

INSECTICIDE

NATURALIS-L[®]



An oil dispersion formulation containing
7.16% w/w *Beauveria bassiana* ATCC 74040 (2.3×10^7 CFU ml⁻¹).

A bio-insecticide for the control of whitefly in all edible crops (protected) and ornamental plant production (protected).

The product will also provide a reduction in thrips.

For use only on crops under permanent protection

Product Registration Number: **MAPP 14655**

A biological, non-chemical insecticide containing a naturally occurring specific strain of an insect pathogenic fungus.

Unique mode of action allows control of whitefly, reduction of thrip and potentially controlling a wider range of pests whilst offering a new means of combating pesticide resistance with no chemical residue.

Usable within chemical and biological pest control programmes.

fargro[®]

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ALWAYS READ THE LABEL: USE PESTICIDES SAFELY

NATURALIS-L®

- Contains a naturally occurring insect pathogenic fungus.
- Controls whitefly, reduces thrips and has potential to control other pests.
- Unique biological mode of action. An ideal resistance management tool.
- Leaves no chemical residues.
- Usable on a wide range of protected crops.
- Usable in IPM or biological pest control programmes.

The following text is taken from the approved product label:

RESTRICTIONS

Do not apply through spray nozzle filters which are less than 50 mesh.

Do not apply using irrigation equipment.

NATURALIS-L should not be tank mixed with any other product. After a NATURALIS-L treatment, leave at least 48 hours before applying a fungicide. The effects of fungicides applied before a NATURALIS-L treatment has not been fully evaluated. Some fungicides may reduce effectiveness of NATURALIS-L.

RESISTANCE

NATURALIS-L has not been reported to have any insect resistance. However, it is good practice to use such products as components of Integrated Pest Management systems, alternating with other control measures. This is particularly important for sequential crops.

The effects of NATURALIS-L on natural enemies has not been fully established, some adverse effects may occur, for example on *Encarsia* sp.

DIRECTIONS FOR USE

IMPORTANT : This information is approved as part of the product label. All instructions within this section must be read carefully in order to obtain safe and successful use of this product.

NATURALIS-L is a bio-insecticide containing viable spores of the fungus *Beauveria bassiana*, strain ATCC 74040, a naturally occurring and non genetically modified fungus. It is applied for the control of all stages of whitefly and for the reduction of thrips in crops under permanent protection. The fungus has a unique mode of action: conidiospores germinate to produce a penetration hypha, which when inside the insects body proliferates to cause insect desiccation and death.

PEST CONTROL

NATURALIS-L controls adult and larval stages of whitefly species which belong to the family Aleyrodidae, including the glasshouse whitefly *Trialeurodes vaporariorum* and provides a reduction in numbers of adult and larval

stages of thrips species, including Western Flower Thrips, *Frankliniella occidentalis*.

CROP RECOMMENDATIONS

NATURALIS-L is for use on all edible crops (protected) and ornamental plant production (protected). NATURALIS-L has been used on a wide range of crops under a range of conditions. Little phytotoxicity has been seen at recommended rates. Before making applications it is advisable to test NATURALIS-L on a small area of crop.

APPLICATION RATE & FREQUENCY

NATURALIS-L is to be applied at a concentration of 0.3% v/v (i.e. 3 litres in 1000 l water). It should be applied with a fine spray, ensuring complete coverage of the plant, to the point just before run-off. Applications should be carried out in the morning or in the evening when adults fly less and relative humidity is higher. Apply at the very first appearance of whitefly or thrips on the crop, and repeat the application at intervals of no less than 5 days, up to

a maximum of 5 treatments.

EFFICACY

The optimal conditions for NATURALIS-L efficacy is when the temperature is between 20°C and 30°C, and the relative humidity is over 60%.

MIXING AND SPRAYING

Spraying equipment must be clean and free of pesticide residues. Before measuring out the product, gently rotate the product container to ensure that spores are evenly mixed within the concentrate. Initially, make a solution in half the final volume of water. Once the product is completely dispersed, make up to the

final volume with the remaining amount of water. When mixing, continually agitate the solution to ensure that the spores are evenly dispersed. Agitation of the solution when spraying will prevent spore sedimentation. After application, rinse out the spraying equipment several times with water and leave to air dry before being returned to store.

STORAGE

NATURALIS-L is a biological product and has a guaranteed shelf-life of 1 year at room temperature. The product preferably should be stored at 4-5°C to retain maximum spore viability.

DO NOT FREEZE.

