome to join!

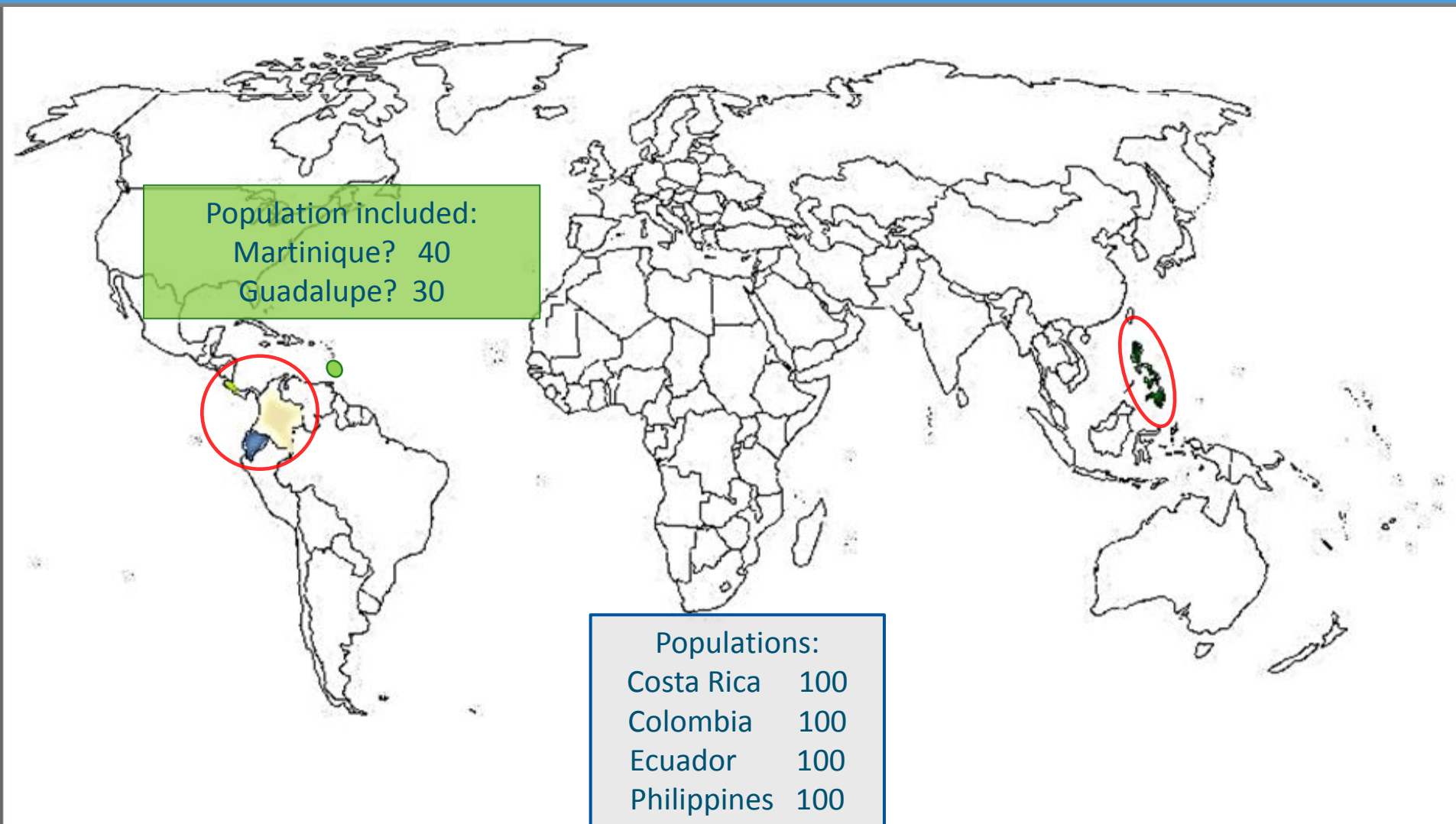


**The World
Banana
Forum**



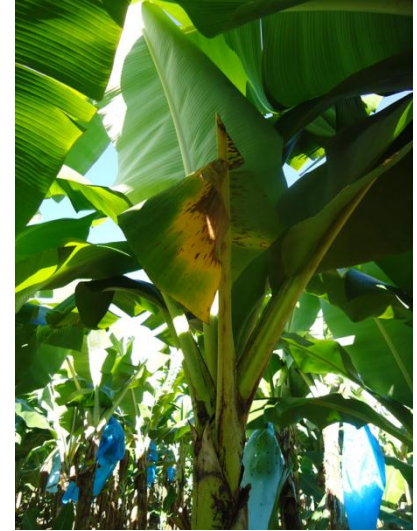
Black Sigatoka

Mycosphaerella fijiensis origin population

