PACIFIC AGRISCIENCE

Pacific Agriscience (Hong Kong) Company Limited

# PAHK - New Products Portfolio

# (Sustainable Products)

*Updated on Apr 21, 2025*

# CONTENT

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# TECHNICAL DATA SHEET

**COMMON NAME:** Nonanoic Acid 57% EC (Pelargonic Acid 57% EC)
**CAS RN:** 112-05-0
**C.A. NAME: Nonanoic Acid**
**IUPAC name:** Nonanoic Acid

## PHYSICO-CHEMICAL PROPERTIES

**Form:** Light yellow transparent liquid
**Odor:** Slight chemical odor
**Mol. Weight.** 158.2
**Mol. Formula** $C_9H_{18}O_2$
**Melting point:** 12℃ (active ingredient)
**Boiling point:** 230-237℃(active ingredient)
**Vapor pressure:** 1 x $10^5$mPa (20°C).
**Solubility:** In water 0.032g/l (30℃)
**Stability:** Stable under normal storage conditions.

## APPLICATIONS

**Mode of action:** Post-emergence, contact herbicide and plant growth regulator.
**Uses**: The product was used for blossom thinning in apples and pears. Also as a herbicide, for annual weeds in potatoes and peanuts. Both nonanoic acid and its ammonium salt are used as a total herbicide in non-crop areas.

## MAMMALIAN TOXICOLOGY

**Acute oral:** $LD_{50}$ for rats and mice>5000mg /kg.
**Skin and eye:** Acute percutaneous $LD_{50}$ for rats >2000 mg/kg. Skin and eye irritant
**Inhalation:** $LC_{50}$ (4 h) for rats 5.29mg/l air.
**NOEL:** None data available
**Toxicity class:** WHO U, EPA III

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## ECOTOXICOLOGY

**Fish:** LC50 (48 h) for carp 59.2ppm

**Bees:** LD50（contact）： >25μg/bee

**Birds:** Dietary LC 50 for mallard ducks >5620ppm

**Daphnia:** LC(3h) for D. similis>100ppm

## ENVIRONMENTAL FATE

**Animals**: None known metabolites were available in animals. The Bio-concentration factor (BCF) is 101.

**Soil/Environment**: The product is non-persistent in soil. DT50(typical): 1.3d, DT50(lab at 20℃): 1.28d

# Nonanoic acid 57% EC

**PRECAUTIONARY STATERIENTS**
**WARNING**
**HAZARDS TO HUMANS AND DOMESTIC ANIMALS**
**KEEP OUT OF REACH OF CHILDREN:**

Harmful if inhaled or absorbed through the skin. Avoid contact with skin. eyes, or clothing. Avoid breathing spray mist. Wash thoroughly with soap and water after handling. Remove contaminated clothing and wash before reuse.

**COMPOSITION**

ACTIVE INGREDIENT: Nonanoic acid (CAS NO.: 112-05-0)…….....57.0%.
INERT
INGREDIENTS……......43.0%
TOTAL……..100%

**DISCLAIM**

The label instructions for the use of this product reflect the opinion of experts based on field use and tests. The directions are believed to be reliable and should be followed carefully. However, it is impossible to eliminate all risks inherently associated with use of this product. Crop injury, ineffectiveness or other unintended consequences may result because of use factors as weather conditions, presence of other materials, or the use or application of the product contrary to label instructions. all of which are beyond the control of Supplier/Manufacturer. All such risks shall be assumed by the user. We warrant only that the material contained herein conforms to the chemical description on the label and is reasonably fit for the use therein described when used In accordance with the directions for use, subject to the risks referred to above. Any damages arising from a breach of this womanly shall be limited to direct damages and shall not include consequential commercial damages such as loss of profits or values or any other special or indirect damages. We make no other express or implied warranty, including any other express or implied warranty of FITNESS or of MERCHANTABILITY.

**APPLICATION**

The active components of this product is Nonanoic acid. The product is a contact non-selective, broad spectrum, foliar-applied herbicide. The product will only control actively growing emerged green vegetation. It provides burndown of both annual and perennial broadleaf and grass weeds, as well as most mosses and other cryptogams. The degree of burndown and the longevity of control is less when the plants are inactive, mature, or biennial/perennial types.

Nonanoic acid is not translocated. It will burn only those plant parts that are coated with spray solution. It is a non-volatile, emulsifiable concentrate. It can be applied through most standard or field type sprayers after dilution and mixing with water in accordance with label instructions. For best results, uniform and complete coverage of target plants is required.

Visible effects on most weeds occur within hours. This product does not damage mature, non-green, woody parts of plants. Cool weather following treatment slows the activity of this product and delays or reduces visual effects.

This product provides no residual weed control. Repeat treatments will be necessary for new plants emerging from seed or regrowth of treated vegetation. Should residual control be desired, use a product labeled for the use situation.

| Crops | Target pest | Application rate |
|---|---|---|
| Non-cultivated field | Annual and perennial grasses and broad-leaved weeds | **Use rate:** 75 to 200 gallons of the spray solution per acre as a broadcast spray.<br><br>Use a 3-5% solution for control of annual weeds, mosses and cryptogams,<br><br>Use a 5-7% solution for burndown of perennial herbaceous plant, weeds in a later stage of growth and control of sucker growth.<br><br>Use a 7-10% solution when maximum vegetative burndown, edging, or foliar trimming is desired. |

Repeat application as required to maintain desirable level of weed control and to control plants emerging from seed and underground parts.

**STORAGE AND DISPOSAL**

Do not contaminate water, food, or feed by storage or disposal.

