The use of non chemical methods in *Rhagoletis cerasi* (L.) control in baby food production

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Abstract

Semi-field trials on cherry fruit fly control in the regime of baby food production were conducted in 2017 in ´Van´ and ´Kordia´ varieties in the Bile Podoli location. The aim of the trials was to find an effective non-chemical solution in the pest control close before harvest to keep the content of pesticide residues under MRL for baby food (0, 01 mg/kg). Using the registered insecticides acetamiprid and thiacloprid applied 3 to 4 times throughout the period of cherry fruit fly activity we usually exceed this limit. Based on the results from previous years (Psota et al. 2016) the common insecticide treatments (2x thiacloprid) were followed by tested products represented by spinosad + attractant applied 2x and natural pyrethrins used 1x before harvest. Under infestation 27% (´Van´) or 33% (´Kordia´) of attacked fruits the efficacy of all experimental treatments varied from 99.4% to 100% across the varieties.

Keywords: Europaean cherry fruit fly, baby food, sweet cherries

Introduction

Europaean cherry fruit fly (*Rhagoletis cerasi* L.) is a key pest of sweet and sore cherries causing damage of fruits coupled with secondary infections by fungi pathogens. In some cases, the infestation can reach 100% of attacked fruits (Fimiani, 1983). According to various resources the cherry fruit fly prefers sweet and later ripening varieties. The yellow varieties are also considered to be attractive (Stamenković *et al.*, 2012) for the flies. The length of flight (50-70 days) and the larvae development inside the fruits make the pest control difficult and expensive. In IPM systems it is usually based on the use of strong insecticides (thiacloprid, acetamiprid, chlorpyriphos-m) applied against flies and/or hatching larvae. Although a lot of effort was made on the development of non chemical or biological alternatives for organic systems (Daniel & Grunder, 2012) any of them has not been put into praxis yet. For now, the only reliable solution for organic regime covering the orchard with nets of a mesh size 1.3 mm combined with Voen or similar systems. However, this measure requires a lot of investments and it is linked to wider business strategy of a farmer. For this reason, the real organic cherry production does not exist in the Czech Republic and in other European countries. However, the use of some promising methods could be a good solution for IPM growers aimed to low-residue or baby food programmes. On the base of our results achieved in previous years (Psota *et al*., 2016) we tested: 1) spinosad with food bait and 2) pyrethrins in semi-field trials during the season 2017.

Material and Methods

The semi field trials were established in the location Bílé Podolí (Czech Republic, Central Bohemia, sugar beet growing area) in 2017. Treatments of all variants (table 1) started in the beginning of a pest flight which was monitored using yellow sticky traps. The chemical insecticide (thiacloprid) was used in the first treatment in the variant where the pyrethrins were used before the ripening. During the harvest 4x100 fruits were sampled for each variant

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to evaluate the infestation. The evaluations were done according to EPPO PP1/035 (2) and the efficacy of treatments was calculated using Abbot´s formula. The Tukey´s test was used for statistical analysis.

Table 1: Trial variants

Trial variant	Dose/ha	Variety	Date of the application
SpinTor+bait*: SpinTor molasses rape seed oil vinegar water	 0.054 l 0.9 l 0.025 l 0.09 l 45 l	Kordia, Van	May 25 June 1
pyrethrins**	0.75 l	Van	June 2
pyrehtrins**	0.75	Kordia	June 12
untreated control	-	Kordia, Van	-

*) One nozzle was used during the application, drop size 4-6 mm, the sun exposed tree crown parts were treated.

**) In the first treatment (May 25) = Calypso 480 SC (0,02 l/ha)

Results

All treatments showed significant difference in comparison with the untreated control where 27% (´Van´) and 33% (´Kordia´) of attacked fruits were observed. Efficacy of treatments was 100% with the exception of pyrethrins applied in ´Van´ variety (99.1%). The differences between treatments were not significant (table 2).

Table 2: The percentage of attacked fruits and efficacy of treatments.

Variant	Variety	Attacked fruits (%)	ANOVA (Tukey´s test)*	Efficacy (%)
SpinTor + bait	Van	0	A	100
SpinTor + bait	Kordia	0	A	100
Pyrethrins	Van	0.25	A	99.1
Pyrethrins	Kordia	0	A	100
Untreated control	Van	27	B	-
Untreated control	Kordia	33	B	-

*) different letters=differences between variants statistically significant at p=0,01

Discussion

The trials confirmed efficacy of the both pyrethrins and spinosad with food bait observed in previous years (Psota *et. al.,* 2016) and the possibility to use them instead of conventional insecticides close before harvest. Spinosad with food bait used as attract & kill method also appears to be good solution for the whole season. In the both cases it is a promising method how to minimize the content of residues in the production. However, it is needed to repeat the experiments in more locations with different climatic conditions and under different infestation pressure. It is also necessary to obtain exact data about degradation of the tested active ingredients (spinosad, pyrethrins) applied in the beginning of a pest flight to guarantee MRL for baby food in potential spray programmes.

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