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MANAGING

Plant Parasitic Nematode Pests in the Tropics

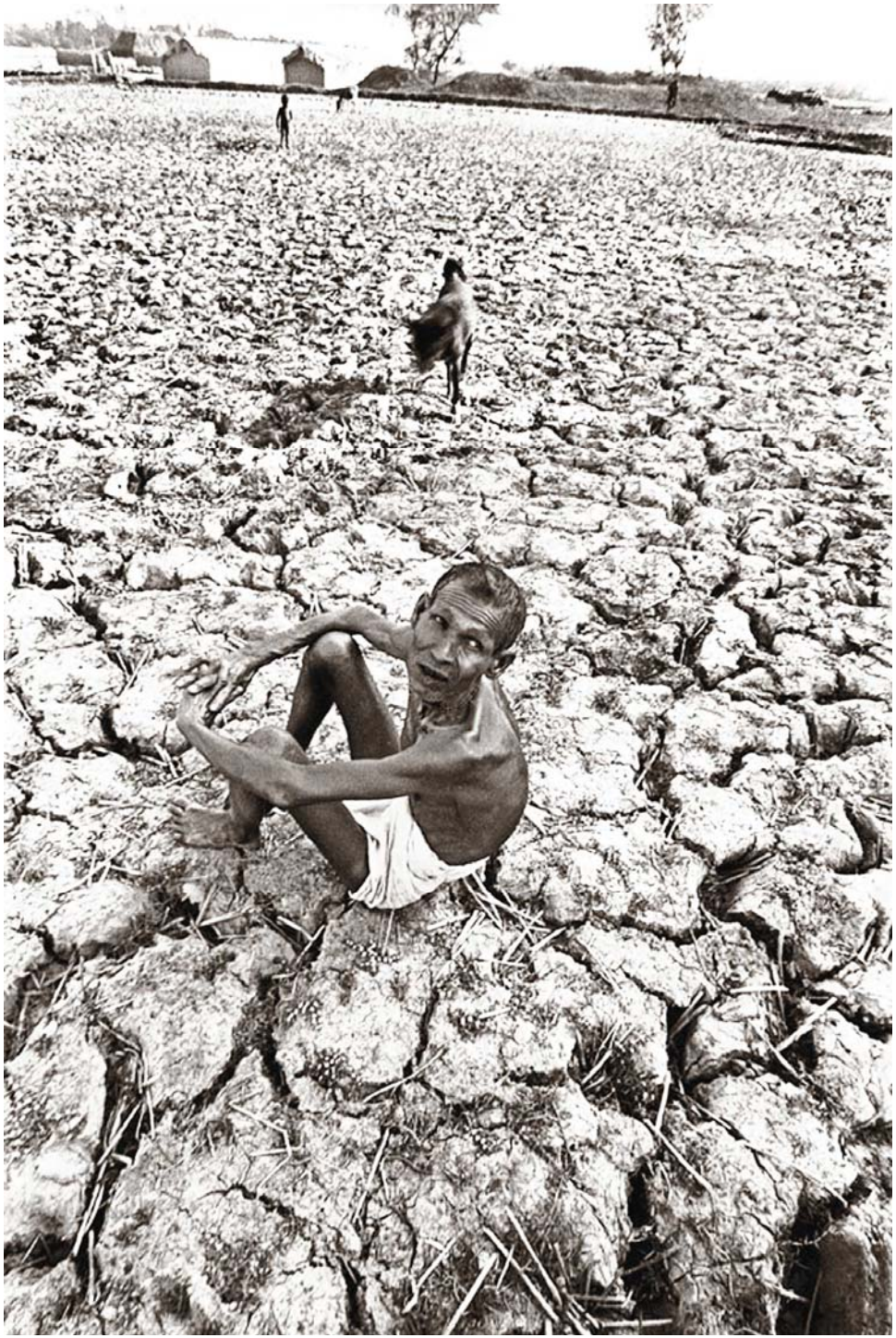
Danny Coyne & Buncha Chinnasri

AVRDC Vegetable Workshop, October 2015, Bangkok, Thailand

WHY BE CONCERNED ABOUT NEMATODES?

