

## General Use and Application Guidelines

BioAct®WP is a water dispersible powder for the control of plant parasitic nematodes in agricultural soils. It can be applied using drip irrigation, with conventional spraying equipment or other irrigation systems (e.g. pivot irrigation) in order to give effective control of nematode pests. BioAct®WP should be applied regularly to prevent the build-up of nematodes that can cause crop losses.

### MIXING DIRECTIONS FOR APPLICATION:

- First determine the amount of BioAct®WP required to give the recommended concentration for the particular BioAct®WP application method.
- Clean the (spray) tank from pesticide residues before using it for the BioAct®WP application.
- Fill the (spray) tank with clean water to about three-quarters full and then add the recommended amount of BioAct®WP.
- Agitate the (spray) tank for a few minutes and then fill it up with clean water. During application, the (spray) tank should be kept agitated.
- For best results, the mixture must be prepared immediately prior to application. Do not allow the mixture to stand for any time.
- Never tank-mix BioAct®WP with fungicides!

### Application Program for Vegetables, Strawberries, Ornamentals and Tobacco

	Timing	Rate	Type of application
First application	<b>A Pre-Planting Soil-Treatment</b>	<b>2 gram per 100 plants</b> Increase application rate, if the product is applied to the row.	Apply BioAct®WP suspended in water by spraying or pouring just to the spots where the plants will be located later on. Water the product in after application by using drip or overhead sprinkler irrigation. Doing so, the soil should be moistened up to a depth of 20 cm.
	Soil treatment 14 days before planting	Use 0.4 gram per each 10 cm row width for every 10 meter of the row.	■ <b>or alternatively:</b> Apply the product through the drip irrigation system.
Second application	<b>B Seedling Treatment</b>	For 1000 litres of potting soil use 10 gram product in a sufficient amount of water.	Dissolve BioAct®WP in the needed amount of water and water in evenly over seedling/transplant trays or pots just before transplanting. Make sure that the whole potting mix is completely soaked by the prepared product suspension. Always combine this treatment with A (pre-planting soil treatment) and C (post-planting drench)!
	Just before planting		
Following applications	<b>C Post-Planting Drench</b>	<b>2 gram per 100 plants</b>	Apply the suspended BioAct®WP through the drip irrigation system (recommended).
	Repeatedly every 6 weeks after planting	Increase application rate, if the product is applied to the row.  Use 0.4 gram per each 10 cm row width for every 10 meter of the row.	■ <b>or alternatively:</b> Water in 200-500 ml of the suspension around base of each plant. ■ <b>If the above application methods are not possible:</b> Spray the soil around the basis of the plants and drench in afterwards with sufficient amount of water using the irrigation system.

In transplant and post-planting applications ensure that BioAct®WP is properly distributed around and through the root system of the treated plant after the product has been drenched into the soil. Water is used simply as the carrier to deliver the fungal spores into the rhizosphere and the amount can be varied with different soil types.

