CONTROL OF OLIVE MOTH – *Prays oleae* Bernhard (Lepidoptera, Hyponomeutidae) FLOWER GENERATION BY INSECTICIDE COVER SPRAYS

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ABSTRACT

Olive moth is one of the most important olive pests, specially it's first and second generations, which cause direct damages on flowers and fruits. Current supression methods are based on chemical treatments, mostly with large spectrum of insecticides. Their repeated use over years often disorders natural balance in olive orchards, which brings problems with different secondary pests and diseases, first of all scales from family Coccidae, followed by outbreak of sooty mould complex. For this reason, researches with some new insecticides with different mode of action were carried out in order to measure their efficacy against olive moth's flower generation. Experiments were set in the area of Central Dalmatia, fifty kilometers west from city of Split, near village Marina and Primošten. Experimental plot used were olive orchards planted with domestic cultivar Oblica. Active ingredients used in trials include most insecticide groups: neonicotinoids (tiaclоprid), naturalites (spinosad), synthetic pyretroids (deltametrin, gama-cyhalothrin and lambda-cyhalotrin) and insect growth regulators (teflubenzuron). All tested insecticides show high efficassy against olive moth. The most effective insecticide used in this trials, measured by using of Abbot efficasy, were teflubenzuron (92-96%) and spinosad (98-100%), with their interspeciffic selectivity. This confirms possibilities for replacing other nonselective insecticides in this trial, commonly used area wide.

Key words: flower generation, IGR, naturalytes, neonicotinoides, sinthetic pyrethroids

1 INTRODUCTION

Olive moth - *Prays oleae* Bernhard (Lepidoptera, Hyponomeutidae) is important olive pest in whole mediterranian olive production area. In the Republic of Croatia this pest is also wide spread, in some areas, specialy islands, large areas arround Zadar and Šibenik causes equal or even bigger damage comparing with olive fruit fly – *Bactrocera oleae* Rossi (Diptera, Tephritidae), (Bjeliš, 2004, 2005). It's life cycle is connected with olive fenophases and developes three generations on different plant organs during vegetation. First generation attacks flowers. Adult females starts laying their eggs right before flowering, during phenology phase „E“, arround ten days before flowering. Young larvae puncture into flower buds, go out from one to another feeding their content. One larva may eat up to 40 flowers.
Second generation occurs in young fruits, cca 4 mm perimeter. After egg developement, larva directly punctures into the fruit feeding in its mezocarp and finally enters the kernel. After destroying the kernel, larva leaves it causing fruit drop. Fruit drop is taking place twice during season. First drop, after puncturing young larvae into the fruit may be prolonged during whole July. Second, caused by exiting larvae that make channel arround fruit pedicle is coming during August and September. Such dropped fruits have no any commercial value.

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Third generation occurs in olive leaves. After egg developement young larva creates tipical gallery. During february it goes out from gallery finishing its stage feeding on leaf back.
Generations that attack flowers, but even more fruits cause damages. These two should be treated by fitosanitary measures, while control of leaves generation is not recomended.
Control of olive moth by non selective insecticides, specially from sinthetic pyrethroids group, usually causes breakdown of the olive entomofauna complex, with outbreak of scale insects and sooty mould complex (Brnetić, 1978a). Replacement of conventional insecticides with more selective insecticides from groups of insect growth regulators or biopesticides like *Bacillus thuringiensis kurstaki*, showes good results of olive moth population suppresion and damage (Brnetić, 1978b, Brnetić, Perko, 1983, Katalinić *et. al*. 1997, Bjeliš, 2007, etc.), but requires higher level of knowledge from the farmers position.
However, other easy to applied selective methods of control are in the developing proces along the Mediterranean area. These are mainly based on mass trapping of adults (Hegazi, Khafagi, 2005) and matting disruption (Mazomenos, Pantazi-Mazomenos, 2003, Bento *et.al.* 2005).