City Life

Flooding




HUNGRIER
WORLD

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

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PESTICIDES

Challenges for Plant Production

PESTICIDES

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

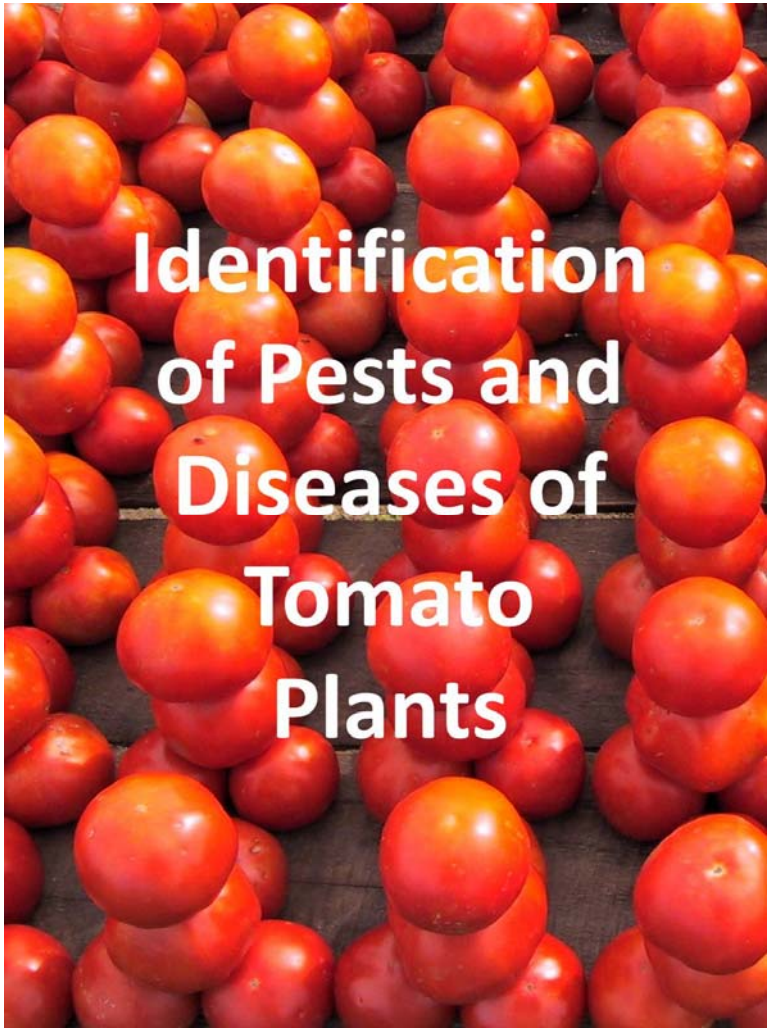
Challenges for Plant Production

- 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

Activities – pest and disease identification

Activities – pest and disease identification



Resistance

Activities – identify resistance

Activities – identify resistance

Field durability under nematode attack

and

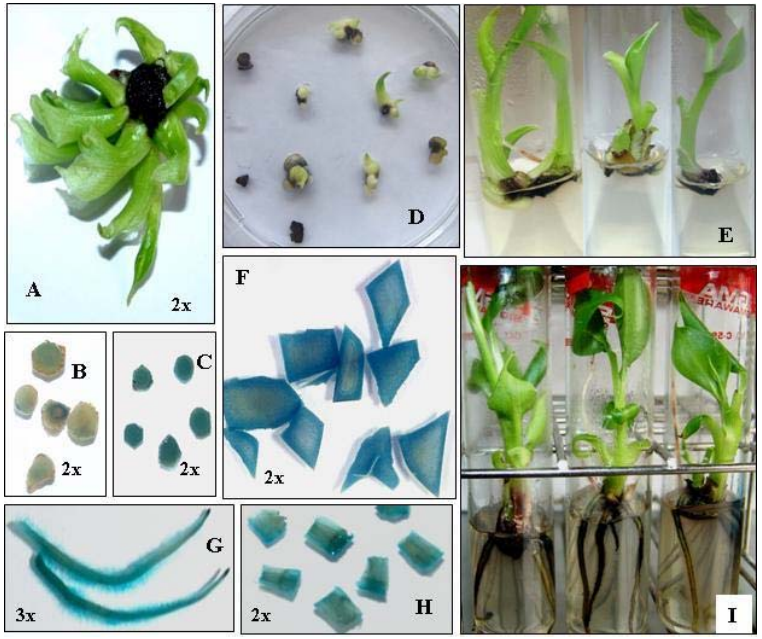
Determine farmer acceptance

Genetic Transformation

Regeneration and transformation of plantain.

