

Efficacy of NOFLY WP against Western Flower Thrip (*Frankliniella occidentalis*) on Pepper in greenhouse conditions.

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Introduction

NOFLY WP is a biological insecticide containing spores of *Paecilomyces fumosoroseus* strain FE 9901. This product is being successfully introduced to control whitefly in commercial greenhouses. Following the EU approval of this microorganism as a new active substance (EU Regulation 378/2013), a continuous development work is being carried out to extend its use to other potential host pests.

Thrips, and particularly *Frankliniella occidentalis*, is currently one of the most harmful pests for growers. It produces both direct damages on fruits and plants and indirect damages by transmission of viruses such as Tomato Spotted Wilt Virus (TSWV). The control of this pest is difficult due to its small size, its ability to generate resistance to synthetic insecticides and lack of effective biological alternatives.

There are several reports in the open literature about potential of *P. fumosoroseus* to infect some Thrips species, but most of them are laboratory or semi-field (pots) assays. The objective of this trial was to verify the potential of strain FE 9901 to control *F. occidentalis* under practical conditions of use by applying the formulation NOFLY WP at different doses.

Materials and Methods

The efficacy of NOFLY WP to control western flower thrip (*Frankliniella occidentalis*) was assessed on Pepper cultivar "Callosi" in a commercial greenhouse in Valencia, Spain. NOFLY WP was applied 3 times (A-B-C) at three doses (50g/hL, 100g/hL and 200g/hL). A standard product (a.i. Acrinatrin 7.5%) was used as control applied at 0.06%.

The experimental design was Randomized Complete Block (RCB) with 4 repetitions per treatment in plots of 10.2 m² area. Adults and larvae from 25 flowers/plot in 14 plants (100 flowers/treatment) were counted at each application time (0-DAA, 0DAB, 0DAC) and 7 days after the last treatment (7DAC).

The first application (A) was done when the pest threshold was reached and the next applications (B, C) were performed at 7 days intervals. At first application day (A), plants showed 176 adult thrips and 45 larvae on 25 flowers/plot in average. The initial population in all the treatments were homogeneous.

Data were evaluated with a suitable statistical analysis after transformation, when necessary, into Log(x+1). Efficacy values were calculated according to the ABBOTT formula based on the total number of thrips (adults and larvae):

$$\% \text{ Efficacy} = [(\text{Not treated} - \text{Treated}) / \text{Not Treated}] \cdot 100$$

Results

Table 1. Number of adults of *Frankliniella occidentalis* on 25 flowers/plot

Crop growth stage		BBCH 64		BBCH 65		BBCH 67		BBCH 69	
Interval application assessment (days)		0 DA-A		0 DA-B		0 DA-C		7 DA-C	
Treatment and Rate	App Code		NK 5%		NK 5%		NK 5%		NK 5%
Untreated	ABC	129,8	A	153,5	A	132,8	A	116,8	A
NOFLY WP 50g/hL	ABC	110,3	A	92	B	60,5	B	56,3	B
NOFLY WP 100g/hL	ABC	143,8	A	67,5	B	4,5	B	36,3	B
NOFLY WP 200g/hL	ABC	138,8	A	94,3	B	53,8	B	42,5	B
ACRINATRIN (7,5%) 0,06%	ABC	131,8	A	54,3	B	24,8	B	22,3	B

NK = Newman-Keuls test ($\alpha = 5\%$)



Fig 1. *Frankliniella occidentalis* also named Western flower thrip, is a very important pest in agriculture as it feeds on over a wide range of different species of host plants, including a large number of fruit, vegetable, and ornamental crops. The insect damages the plant in several ways being the major cause by ovipositing in the plant tissue. The plant is also injured by feeding, which leaves holes and areas of silvery discoloration when the plant reacts to the insect's saliva. Nymphs feed heavily on new fruit just beginning to develop from the flower. The western flower thrip is also the major vector of tomato spotted wilt virus, a serious plant disease.



Fig 2. Commercial product NOFLY WP



Fig 3. NOFLY characteristic icons. By order, NOFLY is suitable for: horticultural crops, greenhouse crops, field crops, fruit crops, ornamentals and cereals. It is a highlight of Futureco Bioscience SAU considered the first fully developed and registered from Spain bioinsecticide, approved for marketing by the European Union product. Sold in packs of 500g, and used as plant protection in IMP as suitable for use in organic farming.



These trials were performed by Promo-Vert Crop Services, in Xàtiva, Valencia for the R&D Laboratories of Futureco Bioscience.