2 MATERIALS AND METHODS

Experiments were conducted during 2005. year in two olive orchards, namely location Marina and location Primošten, fifty to sixty km west from city of Split, in olive growing area of central Dalmatia. Selected olive orchard on Marina location is five years old, planted at 8 x 8 m distance with irrigation system and planted with cultivar Oblica. Selected olive orchard on Primošten location is twenty five years old, planted at 7 x 7 m distance, without irrigation system and planted with cultivar Oblica.
Selected orchards were used couple of years, with puropse to monitore olive pests, with confirmed presence of regulary high olive moth population.
Arround two week prior to experimental treatments, pheromone traps (Traptest, Isagro, Italy) containing Z-7-tetradecanal ampulas, were hung in both orchards, to monitore olive moth adult fluctuation.
Treatment were applied by back-pack sprayer machine on following dates and conditions: 13th May, cloudy weather, 16,5 – 20 °C temperature, on Marina location and 20th May, cloudy weather, 17ºC temperature on Primošten location. List with names, active ingredients, formulation and concentration tested are presented in Table 1.
Results were observed during the phenology phase „G“, means when flower petals start to fall down, when larvae or pupae are full developed and fixed on the inflorescence stam. Infestation was counted by sampling of inflorescence and counting number of preimaginal stages per inflorescence. Trials were set in five replications and eight olive trees were used as one replication. Five times one hundred inflorescences were sampled to observe infestation by flower generation. Insecticide efficasy was calculated with common formula for computing the effectiveness of an insecticide (Abbott, 1925).

Table 1: List and description of tested insecticides

Insecticide group	Active ingridient	Product name	Concentration (%)
Naturalytes	spinosad	Lasser KS	0,03
Naturalytes	spinosad	Lasser KS	0,04
Insect growth regulators	teflubenzuron	Nomolt SC	0,1
Neonicotinoides	tiacloprid	Calipsc SC 480	0,08
Sinthetic pyrethroids	deltametrin	Decis 100EC	0,06
Sinthetic pyrethroids	lambda cihalotrin	Karate 2,5EC	0,025
Sinthetic pyrethroids	gama cihalotrin	Vantex MC	0,004
Sinthetic pyrethroids	gama cihalotrin	Vantex MC	0,005
Sinthetic pyrethroids	gama cihalotrin	Vantex MC	0,006

3 RESULTS AND DISCUSSION

Results showe that trap capture of adult olive moth – *P. oleae* Bern., was signifficant prior to the oviposition period on both locations, started with phenology phase „G“. There is time difference and delay in phenology phase between locations and it is notably that flowering started one week earlier on location Marina (Fig. 1). However, this difference could be casued by microclimat difference or altitude, exposition or simlar, and prooves importance of following phenology stages, instead generalysed spraying advice. Capturing of two to three hundred moths during last ten days before phenology phase „E“, promisses enouhg high infestation for good evaluation of effectiveness of insecticides (Fig. 1).