- for nematode resistance in plantains
- tested with 60+ lines of plantain now

- tested with potato
- provides up to 99% resistance



Tripathi *et al.* 2008, Roderick *et al*. 2012

NARO, University of Leeds

Healthy Seedling Systems

Advanced seed/seedling treatment technologies






Activities – seedling systems

Farmer nurseries

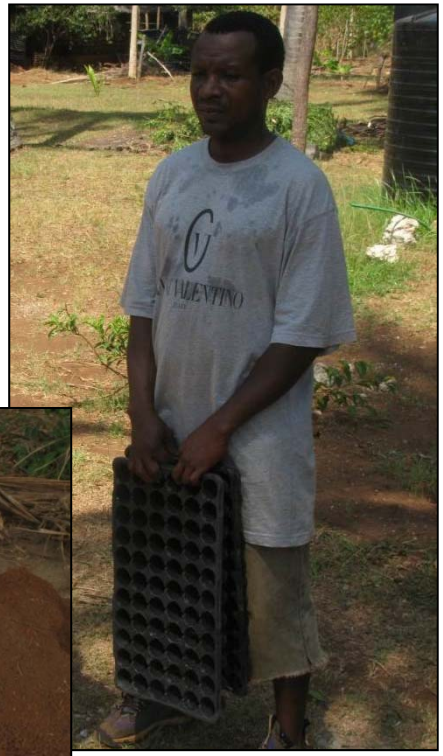
Activities – seedling systems

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

Nematode disinfection
- *Musa*

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

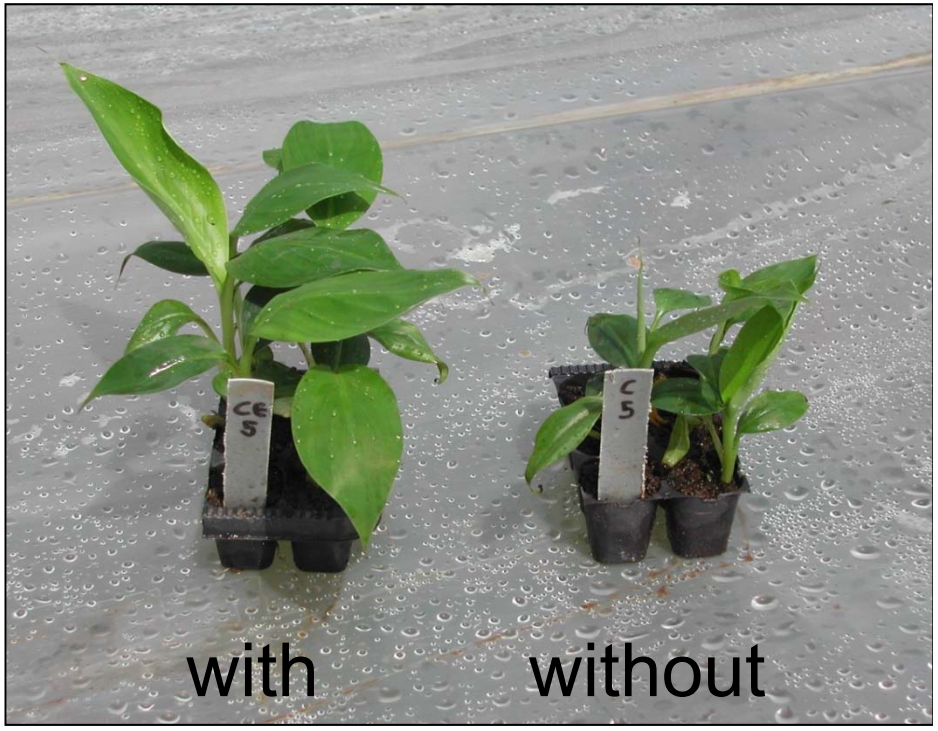
Good Agricultural Practices

Can we develop entrepreneurial Seed and seedling supply systems?

Activities – seedling systems

Bio enhanced seedlings

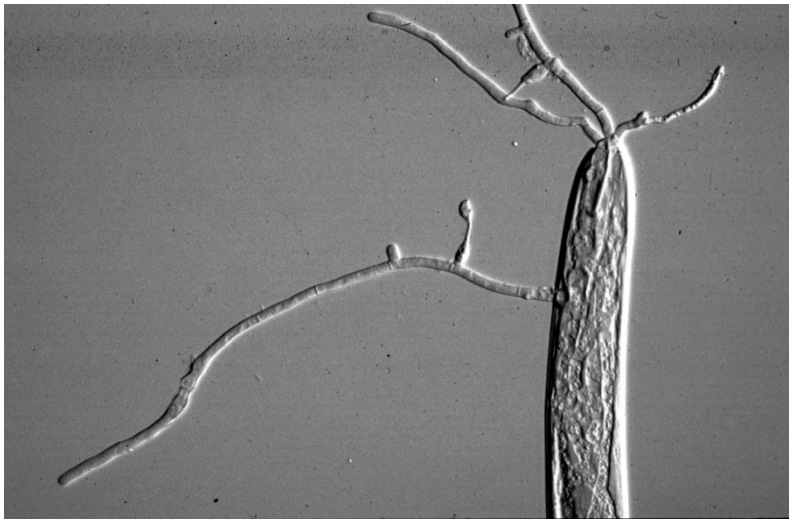
Using biological control agents, such as beneficial soil microorganisms