### Application Program for Bananas

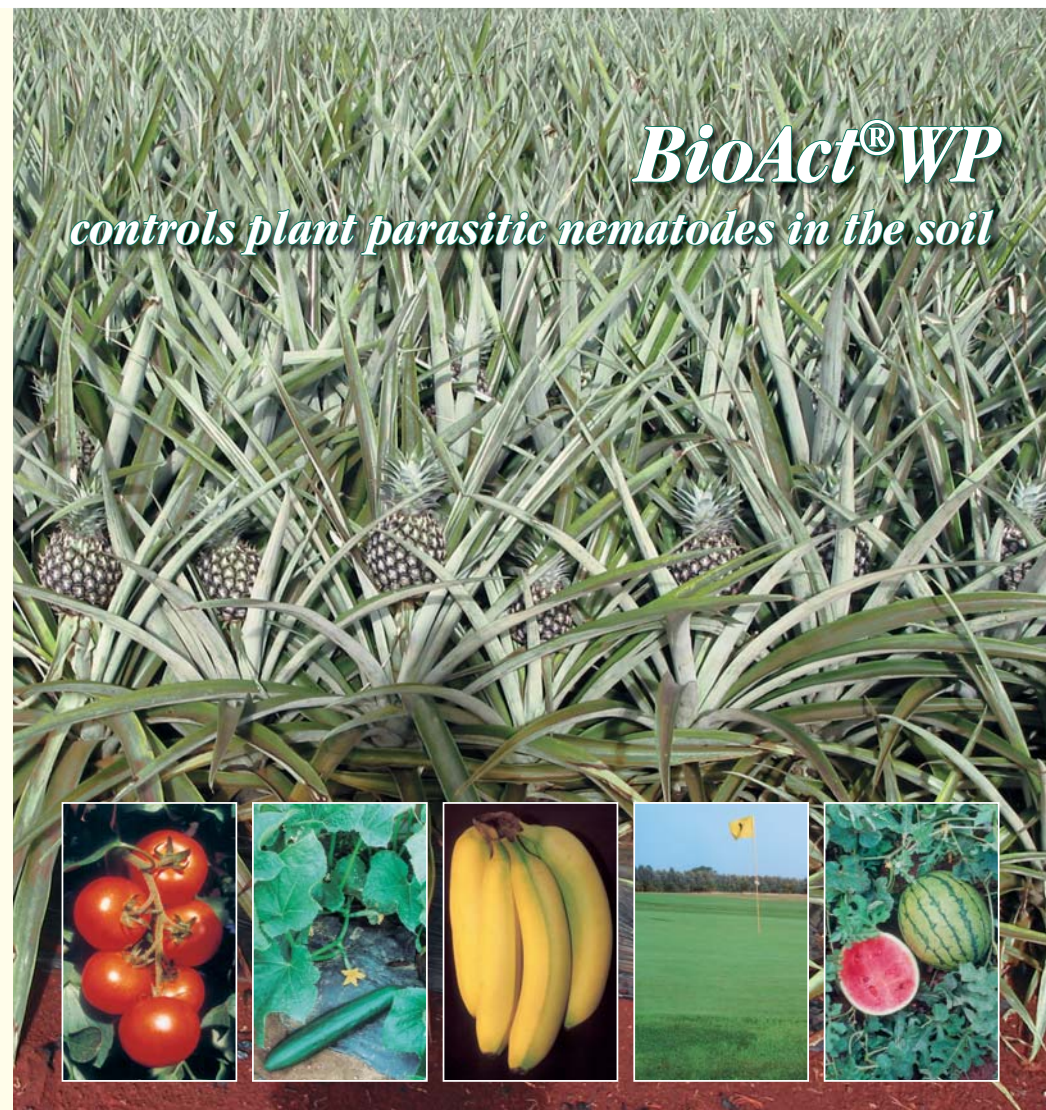
Treatment	Timing	Rate	Type of application
Treatment of the potting mix in the nursery	At transplanting last set before the transplants get planted in the field	For 1000 litres of potting soil use 10 gram product in a sufficient amount of water	Dissolve BioAct®WP in the needed amount of water and drench the product into the pot soil. Make sure that the whole potting mix is completely soaked by the prepared product suspension.
First treatment of the plants in the field	At transplanting in the field	40 gram BioAct®WP in 30 litres of water per 200 plants	Prepare spore suspension and apply 75 ml/plant at planting in the planting hole and another 75 ml onto the refilled soil directly after planting. Drench the product in using an appropriate irrigation system.
Established plants	Repeated treatments at intervals of four months	40 gram BioAct®WP in 30 litres of water per 200 plants	Prepare spore suspension and spray 150 ml/plant uniformly in the area covered by 15 cm radius around the daughter sucker. Drench the product in using an appropriate irrigation system. ■ If no irrigation system is available apply before or during rain (optimum 50 mm water).

### Application Program for Citrus, Nuts, Peach and Grapevines

Treatment	Timing	Rate	Type of application
Spray product suspension outward from stem to cover root system	Repeated treatments at intervals of four month	For 50 m <sup>2</sup> of soil use 50 gram product in 20 litres of water (1 gram/m <sup>2</sup> )	Prepare spore suspension and spray 2.5 litres per m <sup>2</sup> around stem base. Drench the product in using an appropriate irrigation system. ■ If no irrigation system is available apply before or during rain.