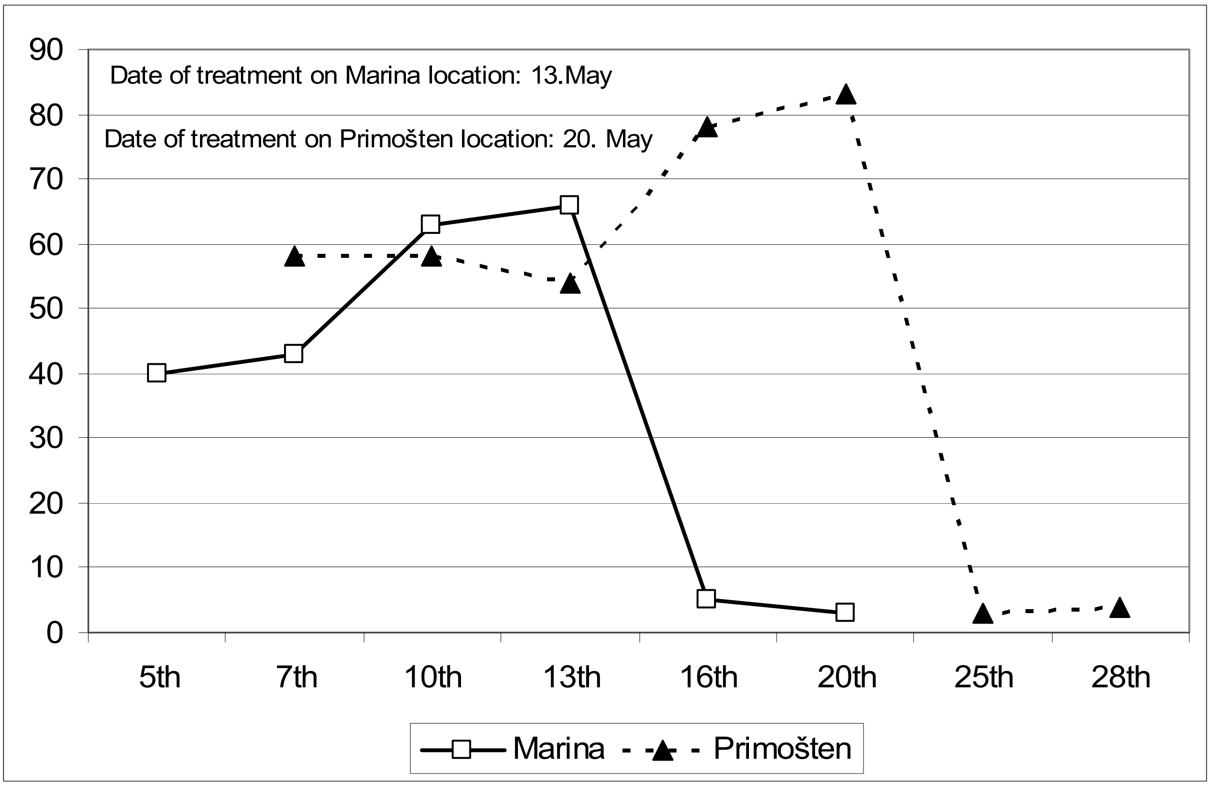

Fig. 1: Olive moth – *Prays oleae* Bern. adults capture on pheromone traps.

Flower infestation was signifficant on both locations and it was measuerd up to 60% on location Marina and 70% on location Primošten (Figs. 2 and 3). Results showe high and satisfactory effectiveness of all tested products. On location Primošten, most effective insecticide was spinosad that reduced olive moth attack for 98,57 – 100%, followed by teflubenzuron, deltametrin, lambda cihalotrin and gama cihalotrin who reduced olive moth attack for 97,14% and the weekest effectiveness was achieved with tiacloprid 92,85 % (Fig. 2.).

On location Marina, most effective insecticides were teflubenzuron and deltametrin, that reduced olive moth attack for 98,3 %, followed by spinosad that reduced olive moth attack for 95,0 %, lambda cihalotrin and gama cihalotrin for 93,3%. The weekest effectiveness was achieved with tiacloprid that reduced olive moth attack for 85% (Fig. 3.). Significant effectiveness of spinosad against flower generation of olive moth – *P. oleae* Bern., should be taken in consideration of replacing conventional insecticide used.

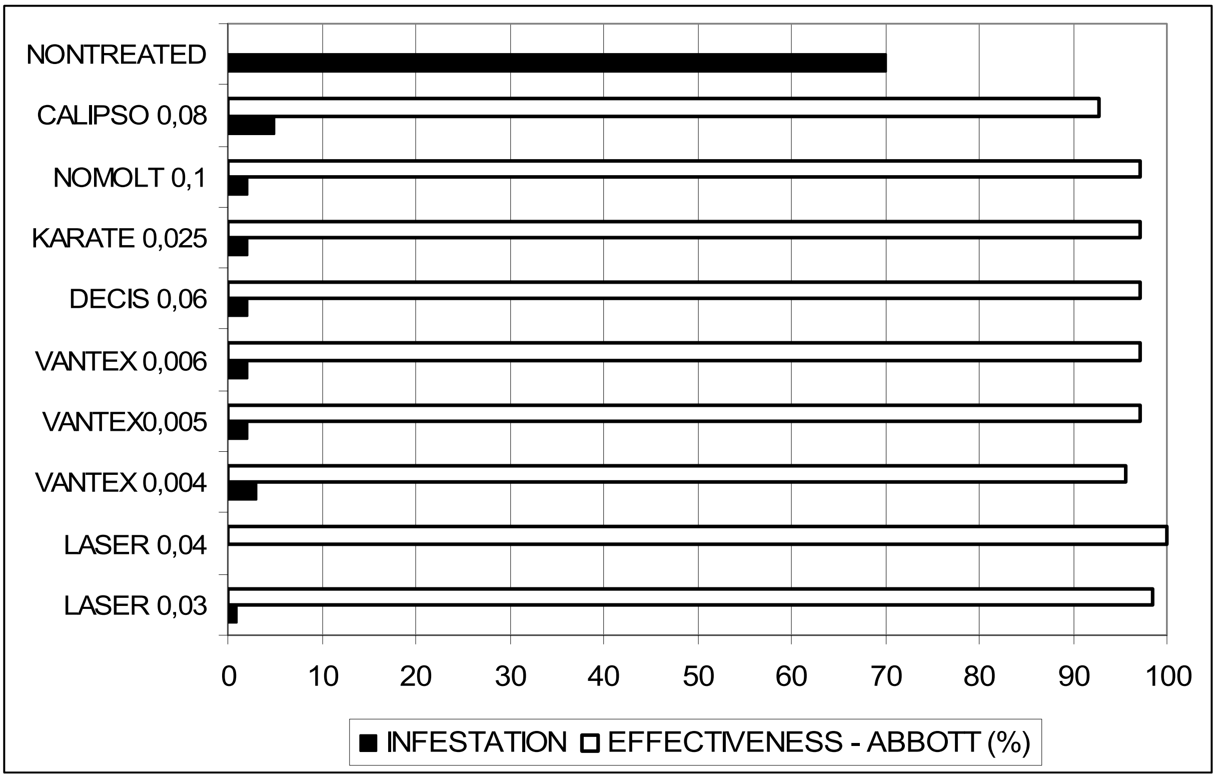

Fig. 2: Effectiveness of tested insecticide on location Primošten.

