

#8 23.01.2014. Compatibility tests of the biopesticide NOFLY with widely used commercial agrochemical insecticides and fungicides.

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Introduction

NOFLY is a biopesticide based on spores of the entomopathogenic fungus *Isaria fumosoroseus* strain FE9901 (before *Paecilomyces fumosoroseus*), whose range of action includes sucking insects such as whitefly *Trialeurodes vaporariorum*, *Bemisia tabaci*, *Aleurodicus dispersus* and *Lecanoides floccissimus*; trips and aphids. It is recommended to prevent and control pests that affect solanaceous crops, cucurbits and ornamentals.

Currently in Europe and Spain we are in the legal framework of Directive 2009/128/EC on the Sustainable Use of Pesticides, which aims to reduce risks of using pesticides that may endanger human and animal health, and the environment. This policy promotes Integrated Pest Management (IPM) and the use of alternative or complementary techniques to those related to conventional chemical pesticides. This does not imply a complete replacement of the use of synthetic agrochemical pesticides, but its rotation, partial replacement or combination with biopesticides as NOFLY.

In this Ecoletter we present how we analysed and tested the compatibility of bioinsecticide NOFLY with commercial and widely used insecticides and fungicides in order to know if their joint application is feasible within IPM programs.

Materials and Methods

In order to determine the compatibility of the active ingredient of NOFLY, spores of the entomopathogenic fungus *Isaria fumosoroseus* strain FE9901, we evaluated its capacity of germination after having contact with commercial insecticides and fungicides such as they would be applied in the field, mixed in tank.

A blend tank was simulated at laboratory scale in 50mL falcon tubes. Starting with an initial 0.2% solution of NOFLY in water (previously sterilized by autoclaving), we prepared different samples: Control samples (spore solution with water), 1/2 of the commercial dose of the product to be tested (1/2DC), the commercial dose (DC) and twice the commercial dose (2DC), as shown in Figure 1 A.

The insecticides and fungicides evaluated were: Kasugamycin, Procymidone, Propamocarb, Cyproconazole, Dimethomorph, Copper Oxychloride, Fenpyrazamin, Pyrimethanil, Iprodione, Fenarimol, Methyl Isothiocyanate, Triadimenol, Myclobutanil, Bupirimate, Triflumizole, Penconazole, Metalaxyl, Etridiazole Chlorothalonil, Sulfur, Mancozeb, Thiram, Fosetyl, Pyrethrins, *Beauveria bassiana*, Thiamethoxam, Pymetrozine, acrinathrin and Imidacloprid.

After placing the tubes in an orbital shaker for 10min, 4h and 24h, the solutions were inoculated in petri dishes with nutrient medium and incubated at 18°C for 16h.

After that period they were stained with lactophenol blue. The nutrient medium was cut and we proceeded to count both the spores that germinated (G) and those which didn't germinate (noG) to calculate the germination percentage, using the formula:

$$\%G = [G/(G + noG)] \cdot 100$$

Those products that gave more than an 80% germination rate after 4h but decreased at 24 hours were considered partially compatible, and those which maintained at 24h rates higher than 80% were considered compatible. Products considered incompatible would give inconsistent germination percentages less than 50% at all intervals of time.

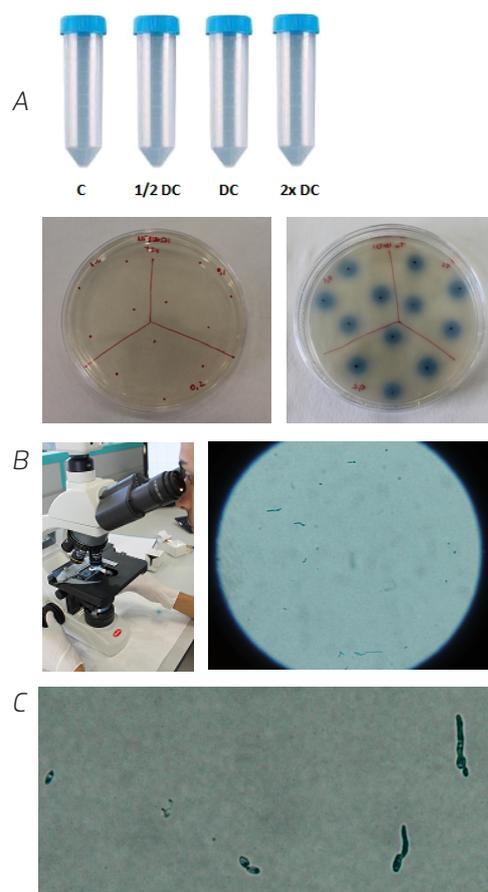


Fig 1. Blended tank simulation method for the tests of compatibility with insecticides and fungicides. By order: A) Dilution, agitation and seed in nutritional medium at 10min, 4 y 24 hours; B) Incubation at 18°C during 16h; and C) cut of colonies and counting at the microscope of germinated and non-germinated spores.

