

CONTROL OF OLIVE FRUIT FLY – *Bactrocera oleae* Rossi (Diptera, Tephritidae) BY MASS TRAPPING AND BAIT SPRAYS METHODS IN DALMATIA

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ABSTRACT

Olive fruit fly - *Bactrocera oleae* Rossi (Diptera, Tephritidae) is the most important olive pest that causes direct fruit loss and has negative influence to olive oil quality. Traditionally, suppression methods have been based on cover spraying using environmentally not friendly insecticides. Other, more selective methods, attract and kill and mass-trapping have been developed as ecologically better alternative. The effectiveness of bait spray and mass trapping methods was evaluated by testing of ready made bait products Success Bait and Eco Trap. The trials were conducted in the area of southern Dalmatia, near city of Ston, during 2008. year. The selected orchards were planted mainly with domestic cultivars Oblica and Bjelica. Trials were set on three olive orchards, bait spray plot, mass trapping plot and control plot. Data were collected in weekly intervals and were analysed as adults captures on traps for monitoring which were set in all experimental plots and fruit infestation. Evaluation shows no difference between average number of olive fruit flies captured on control traps during experiment on bait spray and mass trapping method. Evaluation of effectiveness showed higher effectiveness of mass trapping method in comparison with seven bait spray treatments. Evaluation of effectiveness results confirmed high effectiveness of both improved methods.

Key words: *Bactrocera oleae* Rossi, bait sprays, mass trapping, olive fruit fly

1 INTRODUCTION

Olive fruit fly – *Bactrocera oleae* Rossi 1790 (Diptera, Tephritidae) is most important pest of olive fruits along whole olive growing area of north east Adriatic coast (Novak, 1928, Civanto i Lopez – Villalta, 1999, Bjeliš, 2004) same as along whole Mediterranean growing areas (Longo i Benfato, 1983, Neunschwander i Michelakis, 1978, itd.). This pest causes huge economic damages, caused by infestation of fruits by larvae and fruit drop. Indirect damage can be measured through decrease of olive oil quality, caused by larvae activity inside the fruit, that suffers by nutritional changes of mesocarp degradation and oxidation proces and finally, increase of oleic free acids. Observation of fruit infestation along Croatian growes during begining of new milenium, shows that olive fruit fly – *B. oleae* Rossi, may cause huge fruit drop in cases without any kind of control measures against this pest (Bjeliš, 2004, Bjeliš *et.al.*, 2003a, 2003b).

Control of olive fruit fly – *B. oleae* Rossi with bait sprays was firstly proposed by Berlese in Italy during 1908-1909. year (Roessler, 1989). Control of this pest in Croatia were mainly based on cover sprays method with chemical insecticides, which was followed by bait sprays (Brnetić, 1979a, 1985. etc.) and mass trapping methods (Bjeliš, 2006). Mass trapping method represents preventive control measure, which is based on attraction and killing of olive fruit fly adults, before they reached to make infestation. The main advantage of mass trapping method is exclusion of fruits and whole canopy contamination by insecticides. The mass

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trapping methods can be applied by traps of different construction, which need to be set on the tree canopy. The traps are filled by different type of attractants and treated by insecticide, or they could be fill with attractant-insecticide watter sollution (Haniotakis *et.al.*, 1983, Barclay and Haniotakis, 1991, Bjeliš, 2006 etc.). Numerous researches on the trap type, insecticide and attractant used, number of the traps and trapping duration, resulted in developing of better attract and kill system based on bait sprays or mass trapping. Experiments also showe better efficacy of mass trapping method compared to bait sprays (Brumas and Haniotakis, 1987, Bumas *et.al.*, 1998, Delrio and Lentini, 1993, Ianotta and Perri, 1993, Bjeliš, 2006 etc.), with lower costs of application, specially human labour. This paper evaluates efficassy of mass trapping method in comparation with bait spray method.

