

Controlling cherry fruit fly under organic farming in France: Hopes and despairs

F. Warlop¹, E. Filleron²

Abstract

*Cherry Fruit Fly is still a very damaging pest in Europe, and control measures so far are not fully convincing. Alternatives to chemicals show intermediate levels of efficacy, and growers can not rely on them yet. Although nets offered a very sufficient protection to trees, they do not appear like a easy-to-adapt solution, in traditional orchards. Efforts must be continued to assess new active matters and new strategies, especially while an important new threat occurs, *Drosophila suzukii*.*

Keywords: organic farming, cherry fruit fly, insect-proof net, *Beauveria bassiana*

Introduction

As mean temperatures increased since 2003, pests generally, and fruit flies in particular have been more and more problematic, in organic farming as well as in conventional. Early cherry cultivars may be a part of the solution, but can not be the only ones to be planted. Many strategies have been identified and tested, but so far none could give satisfying level of protection with affordable cost. Natural parasitism is occurring, but at a very low level. Summer or spring soil tillage is supposed to exert an effect on pupae survival rate, but it has never been possible to prove in our conditions. Mass trapping shall be limited to parcels above one hectare, or very isolated from other cherry trees, and its efficacy remains rather irregular with respect to its cost.

New strategies had to be experienced, in order to propose affordable means to cherry growers. Therefore, a task group investigated the relevance of nets for cherry orchards from 2008 to 2010, whereas other natural products were also tested in the field (Severac *et al.*, 2010).

¹F. Warlop, GRAB, Site Agroparc - BP 1222 - 84911 Avignon cx 9 - France, francois.warlop@grab.fr

²E. Filleron, La Tapy - 1881, Chemin des Galères - 84200 Carpentras-Serres - France, efilleron@domainelatapy.com

Results

1) Field results with plastic nets

In 2008 and 2009, several orchards have been protected with two kinds of nets, with two different mesh sizes:



Figure 1: Overview of two different mesh sizes: medium 4x5 (left) / small 6x6 (right)

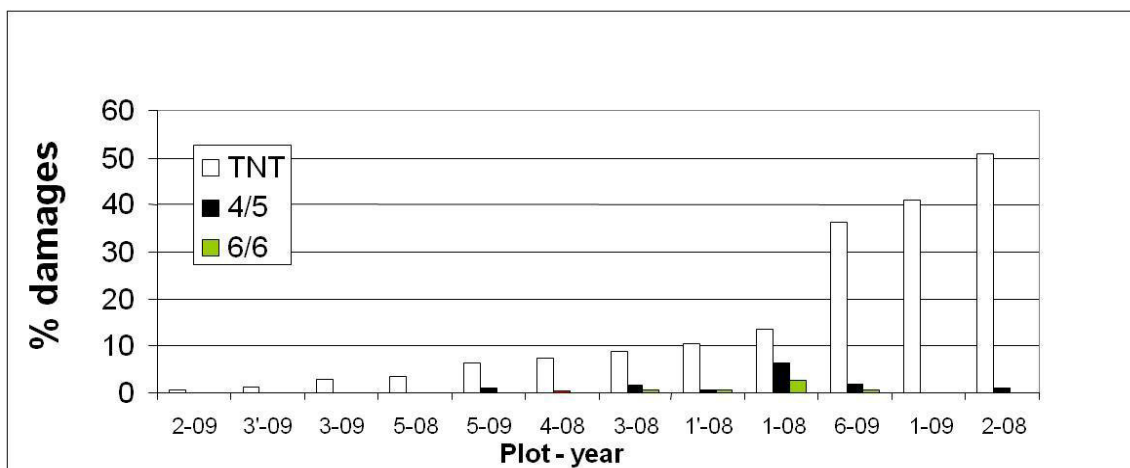


Figure 2: % of damages obtained in 2008 and 2009 on experimental plots, with both kinds of nets (4x5, 6x6) compared with control (TNT) trees.