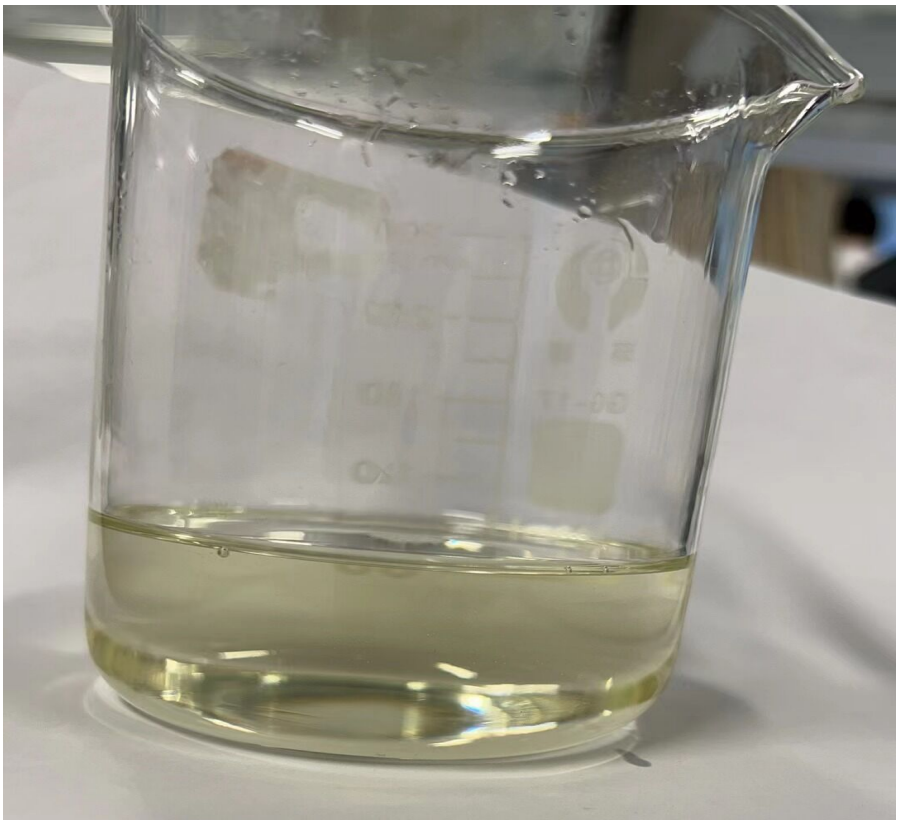
Storage: Store in a cool, dry place. Do not store with strong acid and base agents.

Pesticide Disposal: Wastes resulting from use of this product maybe disposed of on site or at an approved waste disposal facility.

Container Disposal: Triple rinse (or equivalent), then puncture and dispose of in a sanitary landfill, or by incineration, or if allowed by state and local authorities, by burning. If burned, stay out of smoke. Do not reuse container.

DO NOT apply this product to any water sites except treated, finished drinking water reservoirs or drinking water receptacles.

Shelf life: 2 years under normal storage conditions.



Nonanoic Acid 57% EC (Pelargonic Acid 57% EC)

# Biological Insecticides and Fertilizers

## Biological Insecticides :

- Bacillus Thuringiensis subsp Israelensis (Bti)
- Bacillus Sphaericus (Bs)
  Focus on mosquito larvicides

- Btt strain controls palm weevils effectively, mites and aphids which also damage other crops
- Btk strain targets palm tree pests

## Mircobial fertilizer Products :

- Multi-stain microbial consortiums for soil improvement and prevention of soil-borne diseases / pests
- Growth-promoting biofertilizers that enhance crop immunity and increase yields
- Specialized nitrogen-fixing microbial formulas to improve crops'nitrogen absorption capacity

Tailor made technical specifications and application guidelines can be prepared as per client requirements.

# Bacillus thuringiensis israelensis (Bti) and Bacillus sphaericus (Bs)

Bacillus thuringiensis (Bt) and Bacillus sphaericus (Bs) are naturally occurring soil bacterium found all over the world (Lambert & Peferoen, 1992). Part of its growth cycle may include a resilient spore phase when environmental conditions are not favourable, enabling it to survive adverse conditions for long periods of time. These strains are unique because of their ability to overproduce a small number of proteins which crystallize separately from the spore, forming parasporal crystals or insecticidal crystal proteins (ICP) (Baumann et al., 1991). Ingestion of these crystals by certain insect orders has a toxic effect which can lead to death. Due to the inherent stability, specificity and inert formation of ICP crystals, humans have isolated and produced successful biopesticides targeting specific insects. *Bt* and *Bs* differ slightly in specificity of binding to specific host gut epithelial receptors. Furthermore, application of *Bti* to clean water is more effective whereas *Bs* tends to be more effective in water that contains some organic pollution (Walker, 2002).

The mode of action of both strains of bacilli is similar in that larval ingestion of *Bti* or *Bs* ICP leads to its conversion into toxic fragments as a result of both protein digesting enzymes and the alkaline conditions in the stomach of the insect (Lambert & Peferoen, 1992). Specific receptor binding of *Bti* or *Bs* toxic fragments results in a structural deformation of the midgut epithelial cells along with corresponding disintegration of the microvillar membrane, ultimately destroying the insect midgut and leading to death. Due to this specificity of receptor binding found in specific insects, ingestion of *Bti* and *Bs* ICP by other non-target organisms are safe and non-harmful.

## HYPOTHESIS

Alternating application of Bti (briquette) and Bs (WDG) over the course of the rainy season (June to October) will decrease the incidence of new malaria infections indirectly as a result of decreased survival of mosquito larvae and dramatically reduced population of adult female mosquito vectors of malaria..