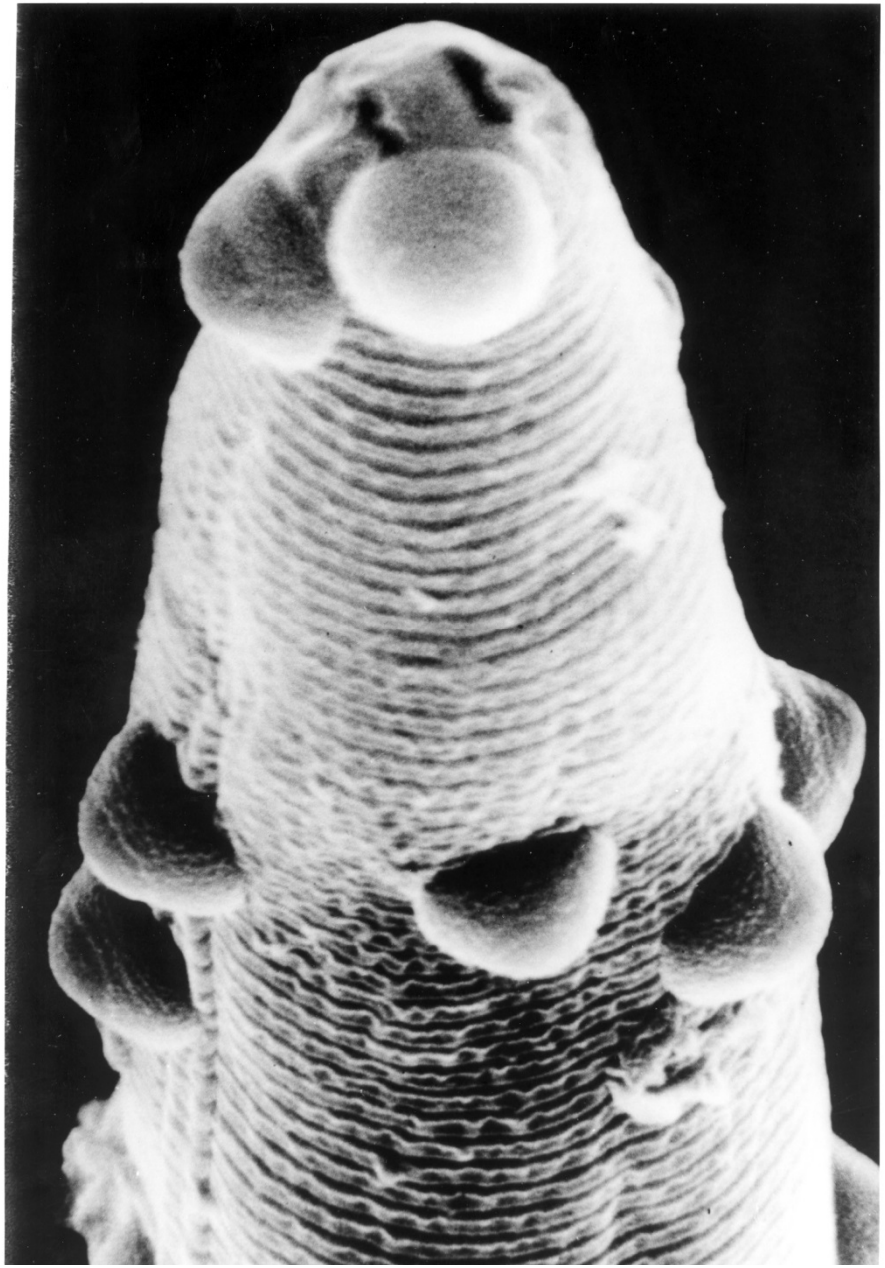


Biological Control

Biological Control

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





Biological Control

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

Biological Control

Our knowledge of BENEFICIAL soil biota in general

??

VERY LIMITED!!!