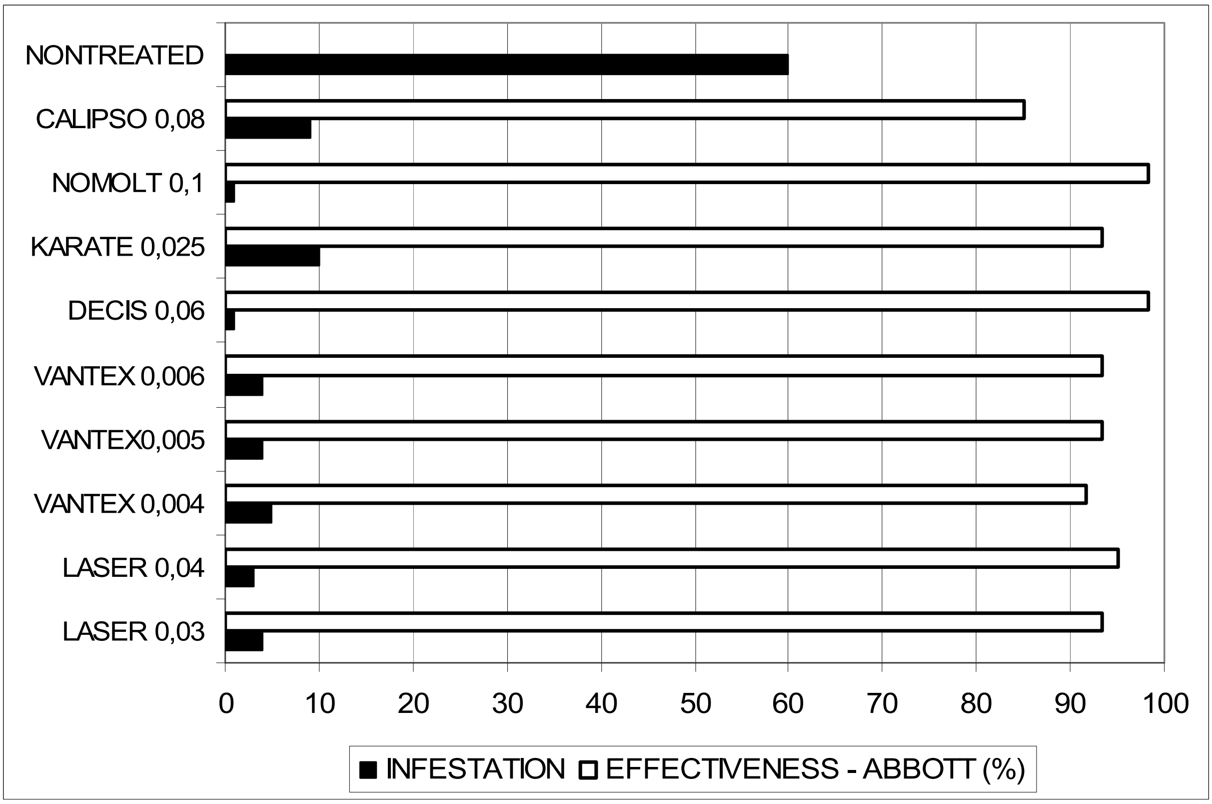

Fig. 3: Effectiveness of tested insecticide on location Marina.

Although, insect growth regulators usually show high effectiveness against lepidopteran species, with low danger impact to the workers, characteristic of some new active ingridients like fenoxicarb, lufenuron and novoluron should not be ignored. Moving ahead from conventional to certificated olive fruit and oil production, requires implementation of newly developed selective methods and products which are allowed to be used in organic farming.

4 CONCLUSIONS

Tested insecticides show different range of effectiveness against olive moth - *Prays oleae* Bern. flower generation. On location Primošten, most effective insecticide was spinosad that reduced olive moth attack for 98,57 – 100%, followed by teflubenzuron, deltametrin, lambda cihalotrin and gama cihalotrin that reduced olive moth attack for 97,14%. On location Marina, most effective insecticides were teflubenzuron and deltametrin, that reduced olive moth attack for 98,3 %, followed by spinosad that reduced olive moth attack for 95,0 %. The high effectiveness of spinosad prooves possibilities to replace even selective insecticides from insect growht regulators group, like teflubenzuron and certainly non selective insecticides from sinthetic pyrethroids group.

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