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# **RESULTS REGARDING THE INFLUENCE OF THE FUNGUS Didymella pinodes (Berk&Blox) ON SOME MORPHOLOGICAL CHARACTERS AT 2 VARIETIES OF PEAS IN THE YEAR 2023**

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# Current Trends in Natural Sciences

### Abstract

Pea (Pisum sativum L) is an important leguminous crop worldwide. In Romania, one of the most important diseases, which causes significant damage to the pea crop, is anthracnose (Didymella pinodes). The objective of this research was to estimate the influence of the attack produced by anthracnose, on some morphological characters and quality indices of yield in the pea crop. The tested biological material was represented by the Alvesta and Nicoleta varieties under the experimental conditions at ARDS Pitesti-Albota, in the year 2023. There was 5 variants tested: Variant 1 (untreated control); Variant 2 (fluxapyroxad + difenoconazole); Variant 3 (azoxystrobin + difenoconazole); Variant 4 (Biosem - biological product); Variant 5 (cyprodinil + fludioxonil). Determinations were made regarding plant height (cm), pod length (cm), pod number m<sup>2</sup>, pod weight (g), weight of a thousand grains (g). Based on the results obtained, the Alvesta genotype registered the best values of the determined indices and characters, when applying the fluxapyroxad + difenoconazole product. The highest average number of pods (472/m<sup>2</sup>) was obtained with the Alvesta variety, the variant with the application of the fluxapyroxad + difenoconazole product. The weight of the pods had values between 310 - 578 g/m<sup>2</sup> for the Alvesta variety, and for the Alvesta genotype the average was between 263 - 490 g/m<sup>2</sup>. In the Nicoleta variety, lower values of the determined indices were registered.

Keywords: diseases, pea, variety

#### **INTRODUCTION**

Peas are grown for their grains, which are widely used in human food or animal feed, the content of the seeds is rich in protein (18-28% for dry grains), carbohydrates (42%), lecithin, vitamins and calcium mineral salts, phosphorus and potassium (Sehirali., 1988; Urbano et al., 2003). In human nutrition, grains from varieties belonging to the garden pea are used, harvested at green maturity (as a fresh, canned or frozen vegetable) (Sturzu et al., 2016). Dry grains are used in animal feed, which are included in the composition of combined recipes for various categories of animals raised in an industrial system. Globally, peas is the fourth legume in terms of consumption, achieving a total production of 10.2 million tons (FAO, 2012, Yucel, 2013). An increase in crop yield is the result of including grain legumes in cropping systems. Also, the amount of input needed has decreased

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because to these cropping strategies (MacWilliam et al., 2014). Increased root disease and other effects on nutrient cycling can lower pea yield when grown regularly (Lupwayi et al., 2012). Crop rotation is an effective cultural method to control pea diseases Ascochyta blight (Didymella *pinodes*) is a serious diseases. In order to decrease the number of ascochyta blight propagules by 90%, a minimum of 6 years must pass (McDonald and Peck, 2009). The most important diseases of fild pea are Ascochyta blight. Ascochyta blight, caused by Ascochyta pisi, Didymella pinodes and *Phoma pinodella*, is one of the most important pea diseases worldwide (Bretag et al., 2006; Fernandez-Aparicio et al., 2010; Le May et al., 2009; Schoeny et al., 2010). Of these Didymella pinodes is the most harmful pathogen. Crop rotation, late sowing, eliminating contaminated pea residues, using pathogen-free seed, treating seeds, using foliar fungicides, and destroying infected pea residues are some of the current control techniques (Bretag et al., 2006; Česnulevičiene et al., 2014). Ascochyta blight-resistant cultivars need also be developed (Bretag et al., 2006). The attack of the pathogen starts as soon as the plants emerge, dark brown spots appear on the leaves, then continue on the stem and petiole. On the pods the attack is the most damaging because the pathogen prevents the normal development of the pods, they remain small and can shake off (Ahmed et al., 2015). In this paper, data are presented regarding the influence of the anthracnose attack, on some production indices and morphological characters, in two pea varieties.

