

19th Session of the Commission on Phytosanitary Measures

#Planthealth for food security, environmental protection
and safe trade

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**Innovation research and ongoing management
measures on *Foc* TR4 in China**

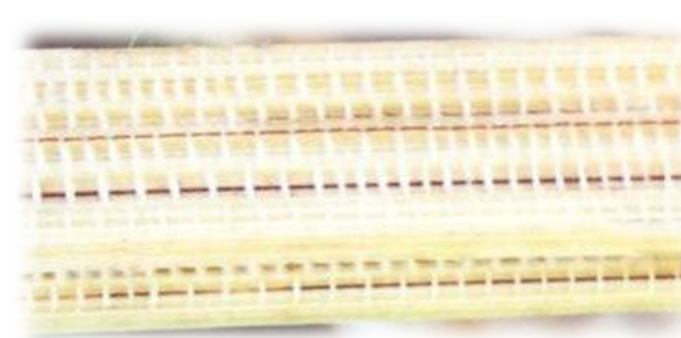
Chun-Yu Li

IPPC IC Team Member

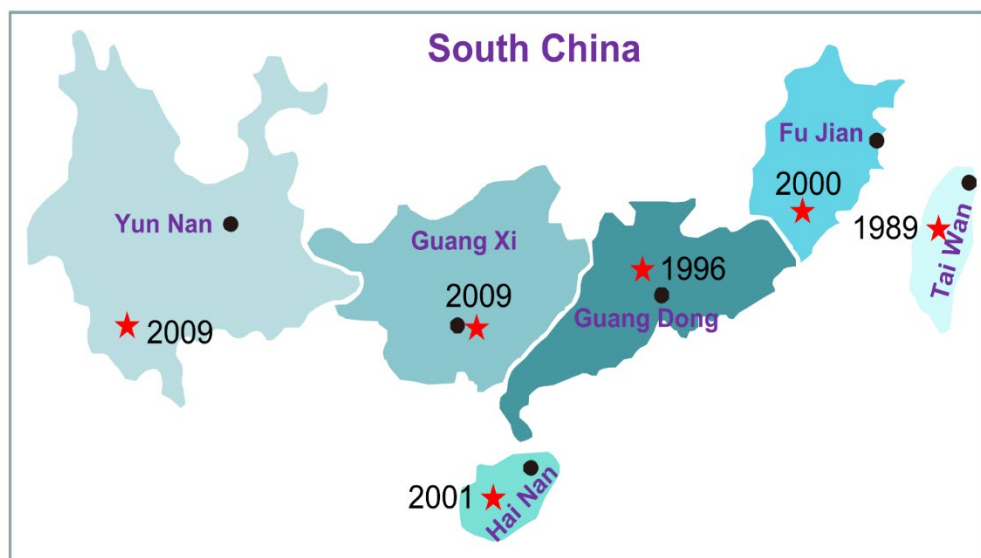
Guangdong Academy of Agricultural Sciences/GDAAS, China

Contents

- Fusarium Wilt of banana in China
- Molecular detection and quarantine
- Resistant breeding and the new varieties
- Integrative Control measures on *Foc* TR4
- The way forward



Fusarium Wilt of banana in China



- ✓ Destroyed many banana gardens and abandoned
- ✓ The direct economic loss >> 10 billion USD/ year
- ✓ National/Provincial Banana Industry Technical System
- ✓ Many kinds measures have been tried in China and recovered China banana industry in some degree.



Molecular detection and quarantine

Traditional methods

- ✓ Race and VCG identification
- ✓ PCR based technologies
 - PCR
 - q-PCR
 - LAMP
- ✓ Other molecular methods
 - SSR, RAPD, AFLP

Point-of-care method



Molecular detection and quarantine

- *Foc* TR4 was in the National Plant Quarantine Pest List
- Surveillance and monitoring
- *Foc* TR4 annual report and occurrence area
- Managing the production and sales of banana plantlets Strictly
- ✓ The selection of Sucker for tissue culture
- ✓ Location of tissue culture factories
- ✓ Irrigation water, soil for tissue culture factories
- ✓ Transportation, sales of banana plantlets



