RESULTS REGARDING THE CHEMICAL CONTROL OF EUROPEAN CHERRY FRUIT FLY (*Rhagoletis cerasi* L.) IN CHERRY ORCHARDS FROM CLUJ AREA

Laura Ioana MACAVEI[1], Viorel MITRE[2], Ioana Mitre[2], Ioan OPREAN[3], Aurelia POP[3], Iuliana VASIAN[3], Raul BĂEŢAN[1], Ion OLTEAN[1]

e-mail: macavei_laura87@yahoo.com

Abstract

In neglected orchards the attack of European cherry fruit fly can affect the production by up to compromising. For framing in the regulations asked by market, it is often required that in cherry plantations to intervene with several strategies of pest control, in which frequently appears chemotherapy. To apply a reduced number of treatments we must know the biological reserve of species and its life cycle. The experiment was conducted over two years, 2013-2014, in an orchard located near Cluj-Napoca city, Romania.To study the biological cycle of this species, we followed the dynamics of climatic factors, especially the accumulation of active degrees that were needed in going through several stages of development. In order to apply the treatments, we observed flight dynamics of *Rhagoletis cerasi* using sticky panels (provided by Institute of Chemistry "Raluca Ripan" Cluj-Napoca). The treatments applyed in combating of the fly consisted in two applications of products belonging to synthetic pyrethroids group. In 2013, the first adults were recorded on 25 May, when the amount of active degrees accumulated was 410, 2 ° C. Frequency of fruits attacked by cherries worm this year was 1%. In 2014, the adults emergence took place on May 21, which corresponded to value of 343,8° C degrees acumulated. Although the population level was still high the frequency of attacked fruits was again 1%, which was mainly due to the possibility of migration of adults at distances over 100 m. In control variant, an untreated orchard, frequency of attacked fruits in both years exceeded 30%.

Key words: chimical control, degree-day, integrated pest management, *Rhagoletis cerasi* L.

European cherry fruit fly, *Rhagoletis cerasi* L. is an important pest of sweet cherry and tart cherry orchards and the fruits attacked by it cause some discomfort for the consumer.

Sometimes in neglected orchards, the production's quality can be compromised in a very high percentage (Olszak R.W., Maciesiak A., 2004). In national and international laws are stipulated standards for fresh consumption so on the market are accepted only the fresh fruits where the frequency of attack is around 2% (Daniel C., Grunder J., 2012). Some importers claim that the attack rate to be even less than 1%. For achieving this norm it is often required that in cherry plantations to intervene with several strategies to control the pests, in which frequently enters chemotherapy.

The control method in which chemicals are used has the easiest way of application, with good results. Reconsideration of chemotherapy is, (Chireceanu C., 2008) and abroad (Kovanci O.B., however, an extremely important fact, especially now when it is known that the planet is going through a period in which the biological and ecological stability is degradating.

The concept of integrated pest management, constitue an optimal solution in terms of applied technology. For performing a reduced number of treatments, with maximum efficiency,we must know the biological reserves of species and its life cycle.

Studies on estimateing the emergence of *Rhagoletis cerasi* adults, based on soil temperature at a depth of 5 cm was made by Suta Victoria 1969 cited Chireceanu C., 2008. This method is uncomfortable to be applied (Kovanci O.B., Kovanci B., 2006).

Another model for determining the moment of emergence of European cherry fruit fly adults, using temperature was studied both in Romania

Kovanci B., 2006). It consists in summing of

[1] Faculty of Agriculture, USAMV Cluj, Cluj-Napoca
[2] Faculty of Horticulture, USAMV Cluj, Cluj-Napoca
[3] Institute for Research in Chemistry "Raluca Ripan", Cluj-Napoca

activedegrees (degree-day, DD) which were required for passing from pupal stage to adult stage. Summing starts from the first day of February when the daily average temperature exceeds 7°C. However the easiest way for treatments warnings remain the observations on flight's peak through yellow sticky panels.

MATERIAL AND METHOD

The experiment was conducted over two years, from 2013 to 2014, in an orchard of intensive type, located near Cluj-Napoca city, Romania.

For the research undertaken for estimateing the start of flight, we calculated the sum of active degrees, by Savescu's formula (1969, 1978) Σ (tn-7 ° C, were tn represents average daily temperature). The summing of degrees started in first day of February when we recorded daily average temperature over 7 ° C, value which is considered as inferior thermal threshold in development of studied species. In the year 2013 this value was recorded on 25 February and in 12 February for the year 2014.

In order to apply the treatments, we observed flight dynamics of *Rhagoletis cerasi* adults using yellow and white sticky panels, provided by the Institute of Chemistry "Raluca Ripan 'Cluj-Napoca. Traps were placed at height of approximately 1,5-1,8 m on the south side of canopy. Their reading was done twice a week, by counting catches on each paneland the the difference we get the number of catches.

