Management of *Tuta absoluta*
Invasive alien species are plants, animals, pathogens and other organisms that are non-native to an ecosystem, and which may cause economic or environmental harm or adversely affect human health.

(UICN 2002)
Why is this pest a threat?

The « enemy release » hypothesis

Native area → Newly invaded area

(Keane and Crawley 2002)
Integrated management of *Tuta absoluta*

A sound combination of tools...

- **Physical control**
- **Cultural control**
- **Biological control**
- **Biotechnical control**
- **Host resistance**
- **Monitoring**
- **Conventional pesticides**

(adapted from Eilenberg et al. 2001)

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Integrated management of *Tuta absoluta*

...targeting each stage of the pest.

**Biological control**

**Physical control**

**Host resistance**

**Biorational chemical agents**

Life Cycle of *Tuta absoluta*
Monitoring

✓ Pheromone traps - 2-4 traps/ha and weekly observation
✓ Egg/larvae or damage sampling

Spray only when necessary, with as selective as possible insecticides
Cultural control

- Destroy previous crop residue.
- Remove host weeds near the field or greenhouse.
- Check the seedlings before transplanting to ensure they are free of eggs and larvae.
- Remove and destroy any infected leaves, shoots and fruit immediately.
Physical control

✓ Grow tomato seedlings inside a netted nursery.

✓ Double check the net to make sure the greenhouse does not have holes or gaps.
✓ Install a secure door in the greenhouse to prevent moths from entering.
Host plant resistance

- Breeding resistant host plants

Constitutive defenses

Induced defenses

(Biondi et al. 2018)
Biotechnical control

- Mass trapping (20-25 traps/ha greenhouse, 40-50 open field)
- Mating disruption (30-60 g of pheromone/ha)

(Capparos et al. 2013, Vacas et al. 2011, Cocco et al. 2013)
Biological control

The use of living organisms to keep pests below damaging levels.

(Biondi et al. 2018)
Generalist predators

*Nesidiocoris tenuis* and *Macrolophus pygmaeus* (Hemiptera, Miridae)
Egg parasitoids

*Trichogramma achaeae* (Hymeno., Trichogrammatidae)
Stenomesius japonicus and Necremnus tutae (Hymenoptera, Eulophidae)
Entomopathogens

*Bacillus thuringiensis* var. *kurstaki* or *aizawaii*

**Fig. 1. Mechanism of toxicity of Bt**
Biological control

Augmentative
- *T. achaearae* (inundative)
- *M. Pygmaeus*
- *N. tenuis* (inoculative)

Classical

Conservation
- Banker plants
- Trophic resources
- Refuges

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Towards a system-wide management