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WHAT IS IN THE BIOCONTROL TOOLBOX? - RESULTS OF TESTING DIFFERENT OPTIONS TO
CONTROL THE BOX-TREE PYRALID *CYDALIMA PERSPECTALIS* IN GERMANY

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ABSTRACT

The Box tree pyralid *Cydalima perspectalis* Walker (Lepidoptera: Crambidae) invaded Europe more than 10 years ago and has spread to and established in nearly all regions of Germany. *Buxus* is mainly an ornamental plant in Germany, but damaged plants are not easy to replace and many historical important places in private gardens, cemeteries, public parks and urban areas rely on the ever-green, dignified appearance of often very old specimen. Therefore effective control strategies are needed, but they must be environmentally safe, also without posing any risk to the user and bystander (especially in public areas). Since 2010 we explored various methodologies for regulating the pest and preserving unaffected box tree plants, aiming on the use of biocontrol agents and the development of an effective monitoring system. We elaborated the life history of the moth in German conditions, overwintering strategies, flight phenologies and basic data on sex ratio and appearance of the melanic phenotype. Together with the company Pherobank, Wageningen (NL), we tested pheromone dispensers and trap types to optimize the pheromone-based monitoring of the moth. The ability of eight species of the egg parasitoid *Trichogramma* to parasitize and locate *C. perspectalis* eggs was studied in lab and semi-field tests. *T. dendrolimi* was the most successful species, but failed to do so in a field trial. Other beneficial insects (lacewing larvae of *Chrysoperla carnea*, anthocorid bug *Orius majusculus* and the ladybird beetle *Harmonia axyridis*) preyed well on *C. perspectalis* eggs and larvae in experimental studies on prey acceptance and prey location on *Buxus* plants. Susceptibility of *C. perspectalis* to commercial products based on Neem (NeemAzal®-T/S) and entomopathogenic nematodes (Nemastar®) was assessed in laboratory bioassays and field trials. When NeemAzal®-T/S treated leaf discs were consumed by larvae, a significant effect on vitality and feeding activity was noted after 14 days of exposure (47%-62% mortality; 10% of larvae were still feeding). Larvae (2nd and 4th developmental stage) demonstrated high susceptibility to Nemastar® (50 EPN per larva caused 100% mortality after 7 days). Both agents were much less reliable in field trials in comparison to the constant effectiveness of products based on *Bacillus thuringiensis*. Potential repellent and toxic properties of 13 plant oils and extracts on egg deposition of *C. perspectalis* female moths and larval mortality were investigated in bioassays and semi-field cage tests. *Thymus vulgaris* L. was the most effective oil considering repellent and toxic effects. None of the tested control options alone provide an opportunity for the effective, eco- and user friendly regulation of *C. perspectalis*. The application of products based on *B. thuringiensis* is still the only highly effective and available biological control method but new approaches dealing with moth behaviour manipulation are promising and may help to prevent any damage and to preserve unaffected *Buxus* plants. In conclusion, the regulation of the invasive Box tree pyralid *C. perspectalis* still remains a major challenge for all concerned parties, even 10 years after its introduction.

Keywords : monitoring, egg parasitoid, predator, oviposition, plant oils.

Results were published:

Göttig S. & Herz A. (2016): Are egg parasitoids of the genus *Trichogramma* (Hymenoptera: Trichogrammatidae) promising biological control agents for regulating the invasive Box tree pyralid, *Cydalima perspectalis* (Lepidoptera: Crambidae)? *Biocontrol Science and Technology*, 26: 1471-1488

Göttig S. & Herz A. (2017): Observations on the seasonal flight activity of the box tree pyralid *Cydalima perspectalis* (Lepidoptera: Crambidae) in the Rhine-Main Region of Hesse *Journal of Cultivated Plants*, 69: 157-165

Göttig, S., Korn, S. & Herz, A. (2017): Repellent and toxic properties of plant oils and extracts on *Cydalima perspectalis* Walker (Lepidoptera: Crambidae). *Archives of Phytopathology and Plant Protection*, 50: 658–673

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