### Application Program for Turf, Golf Course and Sod Production

Treatment	Timing	Rate	Type of application
Treatment of the soil	Just before or together with first overhead sprinkler irrigation after sowing/ planting	For 100 m <sup>2</sup> surface use 40 gram product in 20 litres of water (0.4 gram/m <sup>2</sup> )	Prepare spore suspension and spray 0.2 litres per m <sup>2</sup> uniformly and follow immediately by first overhead sprinkler irrigation (at least 10 mm). ■ Or, use an overhead sprinkler irrigation system to apply the product. ■ If no irrigation system is available apply before or at rain.
Treatment of established turf	Repeated treatments at intervals of 6 weeks	For 100 m <sup>2</sup> surface use 20 gram product in 20 litres of water (0.2 gram/m <sup>2</sup> )	Prepare spore suspension and spray 0.2 litres per m <sup>2</sup> uniformly and follow immediately by overhead sprinkler irrigation (at least 20 mm). ■ Or, use an overhead sprinkler irrigation system to apply the product. ■ If no irrigation system is available apply before or during rain.



BioAct®WP controls plant parasitic nematodes in the soil

BioAct®WP

**prophyta**

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BioAct®WP

the biological nematicide

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## BioAct® WP provides natural and effective control of plant parasitic nematodes

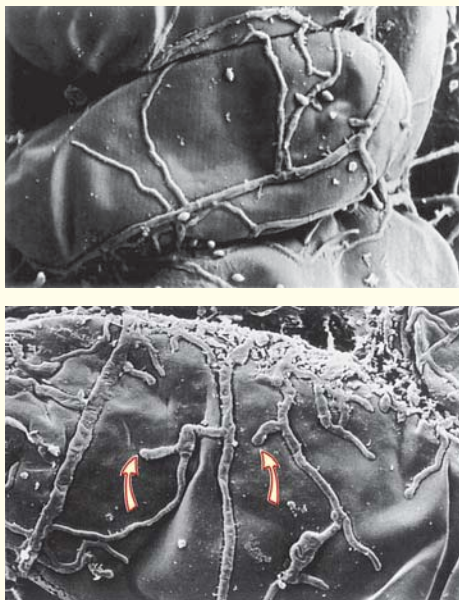
Nematodes or eelworms are major soil pests affecting horticultural and agricultural crops. They cause severe damage and crop losses if they are not controlled.

Harmful soil nematodes infect the roots of plants. They impede the take-up of water and nutrients and weaken the root system of affected plants. The nematode species involved are world-wide in their distribution and collectively cause billions of dollars of crop damage every year.

BioAct® WP is a water dispersible powder formulation to control plant parasitic nematodes. The active ingredient of BioAct® WP is spores of the naturally occurring fungus *Paecilomyces lilacinus* Strain 251. BioAct® WP is a freeze-dried formulation containing 10<sup>11</sup> viable spores per gram.

The fungus *Paecilomyces lilacinus* is strongly parasitic to all stages of development of common plant infecting nematodes. Spores of the fungus adhere to the cuticle of vermiform stages of the nematodes as they migrate through the soil. The spores of *Paecilomyces lilacinus* germinate and the growing fungus penetrates the cuticle and overwhelms the nematode. The hyphae of the fungus can also enter the nematode through body openings, such as the anus and vulva. The developing fungus kills the nematode by feeding on its body contents. In this way the nematode eggs also get attacked and parasitised. In effect, the fungus acts as a parasite of the nematode.

Mycelia of *Paecilomyces lilacinus* Strain 251 growing on the eggs of *Meloidogyne* sp. Arrows show where the fungus is penetrating the egg. SEM images provided by Rita Holland®.



Plant parasitic nematode species controlled by BioAct® WP  
BioAct® WP controls infestations of the common plant parasitic nematodes. The product is particularly effective against the nematode species listed in the table below. On the other hand, BioAct® WP does not affect in any way entomopathogenic and other beneficial free living soil nematodes.

The following plant infecting nematode species are controlled by BioAct® WP:

<i>Radopholus similis</i>	-	Burrowing Nematode
<i>Meloidogyne</i> spp.	-	Root Knot Nematode
<i>Heterodera</i> spp. and <i>Globodera</i> spp.	-	Cyst Nematode
<i>Rotylenchulus reniformis</i>	-	Reniform Nematode
<i>Nacobbus</i> spp.	-	False Root-Knot Nematode
<i>Helicotylenchus</i> spp.	-	Spiral Nematode
<i>Belonolaimus</i> spp.	-	Sting Nematode
<i>Hoplolaimus</i> spp.	-	Lance Nematode
<i>Pratylenchus</i> spp.	-	Root Lesion Nematodes

## Economically Important host plants of plant parasitic nematodes

Any plants suffering from plant parasitic nematode infection can be treated with BioAct® WP. Common crops that are infected include banana, black pepper, citrus, peach, nuts, coffee, cotton, okra, papaya, peanut, pineapple, potato, ramie, strawberry, sugarcane, tea, tobacco, tomato, eggplant, cucumber, melons, legumes and other vegetable crops, as well as ornamental plants and turf.

