Reliability of resistance monitoring on diapausing larvae of codling moth (Cydia pomonella (L.)

Maritza Regina Reyes-Carreno, Jérôme Olivares, Claudio Ioriatti, Edison Pasqualini, Pierre Joseph Charmillot, Pierre Franck, Benoit B. Sauphanor, . Integrated Plant Protection In Orchads, . Universitat de Lleida, . Instituto de Investigación y Tecnología Agroalimentarias

Reliability of resistance monitoring on diapausing larvae of codling moth (*Cydia pomonella* (L.))

REYES, M.[(1)]; OLIVARES, J.[(1)]; IORIATTI, C.[(2)]; PASQUALINI, E.[(3)]; CHARMILLOT, P.J.[(4)]; FRANCK, P.[(1)]; SAUPHANOR, B.[(1)]

[(1)] *PSH - Ecologie de la Production Intégrée. INRA Site Agroparc. 84914 Avignon Cedex 9. France. reyes@avignon.inra.fr.*

[(2)] *IASMA Research Center – Plant Protection Department. S. Michele all'Adige. 38010 – Trento. Italy. claudio.ioriatti@iasma.it.*

[(3)] *Dipartimento di Scienze e tecnologie Agroambientali (DiSTA). Università di Bologna. Italy. epasqualini@entom.agrsci.unibo.it.*

[(4)] *Station fédérale de recherches en production végétale de Changins. CH-1260 Nyon. Switzerland. pierre-joseph.charmillot@rac.admin.ch.*

Resistance monitoring in *Cydia pomonella* (L.) (Lepidoptera: Tortricidae) have been mainly performed on non-target instars, and currently, topical application on diapausing larvae is a widely used method. However, high differences in resistance ratios according to the developmental stage have already been documented, and laboratory results are not ever consistent with observed field situations. Relating the expression of resistance mechanisms with resistance of a given instar to various insecticides could simplify the monitoring procedure.

We used topical application on diapausing larvae to evaluate the susceptibility to ten insecticides of four laboratory strains and 47 field populations, on which resistance mechanisms were also analyzed. All populations seemed to be less susceptible than the susceptible laboratory strain for at least one insecticide. The resistance to five of the studied insecticides was significantly correlated with the activity of enzymatic detoxication systems mainly mixed function oxidases and Glutathion S-transferase, while target site mutations were not related to any reduction of susceptibility.

For a few populations, assays on first instar larvae and field trials were also performed. Results were not always consistent with those of topical applications. Monitoring tests using diapausing larvae tends to overestimate the magnitude of resistance. Otherwise, the spectrum of insecticide resistance cannot ever be explained by known resistance mechanisms. Bioassays therefore remain a necessary tool for resistance monitoring, and topical application on diapausing larvae allows a rapid and large-scale evaluation. However when a resistance is pointed out by such bioassay, it still has to be confirmed with a more reliable method involving the target instar of the insecticide.

Key words: *Cydia pomonella*, insecticide resistance, monitoring, bioassay, resistance mechanism

INTERNATIONAL ORGANISATION FOR BIOLOGICAL
AND INTEGRATED CONTROL OF NOXIOUS
ANIMALS AND PLANTS
WEST PALEARTIC REGIONAL SECTION

Working Group "Integrated Plant Protection in Orchards"

WORKSHOP ON ARTHROPOD PEST PROBLEMS IN POME FRUIT PRODUCTION

Lleida (Spain), 2006, September, 4th – 6th

Local organisers:

UNIVERSITAT DE LLEIDA (UdL)
UNIVERSITY OF LLEIDA

INSTITUT DE RECERCA I TECNOLOGIA AGROALIMENTÀRIES (IRTA)
INSTITUT FOR FOOD AND AGRICULTURAL RESEARCH AND TECHNOLOGY