Results

Table 1. Compatibility of NOFLY (*P. fumosoroseus* FE9901) with insecticides and fungicides.

Commercial product	Active ingredient	Doses %	Compatibility
KASUMIN	KASUGAMICINE 8%	0,05	compatible
DRIZA	PROCYMIDONE 50%	0,1	compatible
PREVICUR N	PROPAMOCARB 60,5%	0,2	compatible
CADDY 10	CYPROCONAZOLE 10%	0,02	compatible
	DIMETOMORPH 15%	0,2	compatible
CUPROFLOW Caffaro Blue	OXICLORURO DE COBRE 38%	0,3	compatible
PROLECTUS WG	FENPYRAZAMINE 50%	0,12	compatible
SCALA	PYRIMETHANIL 40%	0,15	compatible
ROVRAL AQUAFLO	IPRODIONE 50%	0,1	partially
RUBIGAN	FENARIMOL 12%	0,02	partially
	METHYL ISOTHIOCYANATE	0,1	partially
BAYFIDAN	TRIADIMENOL 25%	0,05	partially
SYSTHANE FORTE	MYCLOBUTANIL 24%	0,04	partially
NIMROD QUATTRO	BUPIRIMATE 2,5%	0,3	partially
TRIFMINE 30WP EX	TRIFLUMIZOLE 30%	0,08	partially
CUPAGREX 50	OXICHLORYDE COPPER 50%	0,3	partially
TOPAS 200 EW	PENCONAZOLE 20%	0,03	partially
	METALAXYL-M 2,5% + COPPER 40%	1	incompatible
	ETRIDIAZOLE 48%	0,2	incompatible
ALCIOR-LA	CHLOROTALONIL 50%	0,3	incompatible
SOFRENE	SULFUR 80%	0,25	incompatible
ELOSAL GD	WETTABLE SULFUR 80%	0,3	incompatible
MICENE WP	MANCOZEB 80%	0,2	incompatible
CUPREBEL	OXYCHLORIDE CU 22% + MANCOZEB 17,5%	0,4	incompatible
DITIVER	TIRAM 80%	0,2	incompatible
Aantimildiu 3x	FOSETYL-AL 50% + FOLPET 25%- CIMOXANILO 4%	0,3	incompatible
PELITR-HORT	NATURAL PYRETHRINS 4%	0,2	compatible
NATURALIS	<i>Beauveria bassiana</i> 2,3 %	0,3	compatible
BOTANIGARD SC	<i>Beauveria bassiana</i> 10,6%	0,15	compatible
ACTARA 25 WG	THIAMETHOXAN 25%	0,04	compatible
PLENUM	PYMETROZINE 25%	0,12	compatible
ORYTIS	ACRINATHRIN 7,5%	0,08	compatible
CONFIDOR	IMIDACLOPRID 20%	0,075	compatible



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.



All the tests and experiments content in this Ecoletter were performed in the R&D Laboratories of Futureco Bioscience.

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Good for your crops, good for the environment

Conclusions

NOFLY is incompatible with Metalaxyl-M 2,5% + Copper 40%; Etridiazole 48%; Chlorotalonyl 50%; Sulfur 80% and wettable Sulfur 80%; Mancozeb 80%; Oxychloride Copper 22% + Mancozeb 17,5%; Tiram 80% and the combination of Fosetil with Aluminium 50%, Folpet 25% + Cimoxanile 4% at the commercial doses in which these products are applied.

However, it can be used in Integrated Pest Management combined together with Kasugamycin, Procyimidone, Propamocarb, Cyproconazole, Dimethomorph, Copper Oxychloride, Fenpyrazamin, Pyrimethanil, Iprodione, Fenarimol, Methyl Isothiocyanate, Triadimenol, Myclobutanil, Bupirimate, Triflumizole, Penconazole, Pyrethrins, *Beauveria bassiana*, Thiamethoxam, Pymetrozine, acrinathrin and Imidacloprid concentrations specified in Table 1 and under the trade names referred to therein.

NOFLY is compatible with other insecticides and fungicides and leaves no residue, no waiting time or lack (PHI).