FUTURECO BIOSCIENCE

# ECOLETTER

## NOFLY EXCEEDS THE BIOLOGICAL STANDARD EFFICACY AND PROVES ITS RELEVANCE IN THE REDUCTION OF CHEMICAL TREATMENTS

**#37** Periodic publication on efficacy and characteristics of Futureco Bioscience products.

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### INTRODUCTION

Cultivated tomato is the second most consumed vegetable in the world, with an area devoted to its production higher than 5 million hectares. *Bemisia tabaci* remains one of the most economically important pests of vegetable and ornamental crops worldwide. This pest may decrease the rate of photosynthesis in plants through the excretion of honeydew during feeding, besides being able to transmit a large number of plant pathogenic viruses. Global tomato production has also been severely affected by whitefly-transmitted begomoviruses, particularly the species Tomato Yellow Leaf Curl Virus (TYLCV).

Chemical pesticides are the most widely used method to control *B. tabaci* infestation. The excessive use of these chemicals has led to numerous problems, such as health risk to users and consumers of farm produce, the development of pest resistance, and the destruction of non-target organisms. In recent years, researchers have shown an increasing interest in using biological control agents including entomopathogenic fungi (EPF) as an alternative to chemical control measures.

NOFLY WP is a biological contact insecticide formulated with spores of the entomopathogenic fungus *Cordyceps fumosorosea* strain FE9901, property of Futureco Bioescience and developed as a biocontrol method against whiteflies (*Bemisia, Trialeurodes, Lecanoideus, Aleurodicus*), aphids and thrips (*Frankliniella occidentalis)*.

Integrated Pest Management (IPM) is an internationally recognized approach to pest control and is intended to reduce ecological and health damage caused by chemical pesticides. The IPM program for *B. tabaci* includes biological control, crop plant resistance, physical and mechanical methods, and using selective chemical pesticides when necessary. *B. tabaci* can be effectively controlled by integrating multiple biological control agents, including products based on EPF as NOFLY WP.

The aim of this work was to evaluate the efficacy of NOLFY WP alone and in combination with Pyriproxyfen and Acetamiprid as an integrated pest management approach, evaluating its efficacies in comparison with chemical and biological standard treatments.

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## MATERIALS AND METHODS

The experiments were set in Ponta Grossa, Paraná, Brazil. Two trials were set up, one under **greenhouse conditions** and the other in an **open commercial field**. These two locations were selected because infestation of *B. tabaci* occurred naturally.

The treatments included in the trials were three different doses (1kg, 2kg, and 3 kg) of **NOFLY WP** (*C. fumosorosea* strain FE9901, 18% w/W, 2x109 CFU's/g), at 500L/ha **applied 3 times every 7 days**. These different doses of NOFLY WP were compared with the application of ***B. bassiana* 30%** - the biological reference - at 0.25kg/ha **2 times every 14 days** (1x109 CFU's/g) and with the most used chemical active ingredients for the control of *B. tabaci* on tomato, **Pyriproxifen 10% w/V** at 0.25 L/ha and **Acetamiprid 200 g/kg** also applied **3 times every 7 days**.

Moreover, we included three more assays with NOFLY WP at 1 kg/ha combined with Pyriproxyfen and Acetamiprid, simulating an integrated pest management approach. In this combined treatments, **Pyriproxyfen and Acetamiprid were applied together with NOFLY** at the beginning of the assay (application A) or in the second application (B, just for Pyriproxyfen).

Evaluations were made before the first application (0 days after A, 0 DAA) as reference, and every 7 days, just before the next application (7 DAA and 7 DAB). Two last evaluations were made after the last application, C (5 and 10 DAC).

In each evaluation, 10 central leaflets were selected from 5 random tomato plants per plot, and the number of whitefly adults, nymphs and eggs per leaflet was counted.

Phytotoxicity was also evaluated at 1 and 3 days after first application and 1 and 3 days after the second.

