MANAGING

Plant Parasitic Nematode Pests in the Tropics

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WHY BE CONCERNED ABOUT NEMATODES?

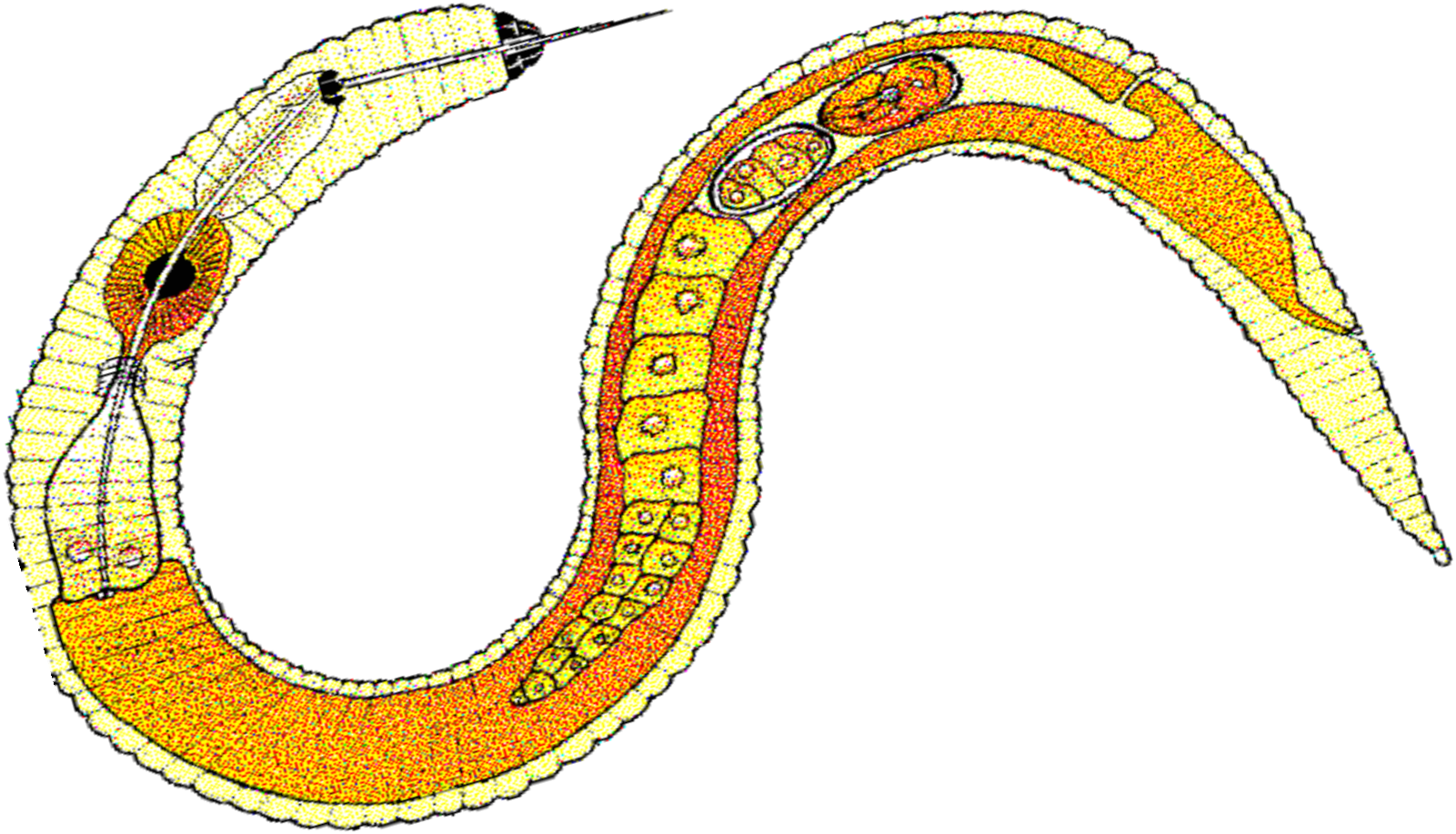

HUNGRIER
WORLD

INTENSIFICATION

Challenges for Plant Production

INTENSIFICATION

- Greater importance of pests and diseases
- Need for innovative IPM approaches
- Effective transfer pathways to farmers



WHY BE CONCERNED ABOUT NEMATODES?

WHY NOT????

- No nematologists
- Don't cause much damage
  - e.g. cereals, cassava
- Lack of donor knowledge
- Difficult to assess
- Difficult to identify

WHY ????

- **Yield suppression, losses**
- **Quality of produce**
- **Interactions**
- **Increase other constraints**
- **Quarantine**
- **Ease of management ?**
- **Pesticide abuse?**
- **Important!!**

NEMATODES

SO

- why so much mystery with nematodes
- why so neglected

What can we do about them??

The Situation

PESTICIDES

PESTICIDES

- Aldicarb
- Carbofuran
- DPCP
- Methyl bromide
- Phenamiphos
- ……

Challenges for Plant Production

PESTICIDES

- Single greatest impact on productivity
- Removal from use of Class I +
- Environmental issues
- etc.
- **search for alternatives**

Challenges for Plant Production

- Greater importance of pests and diseases in production systems
- **Need for innovative IPM crop protection approaches**
- Effective pathways for transfer to the NARS and farmers

What Options do we have

New Products

Tervigo® SC
1

Activities – pest and disease identification

Diagnostics

“Nematodes are considered among the most difficult animals to identify”

Strategy

What is possible?
What is useful for growers?
What is technologically realistic?

