



Food and Agriculture
Organization of the
United Nations

Biopesticides

Operational use against locusts

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The problem

Why Biopesticides?

Every year, there are **locust infestations** somewhere in the world. Devouring crops and rangelands, locusts **jeopardize food security of millions of people** for which agriculture is the only source of income. During more than half a century, chemical pesticides have been the most rapid and efficient method to control locusts.

By definition, **a pesticide is a poison**. Even if used in an appropriate way, there is a **risk for human health and environment**. If pesticides sometimes affect human health, they usually have a **negative impact on the environment**, even if it can

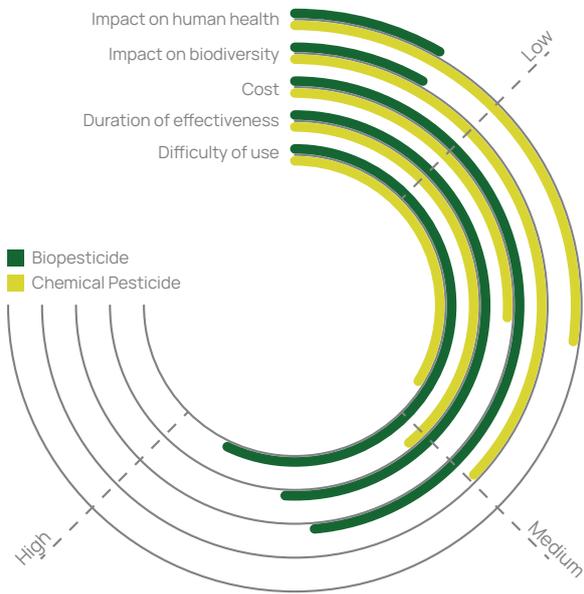
be minimal, because they indiscriminately kill other insects that are essential to the ecosystems. Pesticides can also pollute soil, vegetation, air and water.

More than twenty years ago, FAO started to use **less hazardous control methods**. More recently, FAO has been promoting the use of a **biological insecticide** that attacks locusts and grasshoppers only and has no negative impact on human health and the environment, including as part of its **“Programme to improve regional and national locust management in Caucasus and Central Asia (CCA)”**.



Biopesticide treatments

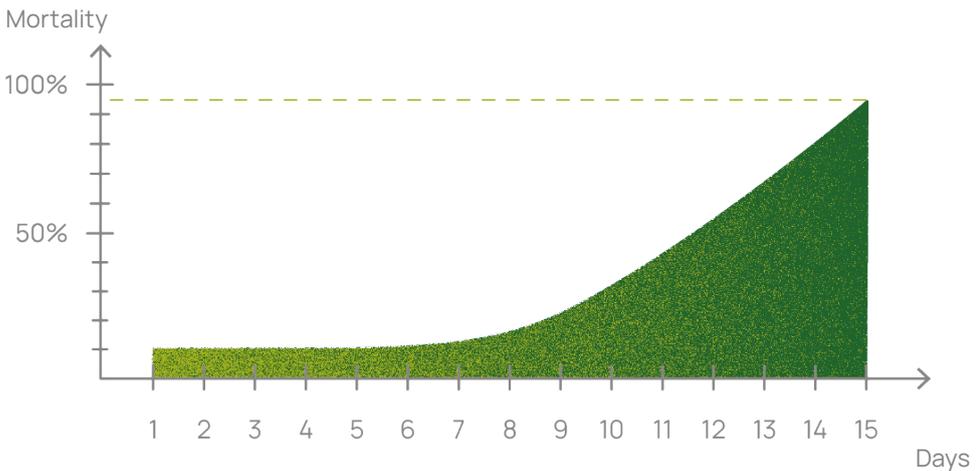
Comparisons and data



4.242.140 ha

Average number of hectares treated annually
in all CCA countries over the past ten years

Efficacy of biopesticides in time



Biopesticides use

How do they work?

- Biopesticides are **highly specific** and kill only locusts. They are **safe for other living beings** (honeybees, birds, humans, fish, etc.)
- Thanks to their composition, they **can be applied in ecologically sensitive zones** – for example, near water.
- **No special protective clothing is needed** for operators, beside a mask and gloves only to prevent allergy.
- The **same spraying techniques and equipment** that are used for conventional pesticides can also be used for biopesticides.

However, there are a few **important steps to be respected**:

1. Storage and transportation.

The spores of the fungus that is used to formulate the bio-pesticide are packed in opaque sealed 0.5 or 1-kg bags, because of the spores' sensitivity to light and humidity; the cold chain need to be ensured.

2. Control of the spore's viability or germination test.

When being stored for lengthy periods of time, or if there are any doubts over the preservation of the cold chain, the viability of the spores must be checked before use. On average, the germination rate is of 90% after 48 hours at a temperature of 25°C.

3. Preparation of the spores' suspension.

The spore powder should be mixed with gasoil, mineral or vegetable, before spraying. This helps the spores to stay on the cuticle of the insect. The main goal is to prepare a homogeneous suspension so that it can be sprayed in Ultra-low volume.

4. After treatment, locust mortality monitoring.

After locust spraying, locust mortality monitoring is required as locusts die only a few days after treatments. To evaluate the treatment efficacy, around twenty locusts need to be collected from the treated plot and placed in a cage to observe their mortality.

The solution

What are Biopesticides?

The biopesticide used against locusts is formulated using the **spores of a fungus**, *Metarhizium acridum*, which is **specific to locusts and grasshoppers**. When the spores enter into contact with locusts, they germinate, **penetrate the locust through its cuticle** and the fungus

pesticides can be utilized for the biopesticides due to its specific formulation. The fungus requires several days to kill locusts and therefore cannot be used when a rapid mortality is required, during locust emergencies. Consequently, biopesticides are not a substitute of

Locust plagues are not a fatality, nor is the massive use of pesticides. Any sustainable management of locust issues means implementing the locust preventive control strategy.

Biopesticides have a key role to play in order to respect human health and environment.

develops inside the locust until it kills the insect – a process which takes between 6 to 10 days. This strain of the fungus used in the biopesticide was selected for its **virulence and multiplication rate** based on many years of laboratory experiments and field trials.

The same Ultra-low volume (ULV) spraying equipment currently used for conventional

chemical pesticides during major crises. However, even during a plague, they remain essential because they are the only pesticides that **can be used when locusts are in ecologically sensitive areas**, for instance near water. Therefore, biopesticides play a key role both in locust preventive control strategy and during locust emergencies.



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