



MANAGING

Plant Parasitic Nematode Pests in the Tropics

Danny Coyne & Buncha Chinnasri

AVRDC Vegetable Workshop, September 2016, Bangkok, Thailand





WHY BE CONCERNED ABOUT NEMATODES?







INTENSIFICATION







INTENSIFICATION

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







WHY BE CONCERNED ABOUT NEMATODES?







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







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









why so much mystery with nematodeswhy so neglected



What can we do about them??







The Situation







PESTICIDES





PESTICIDES



- Aldicarb
- Carbofuran
- DPCP
- Methyl bromide
- Phenamiphos







PESTICIDES

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





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

















pest and disease identification









pest and disease identification



Identification of Pests and **Diseases of** Tomato Plants





Resistance





identify resistance









'rapid' screening method





Activities – identify resistance



Field durability under nematode attack

and

Determine farmer acceptance





Management - resistance



Resistance durability – field/farm





Tripathi et al. 2015, Roderick et al. 2012

Genetic Transformation

Regeneration and transformation of plantain

- for nematode resistance in plantains
- cysteine proteinase inhibitor
- provides good resistance
- Maintained over two crop cycles













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





Agricultural Practices





Activities –

seedling systems







Activities -

seedling systems









seed systems



Nematode disinfection








Nematode disinfection - Musa





















Nematode disinfection - Musa









Nematode disinfection - Yam





Activities –



Nematode disinfection - Yam





Activities –

Nematode disinfection - pesticide











Good Agricultural Practices

SASA, Scotland (UK) **Basic Seed Potatoes** planum ubero Crop No. 60698 Variety ATLANTIC Grade EC2 Class Date 5/10/2011 Producer No. UK/S 6750 Weigt 25 kg Size 30/60mm Declared chemical treatment: Imazalil EC Rules and Standards ZP-asia EC - Plant Passport 00?52070*805





Can we develop entrepreneurial Seed and seedling supply systems?







Bio enhanced seedlings

Using biological control agents, such as beneficial soil microorganisms







Biological Control



Biological Control



- Obligate parasites
 Pastueria penetrans
 - Pochonia
 - Hirsutella











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









Our knowledge of BENEFICIAL soil biota in general ??

VERY LIMITED!!!



Biological Control





Nematode + Nematode Mycorrhyza only

Nematode + Mycorrhyza Nematode only





Soybean infested with *Meloidogyne* and treatments



Nematodes + Carbofuran Nematodes only Nematodes + Mycorrhyza + *Trichoderma*



Fungal antagonists







T. asperellum T-12



Fungal antagonists



Tomato yield



Furadan





Non-pathogenic fungi or bacteria





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.....





Avoidance





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





- 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









Science For A Better Life





Training and capacity building





pest and disease identification



Identification of Pests and **Diseases of** Tomato Plants





NARES capacity enhanced



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







- research support
- training support
- academic support/ training
- collaboration
- •



Linkages – Advanced Institutes















Linkages – Advanced Institutes

Exchange skills

International tropical agriculture





Linkages – National Institutes



CERTIFICATE



M.,

ATTENDED THE TRAINING WORKSHOP ON






Linkages – National Institutes













Training - promotion



Practical plant nematology: A field and laboratory guide

D.L. Coyne, J.M. Nicol and B. Claudius-Cole



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







