

***Bacillus thuringiensis* delta endotoxins (Cry1Ac and Cry1C) encapsulated in killed *Pseudomonas fluorescens* (006457) Fact Sheet**

Summary

Bacillus thuringiensis delta endotoxins encapsulated in killed *Pseudomonas fluorescens* is used for controlling moth larvae on a wide range of crops. Based on the tests that EPA requires before it approves a substance as a pesticide active ingredient, *Bacillus thuringiensis* delta endotoxins encapsulated in killed *Pseudomonas fluorescens* is not expected to cause harm to humans or the environment.

I. Description of the Active Ingredient

The active ingredient, *Bacillus thuringiensis* delta endotoxins encapsulated in killed *Pseudomonas fluorescens*, is created by taking the genetic material that codes for two protein toxins from the bacterium *Bacillus thuringiensis* (Bt), and inserting it into a different bacterium, *Pseudomonas fluorescens* (*P. fluorescens*). These two Bt toxins (Cry1Ac and Cry1C) are toxic to the larvae of certain species of moths and butterflies. These Bt toxins cause death by attaching to specific receptors in the larval gut, eventually rupturing the gut and killing the larva. Because only certain species of moths and butterflies contain the needed receptors, this active ingredient does not harm other organisms such as other insects, birds, or humans.

There are several practical reasons for using *P. fluorescens* rather than Bt to produce the toxins. As examples, *P. fluorescens* produces higher concentrations of the toxins; the toxins remain within the *P. fluorescens* cells (encapsulated) when the cells are killed, making collecting the toxins relatively easy; and *P. fluorescens* does not produce the large number of additional toxins made by Bt, which might harm non-target species.

II. Use Sites, Target Pests, and Application Methods

- **Use sites:** Larvae of many species of moths

- **Target pests:** Agricultural crops including vegetables, field crops (such as corn and cotton), fruits, and nuts. Other use sites include turf, forestry, ornamentals, landscape trees, and nursery crops.

- **Application methods:** The active ingredient can be applied by several methods, including hand spraying, aerial spraying, and ground-based applications. It can also be applied through irrigation systems.

III. Assessing Risks to Human Health

Whether or not a substance poses a risk to humans or other organisms depends on two factors: how toxic the substance is, and how much of it an organism is exposed to. Therefore, the EPA considers both toxicity and exposure data in determining whether to approve a pesticide for use

EPA has evaluated *Bacillus thuringiensis* delta endotoxins encapsulated in killed *Pseudomonas fluorescens* for potential human health hazards, including effects on the skin, eyes, respiratory system, and digestive system. Based upon this evaluation, and the knowledge that the human gut lacks any receptors that would make the toxins hazardous, EPA finds that the active ingredient does not pose a risk to human health.

IV. Assessing Risks to the Environment

EPA has evaluated the active ingredient for potential hazardous effects on the environment. This evaluation included an assessment of potential effects on non-target organisms, including mammals, birds, fish, beneficial insects, marine animals, and plants, as well as effects on endangered species. Based upon this evaluation, EPA finds that the active ingredient does not pose a risk to the environment or to non-target organisms. Organisms other than moths and butterflies appear to lack the gut receptors that would make the toxins hazardous.

V. Regulatory Information

Bacillus thuringiensis delta endotoxins encapsulated in killed *Pseudomonas fluorescens* was initially registered (licensed for sale) as a pesticide active ingredient in 1995. At the end of October 1999, there was one registered pesticide product containing this active ingredient

VI. Producer Information

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VII. Additional Contact Information:

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