Diagnosis

Potato cyst nematode

Globodera rostochiensis
Globodera pallida

Costs the UK $80 million per yr

Diagnosis Tomatoes – for export

Diagnosis Tomatoes – for export

+

Resistant rootstock

Diagnosis

pest and disease identification

Root knot nematodes

=

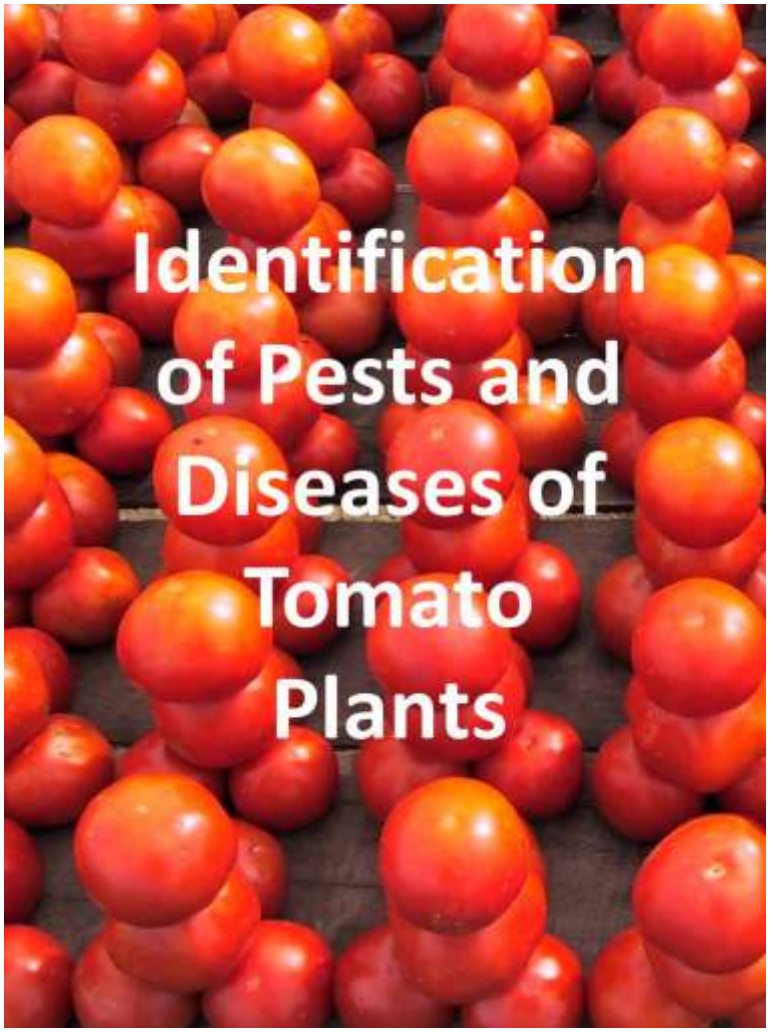
Diagnosis

pest and disease identification

Root knot nematodes

=

Activities – pest and disease identification



Resistance

Activities – identify resistance

Management - resistance

‘rapid’ screening method

Activities – identify resistance

Field durability under nematode attack

and

Determine farmer acceptance

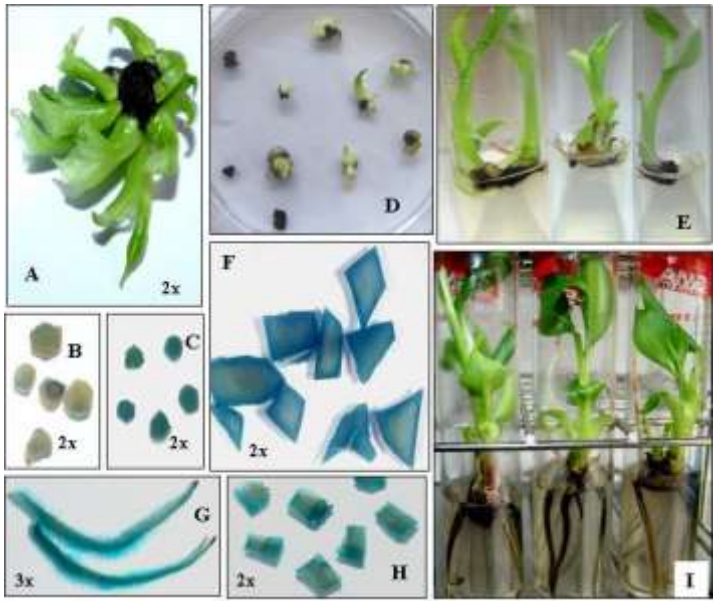
Resistance durability – field/farm

Genetic Transformation

Regeneration and transformation of plantain

– for nematode resistance in plantains

– provides good resistance



Tripathi *et al.* 2015, Roderick *et al*. 2012

Healthy Seedling Systems

Advanced seed/seedling treatment technologies






Healthy planting material

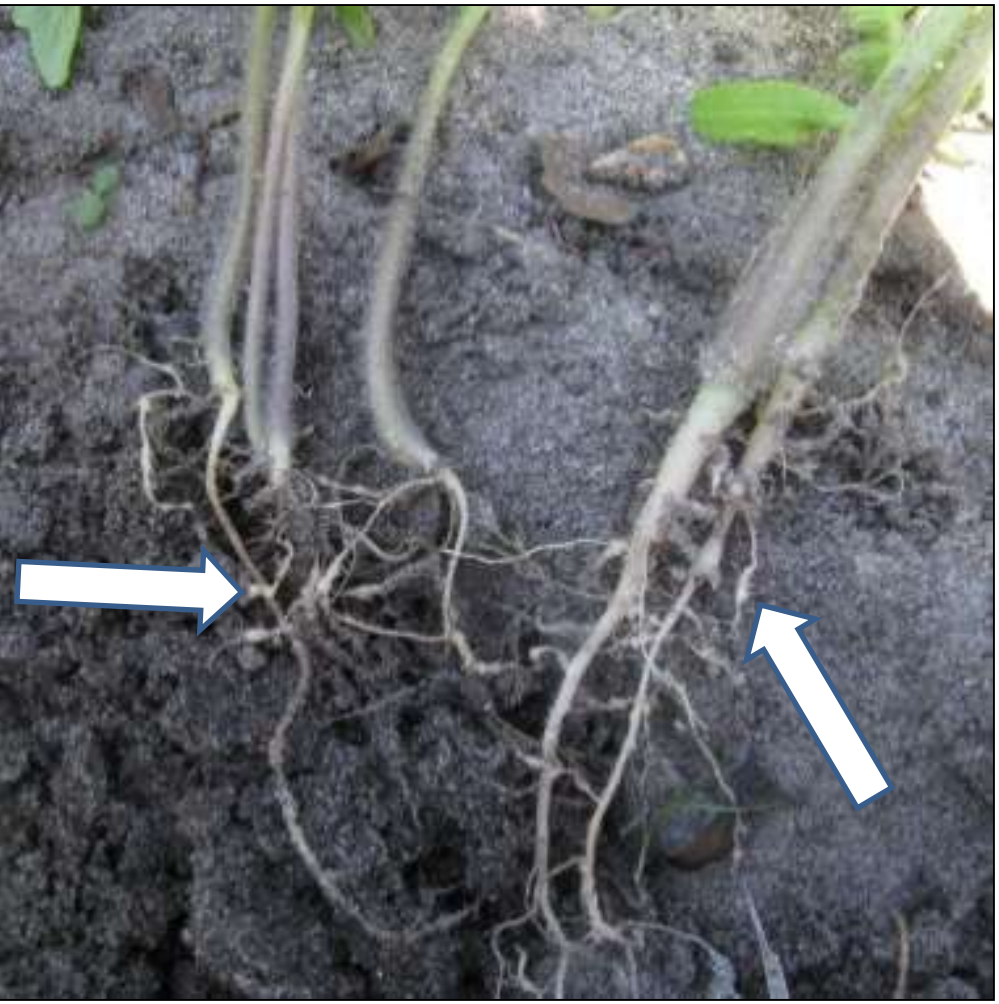
Healthy planting material

Activities – seedling systems

Farmer nurseries

Activities – seedling systems

Activities –



Activities – seedling systems

Introduce, demonstrate and assess:

- Treated potting media
- Use of seedling trays
- Protected nurseries

Good Agricultural Practices

Activities – seedling systems

Grafting onto rootstocks

Activities – seedling systems

Activities – seed systems

Nematode disinfection

-

Activities – seed systems

Nematode disinfection - *Musa*

Activities – seed systems

Activities – seed systems

Nematode disinfection - *Musa*

Activities – seed systems

Nematode disinfection - Yam

Activities – seed systems

Nematode disinfection - Yam

Activities – seed systems

Nematode disinfection - pesticide

Good Agricultural Practices

Can we develop entrepreneurial Seed and seedling supply systems?