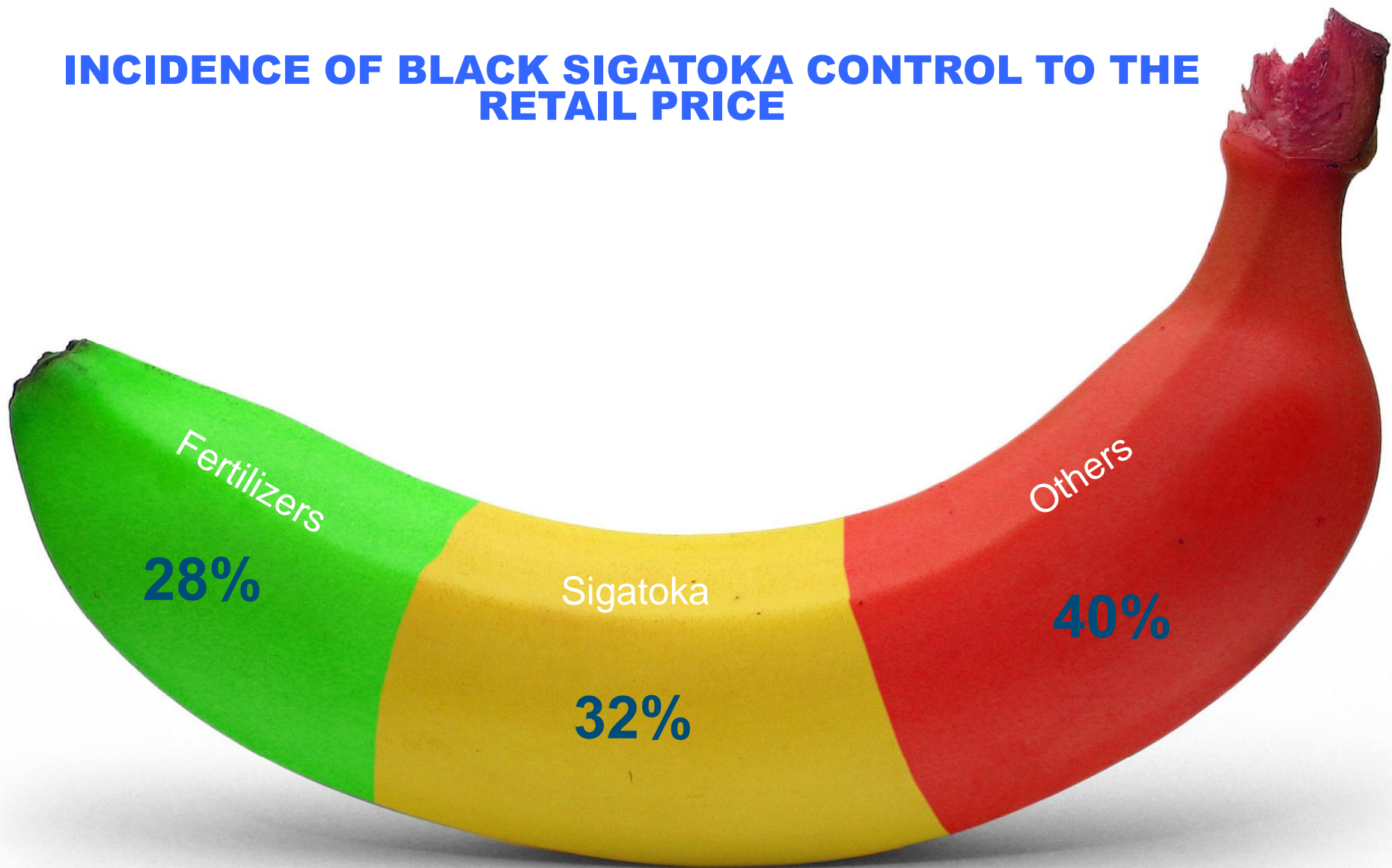


Management options of BLSD

- Deleafing,
- Good farming practices
- Use of chemicals (aerial spraying)
 - Systemic Fungicides
- Resistance
 - Gene cloning, hybrids
