



About Btk – including Foray 48B



Bacillus thuringiensis var. *kurstaki* (Btk) is a naturally occurring bacteria found in soil. Commercial formulations of Btk are used as insecticides for moth and butterfly species. For example, Foray 48B is a commercial Btk formulation that could be used as an insecticide in the event of a biosecurity incursion involving a moth or butterfly species.

Foray 48B is a mist sprayed in small amounts. Depending on the pest species, between 2.5 to 5 litres of product per hectare is used.

When applied at recommended rates Btk does not harm

people, plants, animals, or any insects – except for caterpillars. This is because Btk only becomes active in the caterpillar's uniquely alkaline gut.

Btk has a long history of safe use. Various commercial formulations of Btk have been used in many countries to protect agricultural crops, fruit trees, and forests for more than 40 years. New Zealand organic growers have been using a Btk spray since 1984.

Btk has been successfully used for the control and eradication of white-spotted tussock moth, painted apple moth, and gypsy moth in New Zealand.

Facts and FAQs

About Btk

Commercial formulations of Btk are produced by a number of American and European companies. Large quantities have been used for more than 40 years in North America, particularly to control gypsy moth and tussock moth populations.

Btk has previously been chosen as a preferred spray for aerial application against white-spotted tussock moth, painted apple moth, and gypsy moth because: it specifically targets caterpillars, the bacteria does not grow in warm-blooded organisms (animals or humans), is available commercially, and is one of the safest insecticides currently available.

In 1996/97, Btk was used successfully during Operation Ever Green to eradicate white-spotted tussock moth from the eastern suburbs of Auckland. Between 1999 and 2003 Foray 48B was used to treat established populations of painted apple moth in West Auckland. In 2003, Foray 48B was again used in an aerial spray operation to eradicate Asian gypsy moth from Hamilton. In all cases independent health studies were completed to assess the health risks of the spray. No evidence of adverse health problems was found, although there were reports of minor eye, nose, throat, and respiratory irritations at the time of spraying.

What is Foray 48B?

Foray 48B is the commercial name of an insecticide that contains Btk, and is used to control moth and butterfly pests around the world. It is one of many formulations of

Btk. Btk is a bacterium that occurs naturally in soil in all countries in the world, including New Zealand.

What else is in the spray?

The spray contains mostly water, traces of essential elements, minerals or salts, and “inert” ingredients such as thickening, sticking and wetting agents. All the ingredients (as assessed by New Zealand medical experts) are of extremely low toxicity. The full list of ingredients is commercially sensitive information, and as such cannot be distributed to the public without consent of the manufacturer.

How does Btk work?

Btk is sprayed on to plant foliage. The foliage must be eaten by caterpillars before it can take effect. Once it has been eaten, the toxin in Btk is activated by the alkaline gut contents of the caterpillar, causing gut paralysis. Shortly after eating, the caterpillar will stop feeding, and will die about two to three days later (depending on conditions such as the age and size of the caterpillar, and air temperature).

How is Btk different from other insecticides?

Btk is a biological insecticide and not a chemical. It acts specifically on caterpillars and does not harm other insects, animals, or plants. It breaks down relatively quickly in the environment through exposure to UV light and other microorganisms.

Where else has it been used against caterpillars?

Btk is used world-wide to protect vegetable and horticultural crops and forests. More than 500,000 kilograms of Btk are applied annually in the United States alone. Foray 48B (one particular Btk formulation) has been widely used in Canada against gypsy moth. This has included programmes in large urban areas – for example, 19,000 hectares in Vancouver in 1992.

Is Btk used in New Zealand?

Many countries, including New Zealand, routinely use Btk as an agricultural spray. All of New Zealand's organic certification schemes allow the use of Btk.

The main brands used in New Zealand are Dipel, Delfin, and Agree – these are all registered for use on horticultural crops.

Does Btk affect people or animals?

Btk has been used in commercial pest management for over 40 years in Canada and the United States. Extensive studies have been carried out during that time, as required by the United States Environmental Protection Agency and Health and Welfare Canada, and no significant adverse effects on animal or human health were recorded.

PEOPLE

Two New Zealand health risk assessments on spraying with Btk have been completed. One commissioned by the Northern Regional Health Authority in 1996, and another by the Ministry of Health in 2002. There have also been independent studies into the health risks of spraying with Btk, such as the report commissioned by the Ministry of Health in 2003. No evidence of adverse health problems caused by the spray has been found, although minor eye, nose, throat, and respiratory irritation have been identified as potential health impacts.

While the spray also contains food residues, preservatives, an acidity regulator, an alcohol, and a sugar-like substance as a stabiliser, these ingredients are approved food additives.

Studies to date show no public health concerns, despite long-term, large-scale use of Btk in aerial pest management programmes. This is because Btk is activated only by specific conditions that exist in the gut of the caterpillar. The studies found no evidence of any poisonous, infectious, or disease-causing effects.

ANIMALS

Btk is specific to the caterpillars of moths and butterflies, so it is likely to kill exposed caterpillars. However, native caterpillar populations are expected to quickly recolonise the sprayed zone from the surrounding areas. Adult moths and butterflies are not affected.

Btk is not toxic to bees and does not affect spiders, beetles, snails, shellfish, and worms or other invertebrates.

Animals may be exposed through eating plants or insects sprayed with Btk, inhaling, or absorbing Btk through the skin. However, Btk is only activated by specific conditions in caterpillar's alkaline guts and does not grow in warm-blooded animals, such as cats and dogs.

The only potential effect on birds is a temporary decrease in food supply in those that rely heavily on caterpillars for food. These species may have to spend more time foraging for food.

FISH

Field studies and monitoring of fish populations have found no effects on fish behaviour, feeding patterns or reproduction resulting from spray programmes in Canada and the US in the last 20 years.

Does Btk affect soil, water, plants or food?

SOIL

Btk occurs naturally in soils throughout the world, including New Zealand. Tests have shown that it does not change the soils' productivity or fertility.

WATER

Btk may enter water through direct application, run-off, or through the faeces from animals that have eaten it. Tests have shown it may persist for several months in fresh water (and for a much shorter time in seawater). However, it does not leach out of the soil into groundwater and does not affect aquatic organisms.

In New Zealand there are controls set by the Environmental Protection Authority that restrict the application of Btk onto or into water. For more information please visit www.epa.govt.nz.

PLANTS

If anything, Btk should help plants by reducing the populations of leaf-feeding caterpillars. It has no direct toxic effects on plants.

FOOD

Btk is often used by the food industry (on kiwifruit, citrus trees, grape vines, and berry fruit) to control pest caterpillars. It is also widely used on organic crops, with no holding period required before sale or consumption. As Btk does not grow in warm-blooded organisms, it passes through the digestive system without producing any toxic effect.