SAFETY PRECAUTIONS

Operator Protection

Engineering control of operator exposure must be used where reasonably practicable in addition to the following personal protective equipment:

WEAR SUITABLE PROTECTIVE CLOTHING (COVERALLS) AND SUITABLE PROTECTIVE GLOVES when handling the concentrate.

WEAR SUITABLE PROTECTIVE CLOTHING (COVERALLS), SUITABLE PROTECTIVE GLOVES AND SUITABLE RESPIRATORY PROTECTIVE EQUIPMENT* when applying by vehicle-mounted or trailed equipment or applying by hand.

*Disposable filtering facepiece respirator to at least EN149 FFP2 or equivalent.

However, engineering controls may replace personal protective equipment if a COSHH assessment shows they provide an equal or higher standard of protection.

IF YOU FEEL UNWELL, seek medical advice immediately (show the label where possible).

WHEN USING DO NOT EAT, DRINK OR SMOKE.

IN CASE OF CONTACT WITH EYES OR SKIN, RINSE IMMEDIATELY with plenty of clean water.

AVOID CONTACT WITH SKIN AND EYES.

WASH HANDS AND EXPOSED SKIN before meals and after work.

USE ONLY IN A WELL VENTILATED AREA.

DO NOT BREATHE SPRAY.

Environmental Protection

Do not contaminate water with the product or its container. Do not clean application equipment near surface water and avoid contamination via drains from farmyards and roads.

Storage and disposal

KEEP AWAY FROM FOOD, DRINK AND ANIMAL FEEDING STUFFS.

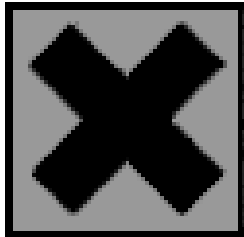
KEEP OUT OF REACH OF CHILDREN.

KEEP IN ORIGINAL CONTAINER, tightly closed, in a safe place.

DO NOT RE-USE CONTAINER FOR ANY OTHER PURPOSE.

WASH OUT CONTAINER THOROUGHLY, empty washings into spray tank and dispose of safely.

The (COSHH) Control of Substances Hazardous to Health Regulations may apply to the use of this product at work.

NATURALIS-L	An oil dispersion containing 7.16% w/w <i>Beauveria bassiana</i> strain ATCC 74040 (2.3×10^7 CFU ml ⁻¹).
	<p>R42 May cause sensitisation by inhalation.</p> <p>R43 May cause sensitisation by skin contact.</p>
	<p>S23 Do not breathe spray.</p> <p>S24 Avoid contact with skin.</p> <p>S37 Wear suitable gloves.</p> <p>S45 In case of accident or if you feel unwell seek medical advice immediately (show the label where possible).</p> <p>S51 Use only in a well ventilated area.</p>
Xn-HARMFUL	
<p>To avoid risk to man and the environment, comply with the instructions for use.</p>	

IMPORTANT INFORMATION			
FOR USE ONLY AS AN AGRICULTURAL / HORTICULTURAL INSECTICIDE			
Crops	Max.individual dose (l / ha)	Max. number of treatments (per crop)	Latest time of application
All edible crops (protected) Ornamental plant production (protected)	3	5	Not applicable
<p>READ THE LABEL BEFORE USE. USING THIS PRODUCT IN A MANNER THAT IS INCONSISTENT WITH THE LABEL MAY BE AN OFFENCE. FOLLOW THE CODE OF PRACTICE FOR USING PLANT PROTECTION PRODUCTS.</p>			

Approval Holder:
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 Cambridgeshire
 PE19 8EP

24 hour emergency Number for NATURALIS:
 0032 1458 4545

WARRANTY: The seller makes no warranty, expressed or implied, with regard to the use of the product other than that indicated on the label. The purchaser and user shall assume all risk associated with use and/or handling and/or the storage of the product, if this use and/or handling and/or storage are carried out contrary to the instructions on the label.

® NATURALIS-L is a registered trademark of Intrachem Bio Italia S.p.A

Safety data sheet available on request.

Pack size: 1 litre, **Outers of:** 12.

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TECHNICAL NOTES FOR NATURALIS-L®

These notes are designed to support the main product manual insert on NATURALIS-L and give advice on how to obtain the best possible pest control from the product.

Description:

NATURALIS-L is a biological insecticide (biopesticide) containing spores of a specific unique strain (ATCC 74040) of the naturally occurring fungus *Beauveria bassiana*. It is used to control foliar pests in protected edible and ornamental crops. It is formulated in a vegetable oil for spore stability and ease of use.