## APPLICATION DIRECTIONS

**Do not apply when wind speed favors drift beyond the area of treatment.**

| **Mosquito Habitat**<br>*(Such as the following examples):* | **Suggested Rate Range*** |
|---|---|
| Irrigation ditches, roadside ditches, flood water, standing ponds,<br>woodland pools, snow melt pools, pastures, catch basins, storm<br>water retention areas, tidal water, salt marshes and rice fields.<br><br>In addition, standing water containing mosquito larvae, in fields<br>growing crops such as: Alfalfa, almonds, asparagus, corn,<br>cotton, dates, grapes, peaches and walnuts, may be treated at the<br>recommended rates.<br><br>When applying this product to standing water containing<br>mosquito larvae in fields growing crops, do not apply this product | 0.5-1.5kg/ha |

| | |
|---|---|
| in a way that will contact workers or other persons, either directly<br>or through drift. Only protected handlers may be in the area<br>during application. | |
| Polluted water (such as sewage lagoons, animal waste lagoons). | 1-2 kg/ha |
| Use higher rate range in polluted water and when late 3rd and early 4th instar larvae predominate, mosquito populations are high, water is heavily polluted, and/or algae are abundant. | |
| **Blackflies Habitat** | **Suggested Rate Range** |
| Streams<br>Stream water (= ppm) for 1 minute exposure time<br>Stream water (= ppm) for 10 minutes exposure time | 0.5-25 mg/liter<br><br>0.05-2.5 mg/liter |
| Use higher rate range when stream contains high concentration of organic materials, algae, or dense aquatic vegetation.<br>Discharge is a principal factor determining carry of Bti. Use higher rate or increase volume<br>by water dilution in low discharge rivers or streams under low volume (drought) conditions. | |
| For control of nuisance flies (*Psychoda* spp., *Chironomus* spp.) in sewage treatment facilities utilizing trickling filter systems. | |
| | |

| **Nuisance Fly Habitat** | **Suggested Rate Range** |
|---|---|
| Trickling filter system of wastewater treatment plants | 10-20 mg/liter<br>a. (0.833-1.67 ml)<br>per liter of wastewater feed to the filter per 30 minutes |
| Use high rate for control of *Chironomus* spp. Apply undiluted with pre-calibrated pump or other device into the wastewater feeding into the filters for a period of 30 minutes. Repeat applications as needed after 2-4 weeks. Control of *Chironomus* spp. may take up to 2 weeks. | |

| **For control of *Chironomine* midges (*Chironominae: Chironomini*) inhabiting shallow, manmade and natural lakes or ponds.** | |
|---|---|
| **Nuisance Midge Habitat** | **Suggested Rate Range** |
| Shallow Lakes and Ponds per sewage oxidation ponds<br>(less than acre 6 feet deep) | 2kg<br>3.5 kg per ha |
| Apply diluted with water in total volume of 50kg/ha by pouring or spraying over the surface to be treated with pre-calibrated device. Repeat application as needed after 2-4 weeks. Control of *Chironomine* midges may take up to 2 weeks. | |

**GROUND AND AERIAL APPLICATION**

Bti WP may be applied in conventional ground or aerial application equipment with quantities of water sufficient to provide uniform coverage of the target area. The amount of water will depend on weather, spray equipment, and mosquito habitat characteristics. Do not mix more BtiWP than can be used in a 72-hour period. For most ground spraying, apply in 50-1000 Liter of water per ha using hand pump, airblast, mist blower, etc., spray equipment.

For aerial application, Bti WP should be applied diluted with water, fill the mix tank or plane hopper with the desired quantity of water. Start the

mechanical or hydraulic agitation to provide moderate circulation before adding the Bti WP. Bti WP suspends readily in water and will stay suspended over normal application periods. Brief recirculation may be necessary if the spray mixture has sat for several hours or longer.
AVOID CONTINUOUS AGITATION OF THE SPRAY MIXTURE DURING SPRAYING.
Rinse and flush spray equipment thoroughly following each use.
For blackfly aerial applications, Bti WP should be applied diluted via fixed wing or helicopter aircraft equipped with either conventional boom and nozzle systems or open pipes. Rate of application will be determined by the stream discharge and the required amount of Bti WP necessary to maintain a 0.5-25 ppm concentration in the stream water. Bti WP can also be applied diluted with similar spray equipment. Do not mix more Bti WP than can be used in a 72-hour period.

**CHEMIGATION**
Apply this product through flood (basin) irrigation systems. Do not apply this product through any other type of irrigation system.
Crop injury, lack of effectiveness, or illegal pesticide residues in the crop can result from nonuniform distribution of treated water.
A person knowledgeable of this chemigation system and responsible for its operation, or under the supervision of the responsible person, shall shut the system down and make necessary adjustments should the need arise.

**RICE-FLOOD (BASIN) CHEMIGATION**

Systems using a gravity flow pesticide dispensing system must meter the pesticide into the water at the head of the field and downstream of a hydraulic discontinuity such as a drop structure or weir box to decrease potential for water source contamination from backflow if water flow stops.

BtiWP is metered or dripped into rice floodwater at application stations positioned at the point of introduction (levee cut) of water into each rice field or pan. One kg of BtiWP is diluted in water to a final volume of 20L. The diluted solution is contained in a 20L container and metered or dispersed into the irrigation water using a constant flow device at the rate of 80 ml per minute. Introduction of the solution should begin when 1/3 to 1/2 of the pan or field is covered with floodwater. Delivery of the solution should continue for a period of approximately 41/2 hours. Floodwater depth should not exceed 10-12 inches to prevent excessive dilution of BtiWP which could result in reduced larval kill. Agitation is not required during the period in which the BtiWP solution is being dispersed. Application of BtiWP into rice floodwater is not permitted using a pressurized water and pesticide injection system.

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# Bacillus thuringiensis var. Tenebrionis $1\times10^{10}$CFU/g WP (Btt)

For the Control of Potato Beetle on Potatoes, Tomatoes, and Two spotted spider mite on vegetables.
ACTIVE INGREDIENT: Bacillus thuringiensis var. tenebrionis Technical Powder…….. . . . . .65%
OTHER INGREDIENTS. . . . . 35%
TOTAL . . . . . .. 100%
Spore count:$1\times10^{10}$CFU/g

## GENERAL USE INSTRUCTIONS

Btt WP is a highly effective biological insecticide containing the active protein crystal produced by Bacillus thuringiensis var. tenebrionis. Btt WP is recommended for use against the larval stage of the Colorado Potato Beetle, Leptinotarsa decemlineata, and two spotted spider mites. Btt WP is most effective against first and second instar larvae. Therefore, applications should be timed to coincide with the first egg hatch of the target pest. Applications should be followed by close scouting for signs of reinfestations. Reapply as necessary to maintain control.

