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To cite this version:
Servane Penvern, Joel Fauriel, Stephane Bellon, Benoit B. Sauphanor. Farmer’s protection strategies in peach orchards: aphid communities in S-E France as a case study. 7. Conference on Integrated Fruit Production; IFP/PFI 2008, Oct 2008, Avignon, France. 11 p. hal-02813914

HAL Id: hal-02813914
https://hal.inrae.fr/hal-02813914
Submitted on 6 Jun 2020

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Farmers’ protection strategies in peach orchards: aphid communities in S-E France as a case study

Penvern S., Fauriel J., Bellon S., Sauphanor B.  
INRA Avignon
• 16 000 ha (2% in OF), and 84% in the S-E of France;

• Aphids are major pests due to several species and different symptoms;

• Management control based on chemicals, but resistance and effects on non-target species;
Identification of farmer’s practices
⇒ on-farm semi-open interviews
⇒ Spray programs

Characterisation of protection strategies
⇒ selection of criteria / IOBC recommendations
⇒ Analysis of farmers’ interviews

Evaluation of protection strategies
⇒ impact on aphids’ population
⇒ impact on beneficials

Approach and outline of the presentation

1. Identification of farmer’s practices
2. Characterisation of protection strategies
3. Evaluation of protection strategies
4. Interpretation

20 orchards OF (8)/CF (12)
1/ Identification of protection practices

Management Indicators
- Level of monitoring (1/2/3)
- Previous infestation (0/1)
- Guidelines (0/1)
- Antagonists (0/1)
- Tolerance threshold (1)
- Aphid biology (0/1)

Cultural methods
- Nb foliar fertilisation
- Vigour management (0/1)
- Fertilisation management (N unit)
- Nearby environment management (0/1)
- Weed strips: shearing intensity (0 = high, 1 = low)

Alternative methods
- Mating disruption (0/1/2)
- Infested branch manual prune out (0/1)
- Nb autumn kaolin applications
- Nest box installation (0/1)

Direct control
- Total Nb of treatments
- Nb of treatments against aphids
- Product's efficacy (Peff)
- Application before blooming (Pos)
- Product's toxicity (Tox)
2/ Characterisation of protection strategies

Observations (axes F1 et F2 : 72,07 %)

-3  -2  -1  0  1  2  3  4  5

F1 (47,95 %)  F2 (24,12 %)

Efficiency

Integrated

Preventive

Chemical

Potential

Toxicity

Biological

Cultural

Methods

Management

indicators

Alternative

Methods

Before blooming

Nbr Tm/season

Efficacy

OF CF

Nbre Tm/Aphids

Nbr Tm/Aphids

Efficacy

OF CF

Nbr Tm/Aphids

Efficacy

OF CF

Nbr Tm/Aphids

Efficacy

OF CF

Nbr Tm/Aphids

Efficacy

OF CF

Nbr Tm/Aphids
3/ Evaluation of the strategies (1/3)

Aphid communities

*Myzus persicae* (Sulzer)

*Brachycaudus schwartzi* (Börner)

*Brachycaudus persicae* (Passerini)

*Hyalopterus amygdalii* (Blanchard)

*Myzus varians* Davidson

*Chrysopidae*

*Coccinellidae*

*Syrphidae*

*Forficulidae*
3/ Evaluation of the strategies (2/3)
Impact on aphids

Kruskal-Wallis:
Df=3, P=0,000

IF/species/plot

Impact on aphids

M. persicae
B. schwartzi
B. persicae
M. varians
H. amygdali

Protection strategy
CF OF

C E P I

Kruskal-Wallis:
Df=3, P=0,000
3/ Evaluation of the strategies (3/3)
Impact on beneficials

Kruskal-Wallis:
R : Df=3, P=0.006
H : Df=3, P=0.008

<table>
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<th>Insect Family</th>
<th>B. schwartzi</th>
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Abundance (N)
4/ Interpretation (1/2)

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Direct control

| Total Number of treatment | 0.562 |
| Number of treatment toward aphids |     |
| Product's efficacy | 0.495 |
| Application before blooming | 0.576 |
| Product's toxicity | 0.490 | 0.510 | 0.482 | 0.635 | 0.486 |
Direct control methods with efficient and toxic products are correlated with low IF (the number of treatment being independent).

No correlation between IF and management indicators, cultural and alternative methods.

However, such methods promote diversity in aphid communities.
Discussion

Can protection strategies be both efficient and ecologic?

- Efficiency and Ecology appear as incompatible,
- Adequacy with farmer’s objectives and production strategy.

⇒ Need for new methods (peach tree resistance, environment management, eligible alternative products, etc.).

Relevance of protection strategies and steps towards integration:

- Internal variability within organic and conventional management systems,
- Organic as a prototype for integration? « Integrated Organic » strategy appears as a more advanced stage…
- Trajectories from chemical to integrated?