Activities – seedling systems

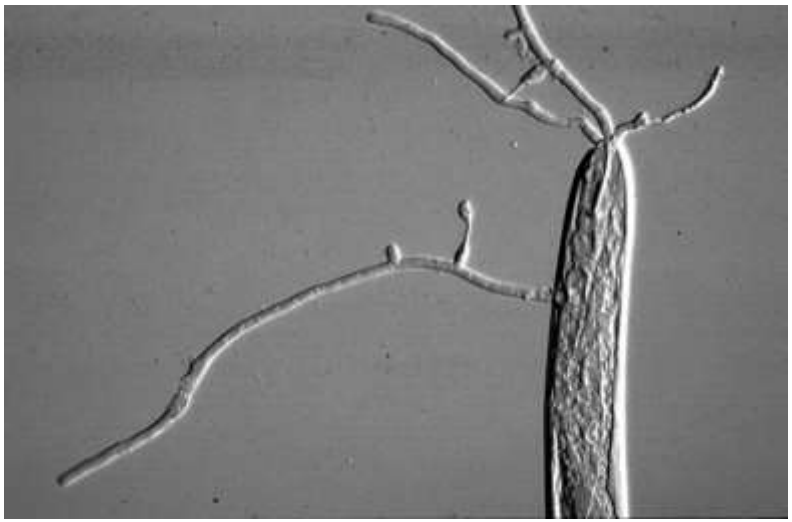
Bio enhanced seedlings

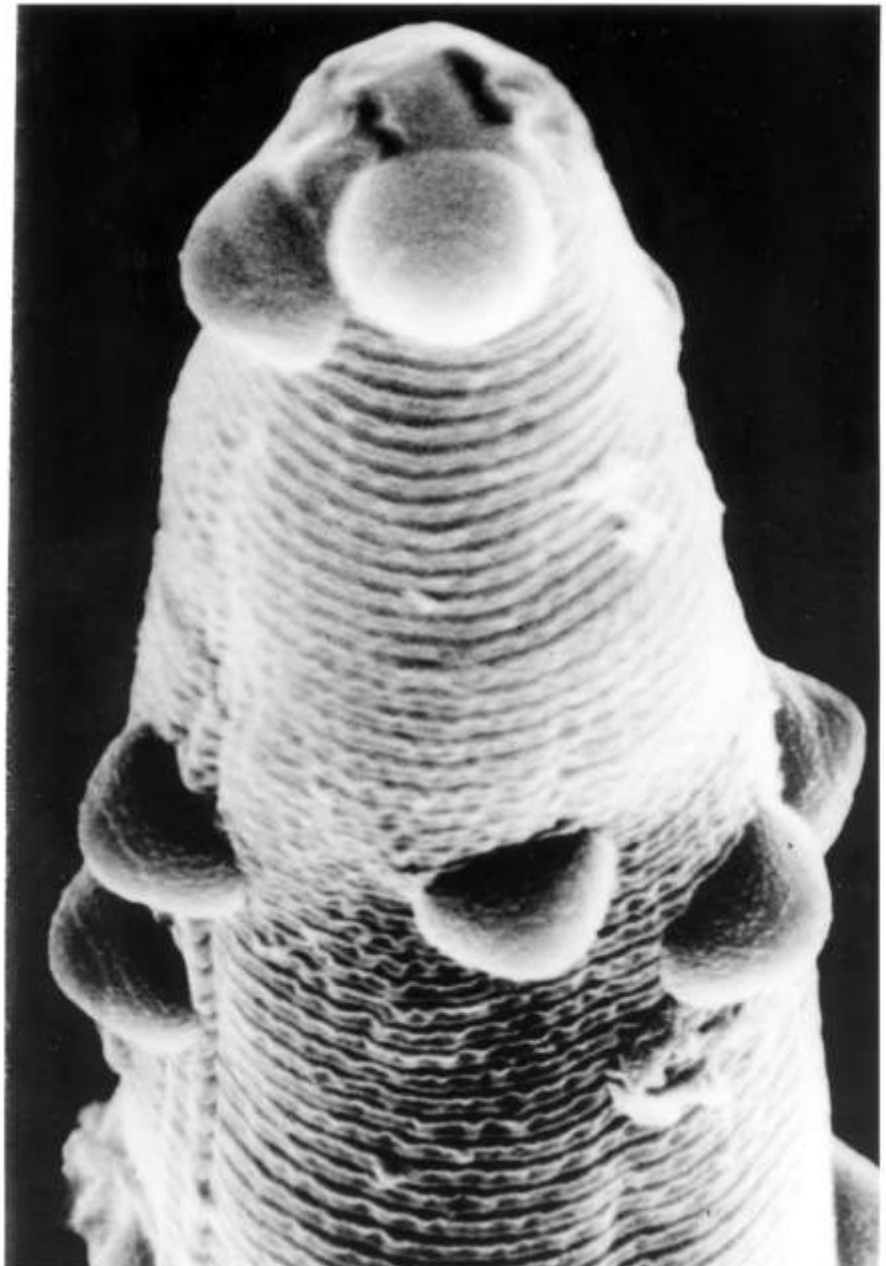
Using biological control

Biological Control

Biological Control

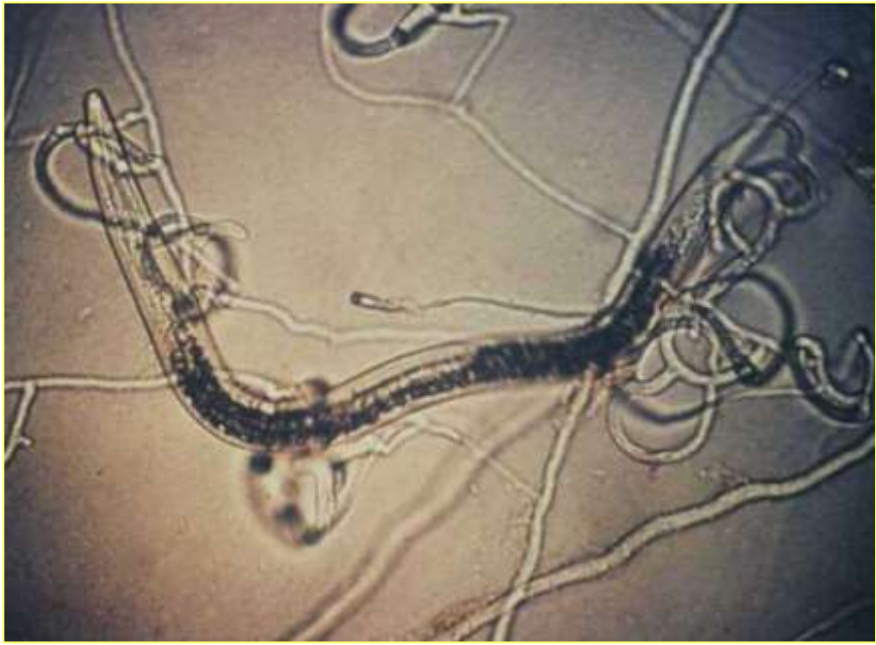
- Obligate parasites
  - *Pastueria penetrans*
  - *Pochonia*
  - *Hirsutella*
  - *etc…..*



