Adaptation of indigenous parasitoids to the invasive tomato pest *Tuta absoluta* in Italy: biology and behaviour of the braconid wasp *Bracon nigricans*

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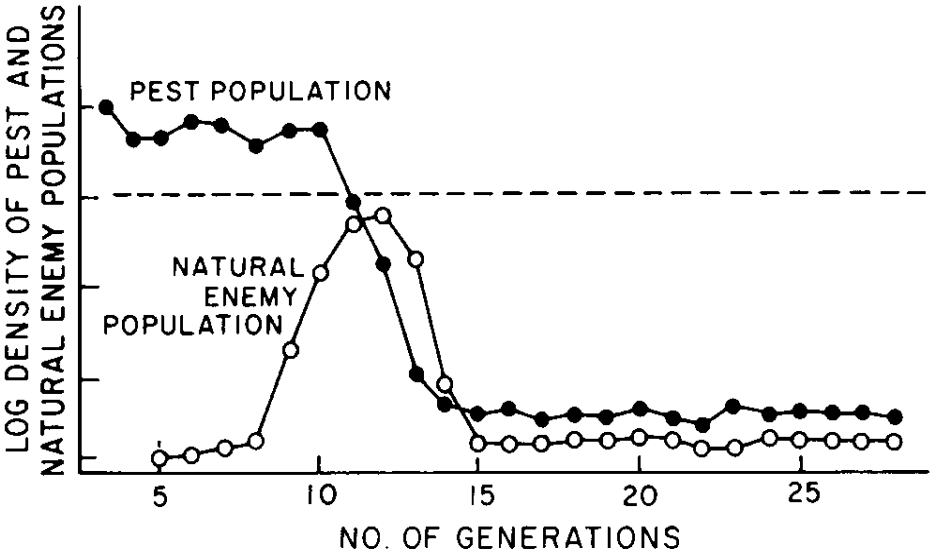
EPPO/IOBC/FAO/NEPPO Joint International Symposium on management of *Tuta absoluta*

Agadir, Morocco, 2011/11/16-18

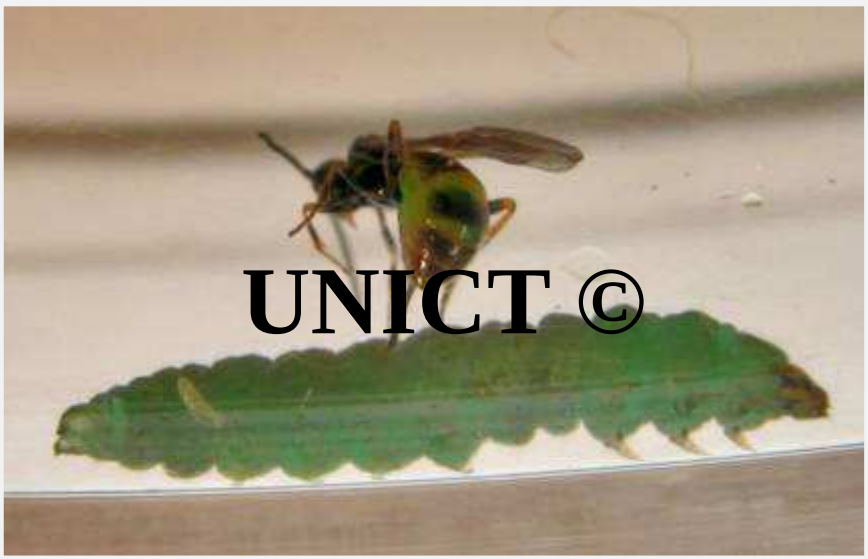
Establishment of exotic species

- Related to their higher competitiveness compared to native species as well as to the reduced control by the natural enemies
- The knowledge of the natural limiting factors is a crucial point in the implementation of any pest management strategy



Aims

- Define the parasitoid complex of *T. absoluta* in newly invaded areas
- Identify potential biocontrol agents
  - Biological and behavioural traits of *Bracon nigricans* (Szépligeti) on *T. absoluta*



Materials and methods - survey

- From August 2009 to present
  - Collection of infested material
    - Protected and open field crops
      - Tomato, eggplant
    - Wild plants
      - *Datura*, *Solanum*…
  - Use of sentinel plants

Materials and methods

Sampling sites

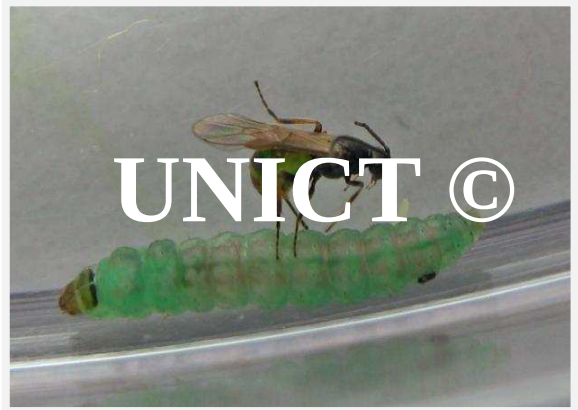
» 6 sites with different ecological features:

- *Urban vegetable crops*
- *Greenhouses*
- *Wild flora*
- *Fruit and ornamental trees*
- *Mediterranean flora*

Materials and methods – *B. nigricans*

- Laboratory trials to determine
  - Host stage preference
    - Choice test
  - Longevity
  - Fecundity and fertility
  - Biocontrol activity
    - % parasitized hosts
    - % paralyzed hosts

- At different **host densities**
  - 10, 20 and 40 L3-L4
- Under different **food regimes**
  - With or without additional sugary-proteinic nutrient



Materials and methods – *B. nigricans*

- Life tables @ constant temperature
  - Age-specific values
    - Survival
    - Viability
      - Fertility
      - Fecundity
      - Biocontrol activity
  - Gregariousness level (1/2/3 eggs of a single clutch)
    - Development time
    - Survival

Discussion – Indigenous parasitoids

- Several Eulophid and Ichneumonid wasps got adapted to the exotic pest
- Very few egg parasitoids
- Presence in all the investigated sites
- No parasitoids inside greenhouses
- Interesting data obtained by means of sentinel plants
- Relatively low total parasitism rate

Discussion - *B. nigricans*

- **Adaptation process**
  - positive correlation between gregariousness level and fitness
    - Progeny increase and time development decrease
  - *T. absoluta* not suitable as host feeding substrate
  - young instars high mortality

Discussion - *B. nigricans*

- **Biocontrol potential**

– positive correlation between host density and the wasp
    - biocontrol activity
        – n. of killed larvae
    - fitness
        – Increasing progeny
        – Increasing male longevity
            » More matings → more female progeny

- Importance of alternative food sources availability in the field for the wasp activity

– Ecological infrastructures
    - flowering
    - honeydew
    - alternative hosts

Discussion - Perspectives

- Searching for other natural enemies
  - Other larval parasitoids
  - Egg parasitoids
  - Predators
  - Pathogens
- Introduction of exotic parasitoids **?**
- Improving knowledge on *B. nigricans*
  - Behavioural studies
    - Host location capacity
  - Intraguild predation and other interactions
  - Efficacy in semi-field and field conditions
    - Banker plants
  - Side effects of pesticides used on tomato crops