

Evaluation of entomopathogenic bacteria and fungi for the control of the western corn rootworm

Untersuchungen entomopathogener Bakterien und Pilze für die Bekämpfung des Westlichen Maiswurzelbohrers

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The western corn rootworm (*Diabrotica virgifera virgifera* LeConte, WCR) is a well established maize pest in Hungary. A range of various control tools are used by farmers to keep its population under economic threshold level. These tools involve rotation of maize but in continuous cultivation, insecticide seed treatment and/or soil insecticide application against larvae are the primary tools. Foliar insecticide applications to decrease adult population and reduce egg laying are less common practices. The use of entomopathogenic bacterial and fungal products still needs research and development inputs.

We have tested the efficacy of fermented cultures of various entomopathogenic (toxin producing) strains of *Bacillus thuringiensis* (Berliner) (*Bt*), and five strains of *Metarhizium anisopliae* (Metsch.) (Sokrin) conidial fungus against the larvae of WCR.

In *in vitro* tests, newly hatched WCR larvae were fed with freshly germinated maize roots. Then, at the second larval stage, they were treated with 2 ml of the bacterial and fungal preparations. Throughout the larval development we measured the rate of surviving larvae.

In *in vivo* experiments two maize seeds were placed into pots of 15 centimeters diameter, and then the pots were grouped by six and placed into isolators. 20 WCR eggs were put directly under the seeds. The microbial preparations were applied in the same dosage as in the *in vitro* trials. Pherocon AM yellow sticky traps were put into the upper parts of the isolators to capture emerging adults. One month after the planting, the height of the plants was measured, and the damage caused by larvae was determined based on the modified IOWA 1-6 scale, along with the number of adults captured by the traps.

In every case, the efficacy of the microbial treatments was compared to untreated controls and to seed treatments with insecticide tefluthrin (Force 1,5G) and *Bacillus thuringiensis* var. *tenebrionis* (Novodor FC).

The efficacies of the *Bt* bacterial preparations and the *M. anisopliae* strains were significantly different from each other. Several bacterial preparations and fungal strains almost reached the efficacy of the tefluthrin treatment considering both larval mortality and the reduction of root damage. In conclusion, the cultures of the *Bt* strains and the *M. anisopliae* fungal strains tested are promising control tools and therefore need further field tests.

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