Biological Control

Nematode + Mycorrhyza

Nematode only

Nematode + Mycorrhyza

Nematode only

Soybean infested with *Meloidogyne* and treatments

Nematodes + Carbofuran

Nematodes only

Nematodes + Mycorrhyza + *Trichoderma*

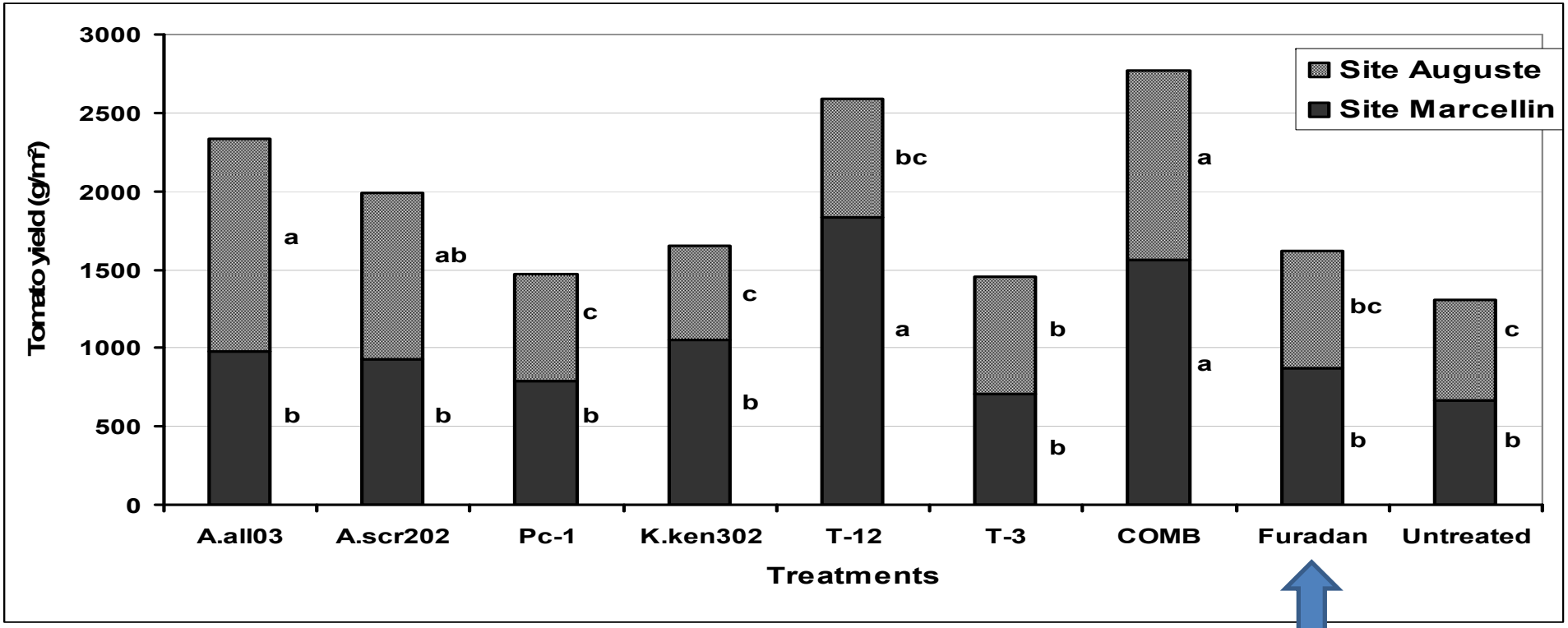
Fungal antagonists

Control

T. asperellum T-12

Fungal antagonists

Tomato yield, Benin – Farmers best



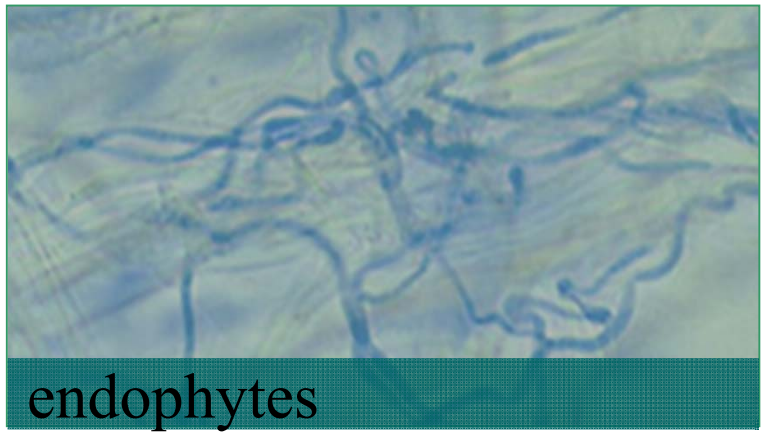
Furadan

Endophyte-enhanced tissue culture