Root knots on tomato caused by *Meloidogyne* sp.  
Photograph by Heinz Decker®.



BioAct® WP can be used as part of an Integrated Pest Management (IPM) system

## Features of BioAct® WP

- Water dispersible powder formulation.
- Easy mixing and simple application through conventional equipment.
- Stable formulation of a naturally-occurring biological control organism.
- Contains 10<sup>11</sup> viable spores per gram of the patented fungus *Paecilomyces lilacinus* Strain 251.
- Used as pre-planting, transplant and post-planting treatments.
- Easy to handle and apply.

## Benefits of Using BioAct® WP

- No adverse effects on the beneficial organisms or on the ecosystem.
- No adverse effects on human beings and animals.
- Repeated use may provide long term protection.
- No adverse effect on subsequent crops.

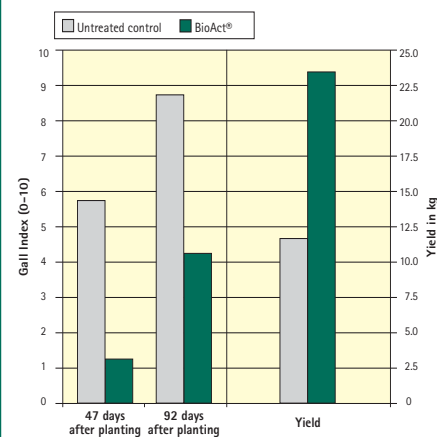
## BioAct® WP Storage

BioAct® WP degrades slowly over time, whereby the shelf life is dependent on the storage temperature. The unopened vacuum sealed BioAct® WP bag has a shelf life according to the table.

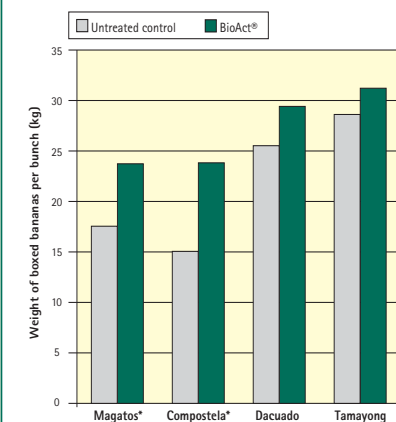
Storage temperature	-10 °C	+4 °C	+20 °C
Shelf life in month (at least)	24	12	6

It is recommended to store the product in a cool place away from heat sources. Avoid long-term exposure to temperatures above 25 °C.

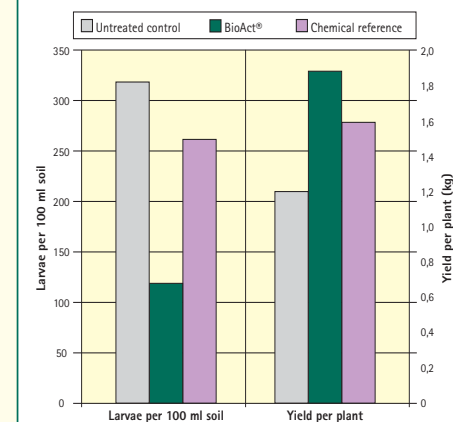
Effect of BioAct® controlling *Meloidogyne incognita* on Cucumber in Greece 2004 (GEP-trial); Application: 14 days prior to planting, at planting and 6 weeks after planting; Last harvest made 92 days after planting.



Effect of regular treatment of BioAct® on banana yield in four Demonstration Farms in Mindanao, the Philippines showing statistically significant differences (\* P < 0.01)



Effect of BioAct® controlling *Meloidogyne incognita* on Tomato in Italy 2004 (GEP-trial); Nematode species: *Meloidogyne incognita*; Application: 14 days prior to transplanting, at transplanting and 4 applications in 6, 12, 18 and 24 weeks thereafter



Trial sponsored by INTRACHEM BIO ITALIA S.p.A.