2 MATERIALS AND METHODS

Three olive orchards were selected for the pupopse of this experiment. Orchards are located in the area of city of Ston, fifty kilometers west from city of Dubrovnik. Orchards are semi isolated, with other orchards of similar size arround. Orchards are in the full yield, more than twenty years old. Growing measures like pruning, fertilisation and weed control by soil cultivation are conducted on annual base program. Bait spray method was conducted in orchard planted with 120 olive trees of Oblica and Bjelica cultivars, planted in 7 x 7 m distance. Mass trapping method was conducted in 140 olive trees planted with Oblica and Bjelica cultivars, planted in 7 x 8 me distance. Orchard used for control plot is planted with 45 trees of cultivar Oblica, at 7 x 8 m distance. Mass trapping method was applied with Eco Trap product (Vioryl, Greece), which represents green carton bag, 15 x 20 cm size, impregnated with insecticide deltametrin from outside. The bag consists amonium bicarbonate inside of the bag, which is acting as food lure for adult flies. Additionally, one ampula of parapperomon spiroketol is hunged on the trap surface. Trap is activated by making two holes and the bag and one hole on ampula. Traps were hunged on the olive trees in ammount 1 trap per tree during second half of June, 2008. year. Bait spray method was applied with Sucess Bait (Dow AgroSciences, USA), which represents ready made bait, consisting insecticide spinosad and food lure. Sucess Bait was applied in 1,5 l/ ha ammount, diluted in 25 liters of watter/ha. Bait sprays were applied 7 times during fruit bearing season, starting from half June and repeted in two week treatment intervals. Adult population in all tree orchards were measured with control traps, type Chromotrap – M (Isagro, Italy), baited with pheromone 1,7 dioxaspiro undecane (Isagro, Italy), amonium hidrogen phosphate and hydrolysed protein Buminal (Bayer, Greece). Three traps per treatment were set in the experimental plots. Traps and lures were replaced in monthly intervals. Counting of captured flies were conducted every two weeks. Fruit infestation was observed through fruit sampling in ammount of 4 x 100 fruits per treatment each time of infestation analisys. Fruits were sampled and infestation was observed in the laboratory.

Effectiveness of tested products/ control methods was calculated with common formula for computing the effectiveness of an insecticide (Abbott, 1925).

3 RESULTS AND DISCUSSION

Results of the experiment are expressed through adult olive fruit fly captures on control traps and fruit infestations, during whole time of experiment. Data about adult captures are presented in Fig. 1. Captures from all three control traps are presented, together with dates of treatment with bait sprays, marked with symbol „*“. Results presented in the Fig. 2., show average number of all flies captured during experiment per trap.