Establishing breeding systems and the new varieties

Breeders from---

- ✓ National/Provincial Banana Industry Technical System
- ✓ GDAAS
- ✓ The Chinese Academy of Tropical Agricultural Sciences
- ✓ Guangxi Academy of Tropical Agricultural Sciences
- ✓

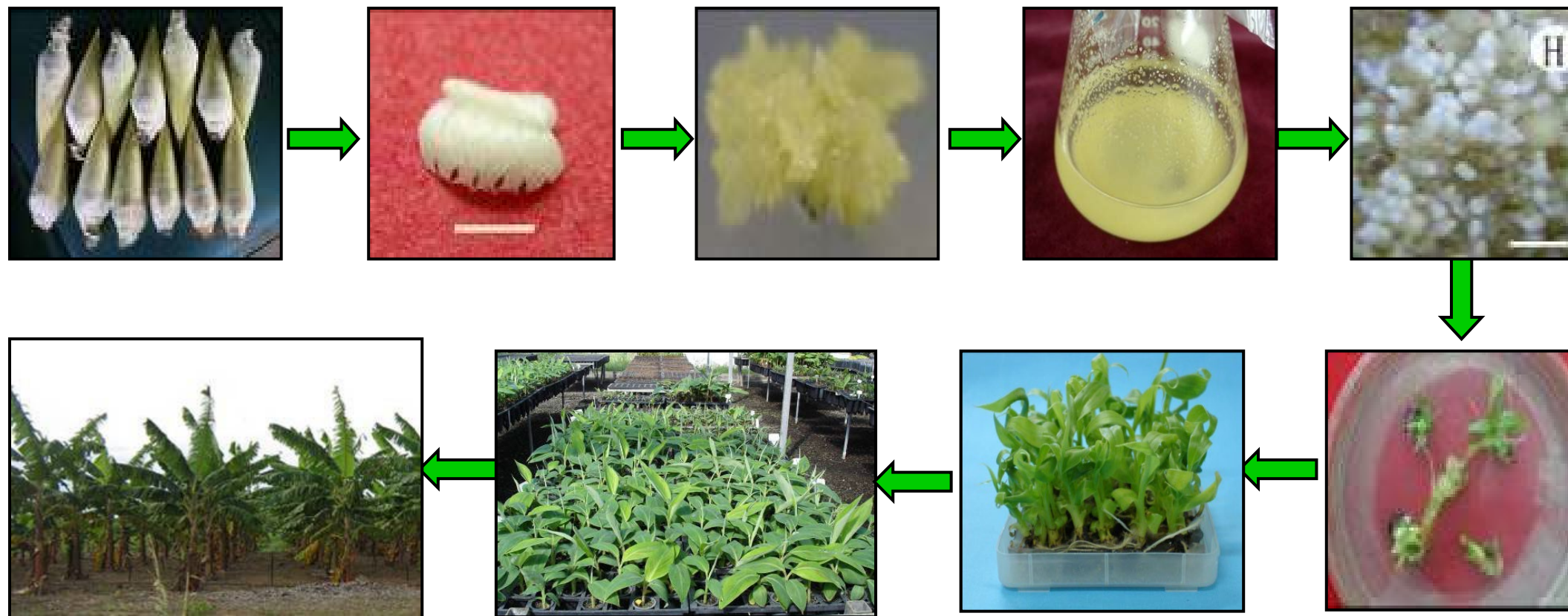


Screening the resistant mutants to *Foc* TR4