In the year 2013 in May 20 were placed a total of 44 panels and as control measures of species we applied two treatments, using for the first treatment Ciperguard 25 EC (0.02%) and for the second treatment, Calypso 480 SC (0.02%). The first treatment was performed a few days after the beginnig of flight, and the second treatment when it was achieved the flight's peak.

In 2014, 55 traps were placed on May 14 and the insecticides used were Calypso 480 SC and Ciperguard 25 EC.

At harvesting time, we checked frequency of fruits attacked by studied pest. To assess the efficacy of tested insecticides we took as a control variant, an orchard where no chemical treatments were applied, orchard which is located in proximity of treated orchard. Observations were made on 500 fruits, collected randomly from different parts of cherry tree.

RESULTS AND DISCUSSION

In 2013 the first day with average temperatures above 7°C was recorded in February 25. The first catches noted on panels were on 25 May, that is after 89 days from the moment of registration of the first day with average temperatures above 7°C. In this period there were a total accumulation of 410.2 degree-day. Maximum flight curve was recorded on June 24, respectively at 29 days after the beginning of flight. Taking as reference the first date when lower developmental threshold was achieved, the maximum flight peak occurred after 118 days, period in which were acumulated 715.9 degree-days (*table 1, 2*).

Tabel 1

Start date for accumulation of active degrees and emergence of adults date

Year	First day temp. > 7 °C	Date of first adult capture
2013	25.03	25.05
2014	12.03	21.05

Tabel 2

Sum of active degrees necessary for emergence and for achieving maximum flight peak

Year	First adult emergence	Adults emergence peak
2013	410.2	751.9
2014	343.8	644.7

The first treatment in controlling the European cherry fruit fly was made on June 8. It was used of synthetic pyrethroids), with contact effect, affecting primarily adults population. In (*figure 1*) it can be noticed that in this time began an intensification of adults flight. The second treatment was applied on 23 June, duo to the fact that we noticed that starting from June 20 the number of captures on traps increased. Maximum flight curve was performed at 1-2 days after treatment.

Calypso 480 SC was used as insecticides, conting on the systemic effect, so the possibility of affecting hatching and first larval age.

At harvest, the frequency of attacked fruits was below 1%. In untreated orchard, considered as control, the frequency of attacked fruits was 44% (with oscillations between 37% and 46%, depending on the variety). It appears that the application of both treatments reduced the frequency of attacked fruits in a proportion of 97.7%.

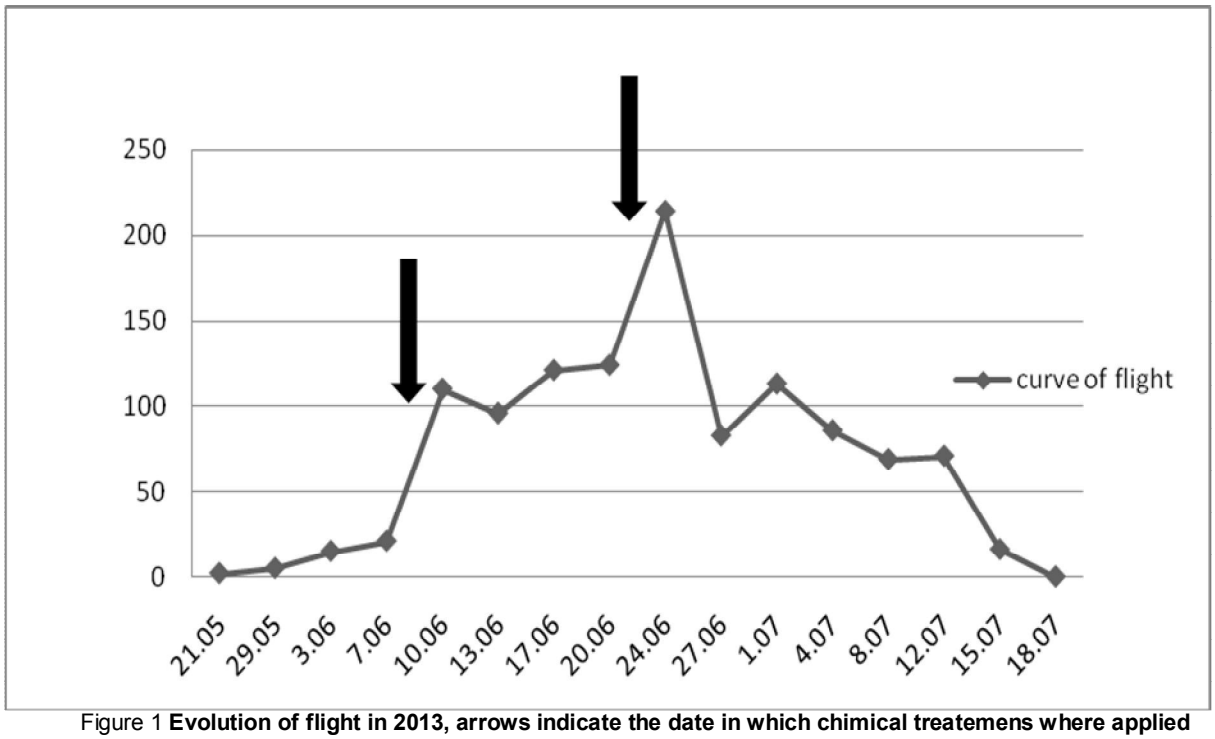

Figure 1 **Evolution of flight in 2013, arrows indicate the date in which chimical treatemens where applied**