## MATERIALS AND METHODS

The research was carried out in the experimental conditions at ARDS Pitesti-Albota, in the year 2023. The research station is located from a physical-geographical point of view in the North-West of the Southern Carpathians, on a typical luvosol soil type, with a low content of nutrients accessible to plants: pH 5.3, humus content 2.21%, total nitrogen 0.159%, phosphorus 89 mg/kg, potassium 84 mg/kg, values determined at 0-10 cm depth. The soil preparation and crop maintenance works were carried out according to the pea cultivation technology, specific for the station area. To achieve the objectives, a bifactorial experience in 4 repetitions was placed in the station's experimental field. Factor A, represented by the Alvesta and Nicoleta varieties. Factor B – (tested treatments): Variant 1 - control variant, Variant 2 - fluxapyroxad (75g/l) + difenoconazole (50 g/l) 2 l/ha, Variant 3 - azoxystrobin (200 g/l) + difenoconazole (125 g/l) 1 l/ha, Variant 4 ecological product (Neem oil 30%, Trichoderma harzianum 2%) 1.5 l/ha, Variant 5 - cyprodinil (25%) +fludioxonil (37.5%) 1 kg/ ha. The experimented treatments were applied in vegetation at the appearance of inflorescences, except for the organic product that was applied to the seed. At the end of the growing season, plant samples / m<sup>2</sup> were collected for each variant, in all 4 repetitions. The determinations were made after sampling in the laboratory and consisted of: plant size / cm, pod size / cm, number of pods /  $m^2$ , pod weight /  $m^2$ , mass of a thousand grains. The data obtained were statistically processed with the help of Polifact.

Climatic conditions were monitored between February and July, with the help of the meteorological station located about 750 m from the experimental field. Regarding the amount of precipitation that fell during the researched period, it was 260.7 mm with a deficit of -126.1 mm, compared to the multiannual average of 386.8 mm (figure 1).

In terms of temperatures in the year 2023, high temperatures were registered in the months of February, March, June and July, compared to the multi-year average. Negative deviations of - 0.9 ° C for the month of April, and for the month of May - 0.7 ° C (figure 2).

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Figure 1. The monthly sum rainfall registered in the period February - July 2023



Figure 2. The monthly average temperature registered in the period February-July 2023

## **RESULTS AND DISCUSSIONS**

The pea crop is affected by a large number of pathogens including anthracnose (*Didymella pinodes*) which can lead to a decrease in the quality of the harvest. The height of the plant is also more or less affected by the pathogen attack. Figure 3 shows data on the height of pea plants. Following the data obtained regarding the height of the plants, it can be observed that, in 2023, the average height recorded values between 72 - 90 cm. In the 2 varieties studied, the height of the plants had close values. Therefore, the application of treatments against the pathogen *Didymella pinodes* did not particularly influence the height of the plants.

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The attack of anthracnose (Didymella pinodes) manifested itself most strongly on the pods, thus reducing their number, depending on the effectiveness of the applied treatments. The most pods  $m^2$  were registered in the variant with the product fluxapyroxad + difenoconazole in both varieties with positive differences statistically ensured. The number of pods/ m<sup>2</sup> varied between 330.5 and 472.5. The lowest number of pods was obtained in the variants without treatment of 375 (Alvesta) and 330 for Nicoleta. Variant 3 (azoxystrobin + difenoconazole) brought an increase of 80.5 pods to the Alvesta genotype, and for Nicoleta, 45 pods/m<sup>2</sup>. The variant with the product cyprodinil + fludioxonil registered significant differences of 62.2 pods for the Alvesta variety, respectively 67.5 more compared to the control variant, the data being statistically distinctly significant. The application of the biological product based on Neem oil and *Trichoderma harzianum* had no significant influence on the number of pods compared to the control variant, the disease causes them to fall. (figure 4).

Following the attack produced by anthracnose, the size of the pods was affected (figure 5). Thus, the pathogen prevented the normal development of pods. In the variant without treatment, the average length of the pods was the shortest, 3.7 cm for Alvesta and 3.2 cm for Nicoleta. The application of the treatment to variant 2 (*fluxapyroxad* + *difenoconazole*) registered the largest sizes of pods; in the Alvesta variety 6.6 cm, and in Nicoleta 6 cm, with very significant positive differences compared to the control variant. The average length of the pods when applying the fungicide *azoxystrobin* + *difenoconazole* was 6.2 cm (Alvesta) and 5.6 cm (Nicoleta), the data being statistically very significantly positive. Significantly positive differences were also registered in the variants with *cyprodinil* + *fludioxonil* treatment.



