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RESEARCH ARTICLE

INFLUENCE OF INDOLYL ACETIC ACID UPON THE AGENT, CAUSING RHIZOCTONIA ROOT DECAY IN SUGAR BEET (*RHIZOCTONIA SOLANI KUHN*) UNDER *IN VITRO* CONDITIONS

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ABSTRACT

The examination is conducted in the Phytopathology Laboratory of the "Episkop Konstantin Preslavski" University of Shumen – Shumen. The influence of the indolyl acetic acid (IAA) on the growth and aggressiveness of the agent, causing the root decay in the sugar beet (*Rhizoctonia solani Kuhn*) has been examined under in vitro conditions.

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INTRODUCTION

The physiologically active substances not only improve the growing and productive abilities of the agricultural plants, but also regulate the development of the system plant – pathogen, actively maintaining the level of compatibility of the components in it through the content of the nutrient medium. The level of the regulatory influence in the system depends on the type and concentration of the physiologically active substances in the medium (Nickell, 1982; Andreev *et al*., 1996). Some substances from the group of the auxins are examined under in vitro conditions on the proving grounds in relation with their influence of the stability of the plants to stress and diseases (Bazil*et al*., 1995; Evidante *et al*, I995; Glez *et al*., 2002). According to Moded (1973) the salts of the indolyl acid (Na-indolyl acetate) and the indolyl propionic acid (indolyl propionate) suppress the growth of the Rhizoctonia *solani* that causes the root decay in the cotton and tomatoes. The biological action of the indolyl acid regarding the sugar beet is examined under field conditions (Bondar, 2002). According to the author, the treatment of sugar beet sowing in early phenophase (7th leaf) and in period of intensive accumulation of dry substance causes improvement of the productivity and physiological processes, but the influence of the indolyl acid on the disease stability has not been recorded. The aim of the present examination is to observe the influence of the indolyl acid on the growth and the attack intensity of the agent, causing rhizoctonia root decay in the sugar beet *Rhizoctonia solani Kuhn.*

MATERIALS AND METHODS

The examinations are conducted under in vitro conditions in the Phytopathology Laboratory of the "Episkop Konstantin Preslavski" University of Shumen – Shumen. The indolyl acid is tested in the following concentrations: 5, 10, 25, 50 and 100 mg/l. Seven days cultures of *Rhizoctonia solani* are sowed on „Чапек"medium in which are added the solution of the indolyl acid in the correspondent concentration, in 5 variants (Popkova, 1987). For control variant is used the same medium without the addition of the indolyl acid. The sowings are cultivated in thermostat, away from daylight, under temperatures of 24˚C. The colonies' diameter has been recorded daily for the calculation of the growth speed. For recording the influences of the indolyl acid on the pathogens has been conducted an ***in vitro*** inoculation of roots of sugar beet with inoculates from the different variant from the different nutrient mediums. The disease is recorded in 5 – marking scale (Chevchenco, 1975), and the speed of penetration is calculated from the values of the diameter of the rotting spots on the root, which have been

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recorded daily. The received results are processed with statistical methods (Zaprianov. 1978).

RESULTS AND DISCUSSION

The results from the test for the influence of the indolyl acid on the mycelium growth are shown in Table 1. The calculated values for the diameter of the colonies and the speed of mycelium growth until the 5th day after the cultivation have shown stimulating action by the indolyl acetic acid. The strongest stimulating influence has been recorded for concentration of 50 mg/l. On the 3rd day after the cultivation has been recorded increase of the mycelium growth, except for the smallest dose -5 mg/I indolyl acetic acid. On the fifth day, this tendency continues and increase in the mycelium growth is registered only for the variant with concentration of -50 mg/l indolyl acetic acid.

for the diameter of the mycelium colonies - 85,50 mm , with 90,00 mm for the control variant , for the growth seed - 12,57 mm/24 h, with13,60 mm/24h for the control variant.

