

Introduction of Biopesticides

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Biopesticides are types of chemicals extracted from natural materials such as plants, animals, bacteria or certain minerals and these chemicals can be used for controlling pests. For example, canola oil/baking soda with pesticidal applications are considered biopesticides.

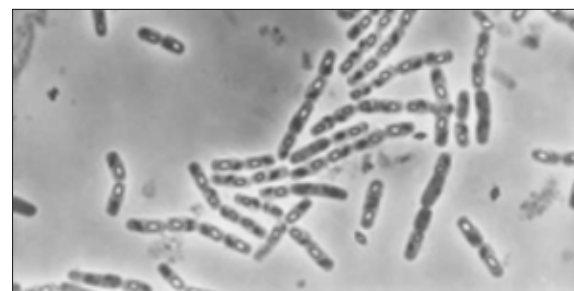
As costs of using synthetic chemicals became apparent, there was resurgence in academic and industrial research of biopesticide. Development of new and useful biopesticides has continued to increase rapidly since the mid-1990s. In fact, more than 100 biopesticide active ingredients have been registered in the U.S. since 1995. Many of these have been introduced commercially in a variety of products¹.

Biopesticides can be considered as dividing into three major classes²:

1. **Microbial pesticides** consist of microorganism (e.g. bacterium, fungus, virus or protozoan) as the active ingredient. Microbial pesticides can control many different kinds of pests, although each separate active ingredient is relatively specific for its target pest(s). For example, there are fungi that can control certain weeds, and other fungi that can kill specific insects.
2. **Biochemical pesticides** are naturally occurring substances that control pests by non-toxic mechanisms. Conventional pesticides, by contrast, are generally synthetic materials that directly kill or inactivate the pest. Biochemical pesticides include substances, such as insect sex pheromones, which interfere with mating, as well as various scented plant extracts that attract insect pests to traps. Because it is sometimes difficult to determine whether a substance meets the criteria for classification as a biochemical pesticide, responsible authority would establish a special committee to make such decisions.

3. **Plant-Incorporated-Protectants (PIPs)** are pesticidal substances that plants produce from genetic material that has been added to the plant. For example, scientists can take the gene for the B.t. pesticidal protein, and introduce the gene into the plant's own genetic material. Then the plant, instead of the B.t. bacterium, manufactures the substance that destroys the pest.

Biopesticides products, compared to broad spectrum chemical pesticides, are usually more target specific and inherently less toxic which would cause less impact to other non-target species, such as other insects, birds and mammals, while application. In addition, biopesticides are often effective in low application rate and could decompose quickly in natural environment. This leads to lower exposures and largely avoid the pollution problems caused by conventional pesticides. Besides, chance of pests developing resistance is much lowered.



A common biopesticide: *Bacillus thuringiensis israelensis* (B.t.i.)
Source: <http://organicoiltechnology.com/>

References:

1. Biopesticide Industry Alliance
<http://www.bpia.org>
2. US Environmental Protection Agency – What are Biopesticides?
<http://www.epa.gov/opp00001/biopesticides/whatarebiopesticides.htm>

Blood Sucking Biting Midges in Hong Kong

Biting midges are dipterous flies belonging to the family Ceratopogonidae. Although not all the members of this family bite humans, a few species are nasty biters of man and domestic animals. In some instances, they transmit harmful diseases.

Adults of biting midges are about 1-4 mm long with dark body colour. Because of their generally small size, some species can pass through screens and mesh that keeps other biting pests (such as mosquitoes) outside and these can make life insufferable. To ward off biting midges intrusion, screens should have mesh size less than 0.75 mm.

There are more than 6000 species of biting midges worldwide. In Hong Kong, three genera of biting midges are known to be human blood feeders. They are namely *Leptoconops*, *Lasiohelea* and *Culicoides*.

Leptoconops

Larvae prefer living in wet mud and sand near coastal area. Adults all have a reduced wing venation and the wings are whitish hyaline in appearance. Female have unique elongated cerci which they use to lay eggs in sand or soil. Adult females feed on the blood of vertebrates including mammals and birds and are day time feeders.



Adult
Leptoconops



Lasiohelea

Larvae are aquatic or semiaquatic. A number of species prefer living on mud with decaying vegetative materials. Adult females are day time feeders on vertebrate blood.



Adult *Lasiohelea*

Culicoides

Larvae of this group are mainly living in semiaquatic and aquatic habitats. They can be found living in wet decaying vegetation, wet soil, small pools and tree holes. The wing of adult *Culicoides* usually with pattern of pale and dark spots. Adult females of this genus feed on vertebrate blood. Almost all species tend to be crepuscular feeders.



Adult *Culicoides*

Lasiohelea taiwana and *Culicoides circumscriptus* are examples of common species found in Hong Kong.

To most people, the bites of biting midges cause acute discomfort and irritation. Scratching of the bites may lead to pruritus and bacterial infection. Although a few *Culicoides* species are vectors of parasitic filarial worms to human, the species found in Hong Kong is not documented carriers of these parasites. In general, biting midges are not considered as very important human disease vectors.