

THE ENTOMOPATHOGENIC BACTERIUM *Bacillus thuringiensis* AS A BIOLOGICAL PLANT PROTECTION AGENT IN CONVENTIONAL AND ORGANIC AGRICULTURE

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Among currently available biological products, those based on *Bacillus thuringiensis* (Bt) are of particular interest. Unlike conventional pesticides, Bt-based products act selectively against target insect pests and are considered safe for humans, animals, beneficial insects, and the environment when used appropriately.

The aim of this study was to develop an ecologically safe formulation based on the entomopathogenic bacterium *Bacillus thuringiensis* var. *thuringiensis* and the agent FP-09 for controlling the Colorado potato beetle (*Leptinotarsa decemlineata*).

A suspension of *Bacillus thuringiensis* var. *thuringiensis* combined with FP-09 acts through the digestive tract of actively feeding *Leptinotarsa decemlineata* larvae. This action causes internal damage and disrupts digestion. FP-09 absorbs digestive fluids, thereby disturbing the osmotic balance and inhibiting digestive processes. The resulting cellular damage ultimately leads to larval death.

Materials and Methods

The trials were conducted in an experimental plot planted with the potato cultivar 'Bernina' at the IGPPP experimental facility and targeted first- to third-instar larvae of *Leptinotarsa decemlineata*. The experiment included five treatments, each with three replicates: an untreated control, *Bacillus thuringiensis*, FP-09, *Bacillus thuringiensis* + FP-09, and the standard insecticide Coragen 20 SC. The treatments containing the bacterium were applied as a culture suspension of *Bacillus thuringiensis* var. *thuringiensis*.

Results and Conclusions

The combined use of the entomopathogenic bacterium *Bacillus thuringiensis* and FP-09 was effective in controlling *Leptinotarsa decemlineata* in potato crops of the cultivar 'Bernina'.

A formulation containing 2×10^8 CFU/mL of *Bacillus thuringiensis* var. *thuringiensis* and applied at a rate of 4 L/ha in combination with 50 g of FP-09 was developed to reduce Colorado potato beetle populations in potato crops.

The biological efficacy of the formulation based on *Bacillus thuringiensis* var. *thuringiensis* and FP-09 against the Colorado potato beetle was evaluated. Efficacy reached 77.0% against the first generation and averaged 79.6% against the second generation.

The applicability of the formulation based on *Bacillus thuringiensis* var. *thuringiensis* combined with FP-09 for regulating the population density of *Leptinotarsa decemlineata* in potato crops of the cultivar 'Bernina' was established.

The results indicate that the formulation is more effective against the early larval instars of the Colorado potato beetle. This finding is particularly important for field application, as treatment at these stages can reduce *Leptinotarsa decemlineata* population density before severe defoliation of the potato crop occurs.