Due to its unique mode of action, Btt WP must be ingested by the target insect larvae to be effective. Therefore, thorough coverage of the crop to be protected is essential for best results. Upon ingestion, the protein is activated under the specific gut conditions of the target insect causing general gut paralysis and cessation of feeding within hours. Death occurs in 2-5 days.

When larvae and adult beetles are present an effective adulticide with rapid knockdown activity should be used.

**Mixing:** Shake or stir Btt WP thoroughly before use.
Fill spray or mixing tank half full of water and begin agitation. Add the recommended amount of Btt WP into water while maintaining agitation. Add other spray materials, if any, and balance of water.
Do not allow diluted spray to remain in the tank for more than 72 hours.
While Btt WP is formulated to provide desirable coverage and adherence to crop surfaces, additional adjuvants, spreaders, or stickers may be added to improve product performance, especially under rainy conditions or heavy dew. Avoid application if rainfall is imminent.

Combinations with commonly used insecticides, fungicides, or other spray tank adjuvants are generally not deleterious to Btt WP if the tank mix is used promptly. Before mixing in the spray tank, it is advisable to test physical compatibility by mixing all components in a small container in proportionate quantities. Use of tank mixes should be in accordance with the most restrictive of label limitations and precautions. No label dosage rates should be exceeded. This product cannot be mixed with any product containing a label prohibition against such mixing.

## APPLICATION VOLUME

Btt WP may be applied by ground or aerial equipment with sufficient quantities of water to provide thorough coverage of plant parts to be protected. The amount of water needed per acre will depend upon crop size, weather, spray equipment, and local experience. Ground Application: Use the recommended amount of Btt WP in a minimum of 350L of water per ha. Aerial Application: Use recommended amount of Btt WP in a minimum of 60L of water per ha. Avoiding spray drift at the application site is the responsibility of the applicator. The interaction of many equipment- and weather-related factors determine the potential for spray drift. The applicator and the grower are responsible for considering all of these factors when making decisions.

## APPLICATION RATE

The Btt WP application rate depends on the population pressure and the stage of the larval development. For light to moderate populations of early instar larvae (newly hatched to 1/4 inch in length) apply 1 to 3kg of Btt WP per ha. Against heavy infestations of early instar larvae apply 2 to 3.5 kg per ha. When mixed populations of younger and older larvae are present, apply Btt WP at 3 to 5 kg per ha.

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# TECHNICAL DATA SHEET

## For Bacillus thuringiensis var. tenebrionis

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**For the Control of Colorado Potato Beetle on Potatoes, Tomatoes, and Eggplant, and Elm Leaf Beetle on Shade Trees and Ornamentals.**

ACTIVE INGREDIENT: *Bacillus thuringiensis* var. *tenebrionis technical powder*……..75%
OTHER INGREDIENTS……25%
TOTAL ……100%
POTENCY: 18,000 Leptinotarsa Units (LTU) per gram Percentage active ingredient, including potency unit measurements, should not be used to adjust use rates beyond those specified in the Directions for Use section.

## KEEP OUT OF REACH OF CHILDREN

## CAUTION

### 1.0 STATEMENT OF PRACTICAL TREATMENT

**If on Skin:** Wash with plenty of soap and water. Get medical attention.

**If in Eyes:** Flush with plenty of water. Call a physician if eye irritation persists.

### 2.0 PRECAUTIONARY STATEMENT

#### 2.1 HAZARDS TO HUMANS AND DOMESTIC ANIMALS

**CAUTION**

Causes moderate eye injury (irritation). Harmful if absorbed through the skin. Avoid contact with skin, eyes, or clothing.

#### 2.2 Personal Protective Equipment (PPE)

Some materials that are chemical-resistant to this product are listed below.

Applicators and other handlers must wear:

- Long-sleeved shirt and long pants
- Chemical-resistant gloves such as barrier laminate or butyl rubber or nitrile rubber or neoprene rubber or polyvinyl chloride or viton
- Shoes plus socks

Follow manufacturer's instructions for cleaning/ maintaining PPE. If no such instructions for washables, use detergent and hot water. Keep and wash PPE separately from other laundry.
Mixers/loaders and applicators must wear a dust/mist filtering respirator meeting NIOSH standard of at least N-95, R-95, or P-95. Repeated exposure to high concentrations of microbial proteins can cause allergic sensitization.

#### 2.3 User Safety Recommendations

Users should:

- Wash hands before eating, drinking, chewing gum, using tobacco, or using the toilet.

#### 2.4 Environmental Hazards

For terrestrial uses, do not apply directly to water, or to areas where surface water is present or to intertidal areas below the mean high water mark. Do not contaminate water when cleaning equipment or disposing of equipment washwaters.

### 3.0 DIRECTIONS FOR USE

It is a violation of local laws or regulations to use this product in a manner inconsistent with its labeling.

Do not apply this product through any type of irriga-tion system.

Do not apply this product in a way that will contact workers or other persons, either directly or through drift. Only protected handlers may be in the area during application. For any requirements specific to your State or Tribe, consult the agency responsible for pesticide regulation.

### 4.0 AGRICULTURAL USE REQUIREMENTS

Use this product only in accordance with its labeling. This Standard contains requirements for the protection of agricultural workers on farms, forests, nurseries and greenhouses, and handlers of agricultural pesticides. It contains requirements for training, decontamination, notification and emergency assistance. It also contains specific instructions and exceptions pertaining to the statements on this label about personal protective equipment (PPE) and restricted-entry interval. The requirements in this box only apply to uses of this product that are covered by the Worker Protection Standard.