Background:

The fungus *B. bassiana* was discovered by Agostino Bassi in 1835 causing disease in domestic silkworm. NATURALIS-L contains the specific strain ATCC 74040 of *B. bassiana* which was isolated from the cotton boll weevil. This strain has been included in annex I of EC 91/414 and NATURALIS-L is approved in the UK as a crop protection insecticide under the Plant Protection Products Regulations. This strain is naturally occurring and not genetically modified.

NATURALIS is sold in Italy, Greece, Switzerland, Germany, Slovenia, Spain, Turkey, Morocco and Austria and is used throughout these countries to control a wide range of insect and mite pests.

Pest Targets:

NATURALIS-L has label recommendations for

the control of whitefly and reduction in numbers of adult and larval stages of thrips. It has activity on a range of other pest species.

Whitefly: including Glasshouse whitefly (*Trialeurodes vaporariorum*), tobacco whitefly (*Bemisia tabaci*) and honeysuckle whitefly (*Aleyrodes loniceræ*).

Thrips: Western flower thrips WFT (*Frankliniella occidentalis*). High levels of control can be achieved in cucumber, but in trials only partial control (c.30%-50%) was achieved in strawberry, where thrips are concealed inside flowers. Starting a treatment sequence early may be critical.

Spider mites: Including Two-spotted spider mite (*Tetranychus urticae*), carmine mite (*Tetranychus cinnabarinus*) and tomato russet mite (*Aculops lycopersici*). Trials have shown good control of these pest species with adult, nymph and ovicidal activity (egg stage).

Capsids: (*Lygocoris*). Reasonable levels of control have been reported in independent trials.

B. bassiana is also reported to have activity against aphids, caterpillar, leafhopper, shore fly and sciarid flies, but experience is limited and control can not be relied upon.

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Why Use NATURALIS-L?

- Within a conventional pest control programme:

NATURALIS-L has a unique mode of action and can be part of an insecticide resistance management programme.

As another means of pest control where pests have developed chemical resistance.

Where a chemical pesticide could leave a residue.

Where there is no approval for use of a chemical pesticide on the crop.

To minimise environmental problems from use of chemical pesticides.

- As part of a chemical pesticide reduction strategy.
- Within integrated pest management (IPM) or biological pest control programme.

NATURALIS-L can be used as a second line of defence when pest/predator ratios become out of balance.

As an early stage prevention treatment particularly in propagation units.

Crops:

NATURALIS-L may be used on all protected edible and ornamental plant production crops. This includes high wire salad crops (tomato, pepper, cucumber), protected soft fruit (strawberry, raspberry, blackberry), protected pot and bedding plants, protected nursery stock and AYR chrysanthemums (potted and soil-grown).

Little phytotoxicity has been seen but before making applications it is advisable to test NATURALIS-L on a small area of crop.

Mode of Action:

The active agent within NATURALIS-L is a naturally occurring soil born fungus, *B. bassiana*. Spores germinating on the insect cuticle will enable fungal penetration and proliferation within the insect causing desiccation and death. Insect activity is disrupted soon after infection although death would be later (typically 3-5 days). Mobile pests can pick up the infective spores from the leaf surface. Dead insects tend to fall to the floor and thus infections from sporulation tend not to be self sustaining, although localised infections (epizootics) can occur.

What are the symptoms in an infected insect:

The first indication of death of sedentary insects, such as whitefly scales, is usually a change of colour. Subsequently under the correct environment a creamy white spore mass may be produced on the dead insect. There is a tendency for dead insects to fall off the plant although heavily infested plants may be left showing dead insect bodies.

What are the best environmental conditions?

NATURALIS-L contains a living organism and as such the environment affects activity. There will be activity between 10 and 37°C within the relative humidity range of 50-100% but optimal conditions are temperatures between 20 and 30°C with a relative humidity over 60%. Sporulation occurs at over 80% humidity.

How fast does it work?

Under optimum conditions infection takes 24-48 hours and death 3-5 days and spores are produced which persist for about 3 days.

What is the effect of sunlight?

Sunlight (ultra violet light) can reduce viability of the spores although the oil within the formulation offers some protection.

When to use it?

NATURALIS-L may be applied at first signs of the pest as a spot application or whole crop treatment. It may also be applied as a corrective measure at any time during the growing season.

Biological control agents:

NATURALIS-L can be used within biological pest control programmes.

NATURALIS-L has been classified as non-toxic (less than 25% mortality) to the following beneficial organisms:

Amblyseius, *Aphidius*, *Diglyphus*, *Encarsia* and *Phytoseiulus*. There is limited data to show it is compatible with *Chrysoperla*, *Steinernema*, *Anthocoris*, *Orius* and *Macrolophus* in some situations.