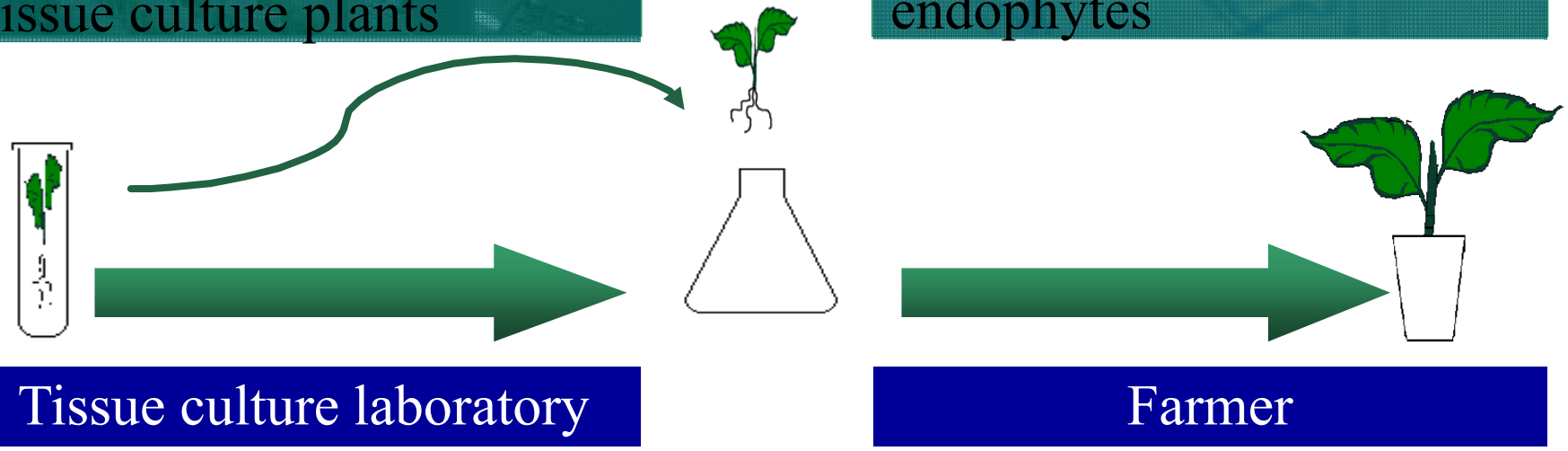
Fusarium oxysporum non-pathogenic

tissue culture plants

+



endophytes



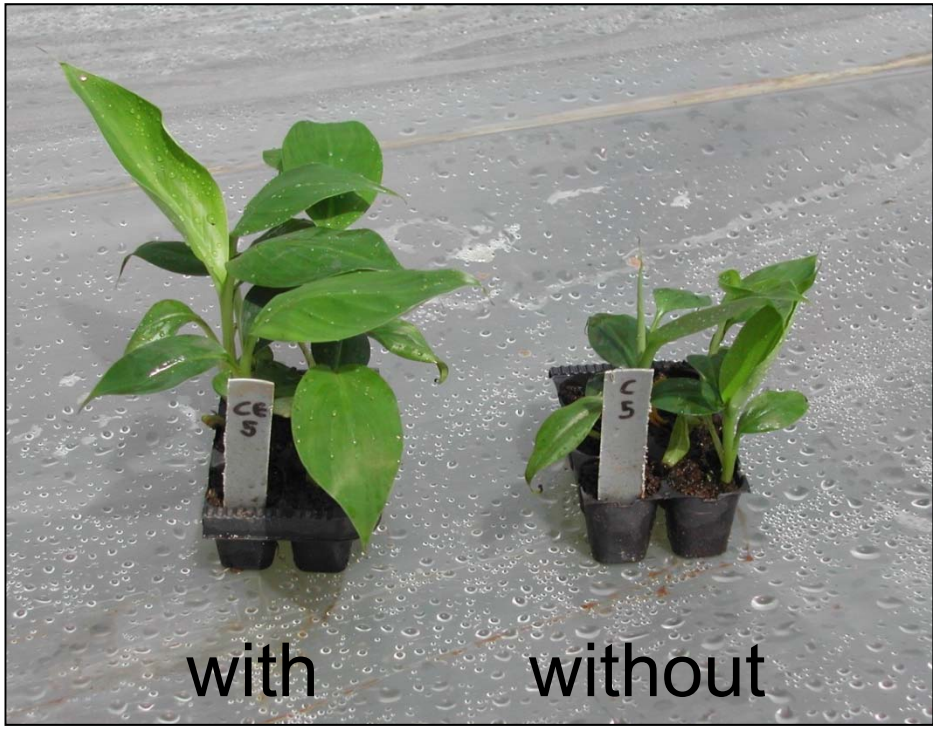
Tissue culture laboratory

Farmer

Endophyte-enhanced tissue culture

Bio enhanced seedlings

Using biological control agents, such as beneficial soil microorganisms



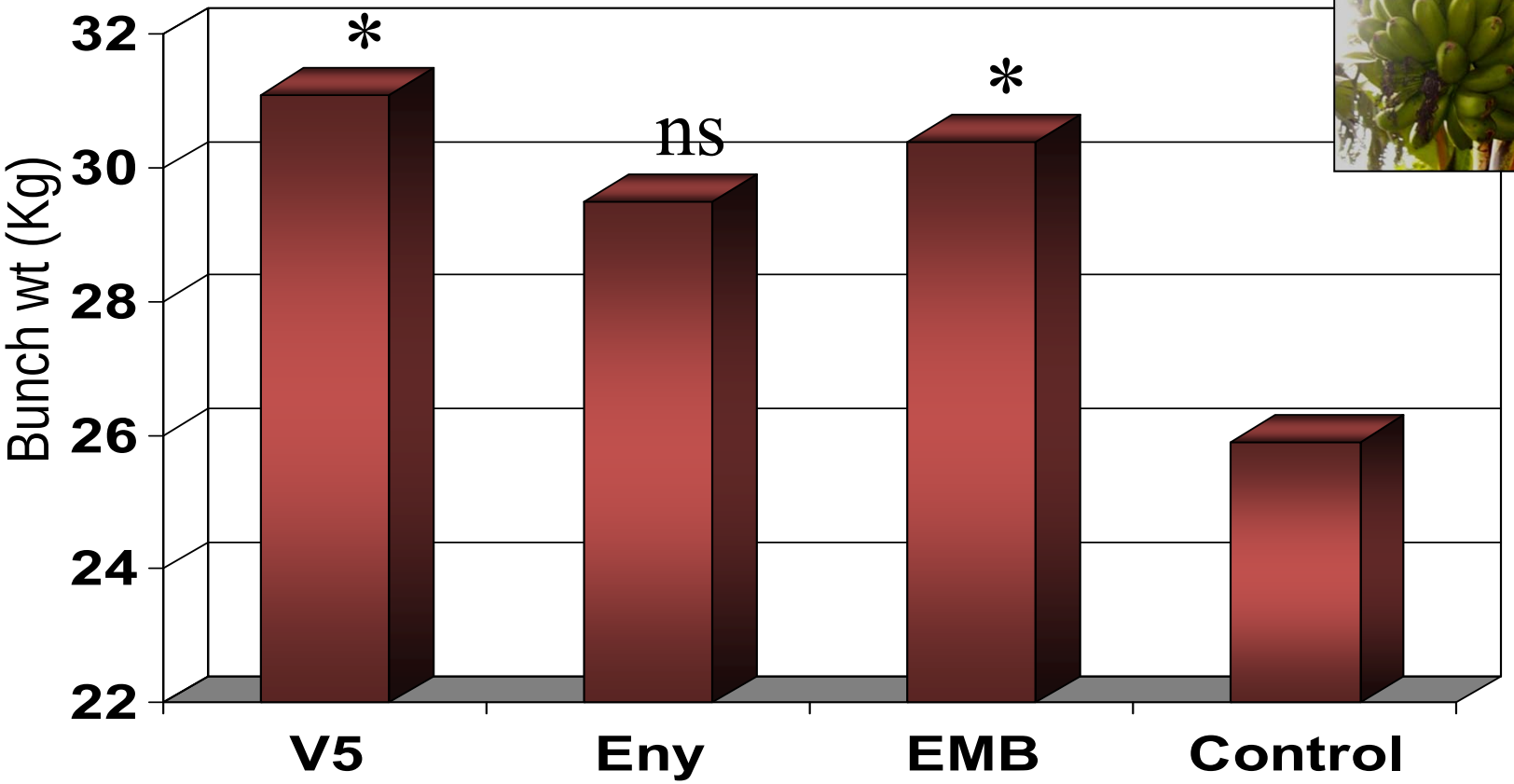
Fungal antagonists

Control

T. asperellum

In farmers' fields

