# Field trials on adulticide bait (spintor-fly®) to control the cherry fruit fly in Emilia-Romagna (North Italy) in 2010 and 2011

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**Abstract**

*In Emilia-Romagna Region (North Italy) trials to identify new strategies for the control of cherry fruit fly have been carried out. The aim was to find an alternative to the active substances commonly used until last years (e.g., dimethoate, phosmet) in Integrated Pest Management but at risk to be excluded from the market due to E.U. PPP revision, and to identify an effective way to control cherry fruit fly in organic farming. For this reasons field trials have been performed in 2010 and 2011 to evaluate the efficacy of a Spinosad-based bait adulticide (Spintor-Fly®) against* Rhagoletis cerasi *L. in cherry orchards. The results obtained were positive in both years. Spintor-Fly ® proved to be very effective to control the pest. An extension of its use in open field is awaited. However, its use on a large scale could be limited by its low persistence (it has to be applied at least weekly), poor rainfastness and phytotoxicity on the treated areas although widely tolerated. For these reasons new formulations of this experimental product developed to mitigate the negative aspects as mentioned above are awaited to be evaluated.*

**Keywords:** *Rhagoletis cerasi*, cherry fruit fly, control, Spintor-Fly.

## Introduction

In the last years in Italy the control of cherry fruit fly (*Rhagoletis cerasi* L.) has become more complex due to the low availability of pesticides.

As it is known, following the revision of European products (reduction RMA), dimethoate is no longer usable and phosmet showed problems of phytotoxicity on different cultivars in different contexts (Caruso & Boselli, 2011). Consequently, in Integrated Pest Management (IPM), there is a shift towards the use of neonicotinoids (acetamiprid, thiacloprid, and thiamethoxam). These products while showing a decent effect from the first experiences in Italy (Caruso & Boselli, 2011), present some problems. For example not all neonicotinoids are authorized for the control of cherry fruit fly. They are already used against the black aphid and their further repeated use may increase the risk of resistance development. For these reasons a broader range of formulations to be included in ordinary control strategies is needed. Furthermore, apart anti-insect nets (Grassi *et al.* 2010) which have not had wide application for the rather high costs and limits of practicality in their use, no means of control against *R. cerasi* in organic production, are available.

Among new products being evaluated, the fruit fly bait Spintor-Fly® is promising. Besides the bait ingredients it contains spinosad as adulticide. (It is authorized for cherry fruit fly control in USA, Canada and for olive fruit fly (*Bactrocera (Dacus) oleae* Gmelin) and Mediterranean fruit fly (*Ceratitis capitata* Wiedemann) control in Europe. In the United States (Yee and Alston, 2006; Alston, 2009) and Canada (Edwards, 2004; Thistlewood, 2010) the system has been used for several years with good results. Its potential for cherry fruit fly control has been ascertained in Germany by Köppler *et al*. (2008).

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In Italy, it showed promising results in trials carried out in 2010 in cherry orchards in the Emilia-Romagna (Caruso & Tommasini, 2011) and Sardinia (Marras *et al*., 2011) as well as against the olive fruit fly and the Mediterranean fruit fly. In this paper a summary of results from trials carried out in Emilia-Romagna in 2010-2011 are reported.

**Material and Methods**

The trial was carried out in 2010 in three farms, one located at Linaro of Cesena (Province of Forlì-Cesena, FC) and the other two in Vignola (Province of Modena, MO) both placed in North Italy. In 2011 the trial was undertaken in six farms, three in Vignola and three in Forlì-Cesena. In both years the selected farms were characterized by high infestation of cherry fruit fly in previous years (more than 50% damage recorded). In general the farms were located in the foothills (150-300 m a.s.l.), and in 2011 the farm six was located in a hill country (700 m a.s.l.). In each farm the experimental design provided a comparison between a plot treated with Spintor-Fly® and an untreated plot as control (Tab. 1 and 3). The untreated plots were located at a distance within 500-600 meters from treated plots. This trial scheme was necessary due to the mode of action of Spintor-Fly® (bait adulticide) which results in higher efficacy when applied on surface areas of a quite large size (greater than 1000 square meters). This new formulationhighly accepted as food by the cherry fruit flies, contains a small amount of the active ingredient Spinosad (0.24 g/l). Adults feeding on the bait ingest the active substance, too. Adults die within a few hours after feeding making it impossible for them to mate. To be effective Spintor-fly® must be homogeneously distributed in the orchard, spraying a small portion (approx. 50 $cm^2$) of the upper part of the vegetation of each plant and leaving coarse droplets of the product on leaves. Sprays were performed with a manual sprayer applying 5 liters of bait solution per hectare (consisting of 1 liter of product and 4 liters of water).

