

The development and potential of the biological insecticide granulovirus on codling moth

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Summary

Cydia pomonella granulovirus is being developed for the UK market and offers opportunities for orchard growers to develop reduced pesticide residue programmes when targeting codling moth control.

Key words: Codling moth, *Cydia pomonella*, *Cydia pomonella* granulovirus (CpGV), Cyd-X, apple, pear, CERIO20, baculovirus

Introduction

Cydia pomonella is one of the most widespread pests of apples, pears and nuts. The codling moth belongs to the family of the tortricid moths (*Tortricidae*), within the insect order of Lepidoptera. It causes considerable losses, especially in apple and pear production. In addition, codling moth wounds provide entry sites for fungal disease which reduce quality in fruit for the fresh market and for juice and cider production.

Currently in the UK, synthetic pesticides are currently used to control codling moth but there is pressure from supermarkets, consumers and producers to consider alternatives. One alternative currently widely used elsewhere in Europe is the use of a codling moth disease, *Cydia pomonella* granulovirus.

Codling moth has the ability to build up from successive generations within one year and from one season to the next. It is imperative that appropriate actions are taken in the orchard to control this pest, otherwise serious losses can be expected. In 2005 the UK value of apple and pear production was worth approximately £86 million (Defra, 2005).

Materials and Methods

Cydia pomonella granulovirus was first reported in 1964 from larvae of apple and pear trees in Mexico. It was found to be highly virulent in the codling moth and highly selective. The active substance *Cydia pomonella* granulovirus (CpGV) is a selective insecticidal baculovirus infecting larvae of codling moth. Granuloviruses are ds-DNA viruses consisting of enveloped, rod-shaped nucleocapsids. The coded product called CERIO20 will be sold as a suspension concentrate under the brand name Cyd-X and will contain 3×10^{13} viral occlusion bodies L⁻¹ of *Cydia pomonella* granulovirus.

A wide range of trials has been carried out with CERI020 and comparable product formulations throughout the Europe from 1990 to 2004. These trial results have been used to register CpGV based products across Europe and approval has now been gained for its use in Austria, France, Germany, Greece, Italy, Netherlands, Slovenia, Spain, Turkey and Switzerland. It is hoped that the granulovirus based product Cyd-X will be registered and be available for commercial use in the UK in the next few years.

Results

A full biological assessment has been published in support of the application for approval of Cyd-X (Boon, 2005). The granuloviruses are ingested by the newly emerged young feeding larvae of codling moth. The protective virus protein matrices (viral occlusion bodies, OBs) are dissolved in the insect's gut, releasing the virus particles. These pass through the peritrophic membrane and invade gut cells by fusion with the microvillus membrane. The virus multiplies and infects various organs of the larva (haemocytes, tracheal cells, fat body and hypodermis), where it destroys cells.

The use of CpGV in an orchard protects non-target organisms and reduces pesticide residues in the fruit by reducing conventional spray treatments. In Italy and other EU countries, where organic producers are dependent on CpGV for effective control of codling moth, growers use pheromone traps along with timely applications of CpGV to target applications against codling moth. It is expected that in the UK CpGV will be integrated within a spray programme so that low pesticide programmes especially post-blossom treatments, can be adopted in the orchard.

The long term use of CpGV has produced some interesting side benefits including the increase in beneficial insects and the overall decline in codling moth populations within the orchard. Further granulovirus products are under development by Certis as integrated crop protection solutions.

Discussion

Besides the codling moth, very few other species can be infected by this virus. These species are also tortricid moths but are not found in pome fruit cultivation so the risks from the introduction of CpGV are considered to be low. It is expected that the CpGV based product Cyd-X will be commercialised and made available for UK apple and pear growers in the very near future.

Acknowledgements

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References

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