



# A LIGHTER TOUCH<sup>®</sup>

*A Lighter Touch grower resource*

## **General principles for Good Management Practices for growers using Biopesticides**

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### **What are Biopesticides?**

Biopesticide crop protection products (“Biopesticides”) are a broad category of plant protection products that are derived from natural products, or contain, living organisms. Biopesticides can be used to complement conventional synthetic agrichemical products in an integrated pest management (IPM) programme, or as a stand-alone method, for protecting crops from disease, pests and competition from weeds. Biopesticides include live microbes (such as bacteria, fungi and viruses) and /or their extracts, crude or purified plant extracts, pheromones and other natural biochemicals. Biopesticides work best when incorporated into an IPM programme utilising a range of management measures. They are different to biostimulants<sup>1</sup> and biofertilisers<sup>2</sup> since they claim pest /disease /weed control rather than just promotion of plant growth. Biopesticides are versatile and can be utilised in both organic and conventional crop production.

### **How do Biopesticides differ from pesticides?**

The biggest difference between Biopesticides and agrichemicals (or synthetic pesticides) is that Biopesticides are made from living or naturally occurring compounds and agrichemicals are made from synthetic chemicals. Both types of products offer protection against a wide variety of pests, diseases and weeds. Many new synthetic chemicals are systemic in nature and can be taken up and distributed within the plant whereas most biopesticides act as protectants on the surface of the plant and therefore it is important to apply them before pest/disease symptoms appear and make sure that good coverage is achieved.

### **Key benefits of Biopesticides**

Biopesticides are an essential tool in sustainable crop production. They are a key component in effective IPM strategies and contribute to environmentally responsible production systems. Biopesticides may seem more challenging to use than conventional agrichemicals, but they provide many important benefits including:

- Biopesticides have a low risk of resistance developing due to the nature of their control. They can be integrated into IPM systems to reduce the chance of resistance occurring to the synthetic chemicals. Biopesticides complement the use of agrichemical options and can maximize yields and improve quality.
- Biopesticides naturally decay in the environment. In NZ most (check the MRL food notice<sup>3</sup>) are exempt from maximum residue limits (MRLs) and can be used close to harvest when agrichemicals could leave a residue non-compliant for trade. Since they rapidly degrade, possible risks to humans and the environment are reduced. Biopesticides are often compatible with

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<sup>1</sup> Biostimulants are products used to stimulate plant growth and optimize plant health

<sup>2</sup> Biofertilisers are substances that contain natural products/ living organisms used to increase fertility of the soil

<sup>3</sup> [www.mpi.govt.nz/agriculture/agricultural-compounds-vet-medicines/maximum-residue-levels-agricultural-compounds](http://www.mpi.govt.nz/agriculture/agricultural-compounds-vet-medicines/maximum-residue-levels-agricultural-compounds)

beneficial insects. Many Biopesticides have zero or short re-entry and pre-harvest intervals (PHIs) offering growers convenience and flexibility in spray timing. Similarly, the PHI is typically shorter following use of a Biopesticide. Having shorter periods allows harvest and transport schedules to be better maintained. Growers can also more easily manage differences in MRL limits when choosing market destinations.

- An IPM strategy that combines Biopesticides, and agrichemical products will utilize multiple modes of action meaning that the chance of resistance occurring to any one product is considerably reduced.
- Biopesticide products can be as efficacious as agrichemical products, particularly when pest/disease or weed pressure is low to moderate. However, some Biopesticides deliver lower levels of control and more variable performance than agrichemical alternatives. For example, Biopesticides might reduce pest pressure, but not remove the pest entirely. Additionally, some Biopesticides take longer to act on the target, but their effects may be longer lasting. Many Biopesticides are best used as a preventative and to assist with resistance management.

### What regulatory approval is needed for use of Biopesticides?

The regulatory process for Biopesticides is the same as for 'agrchemical' products. The product must be registered by ACVM and EPA. They can be categorised as biofungicides, bioinsecticides and bioherbicides. Crop protection products making management claims, whether biological or chemical, must meet regulatory criteria to be approved for use in NZ.

### How do Biopesticides work?

Biopesticides can work in several different ways. Some products only have one mode of action, whilst others have multiple modes of action including:

- **Attraction/repellency:** Biopesticides may contain or produce compounds that disrupt the normal behaviour of insect pests.
- **Competition:** Biopesticides may contain microbes that out-compete plant pathogens for space and other resources and prevent the pathogen from infecting crops.
- **Physical action/barrier:** Biopesticides may produce compounds that cause cell leakage, desiccation and death of the target.
- **Pathogenicity:** Biopesticides may contain microbes that can infect the target and kill it.
- **Toxicity:** these Biopesticides contain microbes that produce a compound/s with direct toxic effect on the target.
- **Induced resistance:** Biopesticides may produce microbial compounds that stimulate the crop's own resistance mechanisms.

### How to use Biopesticides

**Storage:** It is essential to follow storage instructions on the label. Because Biopesticides may contain living organisms as actives, they may have specific storage requirements that are critical to efficacy, and they can be affected by hot temperatures. Some products must be used within a short time following purchase and cannot be resealed and stored. Biopesticides are subject to the same regulations as agrichemical products and need to be held in approved storage facilities.

**Application:** Biopesticides can be sensitive to environmental (i.e. temperature and moisture) conditions - check labels carefully. Many Biopesticides should be applied in the evening to avoid heat and some benefit from being applied with UV protectants. Most Biopesticides are not systemic or rain fast so re-application is often needed if there is significant rainfall following application.

Biopesticides may need to be reapplied at 7 - 10 day intervals. Biopesticides can be applied using the same equipment as used for agrichemicals but it is very important to clean spray systems very well before use and some are harmed by chlorinated water. Use the specified nozzle to prevent blockages.

**Compatibility:** Check label recommendations for adjuvant use and tank mixing partners as live microbes may be affected by other crop protection products.

### Questions to ask when purchasing Biopesticides:

#### **What is the active ingredient?**

If the Biopesticide is described simply as a crude preparation (plant extract or mix of microbes) growers should ask for more details about the active ingredient. If the Biopesticide is based on a single microbe/pure compound, growers should ask for specific identification e.g. which specific microbial strain? If the answers are vague – beware.

#### **How does it work?**

Growers should not accept vague or overly complicated answers. Understanding how the product works is the key to understanding how to use it properly and to achieve good crop protection (i.e. management of the target/s). Cross reference what the company representative tells you with label claims.

#### **What trial data exist?**

Reputable companies will have reliable trial data to back up their claims. Do not accept pot trial data (poor translation to field efficacy) and be cautious with field data on other crops/targets.

#### **How should the product be used?**

Ask for detailed information on how the product should be used and what other products it is compatible with. Be wary of vague answers or claims that it can be used exactly like an agrichemical. Growers should always ensure the use of any biopesticide product is acceptable to the relevant market / industry body to avoid any potential export issues.

#### **Is the product registered?**

All products claiming to control or manage a pest/disease or weed must be registered and as such must have undergone regulatory oversight of stability, efficacy and crop safety. Find the registration number on the label or search the trade name on the ACVM database here: <https://eatsafe.nzfsa.govt.nz/web/public/acvm-register>  
If it is not registered - seek further advice.

If something sounds too good to be true – it usually is. Biopesticides are not stand-alone solutions. They work best when incorporated into an IPM programme utilising a range of management measures.

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*Disclaimer: This publication is intended to provide general guidance relating to the use of Biopesticides and is based on information current at the time of publication (December 2021). Information contained in this publication is general in nature and not intended as a substitute for specific professional advice around crop protection and should not be relied upon for that purpose.*