Possibilities of using virus product Madex for control of codling moth, *Cydia pomonella* L., in Bulgaria

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F

M

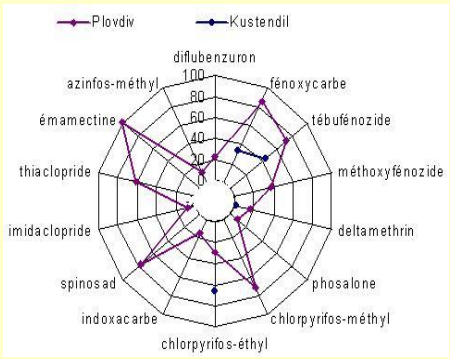
C. pomonella adults
F - female; M - male

INTRODUCTION.

The codling moth (CM), *Cydia pomonella* (L.), is an important pest of apples, walnuts and pears. It causes serious damage to the fruits. In Bulgaria, in spite of numerous pesticide treatments, CM poses a serious threat, due to development of resistance to various groups of insecticides. Charmillot et al. (2006, 2007) detected resistance to organophosphates and pyrethroids by testing diapausing CM larvae collected in some Bulgarian orchards in autumn 2005 and 2006. Therefore, the implementation of non-chemical methods for controlling codling moth became an urgent need. Use of biological insecticides, as the virus products, may be a perspective alternative. The objective of this study was to assess the effectiveness of the granulosis virus product Madex 3 in control of CM in Bulgarian apple orchards, at different population densities.

Damaged apple with a larva inside

CM damage to walnuts



Resistance of CM: percentage survival of larvae treated with different pesticides (Charmillot et al., 2006,2007)

MATERIALS AND METHODS

The trials were carried out during three consecutive years (2006-2008) in several commercial apple orchards of Central-South and South-East Bulgaria. In the trial plots, Madex 3, the CM granulosis virus product of Andermatt Biocontrol AG, was used at the dosage of 50 ml or 100 ml per ha – depending on the CM population density, from the beginning of May till the beginning of September, at 10-17-day intervals. Altogether 10 treatments were applied; till the end of June they were combined with fungicide sprays. Mating disruption method combined with virus, was employed using Isomate-C plus dispensers of CBC (Europe) Ltd. installed once per season, before CM flight started. Commercial orchards, with 14-16 conventional insecticide treatments were used as reference.

In both kind of plots (trial and reference) dynamics of CM flights was monitored by pheromone traps. Fruit damage was evaluated several times during the season. Hibernating population of CM was estimated by counting diapausing CM larvae in corrugated paper bands set around tree trunks.

Madex 3 – the virus pesticide

Isomate-C plus dispenser

RESULTS AND RECOMMENDATIONS

Fruit damage caused by codling moth in the reference plots was high, reaching 6.8-26.3% before harvest, in spite of numerous insecticide treatments applied. At the same time in the trial plots, where 10 treatments of Madex were applied during the season, fruit damage at harvest stayed at a low level, below the economical threshold. The hibernating population of codling moth in the reference orchards, already high in autumn 2006, nearly tripled during the following years, reaching up to 9.8 larvae per tree in autumn 2008. This indicates that the CM population is already resistant to the pesticides used and hence the conventional programmes aimed at control of CM appeared ineffective.

The following scheme has been suggested for control of codling moth in Bulgarian orchards:

- **at a low population density (<1 larvae per tree, <1% of damaged fruits in preceding year)**
  - **– 4 treatments of Madex against the first and 6 against the second generation, with a half-dosage, i.e. 50 ml per ha every time;**
- **at a moderate to high population density (1-3 larvae per tree, 1-5 % of damaged fruits)**
  - **– 4 treatments of Madex against the first and 6 against the second generation, with a full dosage, i.e. 100 ml per ha;**
- **at a high population density (>3 larvae per tree, >5% fruit damage)**
  - **– one application of Isomate-C plus dispensers + 4 treatments of Madex against the first and 6 against the second generation, with a full dosage of Madex, 100 ml per ha.**

Triangular pheromone trap hung in a tree canopy

CONCLUSIONS

Madex virus product is a promising alternative to conventional programmes of codling moth control for the orchards with a low population density of the pest. Combination of mating disruption and virus product may be the most effective in controlling CM in the orchards with high population density and resistance to conventional insecticides.

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