 - Phenotyping
 - Genetic engineering
 - MusaRadix

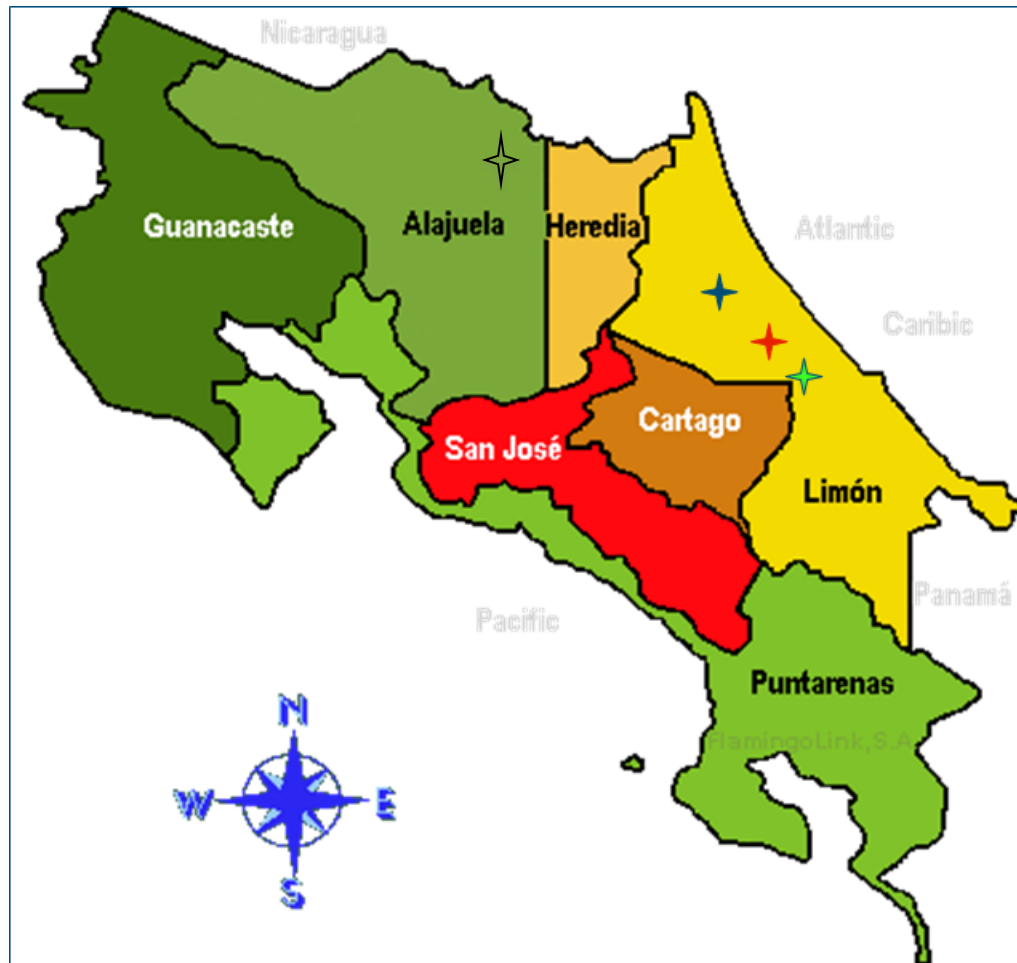


INCIDENCE OF BLACK SIGATOKA CONTROL TO THE RETAIL PRICE



15-20% INCIDENCE in 2001 (Ploetz, 2001)