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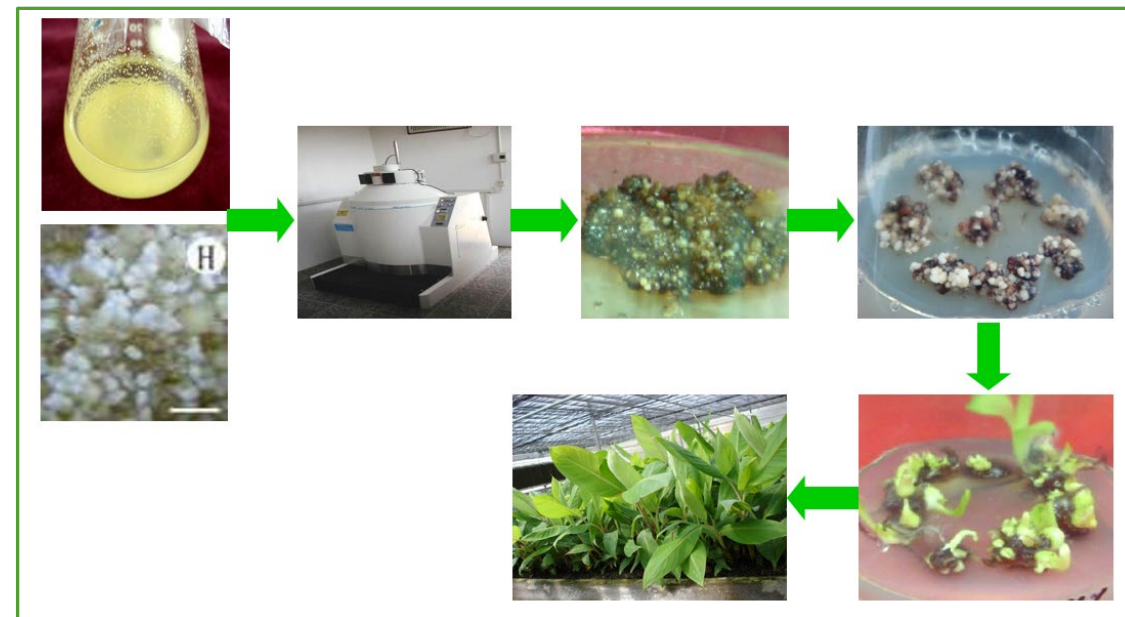
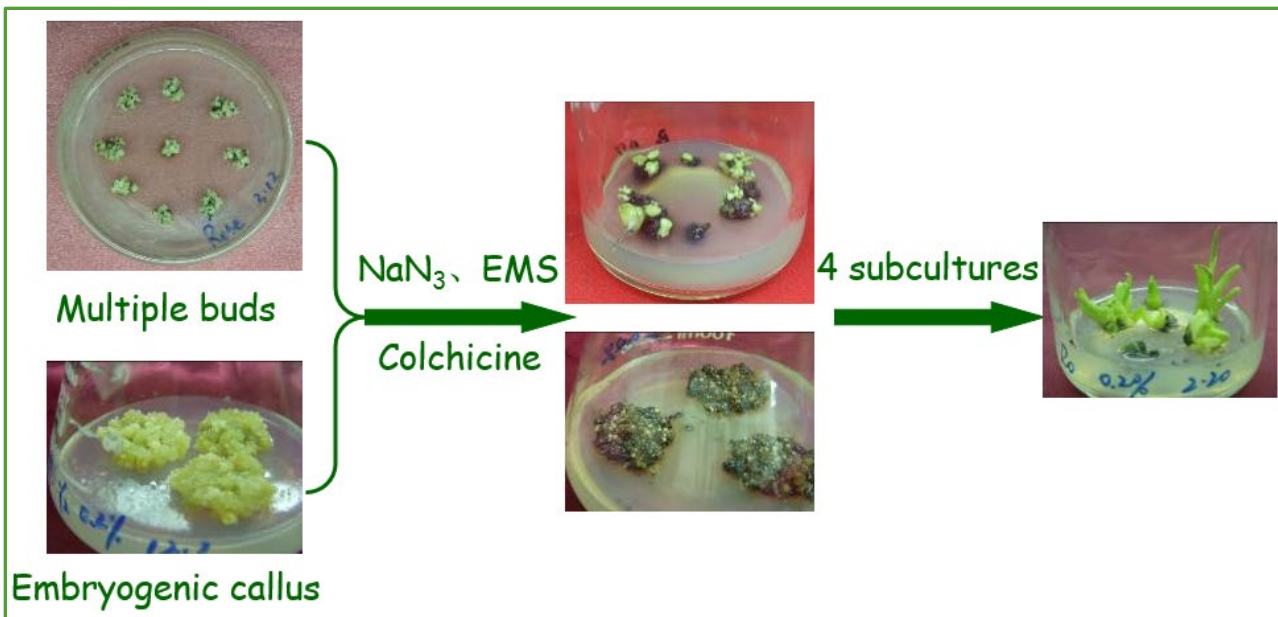


Single-cell original somatic embryo regeneration system

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Physical (Right) and Chemical (Left) mutation breeding technologies