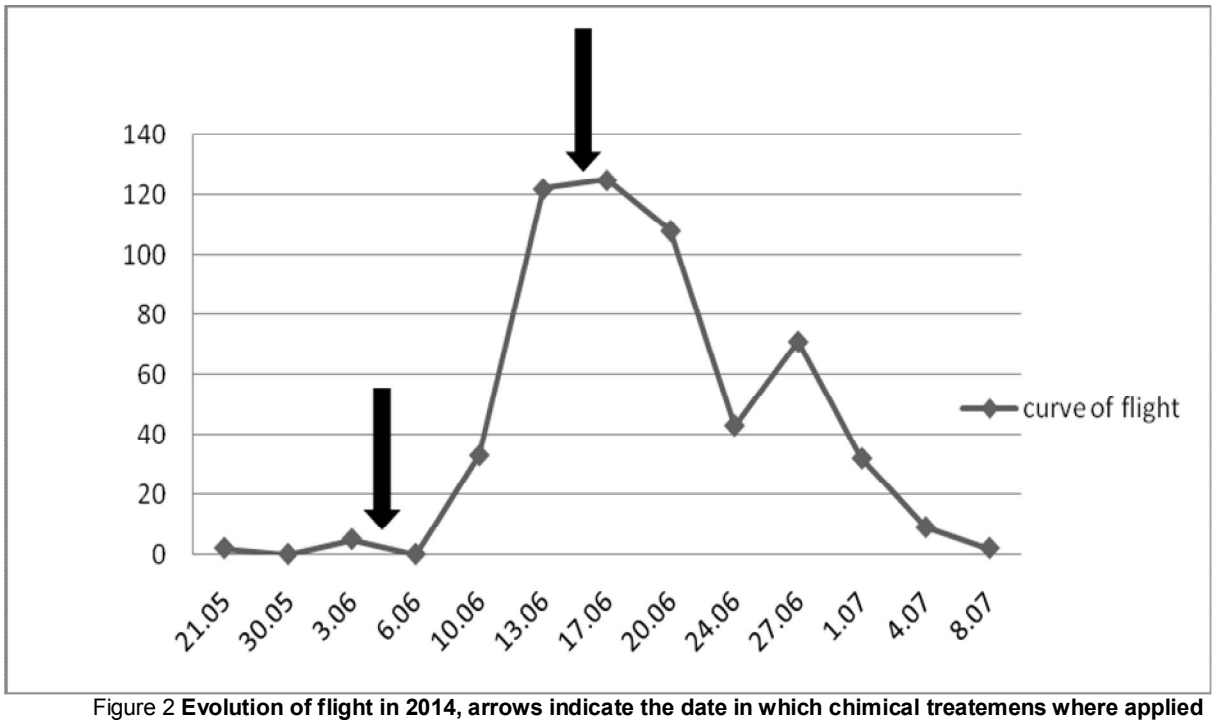

Figure 2 **Evolution of flight in 2014, arrows indicate the date in which chimical treatemens where applied**

In 2014, the first captures were found on May 21, at 98 days after recording temperatures above 7°C from February, which corresponded to 341.1 degree-days. The maximum level of *Rhagoletis cerasi* adults recorded on traps was after 26 days following emergence, on June 17. This year, the flight peak occurred after 125 days from the first day with average temperatures above 7°C, with an amount of 644.7 active degrees accumulated (*tablle 1, 2*).

This year the first treatment was performed on June 4, taking into account that on 3 June we noticed a slight increase of adults flight (*figure 2*). The second treatment was applied on 15 June. The decision in warning of treatement was motivated by the fact that since June 13, has been

a strong increase of catches (on 10 June were 33 captures and on 13 June were 122 captures). The frequency of attacked fruits at harvesting was as in the previous year of about 1%. In untreated control orchard the frequency of attacked fruits was 38% (oscillations between 32% and 41%). By applying the two treatments the frequency of attack decreased by 97.4%.

CONCLUSIONS

In Cluj area, the emergence of *Rhagoletis cerasi* L. adults, takes place in the last decade of May, corresponding to an effective temperatures sum between 343.8 and 410.2 (starting at t0 = 7°C)

The flight peak is achieved after approximately 4 following emergence, with a sum that varies between 644.7 and 751.9 degree-day (DD).

By applying to two chemical treatments the proportion of attacked fruits can be reduced by approximately 97.5%

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