YIELD – dessert banana, Kenya



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Cultural Control

- Rotation
- Mulching
- Etc……

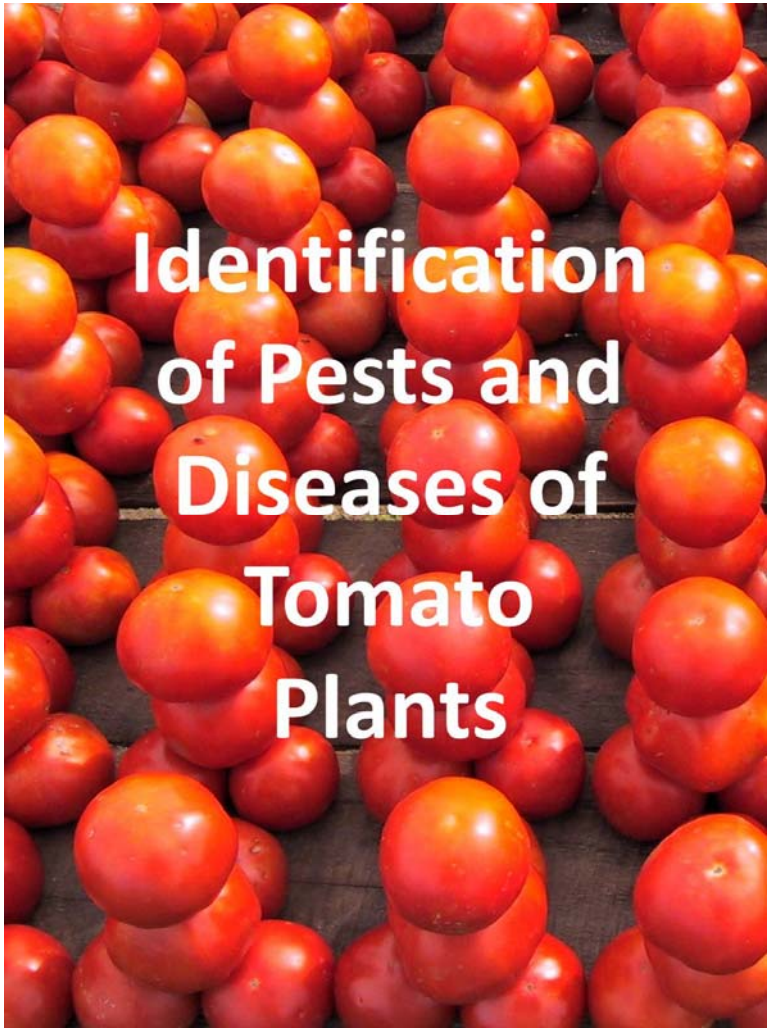
Challenges for Plant Production

- 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**

PARTNERSHIP

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

NEMATOLOGY METHODS FOR RESOURCE LIMITED SITUATIONS:
BASIC TECHNIQUES FOR PLANT & INSECT PARASITIC NEMATODES

