

PROTECTIVE EFFECT OF SOME FUNGICIDES USED FOR THE TREATMENT OF PEA SEED (*Pisum sativum* L.)

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Abstract

Soil-borne pathogens belonging to the genus *Pythium*, *Phytophthora*, *Rhizoctonia* and *Fusarium* produce the rot of pea seeds after sowing and dumping off of seedlings, immediately after emergence. In order to prevent this inconvenient, it was organized an experience, with seed treatments in 4 variants with 4 replicates, the surface of each replicate being 7.5 m². Experimental variants were the following: V1. Apron XL 350 ES (metalaxil M =mefenoxam 350 g/l) at rate of 1 ml/kg; V2. Previcur Energy (fosetyl aluminum 310 g/l + propamocarb hydrochloride 530 g/l) at rate of 10 ml/kg; V3. Topsin 500 SC (thiophanate methyl 500 g/l) at rate of 10 ml/kg; V4. Untreated check. There were used pea seeds of „Diana” cultivar, having a germination capacity of 89%. Seed treatment was applied by „slurry” method. The products Apron XL 350 ES and Previcur Energy applied at the rates of 1 ml/kg seeds and 10 ml/kg seeds respectively, assured the best seed protection against the studied soil-borne pathogens.

Keywords: fungicides, peas, seed treatment.

1. INTRODUCTION

Garden peas occupies an area of 2.3 million ha worldwide with an average production of green peas 7.395 t/ha. The largest area is cultivated in China, India, U.S.A., U.K., Algeria and Peru. In Romania, in 2014, there were cultivated 4745 hectares, with an average production of 4035 t/ha yield (FAO, 2014).

Green peas at the technical maturity contains 10-21% dry substance, 5.5 - 6.0% albumin, 6.5-7.5% sugars, vitamins, minerals. Green pea proteins are rich in essential amino acids (lysine, tyrosine and arginine) (Voican et al., 2002).

Garden peas abundantly grows, flowering and fructificate, if there are moderate temperature and high humidity.

The seeds can germinate at 3-4 °C and over 4.5°C they emergence within 8-10 days (Drăghici, 2006).

In addition to the characteristics of purity and germination, health of the seed is one of the factors involved in obtaining a high yield (Raicu et al., 1978).

Fungicides applied to the seeds are commonly used to prevent or stop the pathogens in culture production. The effect of fungal on development of pathogens depends on the specific fungicide and his interaction with pathogens (Jin et al., 2013).

For control disease of seed pea, fungicides applied reduce dumping off of seedlings and improve seed production by applying them in the experimental field (Akhter et al., 2015).

Pathogens of the soil belonging to the genus *Pythium* sp., *Phytophthora* sp., *Rhizoctonia* sp. and *Fusarium* sp., rotting pea seeds after sowing and dumping off of seedlings soon after emergence, considerably reducing the density of the crop.

The research undertaken to ICDLF-Vidra aimed at the identification the best fungicides for seed treatment, in order to protect seeds and seedlings from attack by soil borne pathogens mentioned above.

Variety of garden peas used for experimentation is Diana a romanian variety classified as demy-late with a growing period of 55-60 days from germination to technologically maturity of grain.

By using chemical method for the disinfection of vegetable seed material can be obtained the release of all or part of the seed pathogens present on the outside of this (Dumitrescu et al., 1998).

Disinfection aims at preventing transmission of pathogens or installation of infections on seeds within the range from germination to spring up so as to prevent the rotting of seeds and seedlings (Ciofu et al., 2003).

2. MATERIALS AND METHOD

In order to prevent the effects of soil pathogens attack on the seed, in the year 2016 at Research Institute for Vegetable and Flower Growing (RIVFG) - Vidra, Ilfov County it was held an experience with seed treatments with four variants and three replicates, the surface being 7.5mp/plot (Figure 1). The experimental variants are shown in Table 1.

Table 1. Experimental variants

Product	Active substance	Dose (ml / kg)
Apron XL 350 ES	mefenoxam 350g / l	1.0
Previcur Energy	fosetyl aluminum 310 g / l + propamocarb hydrochloride 530 g / l	10.0
Topsin 500 SC	thiophanate methyl 500 g / l	10.0
Untreated control	-	-

They were used on the seeds of variety of pea Diana with a germination rate of 89.0%. Seed treatment method was carried out by slurry. Observations were made on the rate of decayed seed and dumping off of seedlings immediately after emergence, in all variants and replicates.