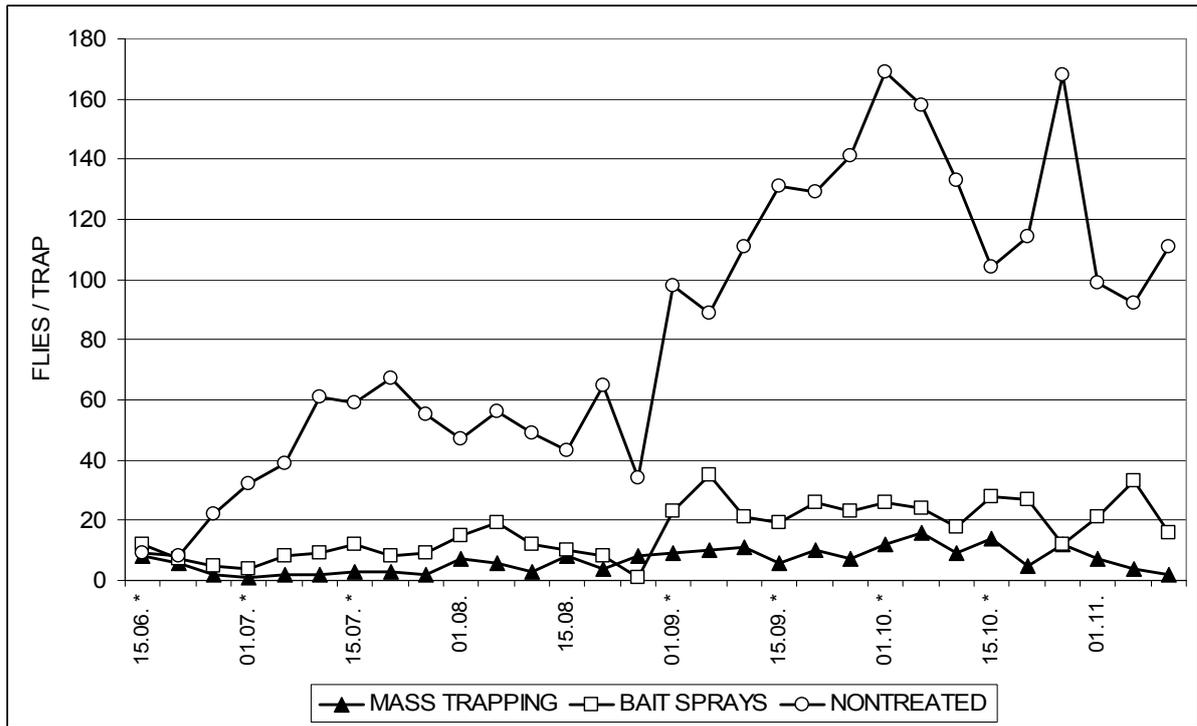


Fig. 1. Capture of olive fruit fly – *B. oleae* Rossi on control traps

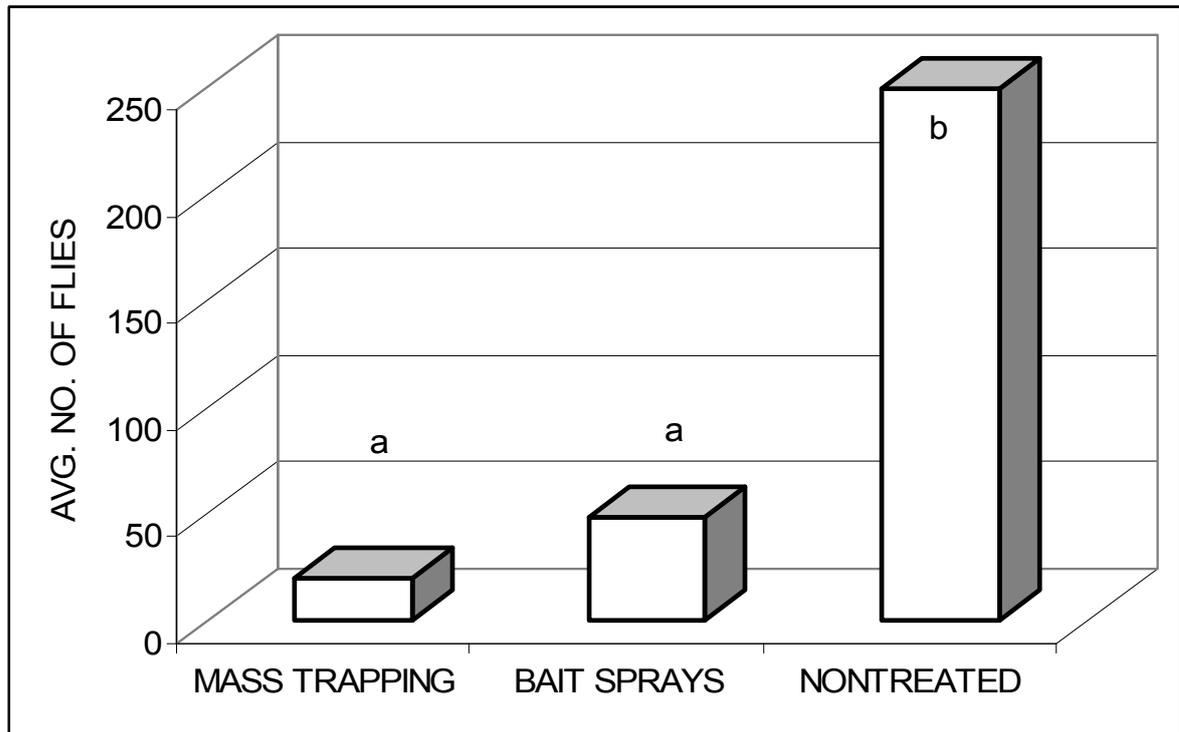


Fig. 2. Average number of olive fruit flies captured during experiment (Duncan's $p=0.5$, $n=30$).

Fruit infestation caused by olive fruit fly – *B. oleae* Rossi, is presented in Fig. 3. Results show values of