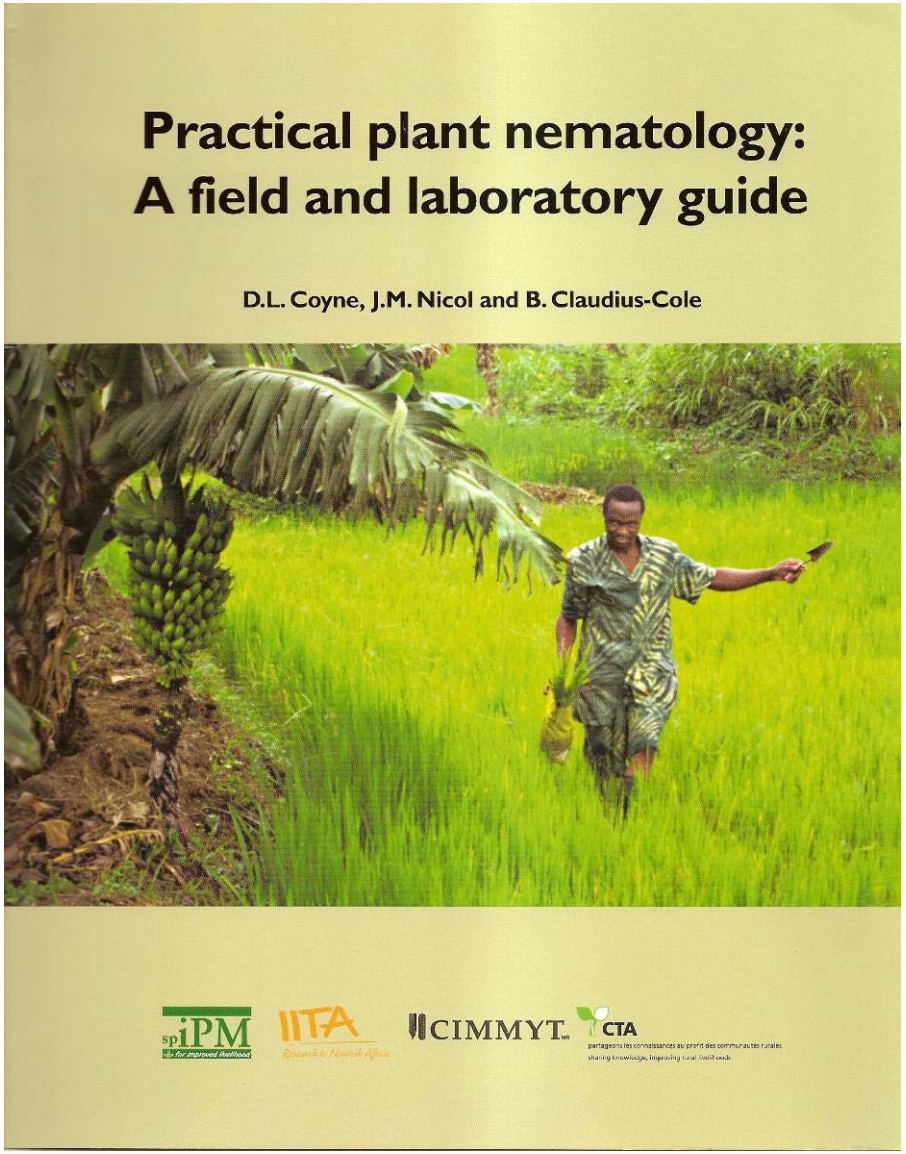
HELD AT THE FACILITIES OF HAWASSA UNIVETRSITY, ETHIOPIA

April 3 – 6, 2014

In the framework of the NORHED-supported 'Controlling diseases of sweet potato and enset in Ethiopia and South Sudan' project

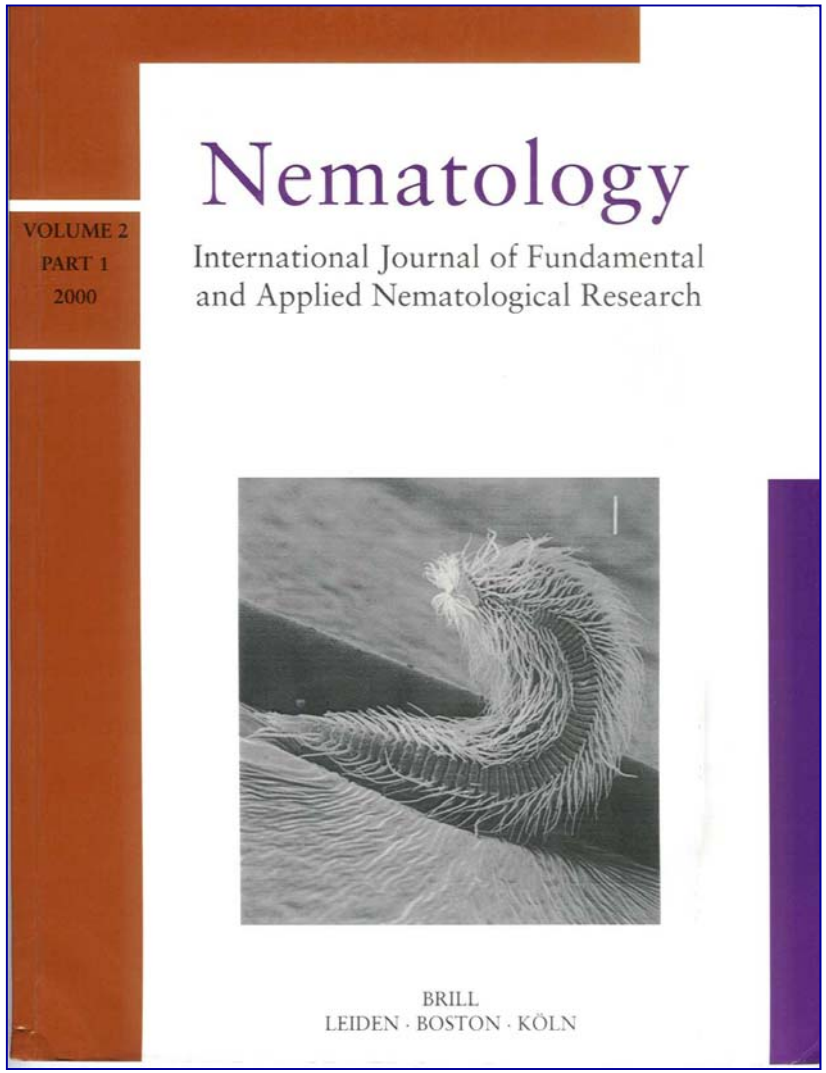
xxxxxx	Danny Coyne +	Prof. Trine Hvoslef-Eide
Director	Nematologist	Project Leader
Ethiopia	IITA	Norway

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