Table 1: Efficacy of the protection with both kinds of nets

<i>Efficacy measured</i>	<i>Mesh 4x5</i>	<i>Mesh 6x6</i>
Average	91,3%	96,4%
<i>Minimum</i>	52,6%	81,5%
<i>Maximum</i>	100%	100%



Figure 3: Outlook of nets on cherry trees in Provence

Conclusions

Nets are the most effective solution so far, but cherry orchards need to be redesigned and intensified to be adapted to nets, and in order to limit investment costs. Therefore, growers are not willing to use this technique yet.

2) Field results with integral plastic mulch

Plastic mulch has been tested in Switzerland (by FiBL) with interesting results, and trial has been repeated in 2009 and 2010, as the barrier may prevent adults from soil emergence, as well as larvae to penetrate soil to pupate.

As picture enclosed shows, a 3000m² organic and isolated cherry orchard, newly abandoned, has been fully covered with a plastic cover (permeable to water and gases). No control plot could be maintained on the trial, in order to avoid neighbouring flies.



Figure 4: Installation of an integral plastic mulch under cherry trees

The effect of the mulch on emerging flies has been assessed on both cultivars concerned (Burlat & Napoleon).

In 2009, pest pressure was very high since temperatures were very favourable. Accordingly, the early cultivar Burlat could be harvested in end of may, and damages could be prevented. On late Napoleon, damages reached 45% which could be considered as lower than expected : this would lead to the conclusion that plastic cover may play a role in limiting the fly damages, though it was not important enough in our conditions. In 2010, the overall population level was too low to evaluate the effect of the mulch.

Considering the time requested to fix the device, the condition of an isolated orchard, an efficacy very limited and environment-dependant, this technique may not be currently recommended to organic growers.

3) Field results with natural products

Natural products remain among the most promising and relevant techniques to control *R. cerasi* (Daniel, 2009). Dimethoate could shortly be withdrawn for ecotoxicity and residues problems, therefore also conventional growers are expecting new field results from alternative compounds.

Various trials have been carried out from 2008 to 2011 by a task group including Ctifl, DGAL, Ministry and experimental regional centres (Warlop *et al.*, 2012), mostly with the new formulation of *Beauveria bassiana* called Naturalis®, but also with kaolin.

Naturalis

As shown on the figure below, seven different partners carried out 12 field trials to assess the efficacy of Naturalis, either on experimental plots or by organic growers, mostly in south of France.