## RESULTS AND DISCUSSION

The results in the greenhouse trial showed that **NOFLY has similar to better efficacies against whitefly than those presented by the biological standard** (based on *B. bassiana*) both against nimph and adults. Indeed at the end of the trial, 5 days after the last application, NOFLY WP presented better efficacies of reduction of adults with 66, 72 and 74% efficacy respectively compared to 59% of whitefly adults reduction achieved by the biological standard (Table 1, purple square). Also in greenhouse, the efficacy of NOFLY against whitefly nimphs at the end of the trial was fairly similar or slightly lower (74% efficacy at 1kg/ha,

66% at 2kg/ha, and 74% efficacy at 3kg/ha) to that presented by the biological standard (74% efficacy - see Table 2, purple square).

Regarding the comparison with chemical standards in greenhouse trial the application of NOFLY WP showed similar to better efficacies on whitefly adults reduction (66, 72 and 74% respectively), compared to the chemical standards based on Pyriproxyfen (72%) and Acetamiprid (78%; Table 1, red square). In the nymphs essay, the chemical standards presented the higher efficacies (Table 2, red square).

Testing the use of NOFLY as a way to reduce the chemical treatments we found out that the combination of 2 treatments of NOFLY (1 kg/ha,) with one only treatment of the chemical standards resulted in similar or even higher efficacies (87% with pyriproxifen and 89% with acetamiprid, Table 1, orange square) than the chemical applied alone, 3 times (88% and 81% respectively) on whitefly adults. On nimphs, the the combination of NOFLY with Pyriproxifen (with only one chemical treatment) resulted in slightly higher efficacies compared to the application of the chemical alone (3 times) with efficacies of 85,9% and 91,7% respectively (Table 2,orange square).

The results of the field trial showed overall efficacies lower than those achieved at the greenhouse trial, for NOFLY but also for the biological and chemical standard products.

In comparison with the biological standard in open field, NOFLY showed a similar or better performance, compared to the biological standard, against whitefly eggs (at all tested dosis equal or more than 31% reduction of the biological standard), while achieved a better reduction of whitefly nimphs, but only at the higher dosis (3 Kg/ha, 55,2 % reduction vs 44,8% of the biological standard)(Table 3).

When combined with standard chemical treatments and applied only 2 times, NOFLY (at 1 kg/ha) obtained slightly lower results to the chemical product applied 3 times on their own, both in the case of whitefly nimphs or eggs (Table 3).

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Table 1: ADULTS % - Greenhouse trial

