INTEGRATED PEST MANAGEMENT PACKAGE ON OLIVE
Olive Fruit Fly Control in Albania

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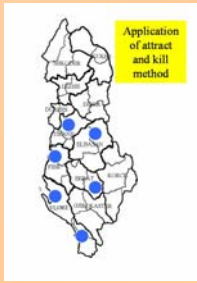


Abstract

The Integrated Pest Management (IPM) Package on olive is a strategy of olive pest control, developed in Albania by the Plant Protection Institute (PPI), as a leader institution of a wide research consortium. The IPM package gives the possibility to manage contrast the olive fruit fly (*Bactrocera olea* Gml), that causes serious damage to the fruits and reduce the quality of olive oil. The IPM package consists on an innovative combination of three different methods for controlling olive fruit fly: - A specific monitoring system of olive fruit fly, that could be easy adapted to different climatic conditions - the so called "Attract and Kill" method, that involves pheromones and food attractants; - cultural practices such as anticipated harvesting of olives, to prevent heavy attacks of olive fruit fly; The "Attract and Kill" method applied on olive groves indicated that this method has the potential to replace or reduce substantially the insecticide treatments for the control of olive fruit fly. The anticipated harvesting of olive has demonstrated to be a useful cultural method that aid in integrated control of olive fruit fly. In order to have optimum of olive oil accumulation, a good olive oil quality and in the same time to avoid the high attack of olive fruit fly the best time to start the harvest for cv Kalinjoti could be considered the first decade of November and for cv Frantoi the first and second decades of October, depending on the years.

Key words: Bactrocera (Dacus) oleae, "Attract and Kill", Integrated Pest Management, Pheromones, Food Attractants.

INTRODUCTION

Olive production is a leading industry that contributes to local economic development and enhances the quality of life of the community. Albania is a traditional exporter of olive and olive oil and pests are the main constraint to production. Olive fruit fly (*Bactrocera olea* Gmelin) OFF is the major insect pest in Albania. It causes serious damage to the fruits and reduces the quality of olive oil. In the past, olive fruits were treated with heavy quantities of broad-spectrum insecticides. During the recent years in Albania chemical sprays have not been widely used and most groves now have viable populations of scale parasites and predators, a resource that should be conserved. At present, attempts are being made in Mediterranean countries by introducing new approaches such the integrated pest control (IPM) practices that have been found to be useful to control OFF. Usefulness of those practices needs to be tested in Albanian olive groves and if found effective, it will reduce pesticide residues in olive products and will allow successful biological control of black scale. In this paper we report the results obtain from the evaluation of an IPM package to control OFF that consists in an innovative combination of three different methods:

•A specific monitoring system for the olive fruit fly, that can be easily adapted to different climatic conditions;

•The so called "Attract and Kill" methods, that involves the use of pheromones and food attractants;

•Cultural practices, such as the anticipated harvesting of olives to prevent heavy attacks of OFF.

MATERIALS AND METHODS

"Attract and Kill" methods using Eco-Traps

The efficacy of the "Attract and Kill" method was compared with the standard control method, i.e. the baits sprays and chemical control applied from the ground (2000-2003). The "Attract and Kill" method was applied to a 5 ha olive orchard, and the bait spray to a neighbouring orchards, a 2 ha. Trees of all orchards were of medium-size fruit cv Frantoi (early variety) cultivated for oil production.

Other experiments were conducted on cv Kalinjot (late ripen cultivar) in an isolated olive grove and in a non isolated olive grove. The "Attract and Kill" devices were installed during the first days of June and additional traps were installed during the last days of September (one trap/tree).

Another experiment was conducted using the Eco-Traps only in September. In order to reduce the number of Ecotraps/tree the same method was used on a non-isolated olive grove at about 2 Ha on cv Kalinjot. On 1 Ha the traps were used at a density 1 trap/tree and on one other Ha traps were used at a density one every other tree. Traps were 15x20 cm envelops. Each trap contained 100 gr. of ammonium bicarbonate salt, and on its surface 0,019 % w/w of deltamethrin. A pheromone dispenser contained 80 mg of the major pheromone compound (1.7 – dioxaspiro{5.5} undecane), was fastened externally.

Evaluation of the method was based on the olive fly population density throughout the experimental period (by using the Chromotraps with sex pheromones), fruit infestation level, and number of bait and chemical sprays application required for acceptable crop protection levels.