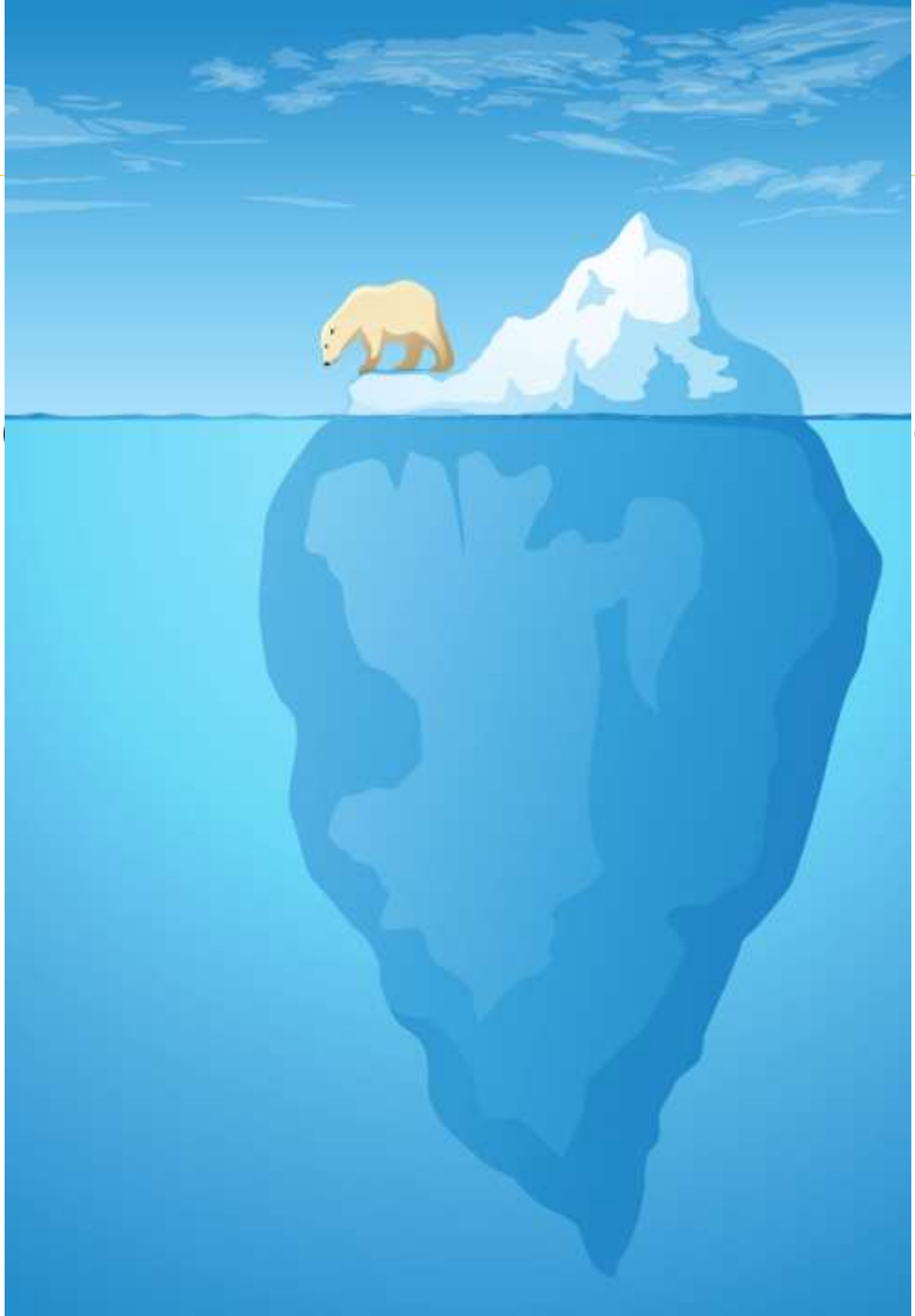


Biological Control

- endophytes
- suppressive antagonists
    - mycorrhizal fungi
    - *Paecilomyces*
    - *Trichoderma*
    - combinations
    - *etc…..*