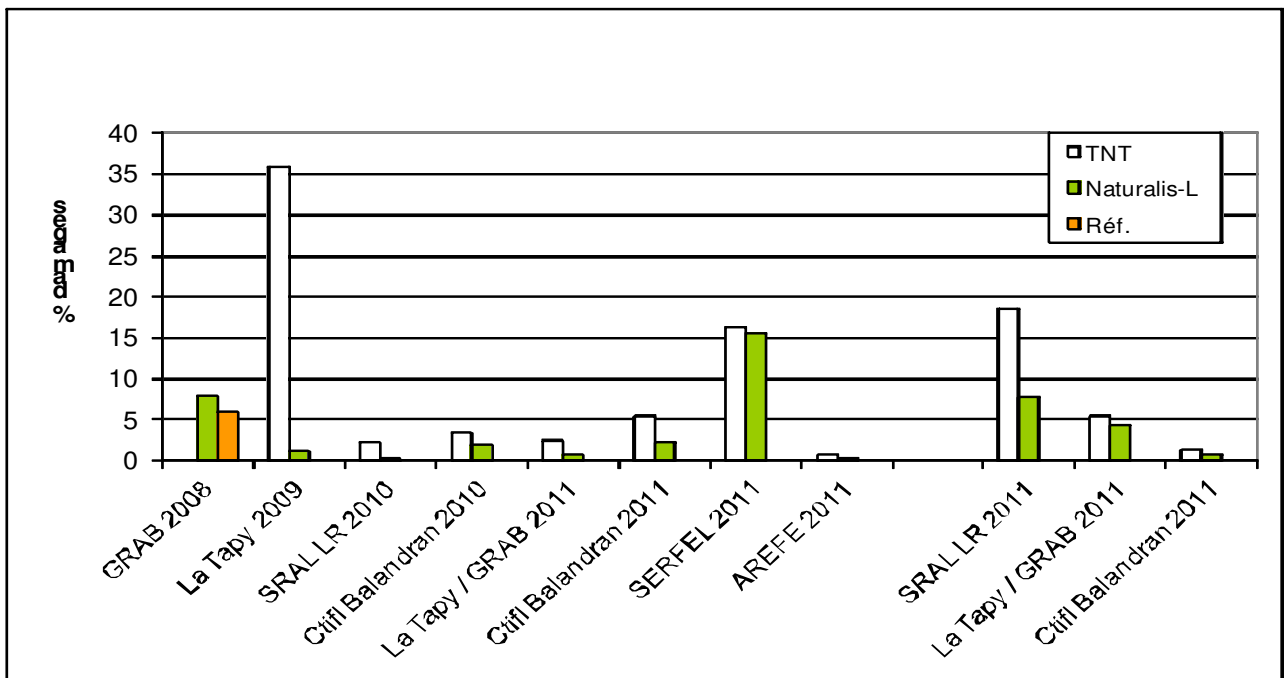


Figure 5: Compared % of damages in 11 field trials done from 2008 to 2011, between control (TNT), Naturalis-L treatments and growers reference. (8 first results on *Rhagoletis cerasi*; 3 last trials on *Drosophila suzukii*).

Results show different levels of pressure, ranging from 0 to 35% of damages at harvest. Efficacy of *B. bassiana* was also very fluctuating, from 5 to 96%, with most of trials giving a mean efficacy of 50-60%, under a low pressure. Efficacy was especially low this year, but this may be due to a formulation problem from company's side.

This active substance however looks irregular in efficacy so far, and dependant of humidity at the time of application. Weather conditions during treatments (may or june) can be rather unfavourable to the germination and contamination of the fungus. It is also essential to spray *Beauveria bassiana* every 7 days until harvest (Daniel & Häseli, 2010).

Kaolin

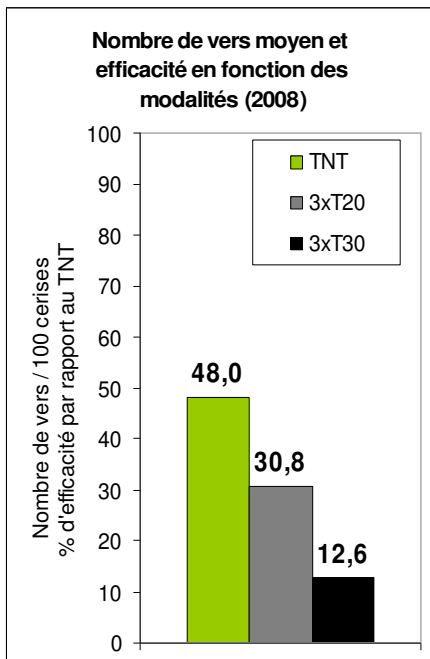


Figure 6: Mean number of larvae for 3 different strategies: control (TNT), kaolin with 2 different dosages.

Kaolin clay has shown interest, as it did on olive fruit fly. Trials led by La Tapy (Filleron, 2010) led to efficacies from 40 to 95%, according to the dosage and strategies used. The graph enclosed shows an efficacy much improved with 3 treatments at 30 kg/ha compared to 3 treatments at 20 kg/ha.

The main concern is about anaesthetic residues, although health risks should be very limited. Machines in packinghouses have been tested for their ability to wash cherries while separating stems. Most of the surface can be cleaned, only the cavity of the cherry keeps traces.



Figure 7: Appearance of cherries before (left) and after (right) washing.

Discussion

Although advances and progress have been achieved in the past years, we are not yet able to recommend reliable strategies to control cherry fruit flies under the conditions of organic farming, except with nets for intensive orchards. This difficult situation is even worse for the last 2 years, since a new invasive pest has been recorded in France, *Drosophila suzukii*, coming from Japan through Italy and commercial exchanges.

This very prolific pest lays eggs on healthy cherries, but also on strawberries, small fruits or peaches. So far, no control strategy is available, and this new situation threatens the economical sustainability of many fruit growers.

Acknowledgements

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