The sprays were performed on a weekly basis except for reaplication, at shorter intervals, required in case of rain. The product is in fact easily washed off. In order to detect the onset of flight activity of cherry fruit fly in due time and to start immediately the applications of Spintor-Fly®, 2 sticky yellow traps (Rebell type) were placed in each field on the $8^{th}$ of May 2010 and on $26^{th}$ of April 2011. The traps should also serve as an indicator of the efficacy of sprays (an increase of the catch would correspond to a reduction of the attractiveness of the bait). Traps were checked with short intervals (1-2 days) before the first detection of adults, and later, weekly. Within 24 hours from the beginning of pest flight sprays with Spintor-Fly® started (Tab. 1 and 3). To assess the efficacy of Spintor-Fly® a survey was carried out in each farm at harvest by sampling 100 fruits for cultivar / treatment. When less than 5 cultivars were present in the plot more fruits were sampled for cultivar reaching always 500 fruits / treatment. The percentage of damaged fruits by *R. cerasi* of the selected cultivars was assessed by opening each cherry fruit and checking visually the presence of cherry fruit fly larvae or the damage caused by them into the fruits. The cultivars to check the infestation included those at medium and late harvest which are the most susceptible to cherry fruit fly (Tab. 2 and 4).

Table 1 – Trial set-up and treatments carried out with Spintor-Fly® in 2010.

| Farm N. | Place (Province) | Treatment | Surface (ha) | Sprays (No.) | Date of sprays |
|---|---|---|---|---|---|
| 1 | Linaro (FC) | Spintor-Fly<br>Control | 0.25<br>0.5 | 5<br>- | May (24,30);<br>June (03,09,16) |
| 2 | Vignola (MO) | Spintor-Fly<br>Control | 1<br>0.1 | 6<br>- | May (17,20,25);<br>June (04,09) |
| 3 | Vignola (MO) | Spintor-Fly<br>Control | 0.3<br>0.8 | 6<br>- | May (17,20,25);<br>Jun (04,11) |

Table. 2 - Cultivars on which trials were carried out in 2010.

| Farm | Cultivar |
|---|---|
| 1 – Linaro (FC) | Ferrovia, Sweet Heart, Cornina, Maraschina |
| 2 – Vignola (Mo) | Mora di Vignola, Nero I, Durone dell'Anella, Ferrovia, Durone della Marca |
| 3 – Vignola (Mo) | Mora di Vignola, Nero I, Ferrovia, Durone della Marca |

Table 3 – Trials set up and treatments carried out with Spintor-Fly® in 2011.

| Farm no. | Place | Treatment | Surface (ha) | Sprays (no.) | Date of sprays |
|---|---|---|---|---|---|
| 1 | Vignola (Mo) | Spintorfly<br>Control nt | 1,0<br>0,1 | 6<br>- | **May**<br>(6,12,17,21,28)<br>**Jun**<br>(13) |
| 2 | Vignola (MO) | Spintor-Fly<br>Control | 1,0<br>0.1 | 6<br>- | **May**<br>(8, 16,19,25)<br>**Jun**<br>(1,13) |
| 3 | Vignola (MO) | Spintor-Fly<br>Control | 1,0<br>0.8 | 6<br>- | **May**<br>(7, 13,17, 21, 28)<br>**Jun**<br>(13) |
| 4 | S. Romano (FC) | Spintor-Fly<br>Control | 0,8<br>0,1 | 7<br>- | **May**<br>(8, 16,22, 26)<br>**Jun**<br>(05, 14) |
| 5 | Dovadola (FC) | Spintor-Fly<br>Control | 1,0<br>0,1 | 5<br>- | **May**<br>(8,15,21,27)<br>**Jun**<br>(03) |
| 6 | Cusercoli (FC) | Spintor-Fly<br>Control | 1,0<br>0,1 | 8<br>- | **May**<br>(10,17,21, 28)<br>**Jun**<br>(02, 09,15,22) |