A gap of 2 days is advised between application and new releases.

Safety to bumble bees:

Use the bee lock to prevent bees entering the crop when spraying. Bees can be released after spray deposits have dried.

MIXING AND SPRAYING

Type of Spray:

NATURALIS-L should be applied with a fine spray, ensuring complete coverage of the plant to the point just before run off. NATURALIS-L can be applied to the crop with conventional spraying equipment, including knapsack sprayers.

Time of application:

Applications should be carried out in the morning or in the evening when adults fly less and the relative humidity is higher.

What interval should be left between sprays?

The minimum interval between applications is 5 days and the manufacturer recommends for best results to reapply after 5 days.

What is the maximum number of treatments allowed?

A maximum of 5 treatments is allowed per crop.

Harvest Interval:

There is no latest time of application, so NATURALIS-L can be used up to harvest.

What is the application rate?

The label rate for NATURALIS-L is 3 litres in 1000 litres of water per hectare. However trials have shown that a concentration of 1.5 litres per 1000 litres provides similar control in most situations.

Different crops and crop growth stages require different water volumes to achieve adequate crop coverage. To meet efficacy and regulatory requirements, the following NATURALIS-L rates are recommended by the manufacturer:

1.5 l/ha where water volumes of 500 - 1000 l/ha are used.

3.0 l/ha where a water volume of 2000 l/ha or above is used.

By increasing the water volume above 2000 l/ha (whilst maintaining the NATURALIS-L rate at the permitted maximum of 3 l/ha), the solution concentration becomes diluted below the desired target concentration of 0.15%v/v (150ml/100litres). Under these circumstances the need for repeat applications is likely.

Trials with low volume air-assisted sprayers have also been successful. The efficiency of the spraying equipment in achieving good crop coverage at reduced water volumes (ie. 300 l/ha) is critical to control. If in doubt, always use high water volumes (over 1000 l/ha).

Knapsack sprayer rate: 15ml / 10 litres of water.

Are there any special requirements with regard to spray preparation?

Ensure that spraying equipment is clean and free of residues particularly of fungicides which may be harmful.

Before measuring the product gently rotate the bottle to ensure that spores are evenly distributed within the concentrate.

Initially make a solution in half the final volume of water. Once the product is completely dispersed make up the final volume of water with the remaining amount of water.

Maintain continuous agitation of the spray tank to prevent spore sedimentation.

Spore Activation:

It may be beneficial to activate the spores in the formulation prior to spray application. To do this measure out the required quantity of NATURALIS-L, mix this with a small quantity of water in a bucket (typically 300ml in 10 litres) and leave for 2-3 hours prior to spraying.

Spores that have been in water for too long may become very soft and liable to damage in the sprayer. Therefore ensure that spray solutions have been used within a maximum

of 5 hours after mixing with water.

After application rinse the sprayer several times with water and leave to air dry before returning to store.

COMPATIBILITY WITH FUNGICIDES

NATURALIS-L contains spores of a fungus so care is required in the application of other fungicides.

The label advises that NATURALIS-L should not be tank mixed with any other product and an interval of at least 48 hours should be left before applying another fungicide. The following notes may help plan a programme.

Group 1 fungicides (relatively safe and it may be safe to apply at about the same time):

Copper oxychloride, fosetyl-aluminium, propamocarb, quinoxyfen, sulphur.**

**sulphur formulated as a spray.

(Vapourised sulphur would be more harmful).

Group 2 fungicides (leave 2 or more days before or after the fungicide treatment):

Bacillus subtilis, iprodione, myclobutanil, thiram.

Group 3 fungicides (leave 4 or more days before or after the fungicide treatment):

Azoxystrobin, bupirimate, captan, chlorothalonil, cyprodinil + fludioxonil, fenhexamid, kresoxim-methyl, mepanipyrim, penconazole, pyrimethanil.

COMPATIBILITY WITH OTHER CROP PROTECTION AGENTS

Most acaricides and insecticides used in a programme would not interfere with the activity of NATURALIS-L.

ADDITIONAL WETTERS

Because of the oil based formulation additional wetters would not normally be required.

SHELF LIFE

NATURALIS-L has a 12 month shelf life when stored at room temperature (20°C).

The production date is stamped on each individual bottle.

To retain maximum spore viability it would be best to store at 4-5°C.

When opened ideally store at fridge temperature (4-7°C).

NATURALIS-L is a registered trademark of Intrachem Bio Italia, and is marketed in the UK by Belchim Crop Protection.

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