Our kn oil biota



Biological Control

Nematode + Mycorrhyza

Nematode only

Nematode + Mycorrhyza

Nematode only

Soybean infested with *Meloidogyne* and treatments

Nematodes + Carbofuran

Nematodes only

Nematodes + Mycorrhyza + *Trichoderma*

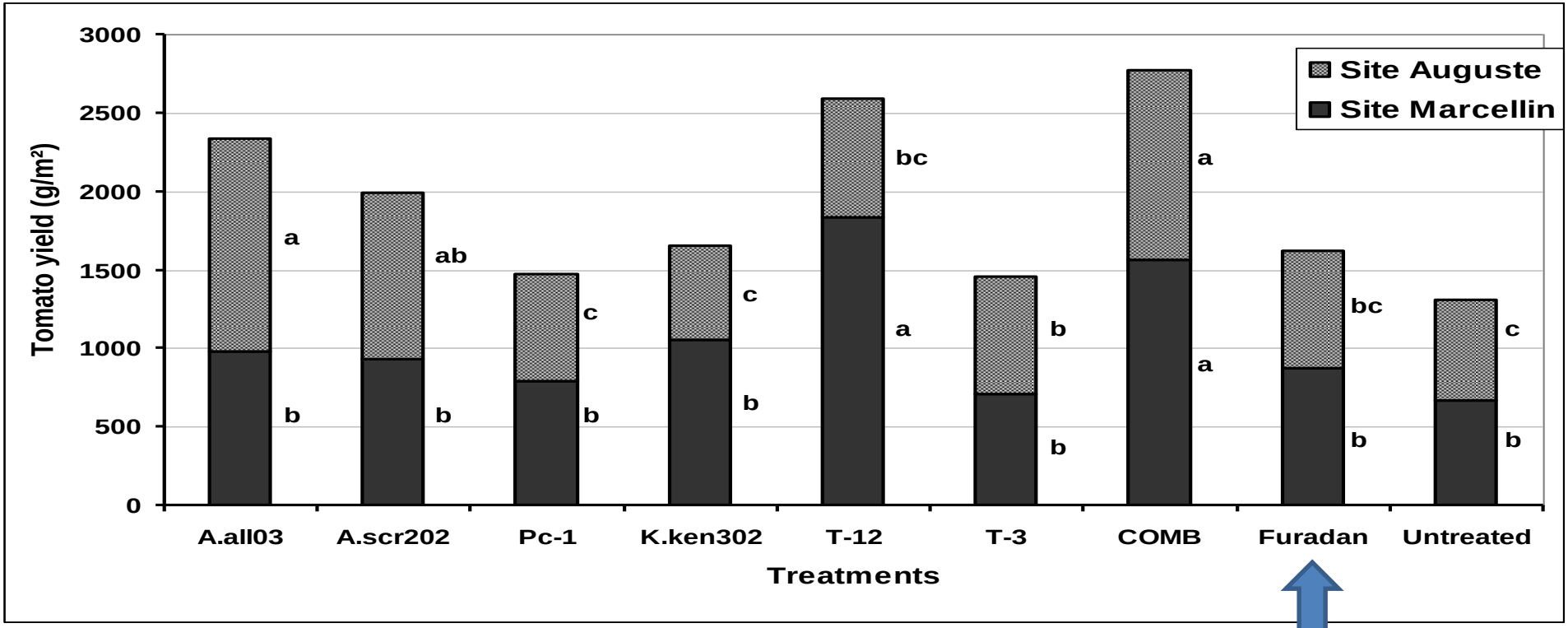
Fungal antagonists

Control

T. asperellum T-12

Fungal antagonists

Tomato yield



Furadan

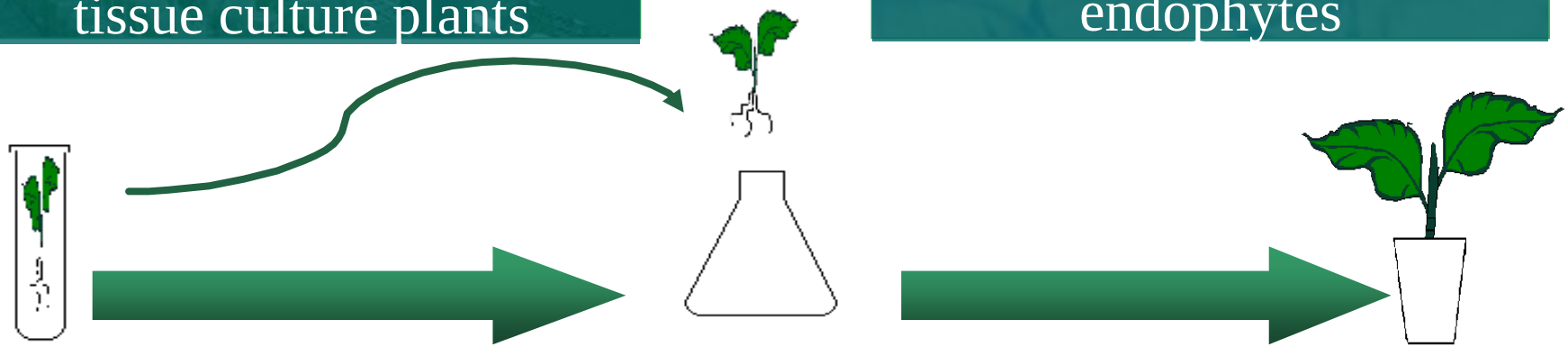
Endophyte-enhanced tissue culture

Non-pathogenic fungi or bacteria

tissue culture plants

+

endophytes



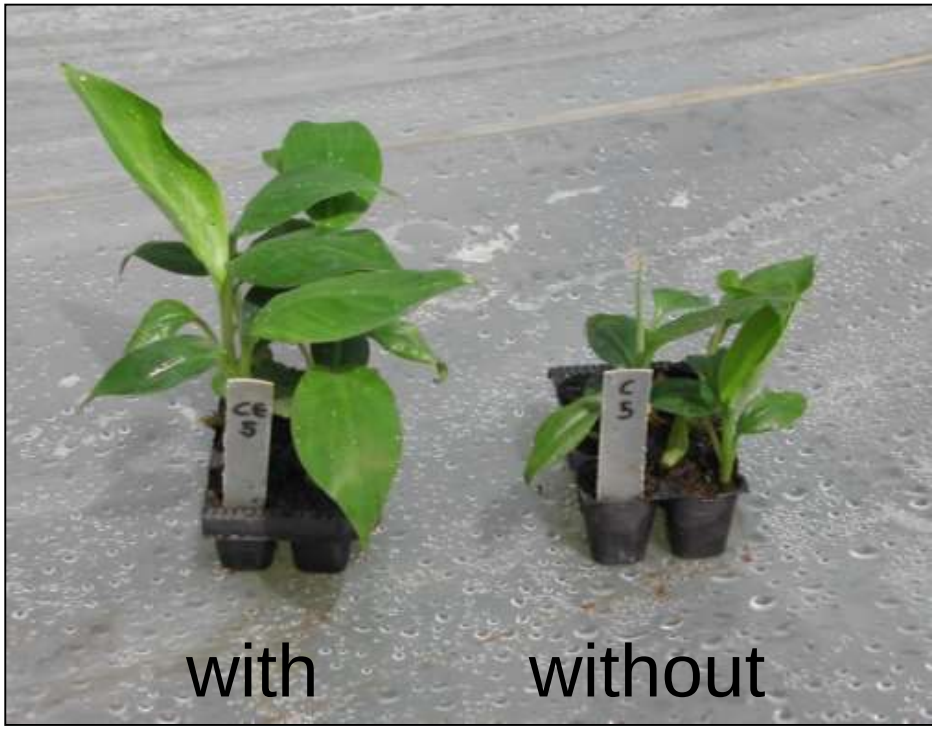