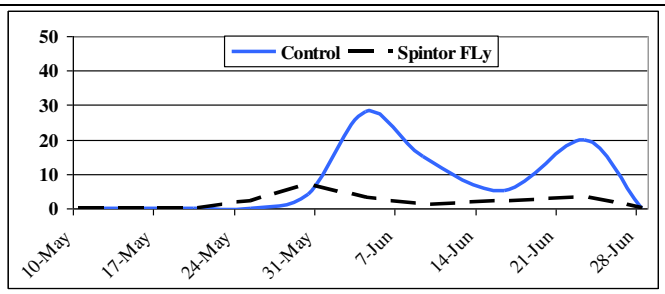
Table 4: Cultivars on which trials have been carried out in 2011.

| Farm no. | Cultivar |
|---|---|
| 1 – Vignola | Nero I, Durone dell'Anella (DA), Ferrovia, Nero II, Ciliegione |
| 2 – Vignola | Durone Anella, Nero I, Nero II |
| 3 – Vignola | DA, Nero I, Giorgia, Nero II, Ferrovia, Lapins, Durone del Cortile, Sweet heart |
| 4 –S. Romano | Sunburst, Ferrovia, Nero III, Morandina, Cornina |
| 5 – Dovadola | Mora di Vignola, Sunburst, New Star, Lapins |
| 6 – Cusercoli | Mora di Vignola, Cornina |

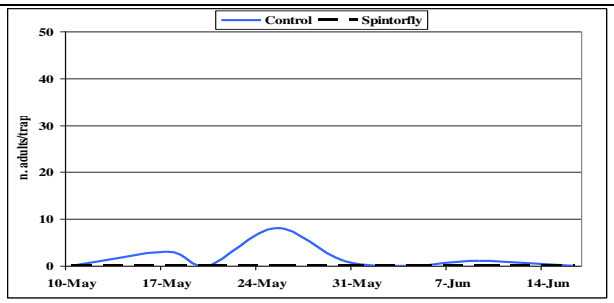
## Results and Discussion

The average adult catches recorded on traps during 2010 in the treated plots with Spintor-Fly® were basically always very low (Fig. 1). This result provided a preliminary indication of the positive activity of the bait spray.

In table 5 the results of the field trial in 2010 are shown. The infestation rate was clearly reduced in all plots treated with Spintor-Fly® compared to the untreated control (not always of the same cultivar for lack of availability). In the treated plots 0,0 to 5.5% of the fruits were infested, whereas in the untreated plot infestation was much higher, ranging from 33% to 90%.




Farm no.1 – Linaro (FC)

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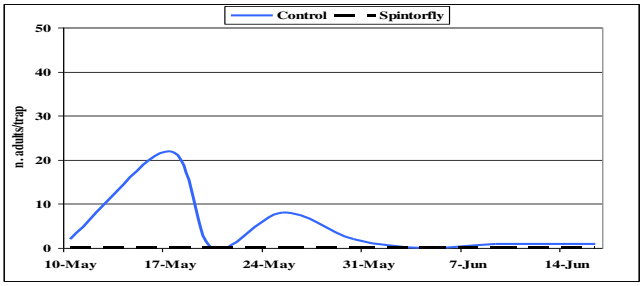



Farm no. 3 – Vignola (MO)

Figure 1 - *R. cerasi flight* 2010

Table 5 - Results 2010: Effect of bait treatments on larval infestation of cherries by *R. cerasi* (average of the different cultivars).

| Farm No. | Thesis | Check at harvest (dd/mm) | Sample size (N. cherries) | Damaged fruits (%) |
|---|---|---|---|---|
| 1 – Linaro (FC) | Spintor Fly® | 9/6; 23/6 | 500 | 1,8 |
| | Control | | 500 | 53,8 |
| 2 – Vignola (Mo) | Spintor Fly® | 8/6; 15/6 | 500 | 2,2 |
| | Control | | 500 | 33,0 |
| 3 - Vignola (Mo) | Spintor Fly® | 8/6 | 500 | 0,0 |
| | Control | | 500 | 90,2 |