Do not enter or allow worker entry into treated areas during the restricted entry interval (REI) of 4 hours.

PPE required for early entry to treated areas that is permitted under the Worker Protection Standard and that involves contact with anything that has been treated, such as plants, soil, or water, is:

- Coveralls
- Chemical-resistant gloves such as barrier laminate or butyl rubber or nitrile rubber or neoprene rubber or polyvinyl chloride or viton
- Shoes plus socks

### 5.0 STORAGE AND DISPOSAL

Do not contaminate water, food or feed by storage or disposal of waste.

**Storage**: Store in a cool place. Storage at temperatures between 5° C and 15°C is recommended for maximum product stability. Storage at temperatures above 30° C for an extended period should be avoided.

*CONTINUED*

## 5.0 STORAGE AND DISPOSAL (CONT.)

Keep containers tightly closed when not in use.

**Pesticide Disposal**: Pesticide waste resulting from the use of this product may be disposed of on site or at an approved waste disposal facility in accordance with federal and local regulations.

**Container Disposal**: Triple rinse (or equivalent). Then offer for recycling or reconditioning, or puncture and dispose of in a sanitary landfill, or by incineration, or, if allowed by state and local authorities, by burning. If burned, stay out of smoke.

## 6.0 GENERAL USE INSTRUCTIONS

Btt WP is a highly effective biological insecticide containing the active protein crystal produced by *Bacillus thuringiensis* subspecies *tenebrionis*. Btt WP is recommended for use against the larval stage of the Colorado Potato Beetle, *Leptinotarsa decemlineata,* and the Elm Leaf Beetle, *Pyrrhalta luteola*. Btt WP is most effective against first and second instar larvae. Therefore, applications should be timed to coincide with the first egg hatch of the target pest. Applications should be followed by close scouting for signs of reinfestations. Reapply as necessary to maintain control.

Due to its unique mode of action, Btt WP must be ingested by the target insect larvae to be effective. Therefore, thorough coverage of the crop to be protected is essential for best results. Upon ingestion, the protein is activated under the specific gut conditions of the target insect causing general gut paralysis and cessation of feeding within hours. Death occurs in 2-5 days.

When larvae and adult beetles are present an effective adulticide with rapid knockdown activity should be used.

**Mixing:** Shake or stir Btt WP thoroughly before use. Fill spray or mixing tank half full of water and begin agitation. Add the recommended amount of Btt WP into water while maintaining agitation. Add other spray materials, if any, and balance of water.

Do not allow diluted spray to remain in the tank for more than 72 hours.

While Btt WP is formulated to provide desirable coverage and adherence to crop surfaces, additional adjuvants, spreaders, or stickers may be added to improve product performance, especially under rainy conditions or heavy dew. Avoid application if rainfall is imminent. Combinations with commonly used insecticides, fungicides, or other spray tank adjuvants are generally not deleterious to Btt WP if the tank mix is used promptly. Before mixing in the spray tank, it is advisable to test physical compatibility by mixing all components in a small container in proportionate quantities. Use of tank mixes should be in accordance with the most restrictive of label limitations and precautions. No label dosage rates should be exceeded. This product cannot be mixed with any product containing a label prohibition against such mixing.

## 7.0 APPLICATION VOLUME

Btt WP may be applied by ground or aerial equipment with enough water to provide thorough coverage of plant parts to be protected. The amount of water needed per acre will depend upon crop size, weather, spray equipment, and local experience.

**Ground Application:** Use the recommended amount of Btt WP in a minimum of 200L of water per hectare.

**Aerial Application:** Use recommended amount of Btt WP in a minimum of 30 L of water per hectare.

Avoiding spray drift at the application site is the responsibility of the applicator. The interaction of many equipment- and weather-related factors determine the potential for spray drift. The applicator and the grower are responsible for considering all these factors when making decisions.

## 8.0 APPLICATION RATE

Btt WP application rate depends on the population pressure and the stage of the larval development. For light to moderate populations of early instar larvae (newly hatched to about 0.65mm in length) apply 2.5kg to 7.5kg of Btt WP per hectare. Against heavy infestations of early instar larvae apply 5 to 7.5kg / hectare. When mixed populations of younger and older larvae are present, apply Btt WP at 7.5kg to 10kg of Btt WP per hectare.

## 9.0 NOTICE OF WARRANTY

**WE MAKES NO WARRANTY OF MERCHANTABILITY, FITNESS FOR ANY PURPOSE, OR OTHERWISE, EXPRESS, OR IMPLIED, CONCERNING THIS RODUCT OR ITS USES WHICH EXTEND BEYOND THE USE OF THE PRODUCT UNDER NORMAL CONDITIONS IN ACCORD WITH THE STATEMENTS MADE ON THIS LABEL. IN NO CASE SHALL THE SELLER BE LIABLE FOR CONSEQUENTIAL, OR INDIRECT DAMAGES RESULTING FROM THE USE OR HANDLING OF THIS PRODUCT. ALL SUCH RISKS SHALL BE ASSUMED BY THE BUYER.**

# Bacillus thuringiensis var.kurstaki 16000IU//μl ES (Btk)

**Bacillus thuringiensis var. kurstaki** (Btk) ES is an emulsifiable oil-based suspension of functional microbial Btk strain designed especially for forestry applications. It can be sprayed undiluted for ultra-low volume applications, and it disperses readily into water or oil-based carriers to form a low viscosity spray suitable for conventional or low volume aerial applications. The oil formulation uses a paraffinic mineral oil which is highly refined and hydro-treated to further purify and remove any potentially toxic substances which may be found in some mineral oils. Btk ES does not contain formaldehyde, benzene, xylene, or other solvents of toxicological concern. When applied undiluted or when tank-mixed with water, Btk ES is slightly acidic, but it is not seriously corrosive to fittings normally encountered on mixing and application. Btk is mildly acidic to ensure product storage stability and to optimize its efficacy. For calibration purposes Btk formulations exhibit the following physical characteristics:

1.1 Physical Properties of Btk ES

Appearance: Brown colored liquid

Potency: 16000IU/μl

Specific Gravity: 0.94 +/- 0.20

Weight: 0.94 +/- 0.20 kg/L

Dispersibility: Miscible with water, diesel fuel, kerosene, agricultural spray oils

**Partial list of insects controlled with Btk ES**

| Common name | Scientific name | Suggested dose ( L/ha) |
|---|---|---|
| Coconut blackheaded caterpillar | Opisina arenosella Walker | |
| Pine Processionary | *T. pityocampa* | 2-5 |
| Nun moth | *L. monachal* | 2-5 |
| Pine moth | *Dendrolimus pini* | 2-5 |
| Pine beauty moth | *Panolis flammea* | 2-5 |
| Pine Looper moth | *Bupalis pinarius* | 2-5 |
| Fir & Larch tortricids | *Zeiraphera spp* | 2-5 |
| Gypsy moth | *L. dispar* | 2-5 |
| Green Oak tortrix | *T. viridana* | 2-4 |
| Oak Processionary | *T. processionaria* | 2-4 |
| Fall Webworm | *H. cunea* | 2-4 |
| Brown tailmoth | *E. chrysorrhoea* | 1-2 |
| Tent caterpillars | *Malacasoma spp* | 1-2 |
| Ermine moths | *Yponomeuta spp* | 1-2 |
| Vapourer moth | *O. antiqua* | 1-2 |
| Winter moth | *O. bumata* | 1-2 |

# Mircobial fertilizer Products (Biofertilizers)

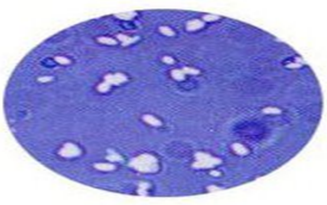
Biofertilizers are the substance that contains microorganism's living or latent cells. Biofertilizers increases the nutrients of host plants when applied to their seeds, plant surface or soil by colonizing the rhizosphere of the plant. Biofertilizers are more cost-effective as compared to chemical fertilizers.

## Type of Biofertilizer :

1.Bacteria
2.Fungi
3.Cyanobacteria

1. **Bacteria**
   The nitrogen-fixing nodules on the roots of legumes. The nodules are formed by the association of the bacterium 'Rhizobium' with the roots of these plants. This association is beneficial and is, therefore, called 'symbiotic'.The nodules help in fixing atmospheric nitrogen into organic forms which can then be used as nutrition by the plants. Bacteria also act as biofertilizers include Azospirillum and Azotobacter. These bacteria are free-living in the soil. Azotobacter is usually used with crops like cotton, wheat, mustard, maize etc.

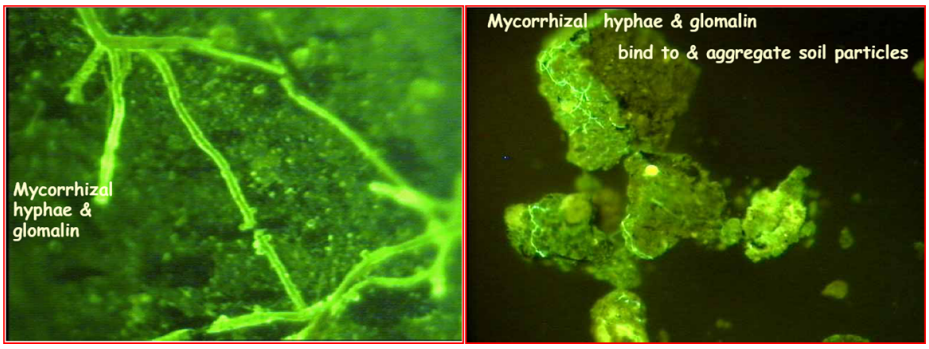

Root Nodule



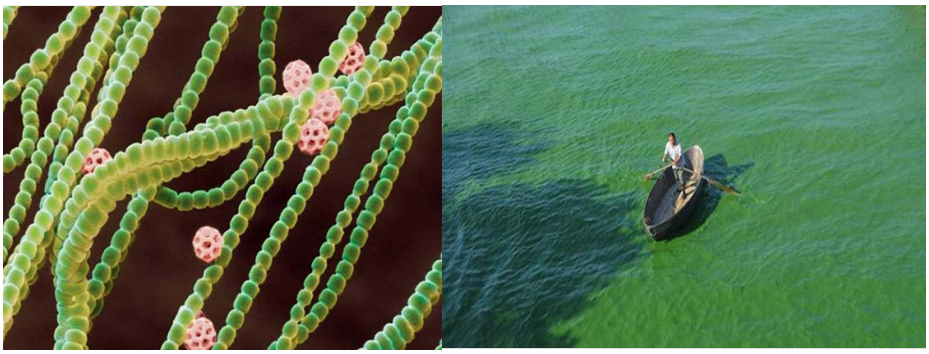

Rhizobia

2. **Fungi**
   Symbiotic associations exist between plants and fungi too. These associations are called 'Mycorrhizae'. The fungus in this association absorbs phosphorus from the soil and provides it to the plant. Plants that grow with these associations also show other advantageous characteristics such as:

- Tolerance to drought conditions and salinity.
- Resistance to root-borne pathogens.
- An overall increase in plant growth and development.




3. **Cyanobacteria**
   These are blue-green bacteria found in water and on land. They also help fix atmospheric nitrogen. Examples are Oscillatoria, Nostoc, Anabaena etc. The symbiotic association between the aquatic fern Azolla and Anabaena is very important for rice fields. In this association, Anabaena receives carbon and nitrogen from the plant in exchange for fixed nitrogen. This adds organic matter to the soil enhancing the fertility of rice fields.