For the statistics calculation were performed Abott test, Duncan test, simple correlations and analysis of variance with differences limit.

The frequency of attacks (%) was calculated according to the formula: $F\% = (N \times 100) / N_t$ (where N = Number of plants attacked, N_t = total number of plants observed).

Efficacy (%) was calculated using the Abott test with the formula: $E_{Abott} = (M - V_t) / M \times 100$ (where M= untreated control and V_t = variant of treatment).

Duncan test enabled to compare the alternatives with each other, which were conferred one letter, for different values, different letters and for similar values, identical letters.

Experience was established on 01.07.2016. In July they were met manifestation conditions for *Phytophthora* sp., *Rhizoctonia* spp. and *Fusarium* sp. (Table 2).

Table 2. 2016 Climate data

Month	$t^{\circ}C$ max	$t^{\circ}C$ min	U% max	U% min	$t^{\circ}C$ soil at 8 hour am	$t^{\circ}C$ soil at 12 houram
July	31,0	17,0	78,4	48,2	23,5	25,8
August	30,6	17,5	77,2	49,5	22,2	24,0
September	28,4	15,2	77,5	50,6	19,7	21,8



Figure 1. The overall look of experience



**Figure 2. Variant 1: Apron XL 350 ES
dose 1 ml / kg seed**



**Figure 3. Variant 2: Previcur Energy,
dose 10 ml / kg seed**



Figure 4. Variant 3: Topsin 500 SC, dose 10 ml / kg seed



Figure 5. Variant 4: Untreated check

3. RESULTS AND DISCUSSIONS

The product Apron XL 350 ES in a dose of 1 ml / kg of seed, ensure the best protection against attack of soil pathogen *Pythium* sp. and *Phytophthora* sp., on the seeds of peas; its efficacy was 81.6% (first place).

Previcur Energy was located the second, at a dose of 10 ml / kg of seed, with an efficiency of 71.1%. Previcur Energy has preventive action inhibiting spore germination and mycelium development.

The product Topsin 500 SC in a dose of 10 ml / kg of seed, which has the only action against spectrum of pathogens *Rhizoctonia* sp. and *Fusarium* sp. it had a poor efficiency. This demonstrates that seed rot and dumping off of seedlings soon after emergence, was due primarily of pathogens belonging to the genus *Pythium* and *Phytophthora* (Table 3).

Table 3. The protector effect of fungicides used for treating seed, against attack by soil borne pathogens

<i>Variant</i>	<i>Nr. seeds used / variant</i>	<i>Corrected germination (89%)</i>	<i>Nr. emerged plants / variant</i>	<i>The frequency of attacks (%)</i>	<i>Efficacy (%)</i>
1. Apron XL 350 ES	2100	1869	1592	14.9 c	81.6
2. Previcur Energy	2100	1869	1432	23.4 c	71.1
3. Topsin 500 SC	2100	1869	683	63.4 b	21.7
4. Untreated check	2100	1869	356	81.0 a	-

Using variance analysis method there were established limit differences and their significance as follows:

- Variant 1 Apron XL 350 ES 1 ml / kg seed, a rate of attack of 14.9%, is very significant negative;
- Variant 2 Previcur Energy, 10 ml / kg seed, a rate of attack of 23.4%, is very significant negative;
- Variant 3 Topsin 500 SC 10 ml / kg seed, a rate of attack of 63.4%, is very significant negative (Table 4), (Figure 2- 5).

Table 4. Summary of results - Differences limit

<i>Variant</i>	<i>The frequency of attacks (%)</i>	<i>Difference</i>	<i>signification</i>
1. Apron XL 350 ES	14.9	-66.1	000
2. Previcur Energy	23.4	-57.6	000
3. Topsin 500 SC	63.4	-17.6	000
4. Untreated check	81.0	-	-

LD 5% = 4.75; LD1% = 6.83; LD 0.1% = 10.04

From the number of plants emerged and the attack frequency was set a distinct significantly negative correlation ($r = -0.999998$) which means that the products used for seed treatment had very good efficacy.

4. CONCLUSIONS

Products Apron XL 350ES, at a dose of 1 ml / kg of seed, and Previcur Energy, at a dose of 10 ml / kg of seed, are provided the best protection of pea seed against soil pathogens attack.

5. REFERENCES

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