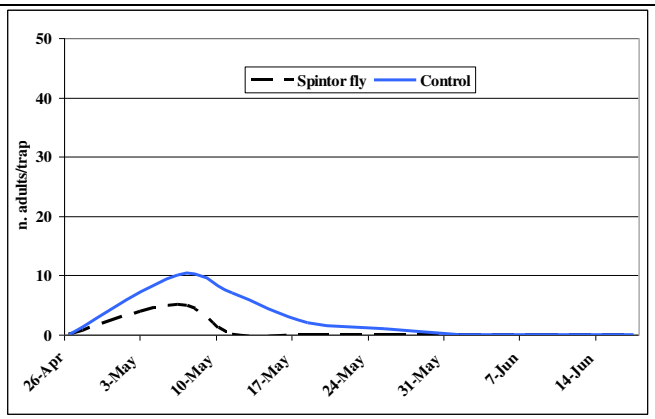
The average adult catches on traps during the trial in 2011 (Fig. 2) in the treated plots with Spintor-Fly® in most of the farms were lower than the catches recorded in the untreated plot, also in the farm 2 (Fig 2) where the pest pressure was very high, confirming the results of 2010. In table 6 the results on the percentage of fruits damaged by cherry fruit fly at harvest in 2011 are shown. In the treated plots the damage by *R. cerasi* on fruits fluctuated between 0.0 to 3.2% compared to an infestation level in the untreated control always higher than 15% and in some cases close to 40%.

Although a lower presence of *R. cerasi* was observed in all farms in 2011 compared to 2010, the results confirm those of 2010. A clear reduction of cherry fruit fly infestation was achieved in the plots treated with Spintor-Fly® compared to the untreated control plots.

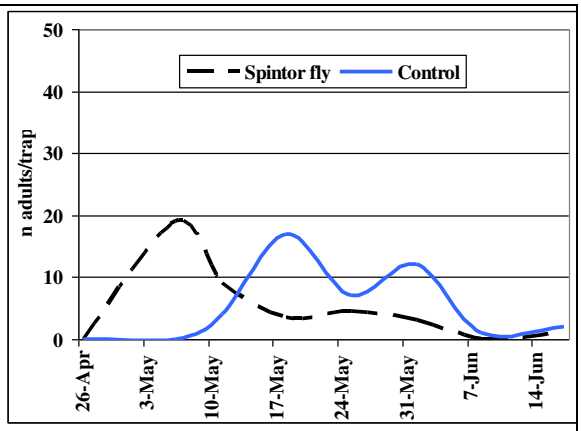
On the other hand symptoms of phytotoxicity in the areas of the treated vegetation were observed both in 2010 and 2011. These symptoms are considered tolerable by the farmers and they are not significantly damaging the cherry trees.

Table 6 – Results 2011: Effect of bait spray treatments on larval infestation of cherry by *R. cerasi* (average of the different cultivars).

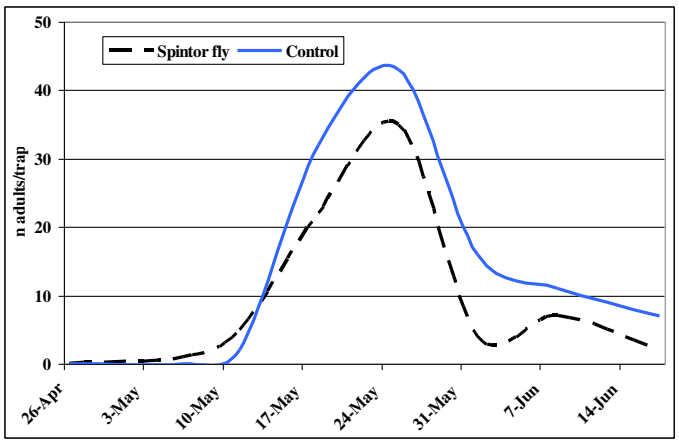
| Farm No. | Thesis | Check at harvest (dd/mm) | Sample size (N. cherries) | Damaged fruits (%) |
|---|---|---|---|---|
| 1 – Vignola (Mo) | Spintor Fly® | 26/5; 7/6; 12/6 | 500 | 0,1 |
| | Control | | 500 | 15,0 |
| 2 – Vignola (Mo) | Spintor Fly® | 1/6; 8/6 | 500 | 0,3 |
| | Control | | 500 | 39,0 |
| 3 - Vignola (Mo) | Spintor Fly® | 31/5; 10/6; 17/6 | 500 | 0,7 |
| | Control | | 500 | 17,2 |
| 4 – S. Romano (FC) | Spintor Fly® | 28/5; 10/6; 24/6 | 500 | 3,2 |
| | Control | | 500 | 20,4 |
| 5 – Dovadola (FC) | Spintor Fly® | 28/5; 3/6 | 500 | 0,0 |
| | Control | | 500 | 28,0 |
| 6 – Cusercoli (FC) | Spintor Fly® | 9/6; 22/6 | 500 | 2,7 |
| | Control | | 500 | 34,3 |




