

MEALIKIL® PLUS
Verticillium lecanii
BioInsecticide

APPROVED FOR USE IN ORGANIC AGRICULTURE

Introducing MEALIKIL® PLUS

MEALIKIL® PLUS is a unique biological insecticide based on a selected strain of naturally-occurring entomopathogenic fungus *Verticillium lecanii* (NCIM 1312) that infects and kills mealy bugs and sucking insects like thrips, jassids, aphids, white flies and mites. Fungi usually need higher humidity to multiply and pathogenise the Mealy bugs. In dry spells, these fungi cannot multiply. Thus normal formulations of these biopesticides are less effective in management of Mealy bugs. MEALIKIL® PLUS contains spores and mycelial fragments and metabolites of *Verticillium lecanii* which work under high humidity -low temperature and low humidity- high temperature conditions. It is formulated as Wettable Powder with CFU count of 1×10^8 / g. MEALIKIL® PLUS is approved for use in Organic agriculture.

A Historical Brief

Entomopathogenic property of *Verticillium lecanii* was described first in the year 1861 It is known as the "white-halo" fungus owing to the white mycelial growth on the edges of infected insects. It was formerly known as *Cephalosporum lecanii*. An approved name of *Verticillium lecanii* is now *Lecanicillium lecanii*.

Mode of Action

Conidial penetration: The microscopic conidial spores of the fungus are slimy and attach to the cuticle of the insect. Hyphae from the germinating spores are produced that penetrate the insect's integument and destroy the internal contents of the insect.

Enzyme production: MEALIKIL® PLUS mycelia produce an octacyclopeptide toxin called bassianolide that consists of four molecules each of D-hydroxyisovaleric acid and L-Nmethylleucine which have insecticidal properties. (Suzuki et al., 1977). The fungus produces other insecticidal toxins such as dipicolinic acid. These toxins weaken the hosts immune system (of insect) and aid in eventually killing it.

Growth: Once inside, MEALIKIL® PLUS replicates and consumes the insect's internal contents eventually killing it. The fungus eventually grows out of the insect's cuticle and starts sporulating. Infected insects appear as white to yellowish cottony particles. MEALIKIL® PLUS infects the insect on contact and does not need to be consumed by the host to cause infection.

Environment factors: MEALIKIL® PLUS is developed by a unique process wherein metabolites of *Verticillium lecanii* are extracted and added back to the spores and formulated. Thus metabolites work effectively in high temperature and low humidity conditions and spores multiply and work in high humidity and low temperature conditions.

Method of Application

Foliar spray: Mix MEALIKIL® PLIS @ 5 g / L of water and spray for control of target pests like mealy bugs and sucking insects . The spray volume depends upon the crop canopy.

Target Pests

Mealy bugs, Thrips, Jassids, Aphids, White flies and Mites.

Crops

MEALIKIL® PLUS is suitable for application on Cereals , Millets , Pulses, Oilseeds, Fibre Crops , Sugar Crops , Forage Crops , Plantation crops ,Vegetables, Fruits, Spices , Flowers , Medicinal crops , Aromatic Crops , Orchards and Ornamentals.

Compatibility

MEALIKIL® PLUS is compatible with BioPesticides and not with Chemical Fungicides.

Shelf Life

MEALIKIL® PLUS is stable for a period of 12 months from the date of manufacturing.

Mass Composition

CONSTITUENT	W/W %	FUNCTION
<i>Verticillium lecanii</i> (Spores , Mycelia and metabolites)	01.15%	Active
Moisture	08.00% max	Inactive
Carrier Powder - Kaolin	q.s.	Inactive

Biological Composition

CONSTITUENT	CFU/g.	FORMULATION
<i>Verticillium lecanii</i>	1*10 ⁸	Wettable Powder

Other Formulations available

<i>Verticillium lecanii</i>	CFU/g	1*10 ⁹	Soluble Powder
<i>Verticillium lecanii</i>	CFU/ml	1*10 ⁹	Liquid

Verticillium lecanii

Free from *Salmonella*, *Shigella*, *E.Coli*

Cautions for handling and use of product

1. Avoid inhalation and skin contact while diluting as there could be spillage / splashes of the product
2. Mixing and spraying equipment is to be thoroughly rinsed with water and detergent before using the same equipment for spraying other pesticides.
3. Surplus spray solution should not be disposed in crop lands / stagnant water / flowing water where there is a possibility of causing pollution to natural resources
4. Do not eat / drink / smoke during application.
5. Direct incidence of MEALIKIL[®] PLUS may cause irritation and therefore it is recommended that the operator should use protective gear viz gloves, apron, mask, eye gear and hood.

Symptoms and Antidotes

Symptoms: Occasional symptoms include head ache and nausea.

Antidote: In the case of ingestion: symptomatic treatment is advised. In the case of contact with Eyes: Flush with water liberally for 20 minutes. In case of Skin contact, wash the affected area with plenty of water and soap.

Citations

There are many citations in public domain on effectiveness of *Verticillium lecanii* as a BioInsecticide

Commitment to Nature

- MEALIKIL[®] PLUS is approved for use in Organic Agriculture.
- MEALIKIL[®] PLUS is safe to natural parasites, pollinators and predators.
- MEALIKIL[®] PLUS can be used as an effective component in IPM programmes, thereby leading to a reduction in use of chemical pesticides and creating a safer environment.
- MEALIKIL[®] PLUS does not lead to residue problems and doesn't cause resistance or resurgence problems.

Benefits from MEALIKIL[™] PLUS

- MEALIKIL[™] PLUS effectively controls most of the economically important pests such as Mealy bugs, Aphids, Thrips, Jassids, White flies and Mites
- Pest reduction leads to improved plant health and thereby increased crop productivity.

- MEALIKIL[™] PLUS is pet friendly , eco friendly and infant friendly