Tissue culture laboratory

Farmer

Endophyte-enhanced tissue culture

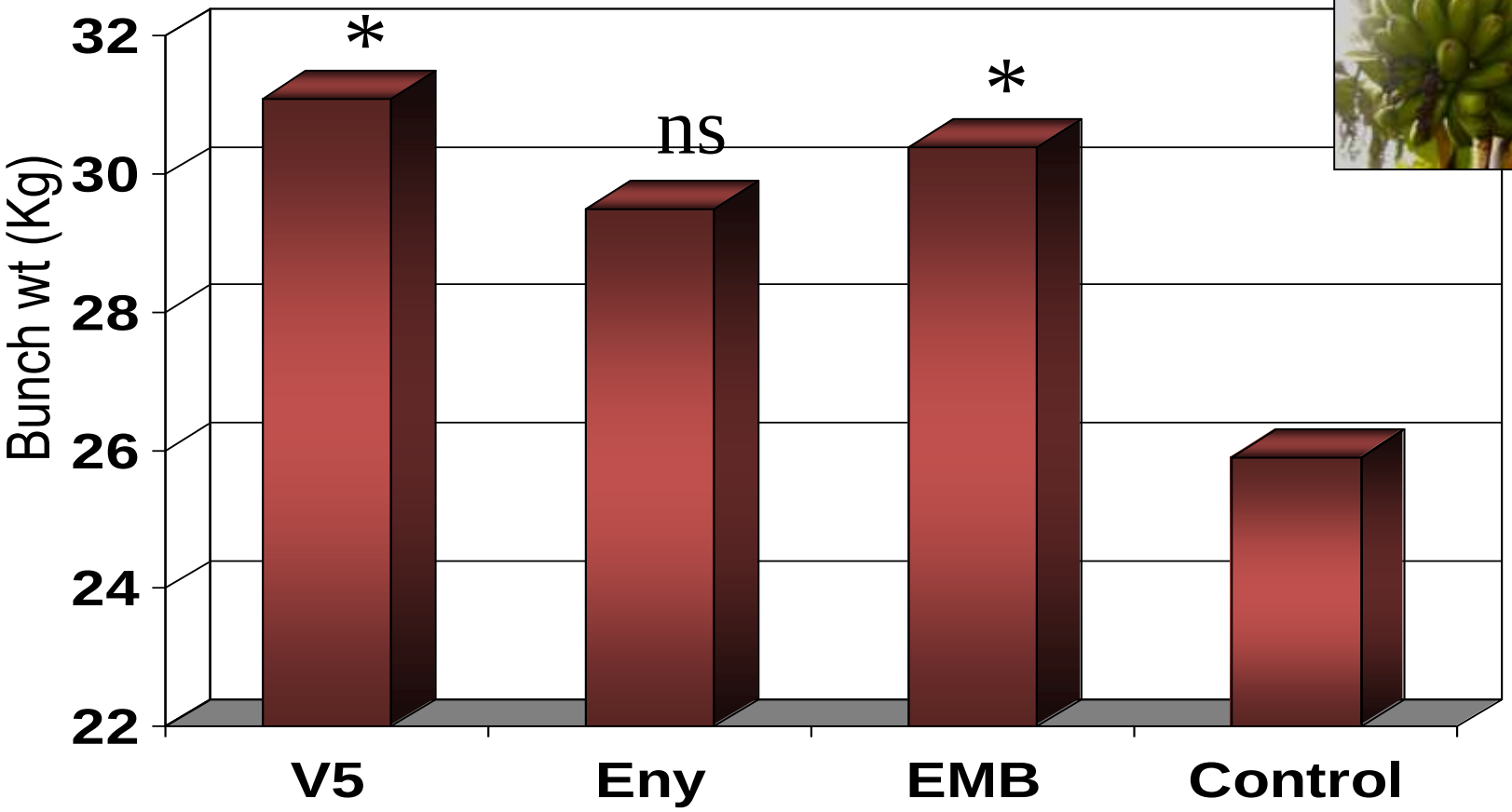
Bio enhanced seedlings

Using biological control agents, such as beneficial soil microorganisms



In farmers' fields

YIELD – dessert banana, Kenya



Fungal antagonists

Control

T. asperellum

Del Monte Project in Costa Rica

14.000 protected TC plants

Control **endophyte**

Cultural Control

- Rotation
- Mulching
- Etc……


TAX

- Quality seed
- Healthy material
- Quarantine
- Sanitary practice
- GAP

Challenges for Plant Production

- Greater importance of pests and diseases in production systems