Fungicide resistance in Costa Rica



Wild type



Cartargena Farm (Guácimo)



San Pablo Farm (Siquirres)



Zent Farm (Matina)

20 - 30 km apart



WAGENINGEN UR

For quality of life

Hope for Black Sigatoka in banana??

- **Immediate:** Improved screens for resistance monitoring
- **Short-term:** Test & compare alternative products for disease control that do not suffer from rapid decline in efficacy
- **Long-term:** True resistance





Key conclusions

1. Industry is > 70% depending on Cavendish bananas. The future is threatened and depends on several external variables
2. High reliability on a single cultivar and on dedicated high-level research work www.bananaresearch.org
3. **Scenario A (BAU):** Fusarium wilt continues to spread in 3 major regions, Sigatoka control costs increase as well as fungal resistance. Production costs and price will increase in the medium term
4. **Scenario B (improved):** Diseases are controlled through improved farming practices. Diversification of varieties in the medium-term. Fair price distribution in the value-chain.
5. **Scenario C (deteriorated):** Diseases become unmanageable in the medium term. Production area will shrink. Supply reduced, price very high. Industry will be badly damaged





The way forward for Cavendish

1. Menu of available options from simple to sophisticated
2. Resistant bananas are the first best option but require time, adoption of good farming practices is the second-best but are immediately available from farm to landscape management
3. Develop a sustainable value chain strategy that includes a risk assessment and cost-benefit analysis to secure supply
4. Promote smart and responsible production, strengthen local capacity, raise awareness across the supply chain to sustainable sourcing
5. Anticipate impacts, implement preparedness and contingency plans for Fusarium, explore alternatives to cope with fungicide resistance to Black Sigatoka
6. Industry and other stakeholders to choose scenario and foster a level playing field, taking into account that cooperation is not an option



**The World
Banana
Forum**



Food and Agriculture
Organization of the
United Nations

Thank you!

For more information:

The Secretariat of the World Banana Forum

Mr Gianluca Gondolini, Mr Pascal Liu

FAO | Trade and Markets Division

e-mail: wbf@fao.org

phone: +390657053200

Skype ID: faowbf

www.fao.org/wbf



The World Banana Forum

english français español


WBF | The World Banana Forum

The World Banana Forum
Working Together for Sustainable Banana Production and Trade


The World Banana Forum (WBF) is a **permanent space** of assembly for participants representing the global banana supply-chain to promote open dialogue on challenges facing the banana industry.

This groundbreaking initiative brings together producers, their organizations, trade unions, cooperatives, exporter groups, trading companies, retailers, public agencies, governments, research institutions and civil society organizations. The Mission of the World Banana Forum is to inspire **collaboration between stakeholders** that produces pragmatic outcomes for the betterment of the banana industry; and, to achieve an **industry-wide consensus of best practices** regarding workplace issues, gender equity, environmental impact, sustainable production and economic issues.

The hope of the World Banana Forum is that all stakeholders can share the vision of a **sustainable banana value chain** for present and future generations.



■ Bookmark the World Banana Forum on Delicious


**Food and Agriculture
Organization of the
United Nations**
for a world without hunger.

Google™ Custom Search

FAO Home

Economic and Social
Development
Department

**The World Banana
Forum (WBF)**

- Scope, Mission and
Objectives
- Expected Outputs
- Calendar of events
- History of the Forum
process
- WBF: Working Groups
- WBF: Steering
Committee
- Funding the World
Banana Forum
- Useful documents
- Links
- Contact us

Contact us

Privacy Policy - Scam Alert

© FAO, 2010