**Working Mechanisms of Biofertilizers :**

- Bio fertilizers fix atmospheric nitrogen in the soil and root nodules of legume crops and makes it available to the plant.
- They solubilize the insoluble forms of phosphates like tri-calcium, iron and aluminum phosphates into available forms.
- They decompose organic matter and help in mineralization in soil.
- They scavenge phosphate from soil layers.
- Benefits from Applying Biofertilizers
- Renewable source of nutrients
- Sustain soil health
- Supplement chemical fertilizers.
- Replace 25-30% chemical fertilizers
- Increase the grain yields by 10-40%.
- Decompose plant residues, and stabilize C:N ratio of soil
- Benefits from Applying Biofertilizers
- nImprove texture, structure and water holding capacity of soil
- nNo adverse effect on plant growth and soil fertility.
- Stimulates plant growth by secreting growth hormones.
- Secrete fungistatic and antibiotic like substances
- Solubilize and mobilize nutrients
- Eco-friendly, non-pollutants and cost effective method

**Limitations of Biofertilizers :**

- Never mix with chemical nitrogen fertilizers.
- Never apply with fungicides, plant ash etc. at the same time.
- Never directly expose to sunlight.
- Do not keep used solution overnight.
- Store at room temperature, not below Oº C and over 35º C.

# Biological Fungicides

- Bacillus Amyloliquefaciens (Soil-borne diseases, registered)
- Bacillus Amyloliquefaciens (Leaf diseases, extended registration)
- Trichoderma (Leaf diseases, soil-borne diseases, registration trials underway)
- Pseudomonas, Bacillus (Bacterial diseases, nematodes)

## Certified Patents

### *Directed Controlled Fermentation*

The liquid fermentation control technology based on metabolic flow analysis, carbon and nitrogen source nutrition and chemical chaperone regulation is used to achieve the large-scale fermentation of high density and highly resistant microorganisms.

### ***Mircoencap Sulation***

The active ingredient is wrapped in the capsule wall material to make micron-level small spheres, and the active ingredient is closed in the capsule, which can inhibit adverse environmental factors, significantly improve the stability of microorganisms, and significantly extend the shelf life. This technology is the first in the world, which not only effectively solves the problem of storage and transportation, but also greatly reduces the production cost of pesticides, and significantly improves the application effect of biological pesticides.

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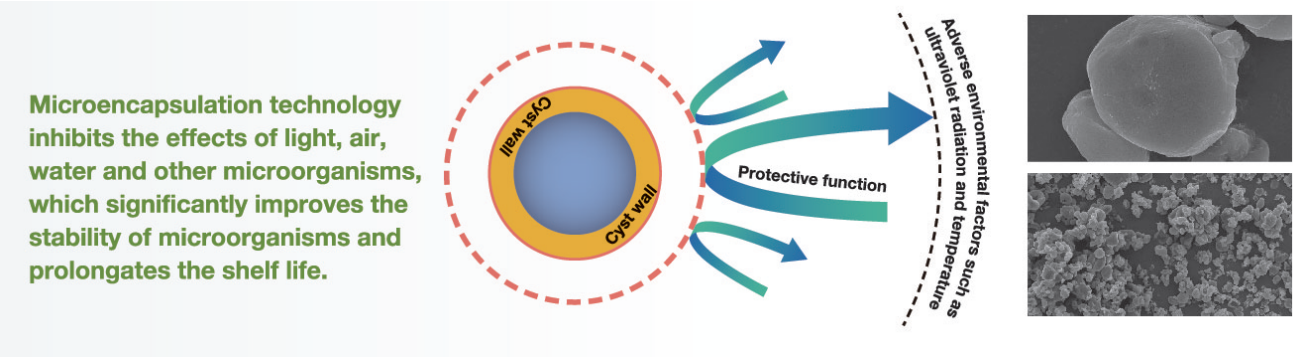



## *Advantages of new technology*

Targeted control fermentation and microencapsulation preparation technology can improve the effective utillzation rate, prolong the shelf life and stabilize the control effect.

The microencapsulation dosage form is leading in the world. Patented technology, strong stress resistance, long shelf life, all water soluble, can have slow release function. Drip irrigation and drone spray available.

Significantly improve the application effect and application range of microbial pesticides. Solve the bottleneck problem of industrialization of microbial pesticides with short shelf life. Large scale production of trichoderma can be achieved by using liquid fermentation technology to produce chlamydospore. Solve the worldwide problem that trichoderma cannot scale production.

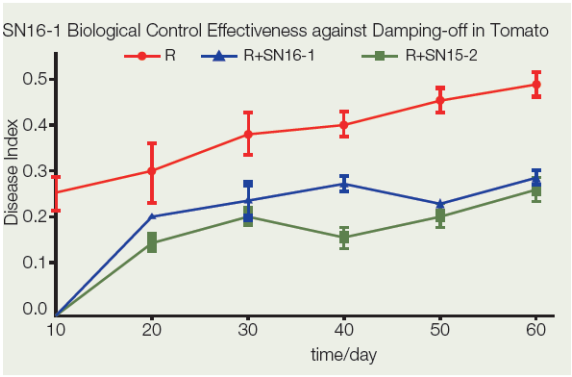
Efficient and clean production, the production process is green, economic, no waste water, waste residue, waste gas generation.

PACIFIC AGRISCIENCE

**Pacific Agriscience (Hong Kong) Company Limited**

## *Biofungicide Example and testing result on Tomato*

Biofungicide is based on the Bacillus amyloliq-uefaciens SN16-1 strain covering a broad spectrum of disease control that sets the standard for quality purity and performance reliability.It delivers several modes of action in the fight against fungal and bacterial pathogens. Stargus is effective against a long list of foliar and soil-borne plant diseases, including some of the most persistent and hard to control like Downy Mildew, Botrytis, Fusarium and White Mold. This innovative product uses the Bacillus rhizobacterium to colonize root and plant surfaces, which prohibits the pathogens from accessing the plant. It also has protective effect by inducing a systemic resistance and acquired resistance response within the plant and a cura-tive effect by inhibiting mycelial growth and sporulation of the fungus on the leaf surface.