fruit infestation with 3rd stage larva, pupae and exit holes, together and represent the harmful damage. Effectiveness of olive fruit fly control methods is presented in Fig. 4., and it was expressed by Abbott effectiveness percentage.

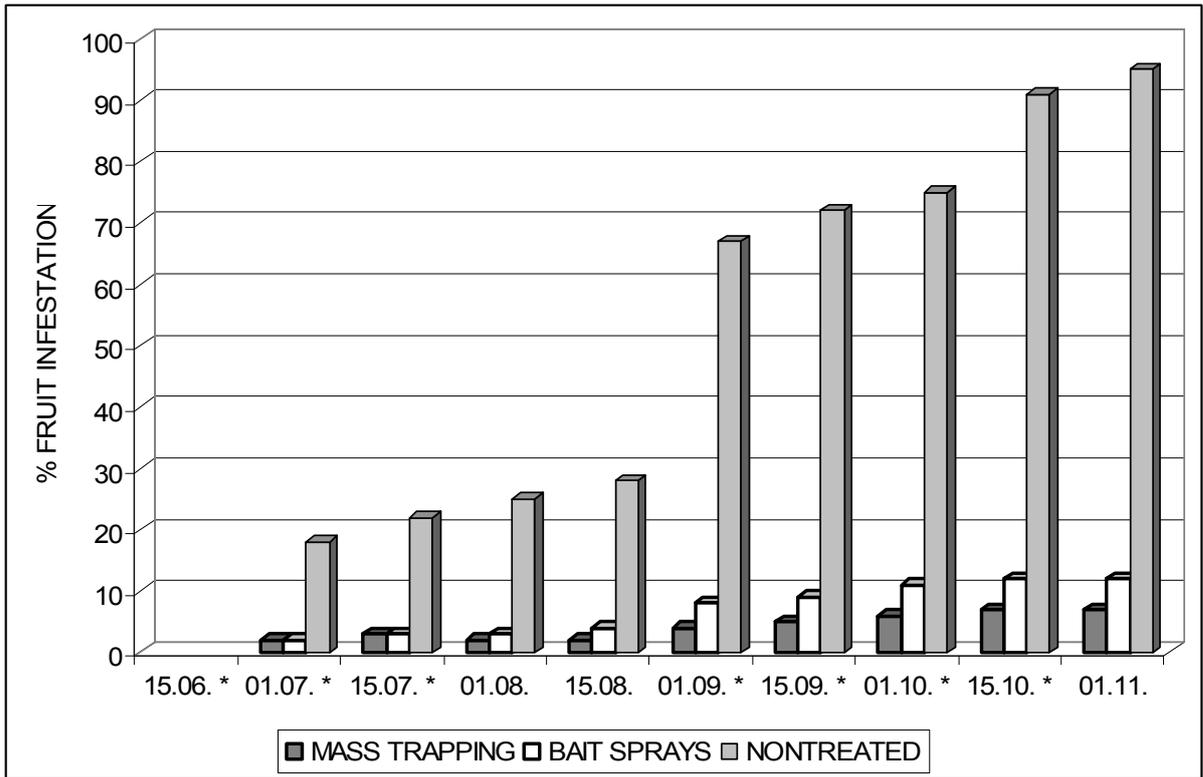


Fig. 3. Fruit infestation by olive fruit fly – *B. oleae* Rossi on experimental plots

