RHAGOLETIS CERASI (L.) IN WESTERN SICILY: PRESENCE, DAMAGES AND CONTROL IN ORGANIC CHERRY ORCHARDS

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Two already published papers:


Rhagoletis cerasi (L.)
Cherry Fly

Order: Diptera
Family: Tephritidae

A problem for late ripening cherry cultivar in organic farming
Cherry orchards in Sicily (ISTAT, 2008)
• Few news about *R. cerasi* in Eastern Sicily (Fimiani P. *et al.*, 1978, 1979)

• No news about *R. cerasi* in Western Sicily
Evaluation of the incidence of *R. cerasi* in organic cherry orchards in Western Sicily through:

- survey on presence and population dynamic of the dipteran
- assessment of
  - damage in cherries;
  - susceptibility of some late-ripening cultivar;
- control tests with nets, pyrethrum and spinosad
Cherry orchards monitored during the research (2006-2011)

- **Traditional cherry area (TRAD)**
- **Few cherry orchards area (FEW)**
- **Isolated cherry orchards (ISOL)**
## Cherry orchards monitored during the research

<table>
<thead>
<tr>
<th>Area</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>TOTAL</th>
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<td>Bivona TRAD</td>
<td></td>
<td></td>
<td>X</td>
<td>X</td>
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<td>X</td>
<td>X</td>
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<td></td>
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<td>X</td>
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<td>2</td>
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<td></td>
<td></td>
<td>X</td>
<td>X</td>
<td>2</td>
</tr>
<tr>
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<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>6</td>
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<tr>
<td>San Giuseppe Jato 2 TRAD</td>
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<td></td>
<td></td>
<td></td>
<td>X</td>
<td>X</td>
<td>3</td>
</tr>
<tr>
<td>Castrofilippo 1 FEW</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
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<td>3</td>
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<tr>
<td>Castrofilippo 2 FEW</td>
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<td>1</td>
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<td>Grisì FEW</td>
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<td>X</td>
<td></td>
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<tr>
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<td>X</td>
<td>X</td>
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<td>6</td>
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<td>4</td>
<td>6</td>
<td>4</td>
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MATERIALS AND METHODS

Monitoring (weekly controls) from mid-April to the end of July by Rebell traps (3 per cherry orchard)
Sex ratio ♂♂/♀♀ in yellow traps
Control tests with nets, pyrethrum and spinosad

Mesh 1 x 2 mm
Control tests with nets, pyrethrum and spinosad

3 treatments (1 per week) by:

Pyrethrum (Biopiren plus 160 ml/hl);

Spinosad (Laser 30 ml/hl).
Sampling on cherries
(at commercial harvesting: mid-May – June):
1. 100 fruits/week/orchard.
Sampling on cherries
(at commercial harvesting: mid-May – June):
1. 100 fruits/week/orchard.
2. Observation under the stereomicroscope.
RESULTS
Average *Rhagoletis cerasi* captures in three different kinds of cherry orchards areas (from 2006 to 2011)

![Graph showing R. cerasi captures per trap per week for different orchard areas from April to July.](image)

**Intervention threshold**

- **Traditional areas**
- **Few cherry orchards area**
- **Isolated cherry orchards**
Rhagoletis cerasi captures in traditional cherry orchards areas in five different years (from 2006 to 2011)

R. cerasi captures per trap per week

Intervention threshold
**Average Rhagoletis cerasi** captures of males and females in Rebell traps in cherry orchards in four different years (from 2007 to 2010)

- Sex ratio $\varphi/\sigma =$ average 1/0.5 (from 1/0.3 to 1/1.9)
- (1/1 in Campania, Italy, Fimiani et al. 1981; 1/0.5 in Hungary, Tuba 2009)
Trend of *Rhagoletis cerasi* males and females captures in Rebell traps in five different years (from 2007 to 2011)

Highest captures → ♀'10 ♀'09 ♀'07 ♀'10 ♀'11 ♀'09 ♀'07-08

Captures/ traps/ week
Forecasting the first adult emergence by daily soil temperature or weekly mean air temperature

GDD for adult emergence

- Daily soil temperature
- Weekly mean air temperature

Weekly adult captures in three cherry orchards

Intervention threshold (5 flies per week)
Average *Rhagoletis cerasi* infestation in traditional cherry orchards area in 5 years (from 2006 to 2011)
Average *Rhagoletis cerasi* captures and infestation in three different types of cherry orchards areas (from 2006 to 2011)

- **Intervention threshold**
- **Damage threshold**

### Legend:
- Blue: Infestation traditional areas
- Red: Infestation few cherry orchards area
- Dark blue: Traditional areas
- Pink: Few cherry orchards area
- Yellow: Isolated cherry orchards

### Graph Details:
- *Y-axis*: R. cerasi captures per trap per week
- *X-axis*: Dates from 22 Apr to 15 Jul
- Percent infestation on cherries on the right y-axis

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*Average captures and infestation in cherry orchards from 2006 to 2011:*

- Traditional areas
- Few cherry orchards area
- Isolated cherry orchards

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**Notes:**

- The graph illustrates the average *Rhagoletis cerasi* captures and infestation percentage on cherries over time.
- There are three distinct areas: traditional, few cherry orchards, and isolated cherry orchards.
- The intervention and damage thresholds are also marked on the graph.
In 16 cases (out of 26) (low/high) captures agree with the (low/high) infestation
Sterile punctures of *Rhagoletis cerasi* on cherries in 6 years (2006-2011)
Susceptibility late ripening cherry cultivars in 2008

Susceptibility of analyzed cultivar linked to the ripening period and not to a different attractant power of cultivars
Control test in San Giuseppe Jato in 2009

Vertical bars show 95% confidence intervals

Attacks per cherry

Untreated

Net

Pyrethrum

Spinosad

n.s.
Control tests in San Giuseppe Jato in 2010

Vertical bars show 95% confidence intervals

Attacks on cherry

26May10 31May10 7Jun10
Control tests in Chiusa Sclafani in 2010

Vertical bars show 95% confidence intervals

Attacks per cherry

Untreated

Net

Pyrethrum

n.s.
Control tests in Chiusa Sclafani in 2011

Vertical bars show 95% confidence intervals

Untreated
Net
Pyrethrum

R. cerasi attacks per cherry

26May11 03Jun11 08Jun11

n.s.
Control tests in San Giuseppe Jato in 2011

Vertical bars show 95% confidence intervals
(Repeated measurements ANOVA)

- Untreated: 0.06 a
- Pyrethrum: 0.03 b
- Net: 0.00 c

R. cerasi attacks per cherry

Dates:
- 26May11
- 03Jun11
- 10Jun11
- 21Jun11
CONCLUSIONS

- *Rhagoletis cerasi* recorded in all sampled orchards, except in the two isolated and new ones.

- Peaks of *R. cerasi* flies in the last ten days of May.

- Sex ratio of adults shows more males than females (1:0.5).
CONCLUSIONS

• Not a high correlation between adults captures in traps and infestation in cherries.

• Low damages by *R. cerasi* in Western Sicily.

• Until 25 May infestation under the damage threshold in all cultivar.
CONCLUSIONS

- Sterile punctures, here quantified for the first time, recorded in all period of fruit samplings.

- Pyrethrum lowered cherry fly infestation only in one case; the net was the best tool that reduced the infestation.
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