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RESEARCHES CONCERNING THE EFFICACY OF TRICHODERMA HARZIANUM T-22 FUNGUS IN PREVENT OF SOIL PATHOGENS IN PETUNIA SEEDLINGS

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Abstract

The researches had aimed determining the effectiveness of Trichoderma harzianum (T-22) fungus, in to prevent soil pathogens (Pythium spp, etc.) in petunia seedlings. Selling of this hybrid stalk is made as the product called Trianum. The product contains spores of the fungus and was used as a solution in concentrations 0.08% and 0.1%; the treatments were applied on the nutritive substrate, after sown or after plants emergence. Experience was realized in 2012, on petunia healthy seedlings, in the pilot greenhouse of the Institute Horting Bucharest. The hybrids studied were Dreams Midnight, Dreams Wihte, Dreams Red. The nutritive substrate were peat fertilized middle. It was evidenced efficacy the product on the soil pathogens that cause "the fall of seedlings" (Pythium spp.). After research, it was concluded that the product have optimal effect in preventing this vascular disease on petunia seedlings; the fungicide had best biological efficacy on the Dreams Midnight hybrid, applied after plants emergence, in concentration 0.08 %.

Key words: *biological fungicide, efficiency, Petunia hybrida*

INTRODUCTION

All petunia varieties existing in culture belong of Petunia hybrid species and are grow through seedling and/or through seeding [2, 3].
The plants are senzitive at vegetation factors.
This species has a high sensitivity to the attack of the soil pathogens (Pythium spp); these pathogens produce "the fall of the seedlings".
In cold conditions associated with moisture excess in the soil and lack of regular ventilation, the base of the stalk is affected - it is necrotizing, it is soften and the plants fall (Photo 1).
"The fall of the seedlings" is a damaging disease.
It is well known the action of the biofungicidelor – complex action, micoparazitism, based on antagonistic fungi of the Trichoderma genus [1].
In this paper is presented the effectiveness of biolological fungicide – Trianum in prevent of vascular disease in petunia seedlings.

Photo 1. Petunia seedlings affected by Pythium spp.

MATERIAL AND METHOD

Experience was realized in the Laboratory for Protected Cultures (photo 2) of ICDIMPH-Horting Bucharest, during 2011-2012 period.
The biological material studied was petunia seedlings, plants derived from hybrid seeds; the seeds were imported, procured from units authorized for distribution of certified seed.
The hybrids researched were Dreams Midnight, Dreams Wihte, Dreams Red Dreams (Photo 3, 4, 5 - s*ource: www.estabrooksonline.com*).

Photo 2. Micro-greenhouse for producing seedlings

Photo 3. Dreams Midnight

Photo 4. Dreams Wihte

Photo 5. Dreams Red

The plants were produced in polystyrene trays, according to conventional technology for producing of annual flowers seedlings.
Nutritive substrate was peat, with an average fertilization potential, pH=6 and 0-6 mm granular structure. It was used a granulate biological product - Trianum (spores of Trichoderma harzianum T-22) – Photo 6, as a solution in concentration 0.08% and 0.1%.

Photo 6. Trianum, spores
of Trichoderma harzianum T-22

The product was used preventively, depending on the variant, as follows: a treatment applied on the nutritive cube, after sowing (0.1%) or a treatment after emergence of the seedlings, healthy plants (0.08).
Was organized an trifactorial type experience, in which the experimental factors were:

- Factor A – the hybrid: a_1 – Dreams Midnight, a_2 – Dreams Wihte, a_3 – Dreams Red;
- Factor B – the level of treatment: b_0 – irrigation with water, no biofungicid, b_1 – treatment with biofungicid, solution in a concentration 0.1%, b_2 – treatment with biofungicid, solution in a concentration 0.08%;
- Factor C – the moment when was applied the treatment: c_1 – after sowing, c_2 – after emergence.

The working variants have been: $V_1(a_1b_0)$, $V_2(a_1b_1c_1)$, $V_3(a_1b_2c_2)$, $V_4(a_2b_0)$, $V_5(a_2b_1c_1)$, $V_6(a_2b_2c_2)$, $V_7(a_3b_0)$, $V_8(a_3b_1c_1)$, $V_9(a_3b_2c_2)$.
For each variant were analyzed 1000 plants.
The effectiveness evaluation of the biofungicid (E%) on the soil pathogens was realized with Abbott's formula:
E = (1-d/D)x100
d = % of attack, in treated variant;
D= % of attack, in untreated variant.