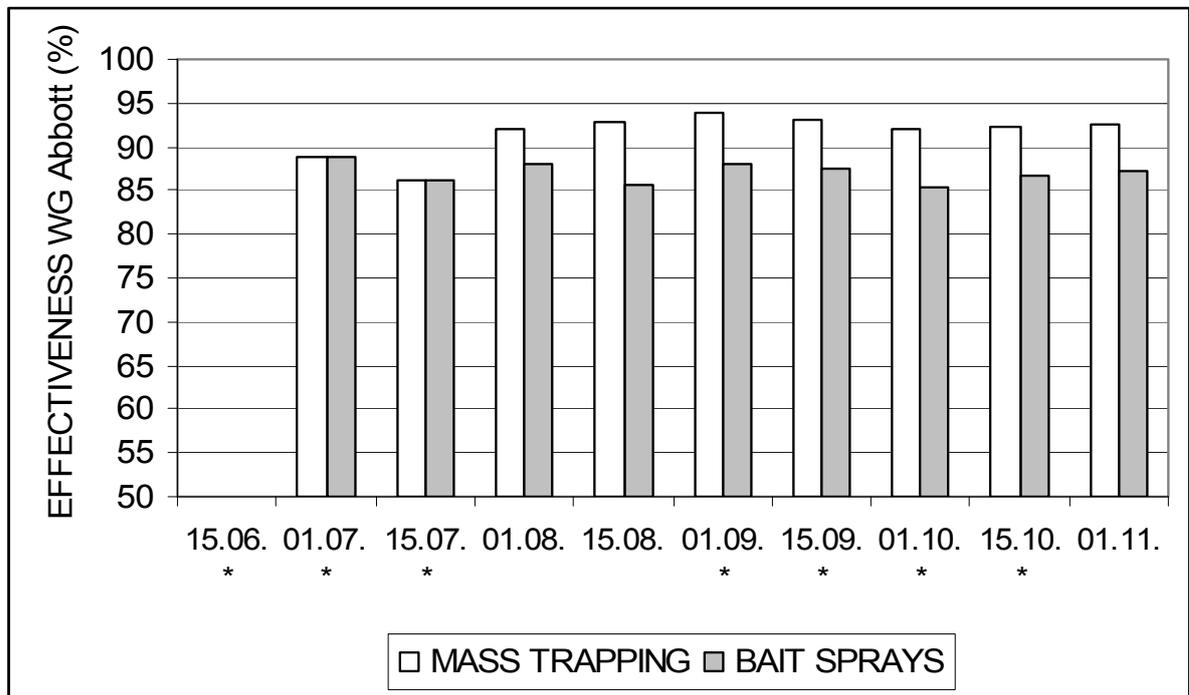


Fig. 4. Effectiveness of olive fruit fly control methods

4 CONCLUSIONS

Experiments for the control of olive fruit fly – *B. oleae* Rossi, confirm good effectiveness of bait sprays and mass trapping methods of control. Captures of olive fruit fly adults on control

traps was highest on non treated plots than in both methods of control, at significant level. Average fruit infestation reached maximum on non treated plots, while both methods of control, show satisfactory suppression level. Mass trapping method confirms higher effectiveness than bait spray methods against olive fruit fly during late summer period. Similar or better effectiveness, lower insecticide use and lower residue risk of mass trapping method than bait spray method, confirm possibilities for replacing current conventional control methods with mass trapping method in ecological conditions of Dalmatia.

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