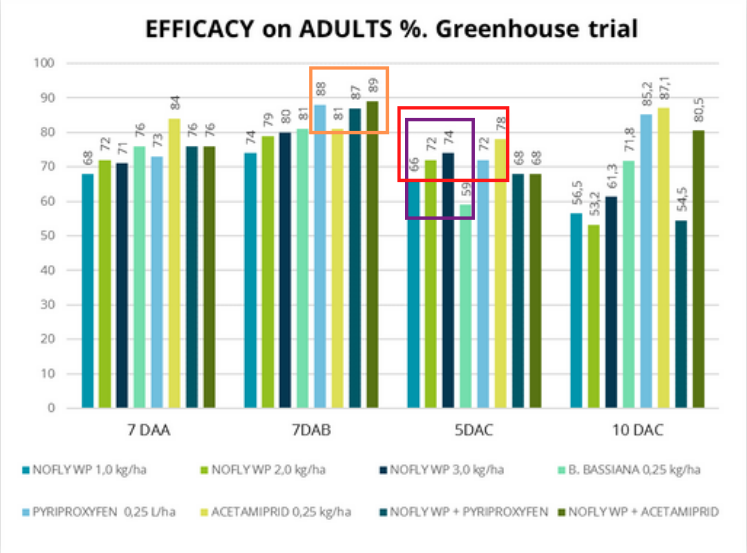



Table 2: NYMPHS % - Greenhouse trial

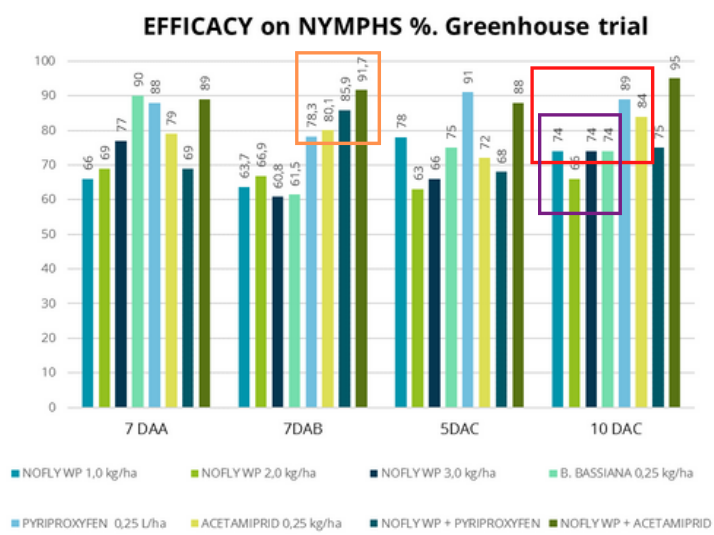
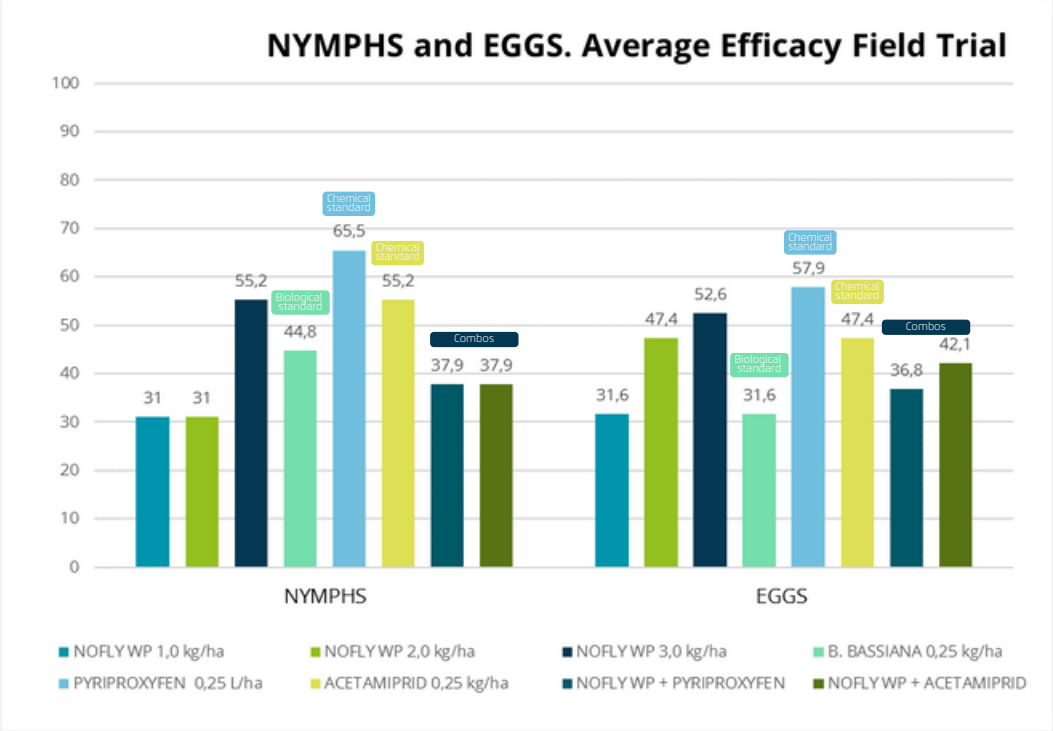



Table 3: NYMPHS & EGGS - Average Efficacy of 3 trials

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## CONCLUSIONS

NOFLY is an optimal tool to control whiteflies in tomato crops, and shows similar to better results than the biological standard. NOFLY can be applied alone or in combination with other pest control products. In combination with chemical standards products NOFLY could reduce the *B. tabaci* population reducing the number of chemical treatments and maintaining percentage of reduction between 42% and 37% depending on the chemical and the conditions.

According to the results the dose of 1kg/ha of NOFLY is adeguate to manage for the whitefly management in tomato plants.

NOFLY WP is a great tool to reduce broad spectrum chemical insecticides applications for the control of whiteflies.


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Futureco Bioscience SA, Avenida del Cadí 19-23, Sant Pere Molanta 08799, Olèrdola (Barcelona), España.