Figure 3. The influence of the treatments applied to the 2 varieties of peas, on the average height (cm) of the plants

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Figure 4. The influence of the treatments applied to the 2 pea varieties, on the number of pods/m<sup>2</sup>



Figure 5. The influence of the treatments applied to the 2 varieties of peas, on the lenght of the pods (cm)

Application of fungicides against anthracnose influenced pod weight differently. Thus, the weight of the pods is affected by the attack of the pathogen, because the pods that were more severely affected, formed fewer and smaller grains. The average weight of the pods was between 263 g in the control variant and 578 g in the *fluxapyroxad* + *difenoconazole* Alvesta variant.

In the 2 varieties, the application of the treatments on the vegetation registered very significant differences compared to the control variant, the only product that did not influenced the pods weight, was the biological one (neem oil and *Trichoderma harzianum*) (table 1).

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One thousand grain weight (TGW) is one of the most important production elements. The results obtained are presented in table 2, they highlight significantly positive differences in the variants with the application of the tested products. The weight of one thousand grains varied between 203-250 g for Alvesta and 191-243 g for the Nicoleta variety.

The highest value of TGW was obtained in the variety Alvesta variant 2 (*fluxapyroxad* + *difenoconazole*) of 250 g, with a very significant positive difference of 47 g compared to the control variant. And in this case, the tested biological product did not register significant differences compared to the variant in which no treatments were applied.

Variety	Variants tested	Pod weight	Difference	Signification
		/g	±	
Alvesta	Control variant	310	-	-
	Fluxapyroxad+difenoconazole	578	268	***
	Azoxystrobin + difenoconazole	530	220	***
	Biological product	343	33	-
	Cyprodinil + fludioxonil	519	209	***
Nicoleta	Control variant	263	-	-
	Fluxapyroxad + difenoconazole	490	227	***
	Azoxystrobin + difenoconazole	470	207	***
	Biological product	280	17	-
	Cyprodinil + fludioxonil	458	195	***
	LSD 5 %		47.79	
	LSD 1 %		72.20	
	LSD 0.1%		129.79	

Table 1. The influence of the treatments applied to peas, on the weight of the pods (grams)  $/m^2$ 

Table 2. The influence of the treatments applied to the 2 varieties of peas,on the thousand weight grains (TGW)

Variety	Variants tested	TGW (g)	Difference	Signification	
			±		
Alvesta	Control variant	203	-	-	
	Fluxapyroxad + difenoconazole	250	47	***	
	Azoxystrobin + difenoconazole	242	39	***	
	Biological product	212	9	-	
	Cyprodinil + fludioxonil	231	28	***	
Nicoleta	Control variant	191	-	-	
	Fluxapyroxad + difenoconazole	243	52	***	
	Azoxystrobin + difenoconazole	238	47	***	
	Biological product	202	11	-	
	Cyprodinil + fludioxonil	222	31	***	
	LSD 5 %	11.37			
	LSD 1 %	15.23			
	LSD 0.1%	20.33			

# CONCLUSIONS

The attack produced by *Didymella pinodes* (Berk & Blox) can cause significant damage to the pea crop. In the experimental conditions at ARDS Pitesti-Albota, the Alvesta variety obtained more satisfactory values of the studied indices, compared to the Nicoleta genotype. The results obtained with regard to the application of the treatments place option 2 (*fluxapyroxad + difenoconazole*) as

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the most effective against anthracnose. The number of pods increases with the use of treatments compared to the variant where no fungicides were applied. The weight of the pods is also affected by the manifestation of the disease, by decreasing the weight in the control variant and in the biological treatment (Neem oil and *Trichoderma harzianum*). The size of the pods, another determined parameter, was positively modified under the action of the fungicides applied during the growing season. At the variant without treatment the size of the pods was reduced compared to the variants with treatments.

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