RESULTS AND DISCUSSIONS

The results concerning the behavior of the petunia hybrids (Midnight Dreams, Dreams Wihte, Dreams Red) to the action of the fungal stalk are presented in Tables 1 and 2.
The assessment of losses caused by pathogens that produce "the fall of the seedlings"

demonstrates that variants biologically treated and untreated variants have different values, were important differences between hybrids (Table 1).

Table 1. The efficacy of the biological fungicide at petunia seedlings

Variant	Attack (%) phase: *seed-lobe leaves*	Efficacy (%)* phase: *seed-lobe leaves*	Attack (%) phase: *true leaf*	Efficacy (%)* phase: *true leaf*	Attack (%) *Total*	Efficacy (%)* *Total*
V_1	2	-	2	-	4	-
V_2	0.5	75	0.3	85	0.8	80
V_3	0.2	90	0.2	90	0,4	90
V_4	2.5	-	2	-	4.5	-
V_5	1	60	0.7	65	1.7	62,5
V_6	0.5	80	0.4	80	0.9	80
V_7	2.2	-	1,9	-	4.1	-
V_8	0.6	73	0.4	79	1	76
V_9	0.4	82	0.3	84	0.7	83

*The biological effectiveness of the experimental variants is expressed in Abbott's %

It is remarkable the differences between variants treated: the percentage of attacked plants between hybrids ranged from 0.2%-0.5% (Midnight Dreams), 0.4%-1% (Wihte Dreams), 0.3%-0.6% (Red Dreams).

Observed the superior efficacy of product in the treatment applied after emergence plants. The biofungicid efficacy was in phase of seed-lobe leaves: 90% (Midnight Dreams), 82% (Red Dreams) and 80% (Wihte Dreams) and in phase of true leaf: 90% (Midnight Dreams), 84% (Red Dreams) 80% (Dreams Wihte), treatment with solution 0.08%, applied after plant emergence. The biofungicide efficacy was in phase of seed-lobe leaves: 75% (Dreams Midnight), 73% (Dreams Red) si 60% (Dreams Wihte) and in phase of true leaf: 85% (Dreams Midnight), 79% (Dreams Red), 65% (Dreams Wihte), treatment with solution 0.1%, applied after sowing.

The biological product is used as a good fungicide for the prevention of soil disease on the petunia hybrids researched.

Statistical analysis of data obtained shows that differences between application moments of biofungicid treatment are small $d(\bar{x}_2-\bar{x}_3)=0.2$, $d(\bar{x}_5-\bar{x}_6)=0.4$, $d(\bar{x}_8-\bar{x}_9)=0.15$ (Table 2).

The petunia seedlings at variants treated with Trianum had an uniform growth during the vegetation period, seedlings untreated with Trianum were inferior (Photo 7, 8, 9).

Table 2. Statistical analysis of experimental data

Variant	Attack (%) phase: *seed-lobe leaves*	Attack (%) phase: *true leaf*	$\bar{x}$
V_1	2	2	2
V_2	0.5	0.3	0.4
V_3	0.2	0.2	0.2
V_4	2.5	2	2.25
V_5	1	0.7	0.85
V_6	0.5	0.4	0.45
V_7	2.2	1.9	2.05
V_8	0.6	0.4	0.5
V_9	0.4	0.3	0.35

Photo 7.Seedlings treated with Trianum

Photo 8. Seedlings untreated with Trianum

Photo 9. Seedlings treated, onset of flowering

CONCLUSIONS

The fungicide (Trianum) has preventive action and can ensure an optimal biological control of the soil microorganisms at petunias, using a pure culture substrate and directing the vegetation factors appropriate of the specie.

The efficacy evaluation on the health of the petunia plants led to the conclusion that the product has an optimal effect, were obtained different values between the treated variants.

The petunia hybrids (Midnight Dreams, Dreams Wihte, Red Dreams) have responded well to biologic treatment administered preventive. Were recorded higher values of the effectiveness at variants with treatment made after emergence of plants, with solution in concentration 0.08%.

Midnight Dreams had higher values in all variants, followed by Red Dreams and Dreams Wihte.

At the treated seedlings with biological fungicide have found an uniform growth of the plants from emergence day to planting and a pace of higher development, comparative with the untreated plants; this impose a further research on goals, objectives and results obtained by applying the Trichoderma harzianum T -22 fungus.

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