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# Biological Insecticides

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## **Biological insecticides to control insects that transmit diseases and damage crops**

Embrapa Genetic Resources and Biotechnology, one of the 45 research units of the Brazilian Agricultural Research Corporation, developed four bioinsecticides to control insects that transmit diseases to animals and human beings and damage crops:

- 1) Bt-horus – for control of the Dengue mosquito (*Aedes aegypti*);
- 2) Sphaerus – for control of the Malaria mosquito (*Anopheles* sp.);
- 3) "Ponto.Final" – for control of Caterpillars that attack crops, such as soybean, vegetables and maize.
- 4) "Fim da Picada" – for control of black flies.

## **Benefit**

The great benefit of these products, which were developed in partnership with the private Brazilian enterprise Bthek Biotechnology, is their effectiveness in the control of insects, without damaging human and animal health or the environment.

## **Microorganism Bank conserves useful bacteria**

All of the biological insecticides were developed using bacteria with toxicity specific to the target-insects. Because of this they are harmless to human health, animals and environment.

The bacteria used in the products come from the Bank of Microorganisms maintained by Embrapa Genetic Resources and Biotechnology, which contains more than 2,300 lineages of bacteria with potential to be used as agents in biological control.

First, scientists collect bacteria that occur naturally in the soil. Then they study them and select those most efficient for control of the target-insects.

## **Bt-horus: effective against dengue**

The biological insecticide Bt-horus is able to control *Aedes aegypti*, the mosquito that transmits dengue. The product was developed from the bacteria known as Bt (*Bacillus thuringiensis*), specific to control the target-insect and widely used in biological control all over the world.

Bt-horus can be used in places where water accumulates, such as plant vases, lakes and water courses, besides others.

One drop per liter of water kills mosquito larvae within 24 hours.

## **Sphaerus SC: biological insecticide for control of Malaria**

The Sphaerus bioinsecticide was developed from the bacterium *Bacillus sphaericus*, recommended by World Health Organization for use in campaigns against disease transmitting mosquitoes, such as the *Anopheles* mosquito. According to the World Health Organization, malaria causes more deaths each year than the AIDS virus.

The bioinsecticide is also effective for control of the urban mosquito, *Culex quinquefasciatus*, which transmits encephalitis and other diseases.

## **Ponto.Final to caterpillars attacks**

"Ponto.Final" is the Brazilian name for a biological insecticide capable of controlling caterpillars without causing damage to humans, animals or the environment.

The product is effective against several caterpillars that attack crops, such as soybean (*Anticarsia gemmatalis*); vegetables (*Plutella xylostella*) and corn (*Spodoptera frugiperda*).

"Ponto.Final." was also formulated with Bt bacteria. With only a liter per hectare, the product can kill the target-insects, while preserving insects beneficial to the environment, such as ladybugs, which feed on caterpillars.

Besides, this biological insecticide has another interesting characteristic: it was certificated for use in organic agriculture.

## **"Fim da Picada": End for black fly bites**

"Fim da Picada", which in English means end to black fly bites, was also developed using Bt bacteria. The new product is being registered and should be on the Brazilian market by the end of 2010.

Black flies (known in Brazil as *borrachudos*) are insects that belong to the *Simuliidae* family. They are blood suckers and, therefore, can transmit diseases to human beings and animals.

Some species are vectors of a disease that occurs in Central Africa and Central and South America, called *onchocerciasis*. It is associated with a parasitic worm found in human blood that produces large tumors under the skin. When the worm reaches the eyes, it can cause partial or total blindness. In Brazil, it is restricted to Amazon region.

Black flies can attack any warm-blooded animal and they bite their victims many times. Depending on the number and intensity of the bites, they can lead to local or generalized lesions and cause loss of blood.

Livestock such as cattle and sheep are subject to the bite of the black fly. It can reduce meat and milk production and even cause loss of cattle, resulting in economic damage.

To study the effects of the Bt bacterium on the target-insects, in order to select the most lethal lineage, the scientists of Embrapa Genetic Resources and Biotechnology collect larva and raise them in the laboratory.