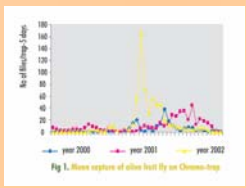
Cultural control tactics for OFF (Olive harvest timing)

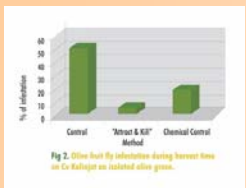
Harvest can be timed to maximize increasing yield and minimize olive fruit fly infestation.To find the optimal harvest time when these two processes can be balanced, a grove was selected at the Vlora experimental orchards. The olive varieties cultivated were Frantoi and Kalinjoti, olive oil producing varieties. To identify the period at which oil formation is at its height, the % of oil with respect to the fresh weight of fruits and to the dry matter was determined. The % of oil content of the olive fruits were determined using a soxhlet extractors. The olive fruit samples were collected at ten days intervals starting from 1-st September. Five samples (one per tree) were collected from each olive variety. The data for olive fruit fly infestations are taken from monitoring pest and disease experiments.

RESULTS AND DISCUSSION

Monitoring of Olive Fruit Fly

Trap catches (Fig 1) indicated that the olive fruit fly population varied through the year seasons. The first flies during the years of study appeared during May and June. A low level of olive fruit fly population was observed during the hot and dry summer months and the mean capture /trap have never been over 20 flies/trap. At the end of August and during the autumn the olive fruit fly developed high population due to favourable weather conditions. The catches of olive fruit fly started to increase having a maximum captures on October 5 (38 flies/trap), on November 10 (44 flies/trap) and on September 5 (167 flies/trap) respectively for the years 2000, 2001 and 2002.

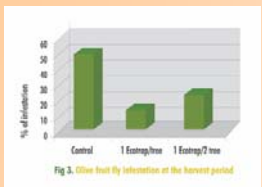


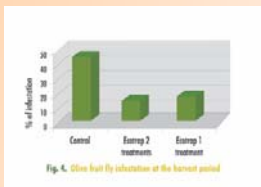


Application of "Attract and Kill" method

During the course of this research, it was observed that the *Attract-and kill* method can significantly reduce olive fruit fly infestation (Fig 2.). The results obtained until the end of November, both with isolated and non-isolated olive groves, showed that one killing device per tree provided adequate protection on late ripen cultivations, especially in years when the density of the olive fruit flies' population was limited. For that reason, curative treatments with insecticides were not necessary to keep the fly population and the fruit infestation at low level.

Good results have been obtained also using 1 Eco-trap every other tree in olive groves with a low or medium sized olive canopy. During the harvest period, the olive fruit fly infestation reached an acceptable level. (Fig 3)





It must be highlighted that good results have been obtained also in non-isolated olive groves where the "*Attract and Kill*" method was applied, using one Eco-trap per tree only in September. No significant differences have been registered when the Eco-traps have been applied twice (in June and in September) (Fig 4). In this case, it must be emphasized that the cost of the treatment is 50% lower.

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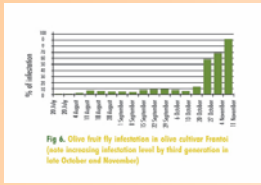
Olive harvest timing

The anticipated harvest of olives has proved to be a useful cultural method that contributes to the integrated control of olive fruit flies. Researches found that early harvest prevents fruits from being attacked during the olive fruit flies population peaks, while maintaining unvaried the yield and the quality of the oil. As olives mature, both the quality and the content of the oil increase (Fig.5). Depending upon the olive variety, the harvest period in Albania usually falls in late November, when the population of the olive fruit fly reaches its most dangerous level (Fig.6). One of the options that were taken into consideration was to harvest olives before the level of the olive fruit fly infestation increases.



Based on data obtained from the experiment done (2000-2003), the most appropriate time of harvest for cv Frantoi, could be considered Oct, 10-20. Regarding cv Kalinjoti, the optimal time for olive oil accumulation is reached on Nov 10, and there are no differences compared with the later treatments (no 20, Nov 30, etc). The relatively high level of OFF infestation were observed after Nov 20.

The olive oils made from these fruits were analyzed at the Chemiservice laboratory (Monopoli, Italy), accredited by IOOC. The olives harvested between mid October and early November were rated as extra virgin, whereas the mid November sample was rated as virgin

Characteristics of olive oil produced on:	15 Oct	01 Nov	15 Nov
ACIDITY% :	0,16	0,24	1,39
K270 :	0,13	0,07	0,11
K232 :	1,89	1,44	1,64
ΔK :	-0,003	0,000	0,000
PEROXIDE (meq/kg02)	6,8	6,8	6,9
POLYPHENOLS (AS cafeic acid) ppm :	876	177	259
Oil type according to European Rule 7568/91	Extra Virgin olive oil	Extra Virgin olive oil	Virgin olive oil

CONCLUSION

The Attract and Kill" method applied on olive groves indicated that this method has the potential to replace or reduced substantially the insecticide treatments for the control of OFF (B. oleae).

On the years with the low population density of olive fruit fly and on isolated olive groves, the application of one trap per tree gave good results to maintain the pest and olive fruit infestation at low levels.

Proper time of olive harvest can be used to manage OFF infestation and provide high quality and high yield of olive oil. Olive harvest in mid October to early November (depending on cultivars) can produce olive oil rating as Extra Virgin

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