Table 2 shows the influence of the indolyl acetic acid on the aggressiveness of the pathogen. On the 7th day after the inoculation the content of 5 mg/l IAA, IAA-25 mg/l, IAA-50 mg/l and IAA-100 mg/l in nutrient medium does not affect the aggressiveness of the pathogen. The concentration of the indolyl acetic acid with value of 10 mg/l stimulates the aggressiveness of the pathogen. For this variant, the recorded mark of damage is 2.6, with 2.0 mark for the control variant. The calculated speed of penetration is the maximal for the trial and has the value of 3.18 mm/24 h, with penetration speed for the control variant - 1, 45 mm/24 h.

Table 1. The effect of the indoly acid on the mycelium growth when infected with Rhizoctonia solani Kuhn

Variants	3rd day from the inoculation		5th day of the inoculation		7th day of the inoculation	
	Ø of the colony-mm	growth speed mm/24 h	Ø of the colony-mm	growth speed mm/24 h	Ø of the colony-mm	growth speed mm/24 h
IAA- 5 mg/I	55,50	13,67	80,00	18.40	90,00	13,60
IAA-10 mg/l	56,00*	14,92**	81,6	18,37	85,5000	12,57000
IAA-25 mg/l	56,50**	15,25***	82,17***	18,43	90,67	13,43
IAA-50 mg/l	56,00*	15,75***	84,00***	19,10**	89,00	13,40
IAA-100 mg/l	55,67*	14,58**	88,67***	18,63	92,00	13,23
Control variants	54,00	13,50	80,00	18,55	90,00	13,60
GD 5 %	1,50	0,77	1,18	0,35	2,68	0,45
GD 1 %	2,04	1,05	1,60	0,48	3,63	0,61
GD 0.1 %	2.72	1.40	2.13	0.64	4.85	0.82
P %	1,38	1,69	0,66	0,92	1,18	1,33

Table 2. Influence of the indolyl acetic acid on the index of attack and the speed of attack of the agent, causing rhizoctonia root decay in the sugar beet (*Rhizoctonia solani Kuhn*)

Variants	3rd day from the inoculation		5th day of the inoculation		7th day of the inoculation	
	attacking mark	penetration speed mm/24 h	v	скорост на проникване mm/24 h	attacking mark	penetration speed mm/24 h
IAA- 5 mg/I	0,8	2,75	1,0	1,95	1,3	1,33
IAA-10 mg/l	0,8	3,17***	2,5	3,40***	2.6	3,18***
IAA-25 mg/l	0,8	2,25	1,0	1,85	1,3	1,38
IAA-50 mg/l	0,9	2,50	1,0	1,90	1,3	1.35
IAA-100 mg/l	0,8	2,75	1,0	1,87	1,2	1,38
Control variant	0.9	2,67	1,8	2,02	2,0	1,45
GD 5 %		0,26		0,22		0,14
GD 1 %		0,37		0,30		0,18
GD 0,1 %		0,50		0,40		0,24
P %		3,76		4,65		3,71

In the end of the examination have been found changes in the growth speed only for the variant with addition of indolyl acetic acid, in concentration of 10 mg/l. As results from the performed calculation and processing of the data, it has been found that this concentration of indolyl acetic acid significantly suppresses the mycelium growth in the pathogen *Rhizoctonia solani Kuhn.* For this variant are recorded the following data:

The results show that apart from the momentary stimulating influence of the indolyl acetic acid in the tested concentration on the mycelium growth of the soil pathogen *Rhizoctonia solani Kuhn,* only the cindolyl acetic acid with concentration of 10 mg/l can influence the aggressiveness of this pathogen. This means that when working with growth regulators from the type

as the indolyl acetic acid, there should be no preconditions for contamination of the soil medium.

Conclusion

The content of indolyl acid and the nutrient medium in concentration of 5, 25, 50 and 100 mg/l does not affect the growth and the aggressiveness of the agent, causing rhizoctonia root decay in the sugar beet (*Rhizoctonia solani Kuhn*) under in vitro conditions. The content of indolyl acid and the nutrient medium in concentration of 10 mg/l suppresses the mycelium growth, but increases the aggressiveness of *Rhizoctonia solani Kuhn*.

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