- Need for innovative IPM crop protection approaches
- **Effective pathways for transfer to the NARS and farmers**

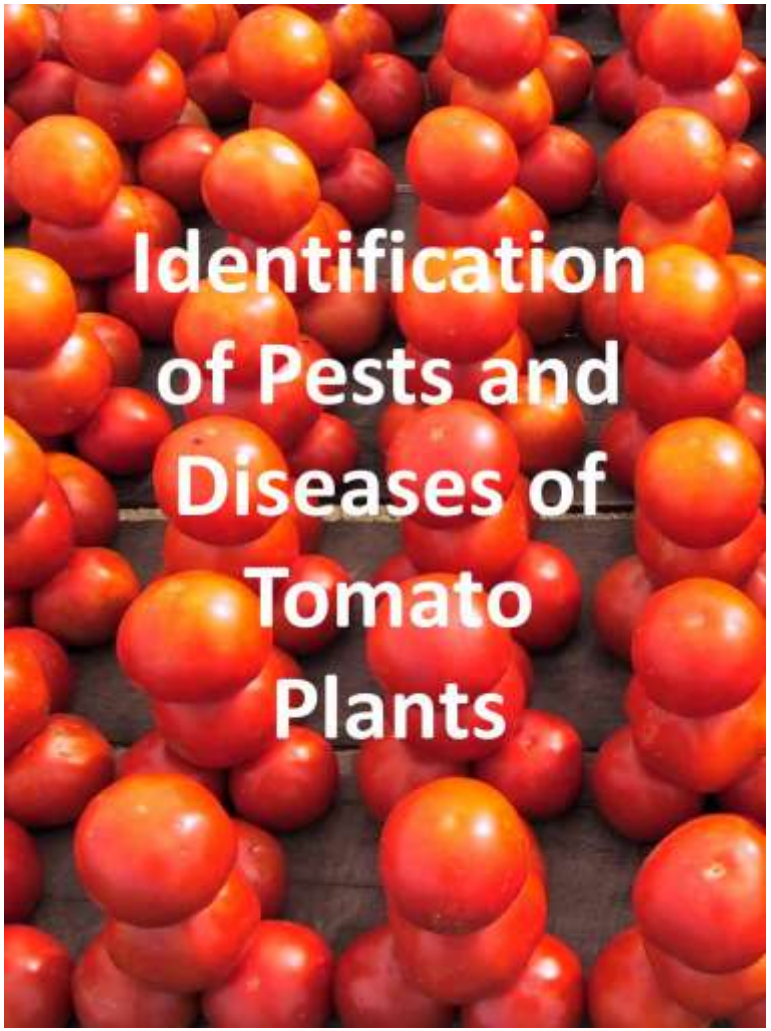
Partnerships

Private sector

- students
- exchange
- training
- support
- joint research

Training
and
capacity building

Activities – pest and disease identification



NARES capacity enhanced

- Degree-related training
- NARES training
- Farmers' training
- Farmers' field schools
  - On-farm trials

Linkages - NARS

- research support
- training support
- academic support/ training
- collaboration
- …….