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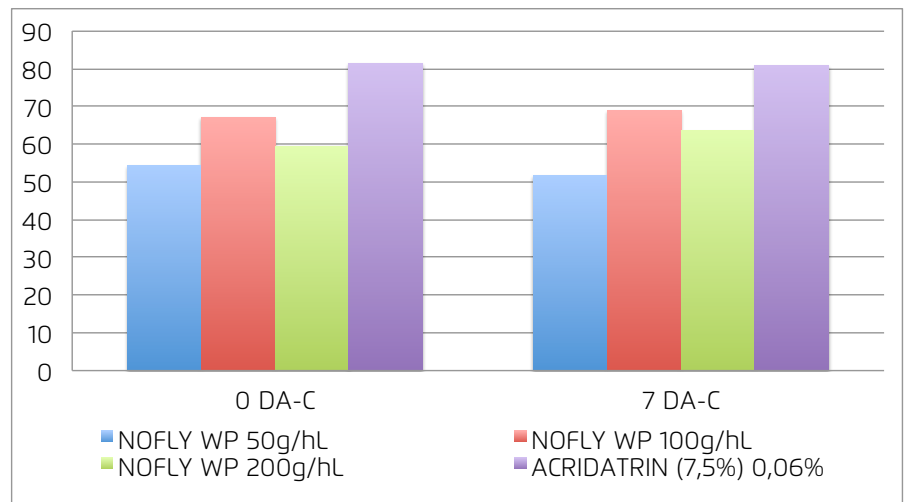
Good for your crops, good for the environment

Table 2. Number of larvae of *Frankliniella occidentalis* on 25 flowers/plot

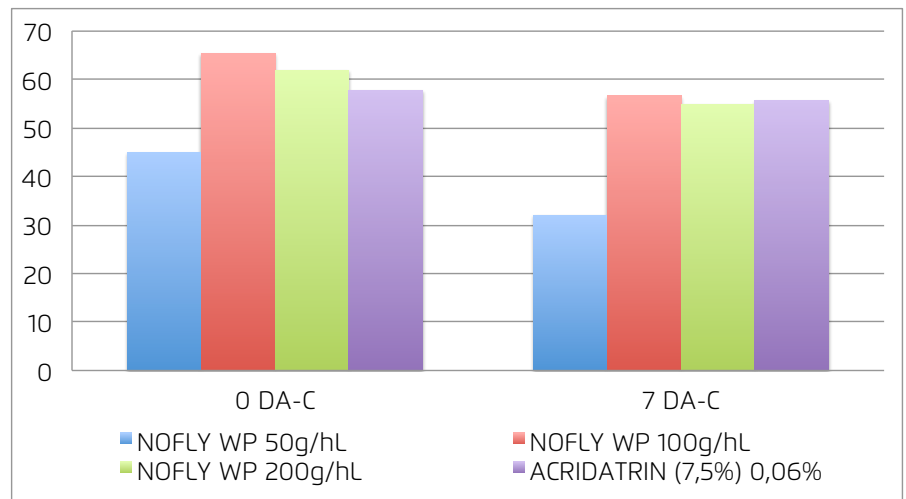
Crop growth stage		BBCH 64	BBCH 65	BBCH 67	BBCH 69				
Interval application assessment (days)		0 DA-A	0 DA-B	0 DA-C	7 DA-C				
Treatment and Rate	App Code	NK 5%	NK 5%	NK 5%	NK 5%				
Untreated	ABC	42,3	A	36,8	A	36,8	A	30,5	A
NOFLY WP 50g/hL	ABC	40,5	A	29,3	A	20,3	B	20,8	A
NOFLY WP 100g/hL	ABC	46,8	A	24,3	A	12,8	B	13,3	A
NOFLY WP 200g/hL	ABC	53,8	A	18,3	A	14	B	13,8	A
ACRINATRIN (7,5%) 0,06%	ABC	44	A	21	A	15,5	B	13,5	A

NK = Newman-Keuls test ($\alpha = 5\%$)

Graphic 1. % Efficacy (ABBOTT) based on the number of adults.



Graphic 2. % Efficacy (ABBOTT) based on the number of larvae.



Conclusions

The product NOFLY WP applied at doses of (100-200 g/HL) shows the same control than the chemical standard on western flower thip larvae and fairly good efficacy on adults.

According to the results of this trial, it may be inferred that NOFLY WP represents a promissory biorational tool to control thrips in vegetable crops.

This is the first GEP evidence of efficacy of *Paecilomyces fumosoroseus* strain FE 9901 to control thrips pests under practical conditions.