

Technical Bulletin #41:

## Agrochemical General Information Sheet - *Bacillus thuringiensis*

***Bacillus thuringiensis*:** Biological insecticide

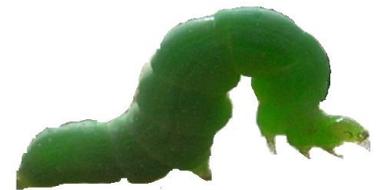
Formulation types: Suspension concentrate, water granules, Wettable powder

Chemical family: Bacterium

### What is *Bacillus thuringiensis*?

*Bacillus thuringiensis* (*B.t.*) is a bacteria that produces a toxic enzyme that kills caterpillars. It is a naturally occurring bacteria found in soils throughout the world.

It is used mostly to control caterpillars (armyworm), loopers, and Lepidoptera larva in general.



**How does it work? (mode of action)** Like many other bacteria, *B.t.* creates spores in a highly resistant, resting form that protects the bacteria from tough environmental conditions. During this spore stage, the bacterium produces the toxic enzyme (protein crystal). When caterpillars ingest *B.t.*, the protein reacts with the digestive system, usually paralyzing it in a few minutes. Death of the insect will occur between three to seven days from either the toxin or from the bacterial spore invading the insect's blood system. *B.t.* has a more effective control when the larvae are in earlier life stages.



Because *B.t.* is a biological product, it tends to have a shorter lifespan than other chemical insecticides. Powder formulations can last longer than liquid-based ones. This product is also easily degraded by sunlight, which means it is better to spray it late in the afternoon and be sure to spray in the areas the caterpillars are feeding from.

**Resistance:** Currently in the field, the diamondback moth is the only insect found to have developed resistance against *B.t.* The diamondback larvae feed on all plants in the mustard family, including; canola, pak choi, mustard, broccoli, and cabbage. When using this pesticide, farmers *must take* steps to help prevent resistance, including alternating *B.t.* applications with synthetic insecticides so that resistance to any one class of insecticide does not develop. Crop rotation is also another method used to help combat resistance. Since different crops are attacked by different insect pests, various insecticides should be used.

Human Hazards	Environmental Fate
Low acute toxicity	Bird (quail): Nontoxic
Moderate eye irritation	Fish (trout): Low toxic
	Mammals (rabbit): Slightly toxic
	Bee (honey): Nontoxic
	Ground water: No threat

### First aid measures:

**Inhalation:** Move patient to fresh air area and consult a physician. Apply artificial respiration if necessary.

**Skin Contact:** Remove contaminated clothing and thoroughly wash affected area with soap and water. Do not apply any medicating agents except on the advice of a physician.

**Eye Contact:** Rinse eyes with clean water to flush out the chemical. If irritation persists, call your physician or nearest health center.

**Ingestion:** If person is fully conscious, immediately give large quantities of water to drink and get medical help. Never give anything by mouth to an unconscious person and do not induce vomiting.

**Mitigation Measures:**

- Wear protective clothing such as a long-sleeved shirt, long pants, rubber gloves, boots, glasses, etc.
- Wash hands with soap and water after use.
- Do not allow product or washings to enter waterways or sewers.
- Triple rinse empty containers prior to disposal. Do not reuse empty containers for any other purpose.
- Store away from foodstuffs, children, and animals.
- Never use or store in or around the home.
- Keep container sealed when not in use.
- Do not apply around open bodies of water (fish ponds) and water sources.
- Chemical sprayers and mix tanks have to be cleaned in designated areas.
- Apply under favorable weather conditions.
- Practice chemical rotation.
- Practice correct implementation of integrated pest management practices.

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