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转基因香蕉突变体内源*MaPDS*基因序列分析

Banana gene edition

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Resistant Cavendish mutant (AAA)
Zhongjiao#4



Resistant Pisang Awak (ABB)
Fenza



Resistant Cavendish mutant (AAA)
Guijiao#9

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Evaluation of the resistant varieties in Southern China

Integrative Control measures on *Foc* TR4

Five components

- ✓ Molecular detection of TR4 in soil.
- ✓ Soil conditioning
- ✓ Planting resistant varieties
- ✓ Application of bio-fertilizer
- ✓ Free or few plough



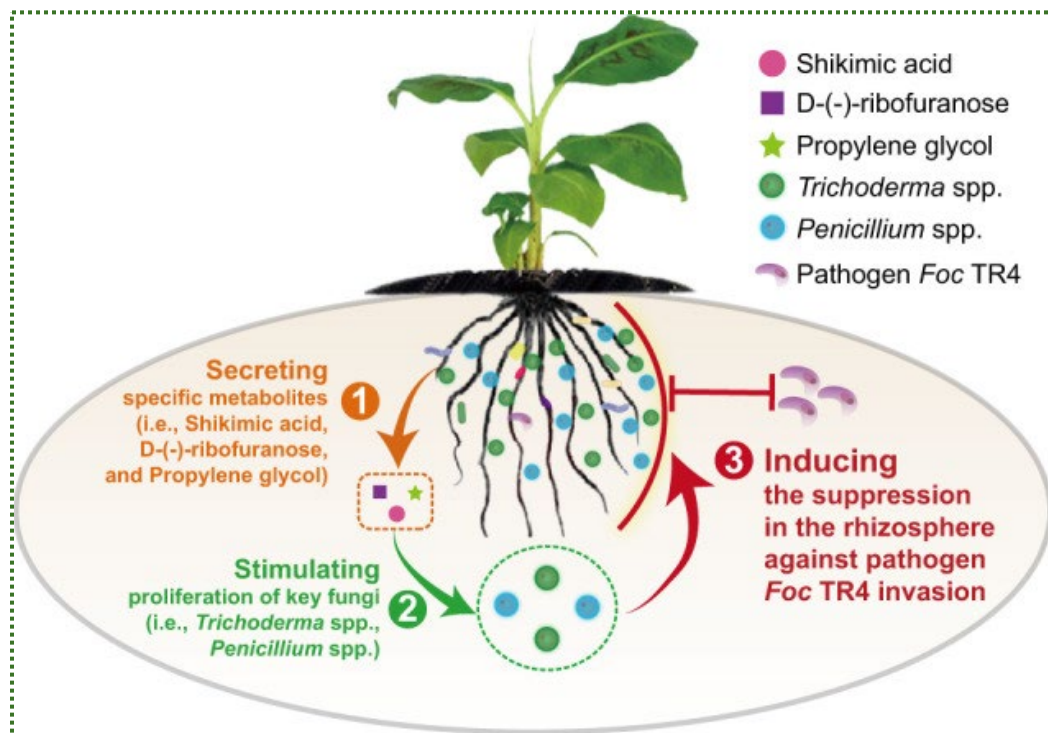
“Five in One” integrative control system
Concluded by China Banana Industry Technical System



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One functional water soluble fertilizer
Based on one chemical released from
the resistant banana root system
which can recruit the beneficial microbes

Academician/Professor Shen Qirong working in the banana
field who's group developed many kinds of bio-fertilizers

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Soil health fertilizers-improving PH value



Alkaline compound fertilizer



Improving the traditional bio-fertilizer



A good soil fumigation method



Ammonia water/lime/ammonium carbonate combined with bio-fertilizer

Root system health



The new roots grow out rapidly

One new bio-fertilizer

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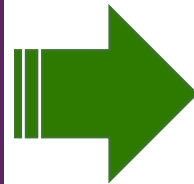
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The way forward

- ✓ *Fusarium oxysporum* is evolving rapidly
- ✓ Our integrative control measures is basing on resistant varieties, not delicious susceptible ones
- ✓ Novel Green sustainable control measures should be focused on and developed



Welcome to Guangzhou!

Playing and eating in Guangzhou

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