1.0×108 CFU/g Bacillus amyloliquefaciens SN16-1 inhibition rates for 30 plant pathogenic fungi

| Pathogenic fungi | Hypostatic radius(mm) | Hypostatic radius (%) | Incubation time(d) |
|---|---|---|---|
| *Fusarium graminearum* | 12.1 | 70.0 | 12 |
| *Verticillium albo-atrum* | 13.3 | 66.3 | 10 |
| *Colletotrichum orchidearum Allesch* | 7.6 | 81.3 | 14 |
| *Colletotrichum gloeosprioides* | 6.6 | 83.8 | 14 |
| *Alternaria fasciculata* | 4.9 | 87.5 | 9 |
| *Corynespora cassiicola* | 8.7 | 78.7 | 9 |
| *Alternaria longipes* | 10.3 | 75.0 | 9 |
| *Alternaria solani* | 9.9 | 76.2 | 8 |
| *Rhizoctonia solani* | 5.0 | 86.3 | 9 |
| *Colletrichum capsici* | 13.3 | 67.6 | 9 |
| *Sclerotinia sclerotioum* | 11.2 | 71.3 | 14 |
| *Gibberella sanbinetti* | 11.0 | 72.4 | 8 |

### Use Recommendations:

The root should be irrigated once after tomato emergence,

the stem base should be sprayed once every 7-10 days, and can be used 2-3 times.

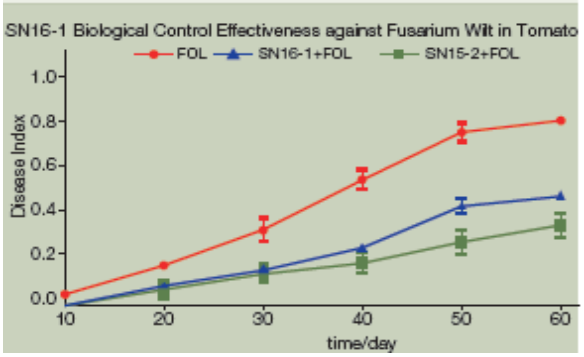
Water consumption: 60-100 kg / mu, spray water consumption: 30-60 kg / mu.

### Target Crops:

- Fruiting Vegetables
- Strawberry
- Tomato
- Paddy

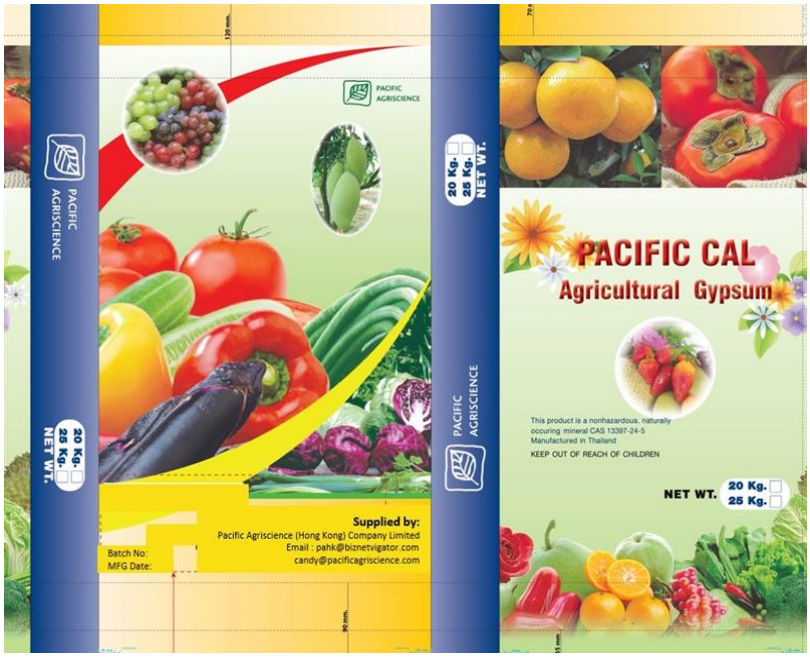
### Target Diseases:

- Alternaria
- Rhizoctonia
- Botrytris
- Powdery Mildew
- Fusarium



# Pacific Cal (Natural Gypsum)

- IFOAM Organic Certificate
- Gypsum (Calcium Sulphate Dihydate) comes from a natural mine in Thailand
- It is a Soil Conditioner (Active Content : 95%)
- It can be in powder or granule form
- It can be used as Secondary Fertilizer by adding micronutrients as S, Mg, Zn, B
- Product can be custom-made by adding different micronutrients as per client's requirements
- Nice bag design



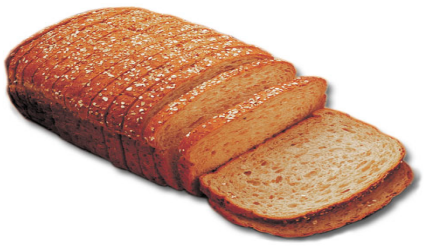
**Pacific Cal can be applied in different series, such as:**

***Agri & Aqua Series***

Secondary Fertilizer (Ca, S, Mg, Zn, B, Hydrogel) - Powder & Granular
Flocculated Soil Conditioner
Aquaculture & Water Treatments (Flocculants, Buffer, $Ca^{2+}$)

***Food Series***

Food Additive (Coagulant, Ca Supplemental Nutrition)
Beer and Wine Fermentation ($Ca^{2+}$)



***Feed Series***

***Feed Additive (Calcium Supplement Nutrition)***
***Animals & Pet***

Collaborative Opportunities
* Calcium Sulphate is normally used as a key ingredient in our negative DCAD mineral formulations.

***Dairy Castle***

Acid forming feed additive formulations
Create a slight metabolic acidosis in cattle

Trigger the release of calcium into the bloodstream when the cow calves

DCAD = $(N^{a+}+K^{+}) - (Cl^{-}+S^{2-})$