Linkages – Advanced Institutes

Linkages – Advanced Institutes

Exchange skills

International tropical agriculture

Linkages – National Institutes

CERTIFICATE

Norad

M_____

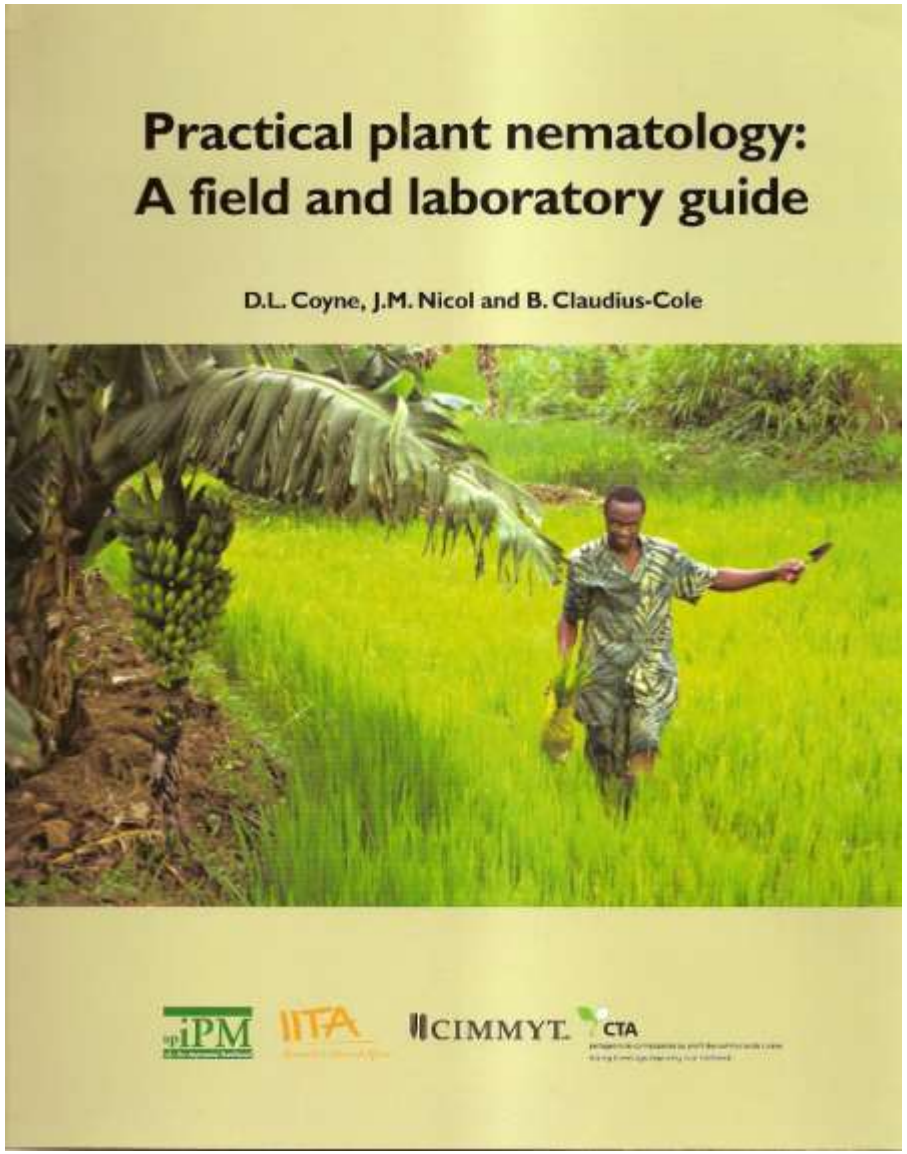
ATTENDED THE TRAINING WORKSHOP ON

Linkages – National Institutes

IITA
Research to Nourish Africa

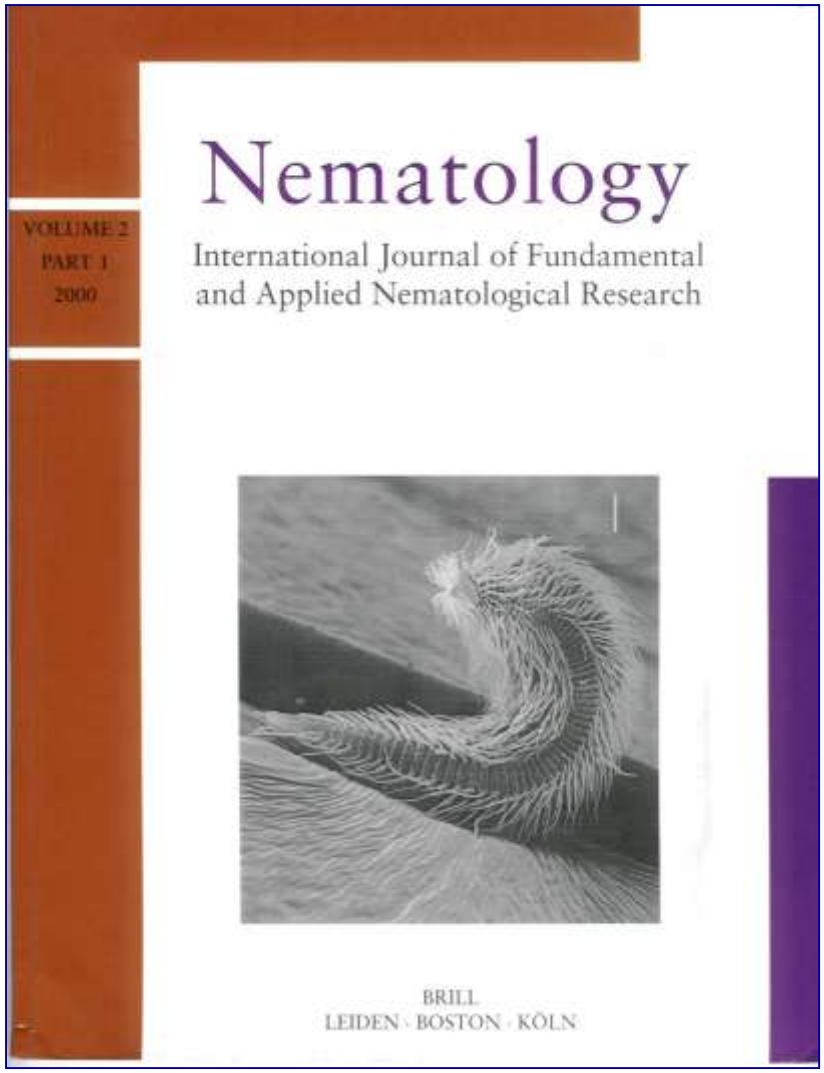
World Vegetable Center

Training - promotion



Production of guides and manuals for use by technicians and others to undertake the basic techniques under conditions with limited resources, typical in developing countries

Training - promotion



Publishing research results

The next generation