Farm no. 1.Vignola (Mo):




Farm no. 4 – S. Romano (FC)

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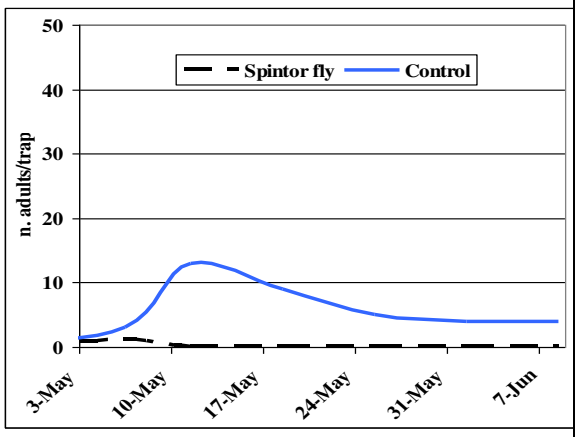
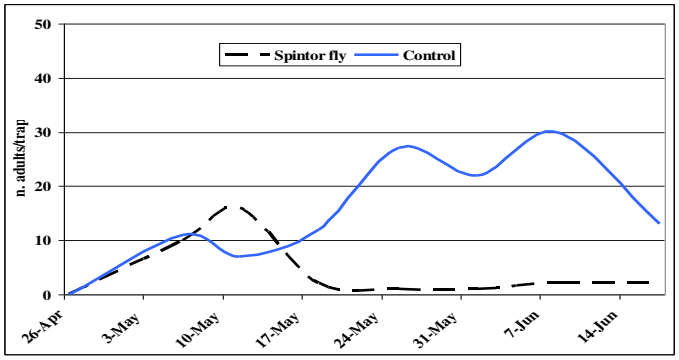
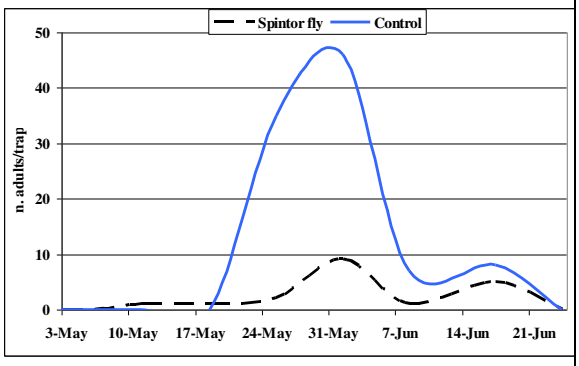



Farm no. 5 – Dovadola (FC):




Farm no. 3 – Vignola (Mo):




Farm no. 6 – Cusercoli (FC):

Figure 2 - *R. cerasi* flight 2011

## Conclusion

The trials carried out in 2010 and 2011 gave positive results highlighting the efficacy of Spintor-Fly® to control cherry fruit fly on cherry. Nevertheless there are a few drawbacks which can prevent its extensive use in open field. In particular the short persistence, which requires repeated applications (weekly) during the period of adult flight and fruits ripening. This is aggravated by its poor rainfastness even with few millimiters of rain. Phytotoxicity on treated areas seems to be negligible and largely tolerable.

It would be useful to evaluate new experimental formulations of this product which limit the negative aspects mentioned above to provide an improvement in their use in both organic and IPM production.

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