

# Growers' Guide to Bt

IPM Newsletter #10

June 2005

**Inside this issue:**

- This issue of the IPM DANIDA Newsletter is entirely dedicated to the use of Bt

Text and most of the photographs in this issue by:

Brent Rowell

Dept. of Horticulture,  
University of Kentucky

email: [browell@uky.edu](mailto:browell@uky.edu)

Photo 4 courtesy of Alton N. Sparks, Jr., The University of Georgia ([www.ipmimages.org](http://www.ipmimages.org)).

“Bt” is the common name for a type of microbial insecticide which contains living spores and toxic crystals from a soil bacterium called *Bacillus thuringiensis*. Bt is used mostly against larvae (caterpillars) of the diamondback moth, imported cabbageworm, cabbage looper, cluster caterpillars (armyworms), and tomato fruitworm (Figures 1-6).

Many liquid and dry forms of Bt are available and these have different brand names. Brands of Bt which have *Bacillus thuringiensis aizawai* on the label are usually best for diamondback moth and small larvae of cluster caterpillar (*Spodoptera litura*). It is very important that Bt is used while the caterpillars are still small. Bt is not very effective against large larvae.



Figure 2. Cabbage looper



Figure 3. Imported cabbageworm



Figure 1. Diamondback moth



Figure 4. Tomato fruitworm.



Figure 5. Cluster caterpillars  
(*Spodoptera litura*)

Bt is very safe and causes no harm to humans, fish, wildlife, or beneficial insects. One of the greatest advantages of using Bt is that it does not kill insect natural enemies which help control many pests (figure 7). Most types of Bt are also approved for use in organic vegetable production.



Figure 7. Bt does not kill natural enemies such as this wasp (a parasitoid of Diamondback moth)

Bt works differently from most insecticides. Pest caterpillars must eat very small amounts of the Bt-sprayed leaves before they will die. After eating Bt, the insects will not die quickly but will get sick and will stop feeding almost immediately. It may take 1-2 days for



Figure 6. A group of 1<sup>st</sup> instar caterpillars of  
"cluster caterpillar"

the larvae to die after eating Bt. It will take longer for larger larvae. Very large larvae and larvae already inside cabbage heads are not likely to be killed by Bt.



Figure 8. Healthy (left) and Bt-affected (right) larvae of cabbage looper.

Check the product label to see if it contains Bt *aizawai* or Bt *kurstaki*. In several tropical countries (including Thailand), diamondback moth has at times developed resistance to brands of Bt which contain "*Bacillus thuringiensis kurstaki*" as the main ingredient. Therefore it is usually better to use "*Bacillus thuringiensis aizawai*".



Figure 9. Label of Bt aizawai



Figure 11. Use Bt when caterpillars are small (cabbage looper).

## Bt usage guidelines

1. **Inspect fields twice per week** and spray when IPM treatment thresholds are reached. These treatment thresholds not only depend on the number of pests, but also on the number of natural enemies observed in the field. If you or someone else cannot scout your fields, it may be necessary to spray Bt every 3-7 days. Use the correct dosage which is on the product label. Use higher rates of Bt if larvae are large or when heavy infestations occur. Remember, **Bt is most effective against small, newly-hatched caterpillars.** Treat immediately when the first feeding damage is observed.

2. **Apply Bt late in the afternoon.** Bt loses some of its effectiveness if exposed to periods of strong sunlight.



Figure 12. Avoid strong sunlight. Spray Bt in late afternoon.

3. Be very careful to **spray the undersides of leaves** as well as the tops. This is where diamondback moth and most other cabbage worms begin feeding.
4. Use **a good quality nozzle** on your sprayer that will produce a fine mist of spray. Higher pressure from your sprayer will also mean better coverage and improved control.



Figure 10. Looking for pests and natural enemies



The report “Did you take your poison today?” provides facts and opinions on the hazards of pesticide use in Thailand.

The report is available in Thai and English language. Please write to the project to obtain a copy.

The report can also be downloaded from the internet:  
www.ipmthailand.org

Strengthening Farmers' IPM in Pesticide-Intensive Areas

Department of Agriculture  
50, Phaholyothin Road,  
Chatuchak  
Bangkok 10900  
Thailand

Tel: 02-579 9654  
Fax: 02-579 9655

Email:  
ipmdanida@ipmthailand.org



Figure 13. Use a good quality nozzle.

5. **Always mix Bt with a spreader-sticker** on cabbage and other crucifer crops. This is very important. Otherwise the spray will not remain on the leaves.



Figure 14. Mix Bt with a spreader-sticker

6. **Use drip or furrow irrigation.** Sprinkler irrigation and hand watering washes off Bt after it is applied. Reapply Bt if heavy rains occur within 48 hours after application.

7. **Use a fresh mixture of Bt for each application.** Do not try to save the leftover mixture in the sprayer to use another day. It will start losing effectiveness if left standing for longer periods. For best results, use it only on the same day it was mixed. Also, do not use any water-based liquid Bt that was saved from last year. Buy a new bottle or package each year and ask the age of the product. Buy well known brands from reputable dealers rather than just the cheapest product.

8. If weekly sprays are necessary for 3 weeks or more, **do not use Bt every time.** Use neem or another reduced-risk insecticide after every 2-3 sprays of Bt. Neem is also approved for organic production but may do more harm to some beneficial insects than Bt.



Figure 15. Drip irrigation.